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Scientific American



AN ILLUSTRATED
JOURNAL OF ART, SCIENCE & MECHANICS

Vol. XIX.



NEW-YORK
PUBLISHED BY MUNN & CO.

Центральная библиотека
110615

SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES

Vol. XIX.—No. 1.
[NEW SERIES.]

NEW YORK, JULY 1, 1868.

\$3 per Annum.
[IN ADVANCE.]

Improvement in Steering Apparatus for Vessels.

The engraving shows a very simple steering apparatus, entirely different in its construction and operation from the right and left handed screw, and also from the geared machines often used. In the action of a gear in connection with a pinion, this does not materially differ from other devices; but in the connection with a cam wheel and depressed quadrant, it affords a beautiful exhibition of the adaptability of mechanical powers.

Attached to the upright shaft that carries the bevel gear, A, is a cam, B, having two grooves on its periphery for the reception of chains or ropes. This cam has a feather or key that will allow it to traverse the upright shaft, while always acting with its rotation. The gear wheel and the cam are rotated by means of the pinion on the horizontal shaft that carries the steering wheel, C. This simple machinery is mounted on a frame, as seen, bolted to the deck of the vessel. On the rudder post is secured a quadrant, D, so depressed in its periphery to correspond with the eccentric action of the cam, B, in its rotation, as always to present the same face, or radius, to its action. This segment has also two grooves for the reception of the steering chain or rope, corresponding to those on the cam. In operation, it will be seen, it is easily understood. When the rudder is "hard-a-port," or "a-star-board," the quadrant presents its longest radius to the shortest radius of the cam, and although the pressure on the rudder is greatly enhanced, the labor of the wheelman is not increased; while the change from one of these points to the other can be made very easily and rapidly, as there is an increasing speed without additional labor, in consequence of the combined action of the cam on the upright shaft, and the cam-like surface of the quadrant on the rudder head. To secure the rudder at any point, the hand wheel over the box next the steering wheel may be used, which compresses the upper box and increases the friction. The feather and slot in the cam and on the wheel permits a lifting of the rudder without disarranging the connections or breaking the parts. This device has received the highest commendations from sailing masters and sea captains, several of which we have read. It has been thoroughly tested during the three years it has been in practical use, and has always proved satisfactory.

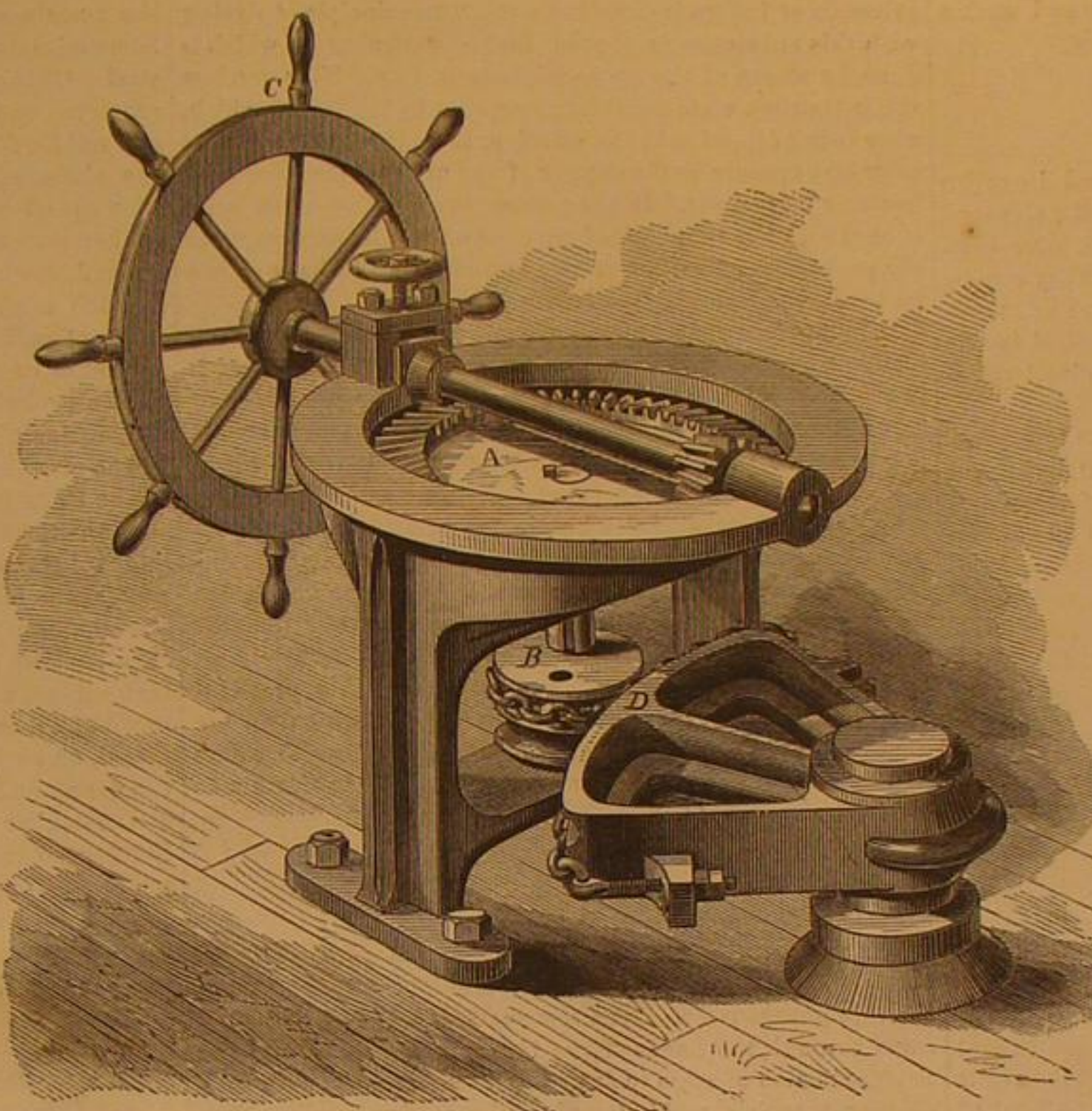
It was patented June 6, 1865, by Albert H. North, who may be addressed for the sale of the entire right at New Britain, Conn. Applications for apparatus to be made to the Bridgeport Iron Works, Bridgeport, Conn.

Improved Burglar-proof Safe.

It is generally conceded that safes for the reception of valuables and papers can be made to withstand the action of fire under almost any circumstances; but the burglar has hitherto defied all attempts to make the safe secure against his systematic attacks, especially if time enough was allowed him for his operations. In the great trial at the Paris Exposition, less than five hours sufficed for the opening of the burglar-proof safe submitted for competition. The sledge and wedge in skillful hands proved superior to bolts, combination locks, and hardness of material. Marvin & Co., the well-known safe manufacturers, have just contrived a safe which they allege to be perfectly burglar-proof. It is shown in the accompanying engravings, of which one is a perspective and the other a partially sectional view. The material of the safe is the well-known chrome iron, the ore of which occurs in masses and crystallized, and is so hard, when melted and cast, that no tool known to the mechanic can penetrate its structure. It can be worked only by the abrasion of grinding. In form the safe is a globe, hollow, and resembling a spherical mortar shell, the opening for the fuse forming the aperture for the door which fits air-tight, being ground to place.

The safes are made of various sizes and may be placed in vaults or in the ordinary fire-proof safe. The thickness of the metal varies according to the diameter of the safe, being

in some instances four inches thick. Its form, that of the double arch or perfect sphere, makes it impervious to the heaviest blows of the sledge. The door being fitted on a series of tapers and shoulders, as seen in the section, precludes the use of wedges or chisels; and being built of wrought iron and the best hardened steel, it cannot be chipped or drilled. The lock spindle is also made of hard-



NORTH'S PATENT STEERING APPARATUS.

ened steel and of tapering form so that it cannot be driven in. Each safe is furnished with one or more shelves, seen in the sectional view, and a patent combination lock.

By the use of this safe, banks, insurance companies, and merchants may be assured of security for their valuables. A number can be placed in a fire proof vault, each officer or proprietor having one for his special use.

This safe was patented March 19, 1867. Orders may be addressed to Marvin & Co., 265 Broadway, New York, city, 721 Chestnut street, Philadelphia, or 108 Bank street, Cleveland, Ohio.

A Vine-Growing Town.

The town of Los Angeles, Cal., claims to be the greatest grape-raising locality in North America. The county bearing

growth, in the center of what is rapidly becoming a most important wine-growing district. The California correspondent of the *Boston Journal* gives this history of the settlement, as illustrative of what may be done by the well-directed efforts of poor men:—

The site where the village now stands was in 1857 a dry, barren plain—just such as to-day extends around it for miles.

In the summer of that year a company of Germans, acquainted with the culture of the grape in the "fatherland," purchased 1,265 acres of the plain at \$2 per acre, to test its capacity for producing the grape. The land was divided into fifty rectangular lots of twenty acres each. A town was laid out in the center, with sixty building lots—one for each shareholder, and ten for public purposes. These twenty acre lots were fenced in with willows and sycamores, and ten acres of each planted with vines. A ditch seven miles long was cut, to bring water from the Santa Anna River. The land for two years was carried on by joint labor. Then the lots were distributed to the shareholders. Reckoning the labor and expense of the stockholders, each share, with the outlay for vines, cost \$1,400 to each owner. This included one of the twenty-acre lots, with a town lot 100 by 200 feet. Each of these shares is now worth a small fortune to the owner, and will be worth a great deal more in a few years. There are 1,200,000 vines growing in the village, 800,000 of which bear fruit. There are also 10,000 fruit trees of various kinds, the whole place resembling a forest and flower garden, divided into squares with fences of willow and sycamore. Nearly every lot has a comfortable homestead, and the inhabitants of the village number 460. There is a good public school, four stores, a post-office, but neither lawyer, doctor, nor minister. There are hundreds of places in these southern counties where such villages might be founded with equal or even greater advantages.

A Wonderful Skull.

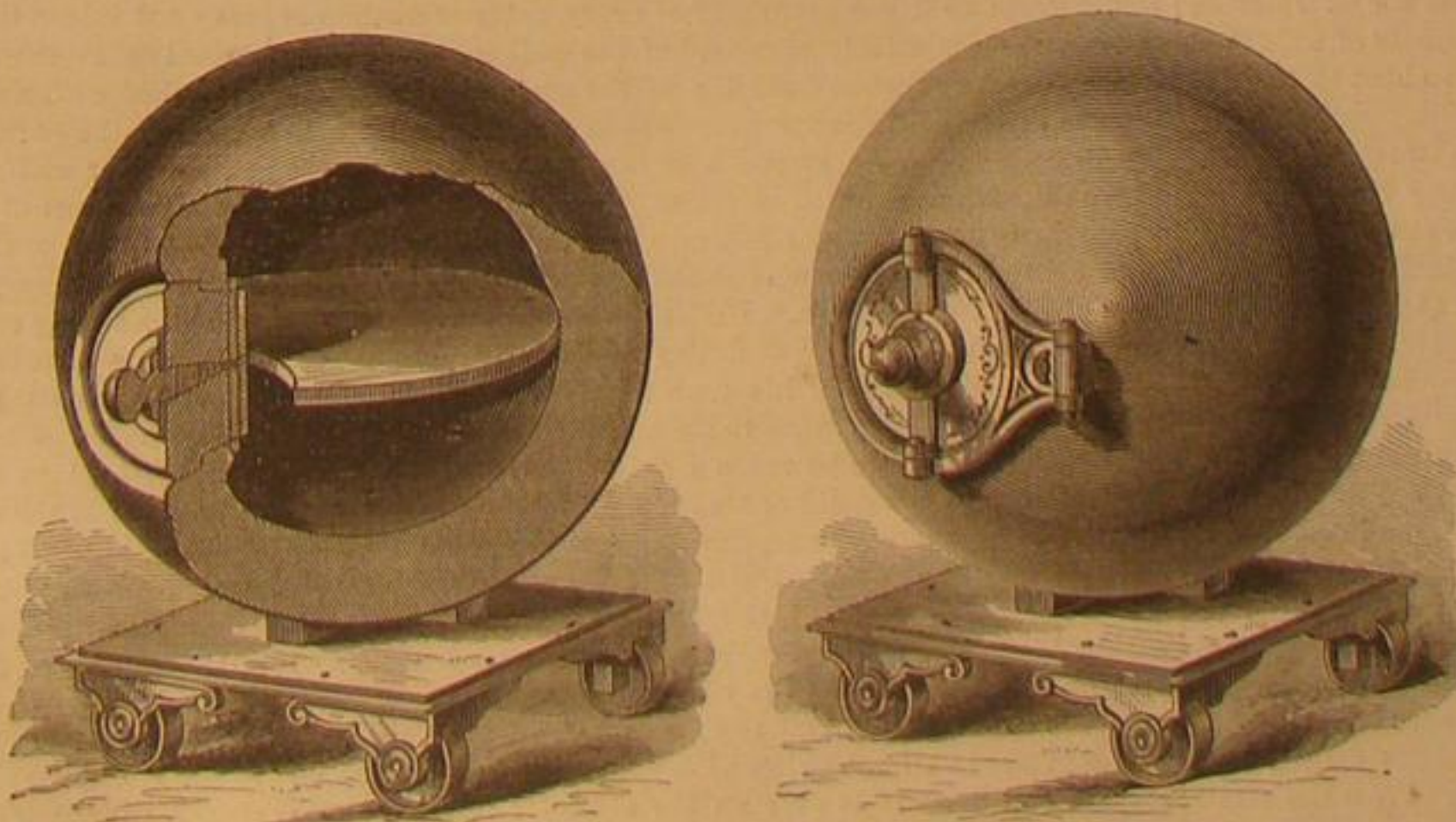
Nearly twenty years ago the medical journals of the world recorded a most singular case of a laborer in Cavendish, Vt., who while engaged in blasting had a tamping iron blown entirely through his head but who actually recovered within sixty days. Such a surprising and unprecedented result at the time of its announcement was generally disbelieved, and provoked great discussion, many eminent surgeons pronouncing it a physical impossibility, but the subsequent public exhibition of the individual himself, convinced the most skeptical, and verified the first report of Dr. John M. Harlow, the attending surgeon who published the case. At a very recent meeting of the Massachusetts Medical Society, this gentleman read a paper giving a history of the case, and presented to that body, the veritable skull which sustained the injury.

The accident occurred on September 13th, 1848, and was caused by the tamping iron striking fire from the rock, exploding

the powder and driving the bar, which was nearly four feet long by one and one-quarter inches diameter, and weighed thirteen pounds, through his head; entering under the cheek bone, passing inside an inch behind the eye and out of the top of the head in the center, two inches back of the line where the forehead and hair meet. The opening in the skull was two inches wide by three and one half inches long, and the brain was hanging in shreds on the hair. In fifty-nine days the patient was abroad. Soon after, with his tamping iron—which he carried with him until the day of his death—he was exhibited in Barnum's old museum, this city, and several years after he left the city for South America. His general health appears to have been good until 1859, when it began to fail. At that time being in California, he was taken with epileptic fits which finally caused his death in May, 1861, twelve years and eight months after the accident. Dr. Harlow kept himself informed as

to the history of his patient, and on his demise obtaining possession of both the skull and the iron, made the disposal of the same as mentioned above.

The effect of the injury upon the man seems to have been the destruction of the equilibrium between his intellectual



MARVIN'S CHROME IRON SPHERICAL BURGLAR-PROOF SAFE.

the same name is certainly the most thrifty, as well as populous, section of the Golden State; its fertile fields last year producing from 14,000,000 grape vines, 1,500,000 gallons of wine and 100,000 gallons of brandy. Twenty-five miles from the town of Los Angeles is Anaheim, a village of eleven years'

faculties and the animal propensities. He became capricious, fitful, irreverent, vacillating, impatient of restraint, a child in mind, an adult in physical system and passions. During his South American life he was a coachman, and underwent great hardship. It appears the man could see out of his left eye though the lid was not subject to his will. In summing up his paper Dr. Harlow presented these views:

1st, The recovery is attributed solely to the vis vitæ, vis conservatrix, or, if some like it, vis medicatrix nature. 2d, This case has been cited as one of recovery; physically the recovery was nearly or quite completed for the four years immediately succeeding the injury, but ultimately the patient succumbed to progressive disease of the brain. Mentally the recovery was only partial; there was no dementia; intellectual operations were perfect in kind, but not in degree or quantity. 3d, Though the case may seem improbable, yet the subject was the man for the case, as his will, physique, and capacity for endurance, could scarcely be equaled; the missile was smooth and pointed, dilating and wedging off rather than lacerating the tissues; the bolt did little injury until it entered the base of the brain, and that opening served as a drain for the blood and matter and other substances that might have caused death by compression; the part of the brain traversed was the part that could best stand such a shock with the least injury.

VEGETABLE COLORING MATTER.

Until within a recent period, most colors used in calico printing, paper staining, dyeing, etc., were chiefly obtained from vegetable sources. Mineral dyes, however, have been much in favor, and have the advantage, where they can be used, of being lasting and easily applied. Some of these thus used, and also as pigments, have been described in our previous pages; we shall, therefore, here chiefly direct attention to colors of a vegetable origin.

The natural colors of leaves and flowers are due to a peculiar principle which is subject to the action of heat, light, and chemical action, but which is lost on the death of the plant. It is there a vital principle only. Colors employed for dyeing, etc., are extracted from the plant after its vitality has ceased, and are resident in the leaves, stems, roots, and flowers. Red dyes are obtained from madder, or *rubia tinctorum*, safflower, or *carthamus*, Brazil wood, logwood, sapan wood, the cochineal insect, etc.; blue colors are afforded by indigo, archil, litmus, etc.; and yellow dyes are produced from fustic, turmeric, saffron, etc.

But all these colors *per se* are fugitive, and require a mordant to fix them in the fabrics to which they are applied. The action of a mordant is readily illustrated by that of iron and an infusion of logwood used in dyeing black. If a piece of cotton were simply dipped in the infusion of logwood, it would only acquire a dirty red-brown color; but if it be first soaked in a solution of sulphate of iron, the oxide of the metal attaches itself to the fibers of the material, and, on being introduced into the logwood infusion, a black and permanent color is produced. The mordants usually employed are salts of iron, alumina, and tin, others being used only to a limited extent.

Madder is chiefly employed in dyeing red. It is the root of a plant, and is imported into this country from the continent in a state of powder, having a dark red color. From it a peculiar principle, called *garancine* is produced by means of sulphuric acid. This preparation is superseding the use of the raw madder, because it is more economical, cleanly and effective. Other principles may be extracted from madder, such as *purpurine*, *alizarine*, *xanthine*, etc., of which the alizarine is the most important, because it is really the coloring principle of the rest, and is the chief constituent of the *garancine* of commerce. The celebrated Turkey-red dye, which with stands the action of most chemical substances, is obtained by means of madder.

Cochineal is properly an animal dye, but its coloring powers are due to the cactus, on which it feeds. With alumina, a decoction of the insect affords a rich red color, used in dyeing silk, and in producing "carmine." We have succeeded in producing some rich red precipitates from a cold infusion of the cactus flower and solutions of carbonate of soda and citric acid, employed in the manner we are about to describe in connection with safflower.

Safflower is a kind of saffron, and affords two coloring principles—a yellow and a red—the former being abundant and useless, while the latter is obtained only in small quantities, and is very valuable as a dye for silks, producing reds of the purest color and of every shade, from pink to deep poppy.

The safflower must be washed in cold water, until all the yellow color is removed. The residue of solid matter is then to be steeped in a solution of carbonate of soda, also cold; and, after some time, cotton wool is to be introduced so as to absorb the color. It will appear of a muddy red tint; but on the addition of a solution of citric acid, or lemon juice, a magnificent red color is afforded. By a repetition of this process the cotton may be filled with color, which can afterwards be removed by the same means as those just employed. The color is thus obtained isolated. A large quantity of the color is manufactured on the banks of the Lea, near London; and also near Paris. The winter months are chosen for the purpose, as the heat of summer spoils the tint. From the small quantity of color produced from the raw material, it is very expensive, and its use is chiefly confined to dyeing silks, and making "carmine saucers."

Decoctions made by boiling the chips of Japan, Brazil, and logwood, afford a red color, with tin and alum as a mordant; and a black with salts of iron. These substances are chiefly used for dyeing wool and cotton yarn. Each of them contains some tannic acid, as do sumac, gall nuts, oak bark, wal-

nut peel, etc.; and such with iron, afford black dyes of various depths.

Yellow colors are produced by the action of alumina, as a mordant on infusions of turmeric, etc.; but these colors are generally fugitive. Intermediate tints of brown, maroon, etc., are produced by successively dyeing the stuffs a yellow and red color, until the desired tint be arrived at.

Blue vegetable colors are obtained from some lichens, amongst which the *rocella tinctoria* is that most commonly used. All the lichens, however, afford colors of some kind and even those of a yellow and red tint. Archil, used in dyeing silk, is obtained from the *rocella* by means of ammonia, or more economically, urine, which has so far undergone decomposition as to afford ammonia. From these plants peculiar coloring principles, such as *orcine*, etc., may be obtained, which are analogous to garancine, alizarine, etc.

Indigo has, until the discovery of the production of aniline from coal-tar, been the chief source of the permanent blue of the dyer. The color from indigo is not obtained, as in most other cases, by infusion or decoction in water, but by means of the strongest sulphuric acid. The raw material, as imported, is in blue colored cakes; these are powdered, and to them the strongest sulphuric acid is added. By this, the real principle of indigo is dissolved out. The principle of dyeing with this substance is that of first deoxidizing it, which is done by means of the proto-sulphate of iron. This renders the indigo in a state fitted for absorption by the fabric, which, after being dipped into the solution, becomes of a deep blue color on exposure to the oxygen of the air, and the color then becomes permanent. In the process, the alkaline earth, lime, is used with the proto-salt of iron. And this introduces us to the production of aniline from a vegetable, as we have shown its production already from coal tar.

If indigo be acted upon by a hot solution of potassa and then distilled, aniline is produced as a nearly colorless liquor. It is highly volatile, soluble in water, and on being oxidized by chromic acid, affords a rich purple tint. It matters not what it is produced from, for it is equally obtainable from indigo, nitro-benzole, and coal tar. And this is a matter of not only deep philosophical interest, but, in the uses to which it is applied, has become a most important article of commerce.

Into the varied treatment which this substance undergoes, we of course cannot enter; and we have made our remarks more extended on it than we should have done, solely because it affords an instance of a most remarkable practical application of purely scientific research, and which we are glad to say has been the means of enriching those to whose perseverance we have been indebted to its manufacture in quantities.

CUTLERY.—UNITED STATES INDUSTRY.

The *Manufacturer*, a London publication, has the following article on our cutlery manufactures, which is worth reading:

The manufacture of cutlery in the United States is of recent origin, comparatively. But a few years since the whole supply came through the hands of the importer from Europe; but the production of edge tools and cutlery was no sooner started than it took a rapid growth, and a foreigner, remarking upon branches of American industry, says—"The manufacturers of cutlery have far surpassed those of the Old World in the production of tools, and that not merely in the excellence of the metal used, but especially in the practical utility of the patterns, and in the remarkable degree of finish of their work." This is a just remark. The "high finish" of American work is applied only, however, where it has utility, not where it is a useless expense. This may be illustrated in watches and clocks. The English have highly polished works that add much to the expense but nothing to the service. In the American article this expense is saved. A peculiarity of American work is the readiness with which improvements are perceived by the intelligent worker, and immediately adopted and applied. This intelligence comes in some degree from the entire freedom of industry, and the absence of all trade "guilds," unions, or restrictions. The American who travels in Europe is struck with the, to him, ludicrous mystery with which every species of handicraft is surrounded. It would seem as if the proprietor of every petty workshop or factory was exclusively possessed of the philosopher's stone, which would be robbed from him by the prying gaze of every transient visitor. The apprentices are only taught the routine of centuries, and only so much as is necessary to fulfill the part of the labor required of them. The manufacture itself, whatever it may be, is divided into branches, each of which is in charge of persons who preserve their supposed secret from the other branches. Under these circumstances the apprentice succeeds with difficulty in becoming a master of his trade. When out of his time he must travel for three years, and when he returns to his native town he must have money and interest to be made a citizen, and then admitted as a member of the guild or trades' union before he can pursue, except as a journeyman, the trade he has learned. How different is all this in the United States! The boy enters a factory, or workshop, and is taught his especial work, and has within his reach every branch of information, scientific and practical, connected with the whole of it. His fellow workmen are experienced in all the branches and with the best modes in use in all countries. His employer is wedded to no system or rule, but is ever on the alert for improvement; always ready to suggest and hear suggestions, and to adopt feasible ones. It is no wonder that in such an atmosphere the arts should flourish, and that an observant foreigner should exclaim, as above, that hardly twenty years of experience in the New World should have surpassed the centuries of progress in the Old World. This branch of industry thrives mostly in individual workshops; it has not come within the sphere of corporate influences. There is a general

and very perceptible adoption of American patterns not only in Europe, but in England, as being more practical, and it is stated that in American factories already there is more English steel used than in England itself. The American worker does not believe in using poor tools when good ones are to be had.

Steel is the material used, by reason of its hardness, for cutting edges of tools and cutlery. The backs are made of iron, as a cheaper material; so also are the handles or "tangs" to which the steel is welded. The steel is blistered as, or after, it is drawn down by tilt hammers into shear steel. This is used for table knives, scythes, etc. When a fine finish is required, or great hardness, the blistered steel is melted into cast steel, and the ingots are forged into bars. Simple articles, such as chisels, are made by hammering a bit of cast steel into the required shape. This being intended only for the edge, is made very thin, and upon it is welded a flat slip of iron which has been forged into the shape of a chisel, with a shoulder formed by driving it into a hole in the anvil. One side of the chisel is, therefore, iron, intended to be ground away, and the other steel. Scissors are made of various materials. Common ones are shear steel, with the blades hardened. Tailors' shears have the blades only steel; the remainder is iron. Formerly only the edge was steel. Some scissors are made of good cast iron, called run or virgin steel. Of these many are sold at seven cents a dozen. There are some, on the other hand, made with bows or shanks of gold, and sell for fifty dollars a pair. When made wholly of steel, the blade is hammered out at the end of a small bar; it is then cut off with enough to form the shank and bow. A hole is then punched, the instruments shaped, united by a screw ground, filed, and burnished. The blades are slightly bowed in such a manner that they touch each other only at the point of cutting, and this point moves as the blades close in the act of cutting from the pivot to the point. This operation is seen by holding a pair of scissors, edgewise, to the light. This action gives smoothness to the cut.

The manufacture of table cutlery is of recent introduction in the United States; and it has made progress by reason of the American invention of a machine to form the blades, which invention has been adopted in Europe. In the old process the blade of a table or other large knife is hammered out on an anvil at the end of a bar of steel, and cut off. It is then welded on to the bar of wrought steel, about half an inch square, and enough of this is cut off to form the bolster or shoulder, or the tang. The blade is then heated and hammered, or, as it is called, smithed, which serves to condense the metal, and enable it to acquire a higher finish. The mark of the maker is then stamped upon it, and it is hardened by heating to redness, and plunging it into cold water. It is tempered to a blue color, and is then ready for grinding. The small blades of penknives are hammered entire out of the best cast steel. A temporary tang is drawn out to secure the blade while it is ground. A number of blades are heated together for tempering by being placed over the fire, upon a flat place, their backs downwards. When at the proper degree of redness, so as to take a brown or purple color, they are dipped into water up to the shoulder. For razors the best cast steel is selected, and when the blade is shaped upon the anvil, from a bar as thick as the back of a razor, and half an inch wide, it is well smithed to condense the metal. Only the best metal will bear the working down of the one part of the blade to the requisite thickness, while the other is left thick. The shape is further improved by grinding on a dry, coarse stone. The tempering is performed after the blade is drilled for the pin of the joint, and stamped. It is then ground and polished.

The grinding and polishing of cutlery are conducted mostly by wheels constructed for the purpose. There is a trough with a stone for grinding and a polisher driven by a pulley. The stones vary in diameter from four inches to two feet, according to the articles to be ground. The convex surface of the small wheels gives the concavity on the blade of the razor, and the other wheels suit the various sizes and shapes of the articles polished. Some are used dry and others are kept wet, in order that the heat engendered by dry grinding may not injure the temper of the articles ground. The dry grinding is more expeditious, but, unless the troughs are furnished with a ventilating fan and flue for carrying off the fine metallic particles and dust from the stones, the health of the worker suffers. This flue is constructed of tin, in the shape of a sort of cap, that comes over the back of the stone; the other end of the flue is in an adjoining room, and has the air partly exhausted from it by a fan in rapid motion. This creates a strong current, which, when the stone is in motion, carries the dust and filings from it into the flue. When the grinding is completed, lapping succeeds. This is done on a thin wooden wheel, faced with a tire of metal made of five parts of lead to one of tin, and cast upon the edge of the wheel. It is then turned true and indented, so as to hold a dressing of oiled emery of different degrees of fineness. The steel blades receive various degrees of polish by drawing them from end to end across the revolving lap, which is fed with emery of various sizes.

The handles of cutlery are made of a variety of substances, ivory, horn, mother-of-pearl, tortoise shell, cocoanut, maple wood, etc. Ivory is mostly used for table knives. A solid piece is cut out of the right size, and a hole for the tang bored at one end. This is sometimes carried through, so that the tang may be visible. When it does not go through the tang is secured by cement. By a late contrivance, a little spring is attached to the tang which falls in a notch in the cavity of the handle, and prevents it from being withdrawn. Balance handles are made by introducing lead into the handle, to counterbalance the weight of the blade. The handles of penknives are complicated. The springs must be nicely ad-

justed, requiring a peculiar temper. The slips for the handles require great care in fitting. It is stated that a three-bladed knife passes through the finisher's hands a hundred times.

The manufacture of butcher and shoe knives is large in the state of New York. The state census gives it at 35,000 per annum, and these have a wide reputation.

The manufacture of forks is said to be one of the most unhealthy of the mechanical arts. It has been estimated that the destruction of life in it is greater than in any other pursuit, by reason of the fine dust evolved in the process of grinding, and which fills the atmosphere of the rooms, and invades the lungs of the operators. This takes place in the finishing. The forks are hammered out of square steel rods three-eighths of an inch thick. The tang and shank are roughly shaped at the end of the steel rod, and are then cut off, with about an inch of the square steel besides. This is drawn out flat for the prongs, and the tang and shank are then shaped by the dies. The other end, heated to a white heat, is laid in a steel die upon an anvil, another die attached to the under face of a heavy block of metal, is allowed to fall upon it to a height of seven or eight feet. The prongs are thus shaped, and all but a thin film of steel removed from between them. This is cleared out by a machine called a fly press. A number of forks are collected together, and annealed by heating and allowing them to cool slowly. They are now sufficiently soft to be easily shaped by the file, and by bending. They are then heated to redness and suddenly cooled, by which the hardness is restored. The process of hardening renders all steel brittle, and it is intended to remove this by tempering. The higher the heat when the metal is hardened the softer and stronger will be the steel. A lower degree of heat gives more hardness and also more brittleness. The temper is indicated in the color, and temperature which produces that color follows a regular scale. Thus 430° of heat gives a very pale straw color, suitable for the temper of lancets. Higher degrees of heat gives darker shades of yellow, suitable for razors, penknives, and chisels; until at 500° the color is brown yellow, adapted to axes and plane irons. Twenty degrees higher the yellow has a purple tinge, seen in table knives. Thirty degrees higher the dark color of a watch spring is obtained. Again twenty degrees the dark blue of saws is visible. At 630° the color has a tinge of green, and the steel is too soft for instruments. This color is supposed to be produced by the action of the oxygen of the air upon the carbon of the steel, and protects the metal from rust in some degree.

One of the most necessary tools for a new and agricultural country is the ax. The remains of all lost races generally disclose, in some rude form, that useful instrument; and the modern nations of Europe present it in an improved metallic form. The Spanish ax, which has no head, is made by hammering out the bar and turning it into a loop, to make the eye. The manufacture of the ax has, however, like its use, been carried to its highest perfection in the United States. An American ax has a fame co-extensive with an American backwoodsman, who alone of all the nations that visit this continent is fitted to struggle with the mighty forests with which the country was covered. While the American pioneer, ax in hand, boldly buries himself in the forest to clear and subdue it, the European rather keeps to the plains as more easily managed. The experience in the use of the ax, and the various uses to which it is applied, have combined to produce great varieties, all of which have undergone considerable improvements. Formerly, the operator depended upon the rude forges and limited skill of blacksmiths to supply axes. With the improvements that suggest themselves, special factories sprang up, and the largest factory of the kind in the world is in New England. There, 1,200 tons of iron and 200 tons of cast steel are by machinery wrought annually into tools. In the most recent process hammered bar iron is heated to a red heat, cut off the requisite length, and the eye, which is to receive the handle, punched through it. It is then re-heated and pressed between concave dies until it assumes the proper shape. It is now heated and grooved upon the edge to receive the piece of steel which forms the sharp edge. To make the steel adhere to the iron borax is used. This acts as a soap to clean the metal in order that it may adhere. At a white heat it is welded and drawn out to a proper edge by trip hammers. The next process is hammering off the tool by hand, restoring the shape lost in drawing out; it is then ground to form a finer edge. Afterwards it is ground upon finer stones, and made ready for the temperer. The ax is now hung upon a revolving wheel in a furnace over a small coal fire, at a peculiar red heat. It is cooled successively in salt and fresh water, and then tempered in another furnace, where the heat is regulated by a thermometer. It is then polished to a high finish, which will show every flaw and enable it to resist rust. It is then stamped, and the head blackened with a mixture of turpentine and asphaltum.

The manufacture of scythes has reached a high state of perfection in the Western States, and the patterns have been imitated to a great extent in Europe.

The manufacture of surgical instruments has become large in the cities, mostly in Philadelphia, where the manufacture has acquired great celebrity. The ingenuity and skill with which an infinite variety of instruments is adapted to the purpose of operations upon the living fibers of the body are marvellous in their way. The quantities supplied to the West and South are large.

When the head of a cold chisel has been battered, so that the steel "rags" over the edge, the edges of the head should always be ground off. The "ragging" is very hard and flinty, and apt to fly at the blow of the hammer, and a particle lodged in the holding hand, is an uncomfortable companion.

CAST-IRON WORKING IN SCOTLAND.

We condense from the *Ironmonger* some interesting information respecting the manufacture of cast-iron wares at the Carron Iron Works in Scotland. These works were established in 1759, by Dr. Roebuck, who employed James Watt to erect a large steam engine, which was merely used to pump back into a reservoir the water that had passed over the water wheels, and so enable it to be used again and again to drive the machinery, instead of applying the engine direct for that purpose.

It appears that the Carron Company employs about 2,000 men and boys, who are well cared for and contented, and there is no trouble with them in the way of strikes or trade disputes, which is not to be wondered at as the Company takes a deep interest in all that concerns the welfare of the operatives, who have benefit societies, the most important one of which has been in operation for several years, and holds an interest in the Company.

THE PROCESS OF MOLDING.

Take, for example, a three-legged pot, the patterns for which consist of nine pieces, two for the body, three for the feet, and two for each of the ears. The body pieces have been formed by taking a completed pot, denuding it of feet and ears. These pieces the molder takes, and placing the severed edges together, lays them down on his bench with the bottom upward. He then incloses the pattern in a circular casing, which he fills up with sand. The sand is rammed down all round and over the pattern, care being taken during the process to insert the feet pieces, and also a wooden plug to form a "gate" through which to pour the metal. The molder then turns the box over and fills the inside of the pot with sand. The next part of the operation is to take out the pattern and leave open and entire the space it occupies. The advantage of having the casing and pattern in sections now becomes manifest. The upper section of the casing is unfastened and taken off, when it is seen that the sand bears an impression of the bottom of the pot. The side pieces are in like manner removed, leaving the body pattern clear. The latter is carefully lifted off, one half at a time, exposing the "core" or globular mass of sand which represents the interior of the pot. The whole surface of the sand is next thickly dusted with ground charcoal, and rubbed quite smooth—a process which makes the iron take a finer "skin" than it would otherwise do. The feet and ear pieces having been withdrawn, all that is now necessary is to put the casing together again, fasten it tight up, and prepare the "gate" by pulling out the plug and rounding off the edges of the hole. So compact does the sand become that the completed mold may be moved about freely without sustaining injury. An expert hand can mold a pot of the largest size in from fifteen to twenty minutes. After a certain number of molds have been prepared, the workmen proceed to "cast" them. The molten metal is carried from the furnaces in huge ladles, and appears to be as fluid as water. When it is poured into the mold, gas is at once generated, which finds its way through the sand, and issuing from the joints of the casing, become ignited, and burns with a beautiful purple flame. Were this gas not allowed to escape, the mold would burst, and the consequences to the workmen would be most disastrous. It is a curious fact, that while a few drops of water would ruin a mold, the boiling metal may be poured in from a height of a couple of feet without disturbing a particle of the sand.

When the metal has cooled sufficiently, it is dug out of the sand and taken to the dressing shops, where roughnesses are removed. Articles cast in several pieces are then carried to the fitting shops, where they are put together. Kettles and stew pans, which are to be tinned, are first annealed, and then passed to turners, who put a smooth and bright surface on the inside. The tinning is then done, the handles put on, the outsides japanned, and the completed goods removed to the warehouse. Portions of many of the articles are of malleable iron—such as the handles of kettles and pans; and in the making of these a large number of smiths are employed. The division of labor system is extensively applied in the works, and the result is that the men in the various departments display extraordinary expertness. When a boy enters on his apprenticeship, he chooses, or has chosen for him, the branch of work that he is to follow, and to that he adheres. Let us suppose that a boy selects pot molding. After some preliminary training he is intrusted with the making of pots of the smallest size. As he advances in years, so does the size of his pots increase; and by the time that gray hairs come, he finds his hands employed upon vessels so capacious that each might contain a dozen of those he made in his early days. This is one of the peculiarities of life at Carron; and though it looks as if designed to remind the men of the flight of time and the growth of years upon them, it is simply the result of promotion by seniority. The mold for a small pot requires nearly as much time to make as that for a large one; but there is a difference of price in favor of the latter, and these the older hands claim the privilege of making. Another peculiarity of the pot-making branch is the mode of payment, which is this: a man agrees to make a certain number of pots for half a crown, and he is allowed one shilling of premium on every hundred that he produces. Taken altogether, the men employed in molding make higher wages than those in the other departments, and it is no unusual thing for one of them to receive even as much as £3 for a week's work; but the general wages of the class may be set down at about twenty-five shillings for sixty hours' work.

ARTISTIC WORKS IN CAST IRON.

The Carron Company has devoted much attention to the production of cast iron goods of an artistic kind. When any new article is to be produced, a drawing of it is first made,

and from that a modeler forms a pattern in wood, wax, or plaster. From the pattern a cast is taken in tin, a metal which takes a smooth surface, and from the tin copy, which is nicely chased up, the molder makes the impression in sand from which the iron is cast. A smoother surface is thus given to the iron than would be the case were a wood pattern used. In all cases, the details of the pattern are sharpened in the iron, after casting, by filing. Though no model seems to be too difficult for the molder to make in one piece, yet, as a matter of convenience, most articles of any size or complexity are made in several pieces. In the molding shop, in which the ornamental castings are made, we had an opportunity of seeing sand molding of the most difficult kind; but the operations of the workmen would require to be seen to be understood. A specimen of work from this shop was shown at the Exhibition of 1862, along with a variety of other castings, and excited a good deal of interest, as showing the capabilities of the sand-molding process. It was a small figure of a stag browsing; and, in order to cast it in one piece, the mold had to be made in upwards of one hundred parts, each part being simply a clod of moist sand, held together by compression.

CAPABILITIES OF CAST IRON.

It would appear that the capabilities of cast iron have not yet been fully developed by the ironfounders of the country. At the Paris Exhibition were shown specimens of Berlin castings in iron, which, by their delicacy and beauty of outline, attracted considerable attention. Some specimens of the same kind of work may also be seen in the Edinburgh Industrial Museum. The minutest details are sharply defined, and the entire surface has a bronze-like smoothness. It has been generally believed that this kind of work was made by mixing with the iron some metalloids, which has the effect of giving to the metal more fluidity and density; but this, we believe, is not the case. The specimens are made of iron alone, and are the result of the laborious researches and experiments of M. Schott, the manager of Count Stolberg's works in Brunswick. "His attention," it is stated, "was first directed to the importance of procuring the finest quality of molding sand, and to prevent, as far as possible, the accumulation of air in the mold which is drawn in during the process of pouring the liquid metal". His sand is made by mixing burned clay with pulverized sandstone, having a maximum porosity. It has also the fineness of grain which is essential in producing a delicate mold. An incident is related which illustrates the importance of this in this branch of the art. M. Schott, in explaining the subject to some friends who were dining with him, sent a folded napkin from the table to the foundry, and shortly after showed them a casting which correctly represented the indentations produced by the finely woven thread of the fabric. The most important part of the process, however, is the preparation of the metal. M. Schott made a series of experiments to determine the melting point of different kinds of pig iron; and, by mixing several in proper proportions, he has been enabled to vary the melting point at will. It will surprise even practical ironfounders to learn that his experiments proved that the melting point of different samples of charcoal iron, made at his own blast furnaces, varied more than 800° Fah. Charcoal iron generally melts at 700° higher temperature than coke iron. The contraction, on cooling, is greatest in the charcoal iron, and, in most cases, it has the greatest density when solid. In examining various specimens of casting, M. Schott brought to his aid the microscope, and was thus enabled to detect certain differences which chemical analysis had failed to explain. The iron ore used by him is not different from that found in many other places. It is reduced in a series of small charcoal furnaces in the vicinity of the mines, which are situated in Northern Germany, near the town of Brunswick.

Modern Naval Warfare.

MR. A. L. HOLLEY of Harrisburg, Pa., who is thoroughly acquainted with the subject, has published in *Engineering* a lengthy article in which he claims for the Messrs. Stevens of Hoboken, that they were the originators of many, if not most of the improvements in modern naval warfare. He sums up their claims that the Messrs. Stevens, father and son, either originated, or first developed, the following important features of modern naval warfare. Twin screw, 1805; armor plating, 1812; inclined armor, 1812 and 1841; training guns by rotating the vessel, 1812 and 1862; engines and screws below water in war vessels, 1841; large engines to work expansively at ordinary times, and with maximum power in action, 1841; concentrated fuel (working to petroleum?), 1841; iron hulls for war vessels, 1841; wrought-iron rifled gun, 1841; the Armstrong lead-coated elongated shot, 1841; concentrated protection, a central battery, a belt of armor at the water line, and a shell proof deck, 1843 to 1854; protecting the hull by immersion to fighting draft, by means of water let into compartments for the purpose, 1843 to 1854; wrought iron engine framing, and a wrought-iron ship of 420 feet length, 1843 to 1854; loading a gun below deck by steam power, 1862.

As to the later inventions of Mr. Stevens, we can testify to the correctness of Mr. Holley's assertion, his plans having been repeatedly presented to this office by the venerable surviving inventor.

TRADES UNIONS ON TRIAL.—The case of Mr. Henry B. Dawson, against the Bricklayer's Union in Westchester county, N. Y., for conspiracy in preventing his son from obtaining employment, has so far resulted in a finding of a bill by the grand jury, the defendants having carried the case up to a higher court. The decision will be looked forward to with interest.

A NEW JERSEY FISH FARM.

The application of science to the artificial propagation and cultivation of fishes has long been recognized as an art. Although it is of no recent date, having been practiced by Jacobi at Hanover over a century since, it has but recently received the attention which it deserves. The rediscovery of the process of artificial impregnation of ova by the Vosgean fishermen, Gekin and Remy, and the founding of the great National French Fish Farm at Huningue, on the Rhine, have resulted in the foundation in Europe of a vast number of fish-breeding establishments; but in this country the subject is only beginning to receive the attention and legislation which it demands. We present herewith a series of illustrations representing a general view (with some details of the hatching process as there practiced) of the fish farm of Dr. J. H. Slack, at Troutdale, near Bloomsbury, N. J., sixty-four miles southwest of New York city, as described in *Harper's Weekly* of June 13th. The farm, comprising about sixty-eight acres, is in a high state of cultivation, as is the whole of the Muskanetkony Valley, in which it is situated; and well kept fences and neat buildings, those never failing signs of industry, bearing witness to the prosperity of the residents.

THE SPRING.

The artificially-constructed ponds and buildings connected with fish raising, covering in all about two acres, are situated on the right bank of the Muskanetkony Creek, which here forms the boundary between the counties of Warren and Hunterdon; the former being upon the right, the latter upon the left of the stream. These ponds are supplied with a pure crystal water from a large and beautiful spring, from which it flows in a continual stream at the rate of 1,000 gallons per minute. This water is, in summer and winter, of the same temperature, 50° Fah., and reaches the hatching house and ponds at the same temperature. This is a matter of the greatest importance in fish hatching. In the spring there are about two hundred small trout, naturally bred. From the spring the water is led by a race-way to and circulated through the three ponds and hatching houses. At various points gates or sluices



THE TROUTDALE SPRING.

cleaned twice a day, except during the autumn, when the falling of the leaves from the trees which overshadow the spring necessitates more constant care.

THE PONDS.

The ponds at present contain about seven hundred adult

capacious throat of "General Grant." On this account three ponds are necessary. The one nearest the hatching house is now being prepared for the reception of the twenty thousand young trout hatched at Troutdale during the past winter: the middle one is devoted to trout of eight inches and under, while in the third are placed the larger fishes, many of them of a size calculated to cause a lover of "the gentle craft" to infringe upon the Tenth Commandment. The bottoms of the ponds are of clay, upon which have been placed a number of large stones, in order that the trout, by rubbing against them, may free their bodies from the numerous parasites, animal and vegetable, which frequently infest them. Shade is afforded by large floats, secured to the banks by wires. The races are slated, to prevent the crumbling of the banks, their bottoms being covered with small stones, upon which is placed a layer of fine gravel, though the latter is not plentiful in the vicinity.

THE HATCHING HOUSE

is situated upon the right bank of the first pond, and a neat lodge to the westward is occupied as a residence by the assistants.

FEEDING.

The large trout are fed with curd, the offal from slaughter houses cut in fine pieces, and fishes, the latter sometimes living. During our visit two living red-fins about 4 inches in length (*Leuciscus cornutus*) were thrown into the pond; they were immediately seized by two huge trout, who at once retired to the lower end of the pond, there to swallow and digest them at their leisure. The gullets of the captors being shorter than their prey, over an hour elapsed before the tails of the red-fins vanished down the throats of the trout.

DR. SLACK'S EXPERIENCE.

Dr. Slack is a thorough lover of the art and craft, and as he is also a thoroughly educated naturalist, his experience and experiments in the artificial hatching of trout ova has a double value and increased interest, and we append it

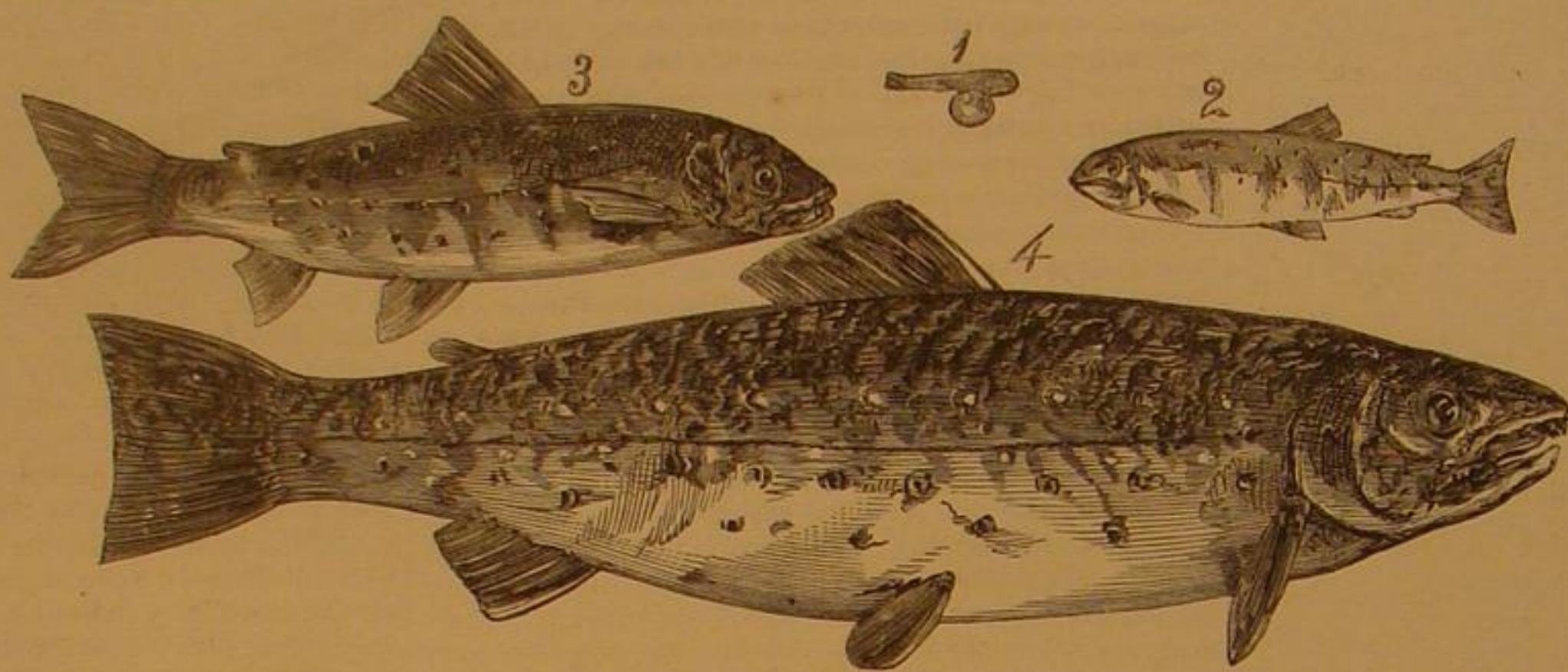


Fig. 1, One week old. Fig. 2, Three months old. Fig. 3, Six months old. Fig. 4, One year old.

THE TROUT AT VARIOUS AGES.

trout, with a few hatched during the winter of 1866-7 by Mr. Thaddeus Norris, the well-known angler and former proprietor of the ponds. Some of the fishes are marked by striking peculiarities, and have received distinguishing names. One

hereto, partly in explanation of some of our illustrations of the process of taking and hatching the eggs:—

"About the middle of the month of October, 1857, it became evident that the spawning season was at hand. The



SECURING THE TROUT SPAWN.

are located, furnished with wire screens, which serve the double purpose of preventing the escape of the fishes and of collecting leaves, sticks, or other articles which may accidentally find their way into the ponds. These screens are

is known as "Bartimeus," from the fact that he is totally blind, and perfectly black in color; "Lady Douglas" has one side of her head of the same somber hue. A long, lean, lantern-jawed male is appropriately yclept "Don Quixote," while a huge three-pounder, who fought it out on the line during the entire spawning season, killing and devouring over a dozen large fishes, is called "General Grant." There was formerly in the large pond a curious parti-colored fish, with irregular spots and streaks of white and black, the colors varying almost weekly, which was known to some of the numerous Democrats in the vicinity as "Horace Greeley;" but he is now no more, having been unfortunately killed and eaten by "General Grant" in December last. The trout is a sad cannibal; "the

dog," it is said, "will not eat dog;" but a trout of but one and a half inches will unhesitatingly seize and devour one of his own species two thirds his own length. Various fishes over a foot long have disappeared from time to time down the



FEEDING THE YOUNG TROUT.

colors of the adult fishes began to alter to an extent noticeable by the most unpracticed eye. Losing the bright tints with which they were formerly bedecked, the female trout became dark and somber in color, putting on a grave and



THE TROUTDALE HATCHING HOUSE.



THE TROUTDALE FISH PONDS.

matronly dress. The hues of the males were, on the contrary, more brilliant than previously. Their general color became much lighter, and in the older individuals the lower jaw projected anteriorly, forming a sort of knob. The distension of the abdomen of the female by the eggs, caused the section of her body to assume an oval shape, while that of the male resembled the outline of the eye of a broad-axe. Fierce battles took place between the males the conqueror celebrating his victory by feasting upon the body of the vanquished; the females swam uneasily about the ponds, trying the bottom with their fins, seeking for gravel in which to deposit their eggs. The bottoms of the ponds being formed of clay and large stones, they were obliged to pass into the races for that purpose. These had previously been prepared by covering their bottoms with fine gravel, and placing across them obstructions, forming a series of dams and eddies.

"On October 30th, fishes were perceived in the race, busily engaged in forming a nest for the reception of their eggs, by removing the fine gravel from a circle of about a foot in diameter. Across the lower end of the raceway, a net was quietly placed, and the gate at the racehead closed, by which the flow of water was stopped. To avoid being left high and dry, the fishes were obliged to pass down stream, and were thus captured in the net, the fishes being placed for the nonce in a large tin kettle. About a quart of pure spring water was placed in the impregnating pan; a male was then taken and held in the manner depicted in the engraving, the left hand grasping the neck below the gills, and the right the body just behind the gills. By gentle pressure with the fore and middle fingers of the left hand, a quantity of the milt was expressed, the amount being further increased by gentle friction toward the tail. This was continued until the water became opalescent or pearly in its appearance. A female was then taken and treated in the same manner, eggs, instead of milt, being extruded. The eggs and milt were allowed to remain in contact for about fifteen minutes, at the expiration of which time they were carefully washed.

"It has been ascertained by experiment, that fifteen grains of the milky fluid of the male is sufficient to impregnate ten thousand eggs; but in practice a much greater quantity is used. The bottom of the impregnated pan, as shown in the same drawing, having a depression calculated to hold one thousand eggs, the quantity obtained could be readily estimated. The eggs average one sixth of an inch in diameter, and weigh one grain each.

"After being thus secured, the eggs were taken to the hatching house, which had been made ready for their reception in the following manner: The hatching-trough had been filled to the depth of two inches with fine gravel carefully boiled, to destroy the eggs of any insects which might have been present; over this a gentle stream of water from the spring, filtered through four screens of fine flannel, was conducted. Upon the gravel the eggs were placed, the greatest care being taken to avoid any sudden jar, as the recently impregnated egg requires the most gentle handling, lest its suddenly acquired life be as suddenly extinguished. After resting in their new location for a few moments, they were evenly spread over the bottoms of the troughs by means of a fine feather. During the entire process the eggs had not for an instant been exposed to the atmosphere.

"This process of impregnating and depositing in the hatching house was repeated semi-daily until January 12, 1868, during which period about seventy-five thousand eggs were taken. Experience shows that from a trout of one pound about one thousand eggs is the average yield; but owing to causes entirely beyond the control of the proprietor, only twenty thousand hatched. The dead eggs were removed daily, being readily distinguished by turning snow white; those still retaining their vitality resembled small pearls, being translucent and slightly clouded. The first young appeared December 10th, forty days after the impregnation of the eggs.

"When first hatched, the young presented the grotesque appearance shown in the smaller figure of the cut of the trout. The ungainly abdominal appendage, technically termed the 'yolk sack,' is, however, gradually adsorbed into the body of the young fish, the entire process requiring six weeks for its completion.

"During this period the young trout requires no food, being nourished entirely by the contents of the 'yolk sack;' but immediately after its absorption it is necessary that they should be regularly and carefully fed. Various substances, all of an animal nature, have been tried, but after various experiments, Dr. Slack has found the muscular fiber composing the hearts of beef cattle to be the most suitable. This is prepared by being chopped into minute fragments, which are passed through a fine wire sieve. When the fishes have attained the length of one and a half inches, the eggs of other fish are employed as food. When placed in the first pond, they will be fed entirely, for some time, upon maggots, the larvae of the common blue-bottle fly. The appearance of these disgusting, though to the pisciculturalist useful little animals, are regarded as fixing the period at which the transfer from the hatching house to the pond should take place."

Troutdale, as we have stated, is easy of access from the city of New York, and a visit to the ponds would amply repay any one interested in the art or science of pisciculture.

It is a part of the business of the fish farmers to furnish in season impregnated trout eggs, either for the stocking of ponds or of scientific observation and research. They can be carefully packed, and forwarded by express to any point, with full directions, or under the care of a competent person. By means of a small apparatus invented by Dr. Slack, which can be placed in an office or library, the fishes can be hatched without the necessity for a hatching house. This apparatus is not unlike the aquarium in common use in our parlors, and requires very little more attention, though

the work of "manufacturing trout" at home would furnish far more interesting employment than a mere aquarium, and at the same time be not less pleasant to look upon."

The *Evening Post* says, on the subject of fish culture, that, "In nearly all our rivers the supply of fish is growing less. The stake nets in the Hudson, stretching for hundreds of rods into the channel do not take more in a day than were formerly taken in nets a quarter or a fifth of their size. In the Susquehanna, Potomac, James, and Delaware, where drift nets are used, the supply of fish is in like manner decreasing. No more fish can now be taken in a net a hundred rods long than formerly in one of five rods. The same reports come from the South; and, unless the fisheries are suspended, or the supply of fish increased by artificial means, there will soon be no more shad in the market.

"The commissioners recently appointed by the Albany legislature, Messrs. Seth Green and Robert B. Roosevelt, have entered upon their duties—the establishment of suitable hatching boxes along the upper waters of our rivers—with much interest and in a manner that promises the most gratifying results. Although appointed for New York only, they have lately visited several southern states, to endeavor to interest the fisherman of the southern rivers in pisciculture, and to induce them to adopt the system of artificial breeding that has proved so successful in Connecticut. Their object in thus extending their observations and labors is to make fish culture general. It has been discovered that shad do not invariably return to the rivers in which they are spawned, and in order that an even supply may be obtained it is necessary that the propagation should proceed simultaneously on all parts of the coast. The James river was the furthest point south visited by the commissioners. There they succeeded in interesting the fisherman and establishing hatching boxes on a small scale. On the Potomac it is expected that their suggestions will be generally adopted.

"The Susquehanna and Delaware are to be visited, if they have not been already, and after introducing the system extensively in our rivers, the commissioners will proceed east in July or August. By this means it is expected that the next year's supply of shad will be largely increased, while that of the following season will be still greater."

HERRING'S CENTER VENT WATER WHEEL.

Perhaps one of the main faults of turbines in general use is the expenditure of a considerable amount of the force of the water against an immovable platform, tending to retard the course of the stream; and another is the diversion of the

Fig. 1

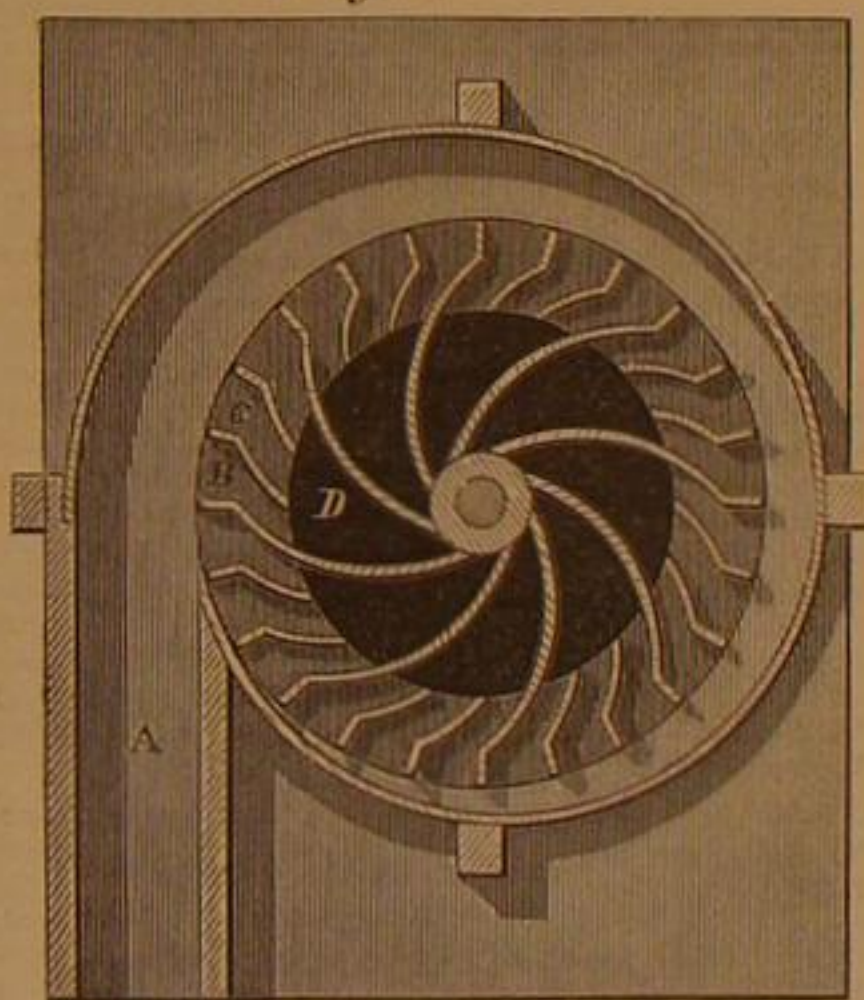
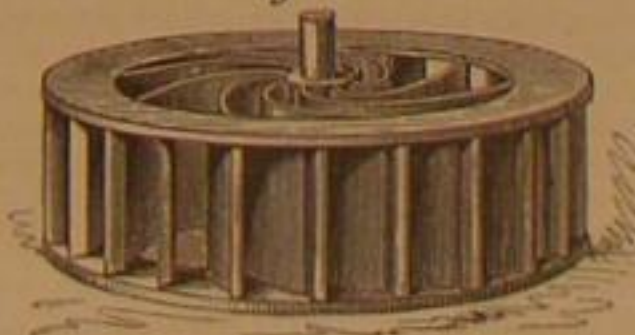


Fig. 2



current toward the center, where comparatively little force can be exerted, and the want of an exit of sufficient capacity to release the water after it has done its work, or expended its force. The intention of the inventor of the form of wheel shown in the accompanying engravings is to obviate these objections and utilize in a more perfect manner the force of the water.

Fig. 1 is a plan view, as seen from its top, showing the scroll, A, the alternate long and short buckets, B and C, and the center vent, D. Fig. 2 is a perspective view of the wheel, showing the long buckets, extending from the periphery of the wheel to the center, and the short buckets, reaching from the periphery to the inner edge of the lower rim. The buckets, both long and short, are radial at their outer ends, where the water impinges upon them. The bottom of the scroll, A, has a circular opening that receives the lower rim of the wheel, and the water acts first against the radial parts of the buckets, and then re-acts against the curved portions, passing out through the opening at the center of the lower rim, which forms a portion of the bottom to sustain the water.

The wheel may be set to turn either to the right or left, as occasion may require, operating equally well in either direction. The advantage of alternate long and short buckets is,

that the water has a strong action against them near the periphery, while a free escape is allowed for the water after its force is expended.

The device was patented Oct. 29, 1867, by George W. Herring, and all communications relating thereto should be addressed to him, Joseph Taney, or Thomas N. Egery, all of Bangor, Me.

FELL'S RAILWAY OVER MONT CENIS.

In our editorial letter published on page 259 of the last volume, we referred to the near completion of Fell's overmountain railway. Since that time the cars have been put on, and from last accounts regular trips were being made. Some of the worst bits of the line, the steepest gradients, the sharpest curves, the most appalling glimpses down precipices and into rugged ravines, where the train, if overthrown into them, would most assuredly be smashed to splinters, occur within the first few miles after leaving Susa. But the new-comer on the line contemplates these without emotion. No unpleasant sensation of peril distracts his attention from the engineering skill and resource displayed in the construction of the line, or prevents his enjoying the beauties of the mountain scenery. He feels like one drawn along a difficult road, but from whose mind every timorous sensation is banished, by seeing how completely the skillful driver has his steam horses in hand, directs them at will, curbs them with a finger. And, indeed, it is this curb power which constitutes one of the greatest marvels of the Fell system. When going twelve miles an hour down gradients of one in twelve, the brakes are applied, the perpendicular wheels cease to turn, the horizontal wheels clip the central rail with hundred-vise power, and within some thirty yards the train is brought to a complete standstill, without the slightest shock or concussion. It would be possible to employ such power as would bring the train up short, and produce all the effects of a railway accident. When one stands upon the line and contemplates the steepness of the slope down which one has just slid easily without strain or inconvenience, he to some extent realizes the prodigious force applied to restrain the momentum of the string of ponderous carriages launched upon that declivity. It is the triumph of mechanical power wielded by a few brakemen's hands, that turn, without apparent effort, the bars in connection with the various wheels. The control is perfect, and measurable to a nicety. In fact, on the descent of the mountain there is nothing to warn a traveler, who should not look of a window, that he is on a railway of a very unusual construction. The motion is steady and easy; there is no jarring of any kind, and one soon ceases to notice the sloping position of the train.

Not less surprising than the steepness of the ascents and descents, is the abruptness of many of the curves, some of them forty-four yards radius. It is probably by these that nervous persons will be more unpleasantly impressed than by the up-and-down-hill work, until a little practice removes the unfounded apprehension. As before mentioned, some of the worst bits of the road are in the first four miles after leaving Susa. Some of the curves are so sharp that one can hardly understand how the carriages, which are about fourteen feet long, outside measurement, contrive to grind round them. But round they do go, with perfect ease, just when one might fancy they were about to fly off, like a steel bar escaping from a curved groove, and, as they turn, the wheels and rails together give out a shrill metallic sound, which one at first may mistake for a whisper of the railway whistle. Just below the now abandoned but still formidable looking fortress of Es-sillon, which all who have passed the Cenis will remember, frowning toward France a little below Lanslebourg, is one of the most remarkable of these curves, horseshoe shaped and forming three fourths of a circle. The places where the line runs very close to the edge of deep precipices are few in number. What has been said already of the power which the engine driver and brakeman have at their command by means of the horizontal wheels, will have convinced all that, with common care, there exists no danger, no possibility of the train getting off the rails. This conviction is soon arrived at by any person traveling on the line, and who, however small his scientific knowledge, takes the trouble to examine the principle and construction of the railway and carriages. Another danger, more than once suggested as scarcely to be avoided, disappears upon actual observation. I refer to the risk of a crumbling of the edge of the mountain road. Aided a little by imagination, this looks very plausible upon paper. For the greater part of the distance, but not throughout, the railway gives the wall to the horse and pedestrian traffic, and takes the outside edge. This does not mean, however, that it is constantly on the brink of precipices; and, where it is so, every precaution has been taken. The masonry that already existed as a support to the coach road, has been examined, strengthened, and extended. Large masses of fresh wall, often many feet thick, have been constructed in various places. It is so obviously the interest as well as the duty of the company to make assurance doubly sure in this respect, that it is absurd to suppose every precaution has not been resorted to.

Danger from avalanches has been guarded against by covered ways, some in masonry—where stones and pieces of rocks are apt to fall—and others of iron roofing. The adoption of this plan has enabled the constructors of the line to make use of a considerable part of the old road over the mountain, a gradual ascent which was abandoned for a zigzag line, on account of the danger to passengers from avalanches and falling stones. Exclusive of several short tunnels, the road is covered in for a distance of altogether nearly six miles, in several places on each side of the summit of the mountain. The chimneys of the experimental engines were considerably lower than those of the French engines employed for the

traffic, and the consequence has been that the covered ways are too low to allow the smoke and steam to rise, and in some places the heat is stifling. In the last covered way on the Italian side of the summit, we were in a vapor bath. But this discomfort will have been completely avoided in a few days, as it already has been in some parts of the covered ways. Openings are being cut along the roofs, and no more inconvenience will then be felt than if the line were uncovered—far less than is habitually experienced in the long tunnels between Turin and Genoa, and Bologna and Florence. Before winter shall return means will have been employed to complete these covered ways in a manner that shall exclude the snow, and yet allow the smoke and vapor to rise. It is also intended to try various kinds of fuel, and if possible to adopt that which gives out the least smoke.

The time hitherto employed (in the various trial trips recently made) in getting across the mountain, has been a little over four hours of actual locomotion. But stoppages are inevitable, chiefly for the purpose of watering the engine, and the journey will hardly take less than five and a half hours, at least, under present arrangements, which would be equal to about ten miles per hour. The diligences, in ascending the mountains, make about ten miles in three hours.

Editorial Summary.

ICE MACHINERY.—A correspondent writes us from New Orleans that a company in that city is now engaged in making blocks of ice of any convenient size. The two machines, made after the plan of Carrié, of Paris, are now in operation, and produce twenty-four tons per day. Two other machines are nearly completed. By a certain evaporating process, of which ammonia is the chemical ingredient, and heat the active agent, the filtered water of the Mississippi is converted into cakes of ice eight or ten inches wide and two feet long by two inches thick, at a cost less than that of transportation from the North—less than \$5 per ton. What will be the result of this new industry, time alone can determine. If it be what it seems, ice may be made cheaper, as it is wanted, in our Northern cities, that it can be cut in the winter and preserved for summer use.

TROPICAL TELEGRAPH LINES.—The putting up of telegraph lines in the jungles and forests of the tropics is a work of the utmost difficulty, and the peculiar conditions of the region require special methods of construction. In India the wires are really small bars of iron $\frac{1}{4}$ of an inch in thickness, an amount of rigidity being thus obtained, which is necessary to meet the requirements of the country. The difficulty, which in this country, is experienced in keeping the wires insulated during heavy rains, fogs, or thunder storms, is immensely augmented in the regions where these meteorological phenomena abound, and the use of this large size of wire is rendered necessary to retain enough electricity to work the wires.

PARISIAN ELECTRICAL JEWELS.—M. Trouvé has made several new and ingenious applications of electro-magnetism in ornamental trinkets, so that now it is quite common to see at fashionable balls in Paris a diminutive butterfly or humming bird perched upon a lady's head, and fluttering its wings as naturally as possible. The owners of these toys carry concealed in their chignons a small battery and minute Ruhmkorff coil, the former composed of zinc excited by a solution of sulphate of mercury, the whole inclosed in vulcanite cells, so that the existing solution cannot escape to the damage of the owner.

A REMARKABLE MIRAGE was lately witnessed at Dover, England, whereby the dome of the Cathedral at Boulogne, France, was made distinctly visible to the naked eye, and by means of a telescope, the entrance to the port, its lighthouse, shipping, the hills surrounding the town, and neighboring farm houses, with their windows illuminated with the setting sun, were plainly distinguished. Even a locomotive and train were seen leaving the city and traveling toward Calais. The distance from Dover to Boulogne is about thirty miles.

ARCHAEOLOGICAL RESEARCHES IN THE WEST.—The vestiges of the works of the ancient "mound builders" of the West, are being made a study by the eminent archaeologist, Dr. W. De Hass. He has made a general survey of the field, locating the ancient works, mapping and measuring them, collecting information and vestiges of art, and excavating many of the smaller tumuli. When finished, an account of his explorations will be published in a superbly illustrated volume.

CRAB CULTURE.—A gentleman at Annapolis, Md., has fenced in a cove on the Severn river, for the purpose of raising crabs for market. He has now about 4,000 of these crustaceans in advance, and feeds them on coarse fish and any kind of refuse meat. A daily inspection is made of the stock, that those who have shed their shells may be dispatched to market in this state, when their value is twenty per cent higher than when possessed of their ordinary covering.

A FRESH and very complete specimen of ancient mosaic art has just been unearthed in Rome, being the pavement of a room excavated in the Vicolo Sterrato. Other rooms belonging to the same house will be revealed by excavating in the adjoining garden, belonging to the nuns of Santa Susanna. The peculiar interest attached to this discovery is the almost assured fact that the building containing this mosaic formed part of Sallust's villa.

A CORRESPONDENT in South Carolina writes that the peach trees give promise of affording the most abundant crop ever

known. As the internal revenue tax is too enormous to allow the profitable manufacture of peach brandy, the only way to save them is by canning and shipping north, and such will be the supply that our informant apprehends prices will be lower in the New York market next fall and winter than ever before.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The bill passed a few days ago by the Massachusetts House of Representatives, authorizes the Governor to make a contract for finishing the Hoosac tunnel within seven years, at an expense of not more than \$5,000,000. It also provides for the payment of \$250,000 for the completion of the Troy and Greenfield railroad, and \$350,000 for interest.

The vast coal mining operations in the famous "Black Country," of England, are beginning to produce effects long since apprehended by mining engineers. The local papers state that recently, at Cinder Hill, the ground began to subside, and continued caving in for several hours, resulting in a pit 172 feet wide and about sixty feet deep. Trees, hedges, and a great quantity of brick clay were swallowed up, but no loss of life is reported.

In the manufacture of trimmings, made to a great extent of silk waste, there are employed in Paris alone 8,500 persons, producing annually products to the value of \$4,000,000, and throughout the empire this industry occupies more than 30,000 hands whose aggregate production is valued at \$20,000,000.

The leading directors of the Hudson river and Central railroads, lately passed over the line between New York and Buffalo, on a tour of inspection. With a single engine, the train traveled over the former road at the speed of sixty miles in seventy minutes. On their return, the distance of thirty-six miles, from Rochester to Lyons, was run in the space of forty minutes.

The people of Montana are devoting some attention to coal mining, an extensive deposit having been opened near Virginia City. The supply appears to be practically inexhaustible, and though of inferior quality, there is little doubt but that it will improve as a greater depth is attained, as is usually the case in coal formations.

An enterprising English company, after overcoming almost insurmountable difficulties have established two extensive iron works at Zimapan, in Mexico. In these works steady employment is given to between 500 and 600 native laborers, and over 600 tons of iron are annually manufactured into bars or other varieties of merchantable iron, and sent to the city of Mexico over a difficult mountain road, built and kept in condition by this same company, at their own expense, the government never contributing in labor or money to its construction.

A portion of the Philadelphia, Wilmington, and Baltimore railroad is now being relaid with steel rails, made at Lancaster, Pa., from metal made by mixing the ores of that locality with magnetic iron ore from New York. The metal is said to wear very slowly, is not liable to mash, and is of great strength.

The average cost per mile of the railways of Pennsylvania, is \$15,186 91; of Illinois, \$17,583 12; of Nebraska, \$19,334 88; of Missouri, \$30,167 73; of Texas \$42,002 15. The first cost of constructing English railways is immense, when compared with these prices, but when once built the British road requires far less working expenditure. To keep the line in repair in England costs less than eleven cents per mile annually; for French roads, eight cents, and for American roads at least twenty-five cents per mile.

Mr. Phillips, in his communication to the Royal Society of London, describes the growth of mineral veins in a locality about seven miles distant from the Comstock silver mines, Nevada. The region abounds in boiling springs, and from them sulphur, silica, and an anhydrous oxide of iron are deposited, the two last forming semi-crystalline beds. One fissure exhibits a silico-metallic deposit. Mr. Phillips concludes that quartz veins have generally been produced by slow depositions from aqueous solutions of silica. That gold may be deposited from the same solutions he attempts to prove from the presence of that metal in pyrites enclosed in siliceous incrustations, and from the fact that large quantities of the precious metal have been found in the interior of the stems of trees, which, in deep diggings, are often converted into iron pyrites. Sulphide of iron may in some way be connected with the solvent by which metallic gold is held in solution.

At Munich, Germany, is a governmental iron foundry, or industrial school, where the best iron workers in Germany have received their education. But this establishment, whose products have obtained a world-wide celebrity, is about being broken up, the people's parliament having requested its discontinuance, because carried on with an annual loss of \$700. During its existence, besides several thousand small figures, busts, and ornaments, the foundry has turned out one hundred and forty nine colossal statues, six equestrian statues, eight ornamental gates, an obelisk one hundred feet high, and the statue of Bavaria, sixty feet in height; and at the present time a number of large works for this and other countries are under way, including a fountain with sixteen figures for the city of Cincinnati, another with five figures for Central Park, New York, a statue for St. Louis, and six life-size figures for the Washington monument, Richmond, Va.

The contest in the Connecticut Legislature, which has waged for several years past, between the friends and opponents of a railroad bridge across the principal river of the State, has been decided in favor of the former interest. To the Shore Line railroad company is granted the desired permission to construct a draw bridge over the Connecticut, at its mouth, and to the projected Air Line road between this city and Boston, another bridge over the same stream, at Middletown.

The cities of Lowell and Fall River are having a friendly dispute concerning the right, claimed by each, to the title of the "Spindle City." Lowell boasts of 433,864 spindles, 12,518 looms; Fall River of 507,000 spindles, 11,500 looms; the first giving employment to 13,729, the last to 6,750 hands. It is not really the simple number of spindles that gives the glory, for one mill may turn out more goods than another with a larger number of spindles. The Lowell mills, last year, used 16,770 tons of cotton, while those of her rival manufactured 11,637 tons. Additional to this, each city has peculiar products, whose values are not comparable, so that no final decision of the case can be fairly made.

Mr. J. F. Bennett announces that he can remove sulphur and phosphorus from pig iron, during its treatment in the Bessemer process, by introducing into the converting vessel carbonic acid gas, either before or with the air blast. He asserts that sulphurous and phosphoric acid are formed at the expense of the carbonic acid gas, the carbon of which is liberated. The gas is produced by acting on brimstone by hydrochloric acid, or by burning carbonaceous matter and storing in a gasometer.

A magnetic mountain has been discovered in Swedish Lapland. It is traversed by a vein of magnetic iron, several feet in thickness. The owner hopes to supply all the world with loadstones. One weighing sixty-eight Swedish pounds has come into the possession of Prof. Dore, of Berlin.

An agricultural exchange presents the claims of the railroad to the farming community by showing that, on a common road, wheat would consume its own value if carried three hundred and fifty miles. In other words, it would be worthless at that distance from market, while by rail it can be carried three thousand miles at a profit. Railways, then, multiply by ten the distance from any grain market at which its wheat may be raised, and the same remarks apply with evident variations to other products.

New interest is awakened in the proposal to bridge the English Channel, from the fact that a design by M. Bouet, a French engineer, has received the favorable commendation of his Emperor, who has ordered him to elaborate all details of the plan, compute the cost, ascertain the time necessary for its construction, and probable profits of the enterprise. The bridge is composed of a series of ten lengths, each with a span of two miles.

In Mr. Hewitt's report on the European Rolling Mills, it is stated that reversing mills are generally employed in Great Britain in preference to three-high rolls. In France, three-high trains have been in use for rolling girders since the year 1819, and everywhere upon the Continent the principle seems to be perfectly well understood, but the reversing mill is generally preferred.

On a line of railroad owned by the Lehigh coal and navigation company, is a plane at the north slope of the Wilkesbarre mountain, with an inclination of 14 feet, 8 inches per 100 feet. For dragging the loaded cars up the slope, a wire rope, said to be the largest, heaviest, and longest ever made, has just been completed at an establishment in Trenton, N. J. The load drawn up at each trip is eighty-five tons; length of rope, 3,700 feet; diameter, over two and one half inches, and weight twenty tons.

How best to furnish communication between passengers and guards, is a problem as yet unsolved in the British mind. The latest plan for accomplishing the desired aim, is providing each train with a long metallic tube, closed at its hinder end, and connected at its other end with an air pump, placed under the tender of the engine. The piston of the pump is connected with the driving wheels, so as to work slowly as long as the train is in motion. As long as any air is in the tube it is exhausted by the pump, and forced out through a whistle near the engineer. The tube has a tap in every compartment to be opened in case of necessity, when air is admitted, the whistle, as a consequence, sounds, and as the passenger cannot close the orifice, will continue so doing until the train is stopped.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

ANTI-GRANULATING LARD COOLER.—Geo. C. Cassard, Baltimore, Md.—The object of this invention is to enable lard to be rapidly cooled in large quantities, by machinery, in such a manner that it shall not granulate, and thereby become injured in quality.

GAS STOVE.—J. D. Spang, Dayton, Ohio.—The object of this invention is to construct a neat and convenient portable self gas generating stove, which can be easily kept in order, and regulated, which is adapted to all the various purposes of cooking, heating, etc., and which utilizes the heat and the fuel to the greatest possible degree.

INK WELL FOR SCHOOL DESKS.—C. T. Chase, Albany, N. Y.—This invention consists of an improved ink well, the arrangement of which is such, that but a small opening is left for the ordinary purpose of dipping, over which a cap fits when not in use; but, also, so constructed that the whole cover is readily moved aside, when desired, for the purposes of filling or cleansing the well.

ARTIFICIAL FUEL.—E. Lonsdale and C. F. Reguin, Nashville, Tenn.—This invention relates to a new compound of which coal dust forms a material ingredient. The object of the invention is to utilize coal dust, by mixing it with cheap substances, so as to enable the poor to acquire a good, inexpensive and convenient fuel.

LAMP BURNER.—J. W. Schreiber, New York city.—This invention relates to a new lamp burner, which is not dangerous and by which a large, bright flame is produced.

MUSIC TYPE.—Edward L. Balch, Boston, Mass.—This invention relates to a type for printing music charts for use in schools, seminaries, etc., the object being to print such charts with ligneous type, as with movable metallic types, and as the distance at which the charts are required to be seen and read is great, thick and heavy lines for the music staff, as well as the stems of the notes, are required.

CULTIVATOR.—Samuel Reed, Rising Sun, Md.—This invention has for its object to improve the construction of cultivators, so as to make them more convenient and effective in operation.

WARPING CHUCK.—Joseph T. Haskins, Rockport, Mass.—This invention has for its object to improve the construction of the common warping chuck, so as to prevent the wearing or chafing of the warp or lines in warping a vessel, or when she is fastened to the wharf.

CROSS BAR LOCK.—James E. Hanger, Staunton, Va.—This invention has for its object to furnish an improved cross bar lock, simple in construction, easily operated, and effective in operation.

MACHINE FOR MAKING BEER CASK BUNGS.—W. Donaldson, Cincinnati, Ohio.—This invention has for its object to furnish an improved machine by means of which beer cask bungs may be formed rapidly and accurately.

SUBTERRANEAN WALLS.—Max Thode, Mattoon, Ill.—This invention consists in forming the walls of cisterns, cellars, or other subterranean structures, in two parts, or double, with an interlining of pitch, asphaltum, or other equivalent resinous substance, by which means water or dampness is excluded.

Auger.—N. C. Sanford, Meriden, Conn.—This invention consists in forming an auger with two or more cutting lips communicating from the first or usual cutting lip and passing around the last turn or twist of the helical part of the auger, each successive lip being at a quarter distance from the axial center of the auger than the preceding, and in a different horizontal plane, whereby the paths of the several lips are different and distinct, and the auger may be operated more easily.

CIRCULAR FILE AND SAW SET.—Benj. P. Pendexter, Minot, Me.—This invention relates to a new and improved method of constructing machinery for the filing of saws and plain surfaces and for setting of saws, whereby the same is done more accurately and more rapidly. It consists of a circular file attached to a flange wheel on a rotary arbor, and of an adjustable table attached to the frame on which the saw or other article to be filed is placed, so that the same may be set at any angle to the rotary saw. It consists also of an automatic saw set attached to the frame of the machine and in combination therewith, operated by a cam in said arbor against the face of a spring or its equivalent, whereby the saw may be set without the operator leaving the machine.

HAT AND WEB FELTING MACHINES.—Chas. Mossant, Bourg du Péage, France.—This invention refers to a new method of constructing a felting machine, which is applicable to and particularly designed for the felting of hat forms or cones, but which can be effectively applied to the felting of wool in one continuous web or band, or similar articles.

ASH SIFTER.—Charles Folsom, New York city.—This invention relates to a new and useful device by which ashes or other substances may be both transferred to the sifting apparatus, and sifted without the escape of dust.

WAGON OR SLED BOLSTER.—George Richards, Richland Center, Wis.—This invention relates to improvements in bolsters for wagons, sleds, etc., the object of which is to provide a connection for the stakes, whereby they may be turned down out of the way when the wagon or sled is to be loaded with any heavy article requiring to be passed over the side of the same.

MACHINE FOR MAKING CIGARS AND CIGARETTES.—Joseph and Alexander Marengo, Burlington, Vt.—This invention relates to a new and useful machine for the manufacture of cigars and cigarettes, whereby much valuable time is saved and a quality of kind of tobacco may be used which by other methods cannot be worked into cigars.

LATHE MACHINE FOR FITTING WHISTPINS IN CRANKS.—Geo. Raft, Erie, Pa.—The object of this invention is to accomplish the fitting of wrist pins in cranks or crank disks, whereby the axis of the wrist pin shall be exactly parallel with the axis of the crank shaft, a condition always requisite to obtain a smoothly working crank shaft. It consists of a boring attachment which is borne by the lathe carriage, to bore out the eye for the wrist pin while the crank shaft is still on the centers of the lathe.

CAR WHEELS.—W. R. Thomas, Catasauqua, Pa.—This invention relates to improvements in car wheels made of cast metal, whereby it is designed to provide a more durable wheel, and one which is less liable to be affected by unequal contraction or expansion than any now in use, and it consists in an improved form of wheel, where by the metal is disposed in a manner better calculated to secure the aforesaid objects.

IMPROVEMENT IN ROLLERS FOR FORMING AND FINISHING CAR AND WAGON AXLES.—W. S. Mackintosh, Pittsburgh, Pa.—This invention relates to a new and improved method of constructing rollers for forming and finishing the axles of cars or wagons, whereby the same are more economically and perfectly formed and finished.

CORN MARKER.—W. E. Phelps, Elmwood, Ill.—This invention relates to a new and improved device for furrowing or laying off ground in rows to receive seed corn. The invention consists in the application of three wheels to a frame constructed in a usual way, whereby, as the machine is drawn along, three furrows will be made, and the wheels allowed to conform perfectly to the inequalities of surface over which it may pass.

REEL FOR REAPING AND MOWING MACHINES.—Wm. F. Rundell, Genoa, N. Y.—This invention relates to an improvement in a reel for reaping and mowing machines, for which reel letters patent were granted to this inventor December 31, 1867.

SILL AND WEATHER STRIP FOR DOORS.—J. E. Linsley, Goshen, Ind.—This invention relates to a new and improved sill and weather strip, for which letters patent were granted to this inventor, bearing date June 19, 1866.

COMBINATION TOOL.—C. M. Lowe, Cincinnati, Ohio.—The present invention relates to a tool in which are combined, among others, a pair of callipers, dividers, and compasses, a surface gage, and a square.

COMBINED HARROW, DRILL, PLANTER, AND ROLLER.—D. B. Platt, Madison, Ind.—This invention has for its object to furnish an improved combined harrow, drill, planter, and roller, so constructed and arranged that the drill and roller, or planter, may be used together, or the roller and harrow may each be used alone, as may be desired, according to the particular work to be done.

SHOOTING GALLERIES.—James S. Conlin, New York city.—This invention has for its object to improve the construction of shooting galleries, so as to make them convenient for use, easily operated, and entirely safe.

MOLDING MACHINES.—E. H. Ripley, North Chelmsford, Mass.—This invention relates to a simple and effective machine for forming moldings, which is so constructed and arranged that by very simple adjustments the same cutter may be used for cutting moldings of many different designs, so that with an ordinary once cutter fifteen or more different designs of fancy moldings may be cut. The adjustments necessary for effecting these results are very simple and easily made. And the result is the production of a neat, compact, practicable, and useful machine, well calculated for use in the work shop.

WINDMILL.—J. Tobias Braun, Randolph Centre, Wis.—This invention relates to a new self-setting windmill, which is so arranged that the horizontal axle on which the wings or sails are mounted has bearings on both ends, thereby allowing the use of less clumsy apparatus, and doing away with much friction.

DAMPING APPARATUS FOR LITHOGRAPHIC MACHINES AND PRESSES.—Geo. Cooper, New York city.—This invention relates to a new device for automatically damping the printing surface and the edges of lithographic stones, so that in machine lithographic printing the required moisture may be imparted to the stone.

MACHINE FOR RAKING AND LOADING HAY.—John Adams, Transfer, Pa.—This invention has for its object to furnish an improved machine for raking and loading hay, which shall be simple in construction, effective in operation, and may be easily attached to a wagon and adjusted to carry the hay to any desired height.

CARTRIDGES.—Richard J. Gatling, Indianapolis, Ind.—This invention relates to a new metallic-center cartridge, which is so arranged that the cartridge cannot be exploded unless it is struck in the center by the firing pin, or some other sharp instrument, so that the fulminate will be protected from the influence of moisture, and so that no gas can escape through the back of the cartridge when the same is exploded.

PORTABLE FENCE.—John Leonard, Basil, Ohio.—This invention has for its object to furnish an improved portable fence, strong, simple in construction, and easily put up, taken down, or moved from place to place.

GAGE WHEEL FOR PLOWS.—Galus S. Deane, Grand Rapids, Mich.—This invention has for its object to furnish an improved gage wheel for plows, which shall be strong and durable, and which shall be so constructed that the parts most subject to wear may be readily detached and removed when worn, and replaced with new ones at a trifling expense.

QUILTING FRAMES.—Peter H. Mellon, St. Louis, Mo.—This invention has for its object to improve the construction of quilting frames as to make them more convenient in use, enabling the quilt to be shifted and the frame taken apart and put together, or adjusted at any desired height, quickly and conveniently.

LAMP SHADE.—Alfred M. Weekes, New York city.—This invention relates to a new shade for coal-oil and other lamps, which is to reflect the light upon a table or otherwise downward around the light, and at the same time to leave the upper part of the chimney free above the shade, so that the light may also illuminate the room from above the shade.

FAKING ATTACHMENT TO ROCKING CHAIRS.—Augustus R. Hobbs, Elizabethport, N. J.—This invention relates to a new and improved attachment to rocking chairs, whereby a rotating motion is communicated by the rocking of the chair to fans so situated as to cool and refresh the occupant of the same.

ORE FURNACES.—David C. Collier, Samuel Cushman, and Newell E. Farrell, Central City, Col. Ter.—This invention relates to a new and improved method of constructing furnaces for the washing and chloridizing of ores, whereby the same is more effectually and economically done.

STEAM HAMMER.—David Davy, Sheffield, Great Britain.—The object of this invention is to provide means for economizing steam in the use of steam hammers, or hammers actuated by any other elastic fluid, when such hammers are working with varying lengths of strokes.

MASH TUB.—Leopold Klee, Pittsburg, Pa.—This invention relates to improvements in mash tubs for preparing mash for brewing and other purposes.

HYDRANT.—H. J. Bailey, Pittsburg, Pa.—This invention relates to new and useful improvements in hydrants, which embrace the construction and general arrangement of parts. The provision made for preventing the oxidation of the casing, and for removing the working parts from the case for purposes of inspection or repair.

DRILL CHUCK.—Eli H. Babcock, Canandaigua, N. Y.—This invention relates to an improvement in the method of holding and truing steel drills in lathes and drilling machines, whereby machine work is greatly facilitated, and whereby the process of drilling in iron, steel, or other metals, can be much more accurately performed than when done by drills held in the ordinary manner.

DOOR LOCK.—Richard C. Harrington, Newark, N. J.—This invention relates to a new door lock, which is so arranged as to be altogether burglar-proof; this is provided with two key-holes, one on the inside and one on the outside, but not opposite to each other; and is so constructed, that it can at all times be locked and unlocked from the inside, also unlocked from the outside, when it has been locked from the outside; but it cannot under any circumstances be opened from the outside if it has been locked from the inside.

PRINTING INK.—Charles Walsten, Lafayette, Ind.—This invention relates to a new and improved method of making printing ink whereby the cost of the same is greatly cheapened.

HORSE HAY RAKES.—Jonathan Hunsberger, Worcester, Mass.—This invention has for its object to improve the construction of wire toothed horse hay rakes, so that the driver by a simple movement of the foot lever can cause the rake to rise and discharge the collected hay.

MACHINERY FOR SPINNING.—A. L. Houghtaling, Philmont, N. Y.—The nature of this invention consists in a new and useful improvement in a spinning machine for drawing and twisting roving or roving, whereby the thread is drawn out, evenly to any required degree of fineness, which improvement may be employed for spinning any kind of fibrous material.

CLAMP.—Gustavus V. Brecht, St. Louis, Mo.—This invention relates to a machine for boring out the centers of wagon hubs for fitting the boxes thereto, and it consists in the manner in which the clamps or jaws are formed by which the hub is held while the operation is being performed.

SCREEN AND SCOOP.—Augustus Thayer, Albany, N. Y.—This invention consists in a new and improved combination of a screen and scoop, whereby a scoop or small shovel may, with the greatest facility be connected with a

screen whenever desired. The invention is applicable to fire shovels, and may be applied to scoops of all kinds.

WASHING AND WRINGING MACHINE.—Robert H. Tomlinson, Brownsburg, Penn.—This invention relates to a new and improved machine for washing or cleansing cloths and for wringing them at the same operation.

STAMPING MILL.—Richard Uren and John Walker, Houghton, Mich.—This stamping or quartz crushing machine is of that class wherein the piston is connected directly to the stamp head, without the intervention of a dummy shaft and crank in which it is desirable to operate the stamp so that it may have no variable throw, effected by an automatic valve movement, and it consists, first, in providing supplementary cylinders and pistons at each end of the main cylinder, to act as cushions against which the force of the stamp piston may be expended without damage, whenever from any cause the piston will be forced against the ends of the steam cylinders. Second, in providing a variable automatic cut-off to regulate the amount of steam admitted to the cylinder for raising the hammer or stamp. Third, in providing an adjustable outlet which may be so graduated as to regulate the discharge of water and pulverized ore from the machine. Fourth, in providing the stamp head with a flange of such shape as to throw the water and pulverized ore against the screens, in a manner more readily to separate the ore and discharge the pulverized portion from the machine. Fifth, in providing through the bottom of the mortar an outlet for those particles of ore which do not become sufficiently pulverized to pass through the screens, and which usually, in the machines as now constructed, become packed in the mortar so as to be difficult to remove.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at \$1.00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

Ballston Spa, N. Y.—Twenty dollars received, said to be for second Government fee—no signature to the letter. Who are you?

W. H. B., of Texas.—Several devices have been proposed to overcome the resistance caused by running cars around curves. A divided axle is the well known plan, but it does not work well in practice.

D. L. G., of R. I.—Your electrical thermometer is not new. Such an instrument was described last year in the German Polytechnic Journal.

A. A. R., of Mich.—Your communication in regard to the sun's rising is a good one, but we have already devoted as much space to the subject as we can afford. The question is really one of very little practical value.

D. E. B., of N. Y.—"What should be the thickness of a coiled steel spring—number of wire—to sustain a weight of 300 lbs.?"—Probably the spring meant is a spiral spring. Its suspensive power, without setting, would vary greatly with the temper of the steel and the diameter of the spiral. It is doubtful if a rule could be established covering all the conditions.

C. C. S., of Pa., asks, "What is the process of marbleizing slate and other materials?"

C. W. I., of Iowa.—We think Henry Carey Baird, 406 Walnut street, Philadelphia, may furnish you with a treatise on hydraulics which will contain a simple formula for calculating the rise of water above mill dams. Weisbach's formulas are intricate, but we know of none better.

J. C. E., of Miss.—We believe Capt. McClure did sail through a passage at the north of this hemisphere, and we have never seen the statement denied. The existence of a "northwest passage" we believe to be fully established. As to the reward said to be offered for this discovery we are not informed.

C. C. H., of Mass.—The greatest authenticated depth—72 feet—of the descent of a diving bell of which we have any knowledge was attained in the harbor of Portsmouth, N. H., and described in Vol. XXII of the *American Journal of Science*.

N. D. A., of N. Y.—"At a temperature of 212 Fah., the elastic force of steam just equals the pressure of the atmosphere. Does a gage showing a steam pressure of 70 lbs., per square inch indicate absolute pressure, or does it show only the pressure above 212°? In other words, do our common spring gages begin to record pressure at 31° or 212° Fah?" Steam gages record the pressure of steam from a point above the equilibrium of the steam as generated and the atmospheric pressure.

L. F., of C. E.—Mix plaster of Paris with water from quicklime and it will be less liable to crack than with pure water. A little glue dissolved, will not injure it.

J. B. S., of Ga.—"What is the greatest difficulty to be overcome in the construction of aerial machines?" Their direction and propulsion. For the first there is the changeableness of air currents, and for the second the slight resistance of the air. Beside these may be reckoned the impossibility of re-generating a gas of sufficient levity as needed. These difficulties appear to be almost insurmountable.

A. J. W., of Miss.—Fruit or vegetables when to be canned are partially cooked in a water bath and the can containing them suddenly stopped or cemented air-tight. The process requires some care, but can be easily learned. The idea is to expel the atmosphere by steam and before the steam entirely escapes to stop up the can so that no external atmosphere can get in.

E. J. H., of Kansas, asks if the pressure of the atmosphere will affect a belt conveying power from a source two hundred feet distant any more than from a distance of twenty feet. Certainly, the resistance of the atmosphere is greater on a large than on a small surface. In conveying power, however, by means of a belt for long distances it is seldom taken into account.

H. G. R., Jr., of Ill.—We have at present no pamphlet on the application of disinfectants in arresting the spread of the cattle plague. Carbolic acid is the best disinfectant of which we have any knowledge. Refer to past numbers of this paper for further information.

D. W., of Pa.—We are unwilling to give advice in regard to the use of arsenic as a medicine. You should consult an experienced physician. Persons ignorant of the science of medicine and symptoms should avoid dosing themselves with dangerous drugs.

G. H., of Miss.—Your communications are full of curious details, but it would puzzle a Philadelphia lawyer to decipher the peculiar style of writing which you have adopted. The compositor is very liable to grumble a good deal when such copy is put into his hands. If you desire to give publicity to your views you had better issue them in pamphlet form.

EXTENSION NOTICES.

John Mable, of English Neighborhood, N. J., having petitioned for the extension of a patent granted to him the 3d day of October, 1854, for an improvement in pen and pencil case, for seven years from the expiration of said patent, which takes place on the 3d day of October, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 14th day of September next.

Norman C. Harris, of Poulney, Vt., having petitioned for the extension of a patent granted to him the 24th day of April, 1855, for an improvement in manufacture of slate pencils, for seven years from the expiration of said patent, which takes place on the 24th day of April, 1869, it is ordered that the said petition be heard at the Patent Office on Monday, the 23d day of November next.

Business and Personal.

The charge for insertion under this head is one dollar a line.

For Sale—patent rigging for jib sails—will increase the speed of any fore-and-aft vessel. Patented May 12th, 1868. Address inventor, Fred. Fillingham, Ithaca, N. Y.

Metal small wares of all descriptions made and introduced to the trade. Dies and tools for all kinds of work, brass castings, etc., etc., to order. J. H. White, Newark, N. J.

Stamped brass goods, steel dies, new patent goods, etc., manufactured by T. N. Hickcox & Co., 260 Pearl st., New York.

S. S., Wis.—M. M. Leahp, Milwaukee, is agent for Broughton's lubricators, oil cups, gage cocks, and oilers. Undoubtedly they are the best.

Wanted—Engine 12-in. cylinder, 2-ft. stroke, and boiler to suit. Address H. Gibson, Locust Point, Baltimore.

Adams' improved air cylinder graining machine, in operation daily and specimens of work at 44 Murray st. Send stamp for circular, full particulars, prices, etc. Address Heath, Smith & Co., as above.

For sale—Road or State rights to make and use Blythe & Hayes' patent machine for turning off locomotive crank pins in the wheel. Address W. Blythe and S. Hayes, Alexandria, Va.

The surest detective of low and high water, and high steam in boilers yet invented. Springer, Hess & Co., Philadelphia, Pa.

Bartlett machine and needle depot, 569 Broadway, New York. Needles for all machines, hackle, gill pins, etc.

Merriman's patent bolt cutters—best in use. Address, for circulars, etc., H. B. Brown & Co., New Haven, Conn.

To iron and steel manufacturers.—A gentleman who has given several years to study of metallurgy, mineralogy, chemistry, geology, etc., as also, one year to the manufacture of iron and steel, would be pleased to become connected with some iron or steel establishment on a fair salary. Address, M., box 5636, New York city.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

Wanted—manufacturers of tinmiths' tools, to address Geo. M. Irwin, box 1455, Pittsburgh, Pa.

NEW PUBLICATIONS.

POLAR MAGNETISM.

This is the published paper, by John A. Parker, read before the American Institute, and to which we referred in our criticism on the exercises of the Polytechnic Club, page 297, Vol. XVIII. Our opinion was by no means favorable, and having perused the pamphlet we are more strengthened than ever in our disapproval of its contents. Instead of being a contribution to the stock of knowledge, it is nothing but a confession by its author of his want of knowledge of a subject about which every philosopher of the present day should be well informed, and much more one who aims at giving public readings and issuing publications relating to it. Perhaps we had better state our grounds, in order not to be accused of being too severe or unjust.

The author possesses some information, he has of course read or heard something on the subject, but what he knows about it is very superficial, one-sided, and incomplete. He announces as a great discovery of his own, that the magnetic pole revolves around the geographic pole, and that this ignores entirely that this hypothesis is very old, and by later investigations has been proved utterly inefficient to the full explanation of the very complex phenomena of terrestrial magnetism. He ignores the existence of the magnetic observatories established at the suggestion of Humboldt in different parts of the earth, and the important results lately obtained therefrom. He ignores the numberless irregularities and anomalies at different parts of the earth's surface, and, for instance, attempts to make out that the determination of the location of the magnetic pole by Captain Ross was erroneous, and because it does not agree with the declination in London, declares that Humboldt was wrong, etc., etc.

Then our author tries to prove, not with facts but with high-sounding words, that magnetism, electricity, and gravitation are all one; he calls the electricity developed by a revolving belt in a manufactory "magnetism," and says: "I have come to the conclusion that what we call polar magnetism is the result of magnetic force rendered active by revolution . . . a latent force derived from latent principle and put in motion by a forward revolution." Clear as mud, this!

Then he says that the attraction of the needle is toward the center of the earth, and mentions an experiment with a needle magnetized only at one end, which he says will point perpendicularly downward toward the center. The mere mentioning of this experiment, which assuredly he never made but in his imagination, proves that he does not know the laws governing the action of magnetized bars, nor the influence of the earth on them, and that he has only a very obscure notion of the inclination or dip of the needle.

The variation of the compass he thinks to have explained by speaking of cosmical influences, and formally proposes again the long exploded idea of a shifting of the earth's poles, which, according to him, will eventually reach the equator, when that will be a frozen region. He thinks that this theory explains the fossil remains of equatorial plants and animals found near the poles, and thus seems to ignore that La Place has long ago proved the utter impossibility of such shifting of the poles in regard to the earth's mass, and the teachings of geology in regard to the transitions our globe has undergone.

As there is scarcely a page among the thirty-four this pamphlet contains which does not need correction or criticism, we have no space for further comment.

EXPERIMENTUM CRUCIS. By L. S. Benson.

This is a small pamphlet sent us by the author, in which it is at first not clear what he is driving at, but on reading the same it appears that he attempts to demonstrate that the common way of finding the circumference of the circle by the method of approximation, and the results obtained by this method are entirely erroneous. From a false proposition he deduces that the surface of a circle is exactly three times the square of its radius. As this is disproved by the inscribed polygons, which as soon as they have some sixty-four sides or more, are larger than this number, our author asserts that the calculation of these polygons gives an excess above the circle, consequently that the periphery of these inscribed polygons gets, some way or other, outside the circle as soon as they have numerous sides! Now, to show how this can be, he tries to prove that it is always the case in curves, and gives the calculation of the polygons inscribed in a parabola, and by some slight mistake he finds that the inscribed polygon of 512 sides is 0.007 larger than the parabola itself, and then jumps to the conclusion that the polygon of 52,768 sides must be 0.148936 larger than the circle in which it is inscribed. The whole reasoning falls utterly to the ground when we take into consideration that the number found by mathematicians by the method of approximation is verified not only by scores of other methods, but also by the most scrupulous practical trials, and by all astronomical calculations; that all thorough mathematicians agree perfectly about this number, and that the disagreement only is to be found among the circle squarers, one of whom found 3 (like our author), another 3½, another 3¾, etc., etc., every one of them starting from false premises, and ignorant of the labor performed before them by others better informed than they.

Instrument for Describing Ellipses.

Describing an oval by means of pins, string, and pencil, or by striking two segments of circles and connecting their peripheries, as well as the method by intersecting lines, are but makeshifts, it being difficult to inclose the exact area desired. The device, however, shown in the engraving, gives the means of forming ellipses, of any required size and proportion, quickly and perfectly.

It is a simple instrument, adapted to the trestle of the draftsman, or the bench of the mechanic, easy to handle, and certain in its operation. It is a stock or handle, A, of metal, ivory, box, rosewood, or mahogany, having a slot cut through the greater part of its length, in which slides a bar, B, and a protractor, C, so united to the graded scriber, D, by adjustable sockets of metal, as to insure harmony of the parts in using. One end of the scriber has a swiveled holder for pen, pencil, blade, or diamond, to mark or cut the oval. The arms, B and C, can be set on the scriber to form any size of ellipse within the compass of the instrument, and with any relation to a true circle. At the small end of the handle is a stud, E, which is the center on which the scriber and its parts turn, while a pointer, F, at the end of the slot, determines the line of one axis of the oval, so that it may be drawn exactly where it is wanted.

From this brief explanation it is believed any draftsman or mechanic can understand the operation of this device; its advantages are obvious to all who use drawing materials for drafting machinery, buildings, etc. It is evident, also, that for cutting patterns, where a knife blade is used instead of pen or pencil, it is well adapted. For cutting glass for oval frames also, a diamond taking the place of the pencil, its advantages are evident. The implement is manufactured to varying sizes and in different styles, to suit the demands and taste of the user. The instrument can be adjusted to draw an oval with its long axis parallel to the stock or handle, as well as with its short axis in the same position.

The patent for this device was obtained through the Scientific American Patent Agency, January 14, 1868.

Further information may be obtained by addressing the inventor, Franklin Bowly, Winchester, Va., or Augustin J. Smith, Baltimore.

THE PROGRESS OF MECHANICAL INVENTION.

"The times change." We notice the truth of this adage as we glance back over nearly a quarter of a century, and see the vast advances made in one of the specialties of this periodical; that of mechanical improvement. We see our inventors and mechanics taking a higher ground, assuming a higher status, turning their attention from the primer of mechanical and scientific knowledge, proving theories by practical experiments, and using their own powers of observation, thinking, and practice, in preference to accepting the dicta of men of a by-gone age. So long as they adhere in their experiments to well-established laws, even if they use those laws to establish a fact not known to their propounders, they cannot go far wrong. And they may also criticize the experiments upon which those laws were founded and the deductions drawn from them and still be doing "God service," and benefiting their fellow men. But when they choose to ignore the laws which govern matter and project so-called improvements in defiance of those laws, they are simply wasting the time and talents God has given them for useful purposes.

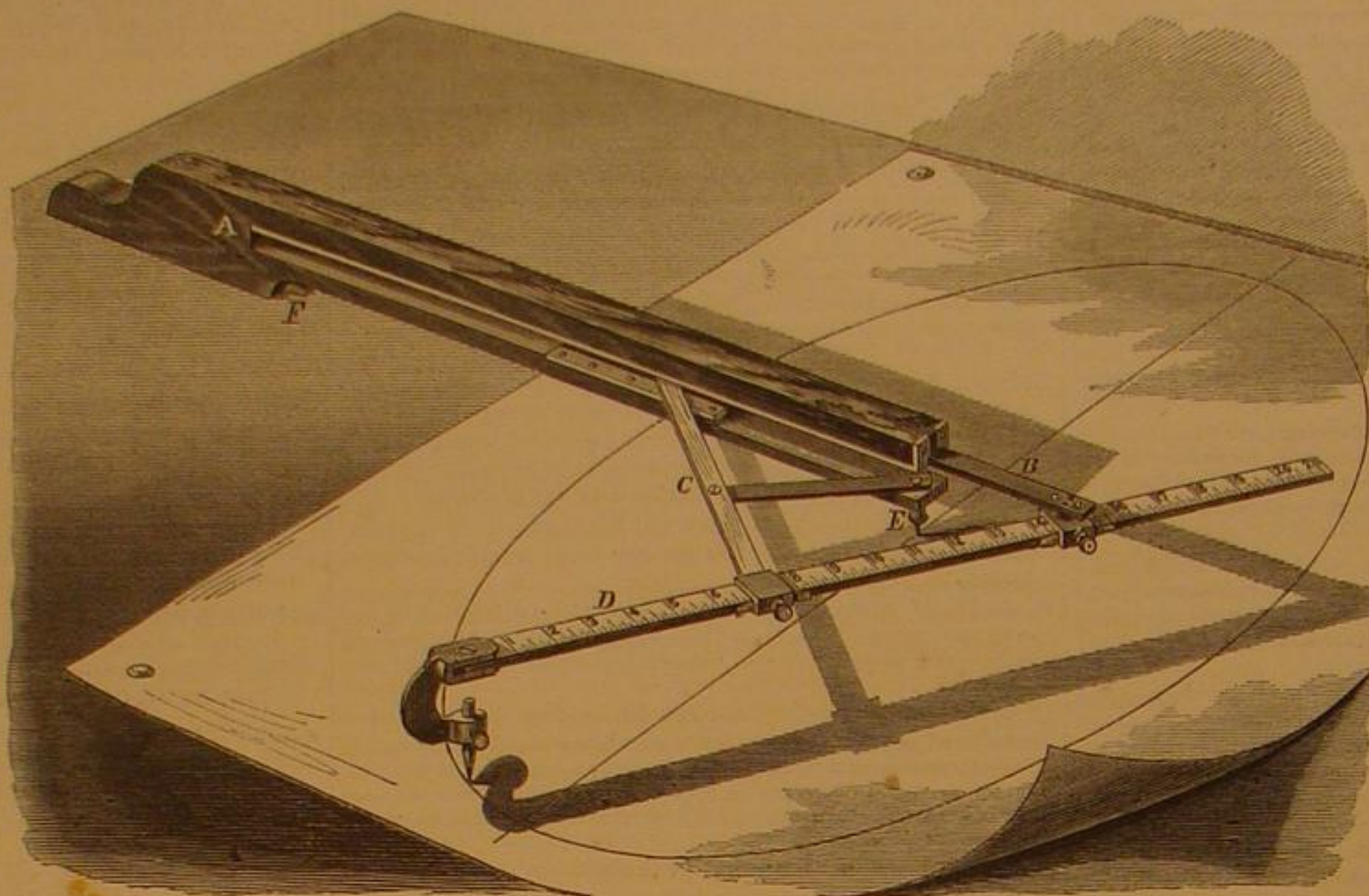
Not long ago one of these "improvements" was brought to our notice by its enthusiastic inventor, who actually claimed to have abrogated the natural and well known law that a force will not yield greater power through the medium of machinery than it first possessed. In vain was it to show—to demonstrate—that the friction of the parts of his machine necessarily absorbed a portion of the original power applied; he insisted that his plan and machine were perfect and that the natural law must be modified to suit his case. Still, even here, we saw the truth of the proposition just made, that our mechanics and inventors were thinking for themselves.

Twenty years ago a mechanic who attempted an improvement in the method or appliances of doing his work was met with discouragements on every side: his fellow workmen, either from jealousy or envy, belittled his work and refused to use his device. Employers looked upon the innovation as a transgression of old time custom and habit, and refused aid to a project which threatened to remove their processes from the well-worn groove and to compel them to a rejection or modification of their appliances. If the inventor took out a patent and expected others to pay for the use of his brain product, he met with discouragements and rebuffs on every hand. Frequently he was compelled to see his improvement adopted and large fortunes made by its aid while he suffered the stings of poverty and the unpleasant reflection that his ambition was not gratified, as in many cases not even an acknowledgment of his agency in the invention was accorded.

Since that time our people have been educated to that extent that not only the workman but the employer and the consumer have come to recognize the value of improvements and the rights of the inventor. Now a really valuable improvement finds a ready sale and speedy adoption, especially if its claims are properly advertised. We cannot but believe that the SCIENTIFIC AMERICAN has done much toward this education and the recognition of the claims of inventors and the value of their labors. As a means of presenting these claims and as an advocate of the rights of inventors this journal has no superior.

BETTING AGAINST THE WEATHER.

We were told a few days since that a gentleman in this city had won ten thousand dollars in betting against the

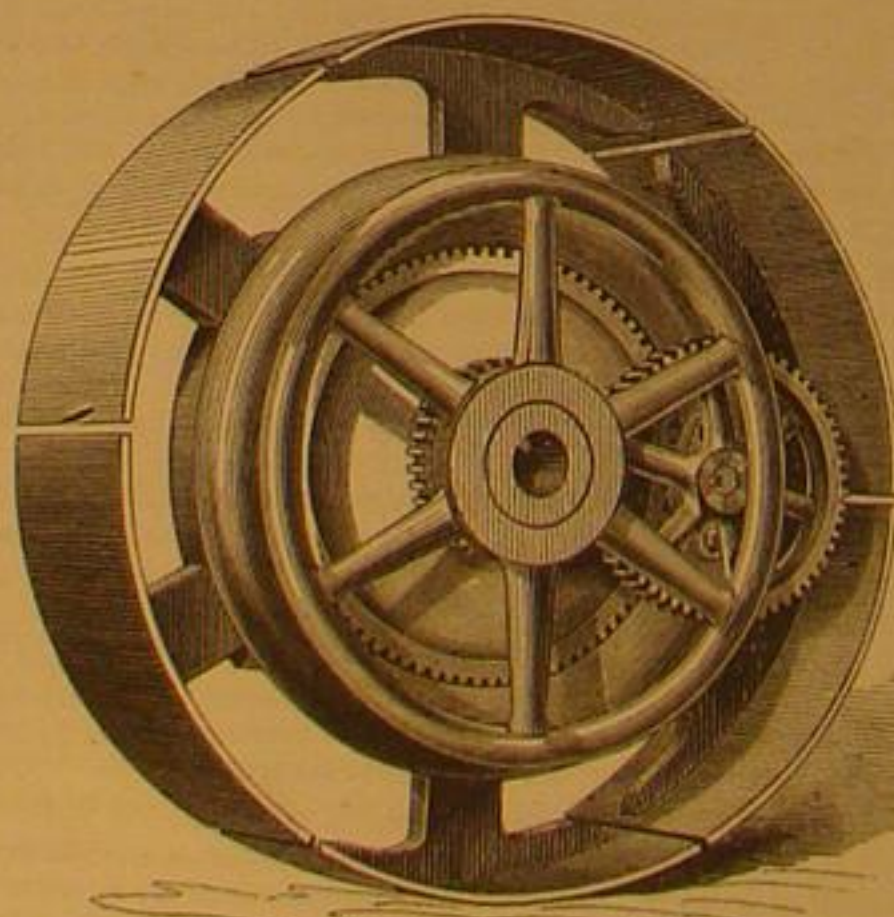
**BOWLY'S PATENT OVAL COMPASS.**

weather during the past spring. There is some novelty in this, to say the least, and it may be no worse than the very prevalent practice of growing against the weather. When we consider the numerous and rapid changes which take place in our climate, it is a remarkable fact that the mean temperature of a place remains nearly the same. The winter may be unusually cold, or the summer unusually hot, while the mean temperature has varied less than a degree.

A very warm summer is therefore likely to be accompanied with a cold winter; and in general, if we have any long period of cold weather, we may expect a similar period at a higher temperature. Usually, however, in the same locality, the relative distribution over summer and winter undergoes comparatively small variations; therefore, every point of the globe has an average climate, though it is occasionally disturbed by different atmospheric changes.

SAVERY'S IMPROVED EXPANDING PULLEY.

In the manufacture of paper there are many causes, well known to those engaged in the business, which render it necessary to frequently alter the speed of the different rolls.



These variations in speed are now effected by means of lags of felt, canvas, or leather glued to the face of the driving pulley, or removed therefrom, as the exigencies of the case demand. This rude makeshift is very unsightly, and entails much labor, as all who have noticed the driving side of a paper machine can testify; it is also very uncertain in its operation, as portions of lagging often become loose and come off, breaking the paper, and necessitating the stoppage of the machine. To keep the lagging in order involves so much effort on the part of the machine tender that he will sometimes allow the paper to break rather than take the time necessary to prevent such an accident.

The design of the improvement herewith illustrated is to

provide against these annoyances by an expanding pulley. It is so constructed that it can readily be made larger or smaller by turning the hand wheel backward or forward, and this may be done while the machine is in motion. The change of size can be made very gradually, just as the jaws of a scroll chuck can be opened or closed gradually. The pulley is made very strong, is not liable to get out of order, and has been tested by many of our first class paper makers, receiving their unqualified commendations.

Patented through the Scientific American Patent Agency, June 9, 1868, by Thomas H. Savery. All orders or communications for information should be addressed to Pusey, Jones & Co., manufacturers of Paper Machinery, Wilmington, Del.

Transparent Gelatin Prints.

At the last meeting of the Franklin Institute, there were exhibited by Alex. E. Outerbridge, Jr., some transparencies for the lantern, of a novel and effective description. They consisted of impressions from wood cuts, made upon sheets of gelatin directly from the cut, and with as much facility as upon ordinary paper. Mr. Outerbridge has since found that the finest lithographs may be taken upon this substance with the greatest readiness. The only precaution necessary is to print with a dry stone, since gelatin is very soluble in water. The gelatin may be made insoluble by mixing with it while fluid a small quantity of bichromate of potash, and then exposing to light. This, however, slightly tinges the other wise perfectly transparent substance. We have in our possession an impression on gelatin, of the map of the Suez Canal. The finest lines and dots appear perfectly, and with more density than could be obtained in a photograph. This opens quite a new and extensive field for lantern illustration.—*Franklin Jour.*

[Mr. Outerbridge has also favored us with a few specimens.

The use of sheet gelatin for the above purpose is quite old. We have had a large number of pictures of precisely the same kind in our possession for more than eight years. Several years ago, we attended a public exhibition of the stereopticon, at which the views produced on the screen were obtained from similar gelatin prints. A panoramic effect was also presented, the pictures being printed upon long strips of gelatin, which were cemented together and stretched between two rollers, in such a manner that by turning a crank the pictures were successively brought before the lenses and thrown upon the screen. Many of the pictures were colored, and beautiful effects produced. We also witnessed, some years ago, a very useful application of gelatin in a school, where the teacher was accustomed to trace small pictures with a pen and india ink, upon strips of gelatin, and then draw them through the magic lantern, thus reproducing the pictures, greatly enlarged, before her class. It is a very simple, cheap, and effective method of instruction. Sheet gelatin, suitable for the purpose, can be had of dealers in artists' materials. It costs about thirty cents a square foot. The expense of the magic lantern is small, and the gelatin pictures may be readily done by hand. A little practice suffices to enable most young persons to make them.—*Eds.*

"MINARGENT" is the name given to a new substitute for silver, which is said to possess nine tenths of its whiteness, malleability, ductility, tenacity, sonorousness, and density, while it has a superior metallic luster, wears better, is less likely to be acted upon by sulphur in its various forms, and is less fusible than silver. The chief features of this wonderful alloy consist in the introduction of pure tungsten and aluminum, also the considerable proportion of nickel which the inventors have been enabled to alloy with aluminum notwithstanding its known want of affinity therewith. Minargent is composed of 1,000 parts copper, 700 parts nickel, 50 parts tungsten, and 10 parts aluminum. The first three elements are melted together, then run off in a granulated form, and again melted, adding the aluminum and about 1 1/4 per cent of a flux composed of one part borax and one part fluoride of calcium; these proportions of borax are reduced as the fusion proceeds.

A QUEER TRADE MARK.—A company in France manufacturing steel pens have adopted the very singular trade marks which represent the crucifixion of Christ and the descent of the Holy Spirit; each pen is being stamped with these devices. The French have some very queer notions about the use of names for business purposes. Thus, for example, one establishment in Paris is known as the "Store of the Child Jesus," and a competition concern, not to be outdone, has adopted the appropriate title, "Store of the Good Devil." We once remember to have seen a large transparency in front of a mountebank's tent illustrating the birth of our Savior.

MISSISSIPPI planters this year are paying considerable attention to the cultivation of "Havana" tobacco for cigars. The young transplanted plants are reported to be thriving finely.

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

"The American News Company," Agents, 121 Nassau street, New York
"The New York News Company," 8 Spruce street.

Messrs. Sampson, Low, Son & Marston, Booksellers, Crown Building, 188 Fleet street, London, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

Trubner & Co., 60 Paternoster Row, London, are also Agents to receive subscriptions.

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VOL. XIX., No. 1....[NEW SERIES.]...Twenty-third Year.

NEW YORK, WEDNESDAY, JULY 1, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

*Improvement in Steering Apparatus for Vessels.....	8
*Improved Burglar-proof Safe.....	1
A Vine-Growing Town.....	1
A Wonderful Skull.....	1
Vegetable Coloring Matters.....	2
Cutlery—United States Industry.....	2
Cast Iron Working in Scotland.....	2
Modern Naval Warfare.....	3
*A New Jersey Fish Farm.....	4
*Herring's Center Vent Water Wheel.....	5
Fell's Railway Over Mont Cenis.....	5
Editorial Summary.....	6
Manufacturing, Mining, and Railroad Items.....	6
Recent American and Foreign Patents.....	6
Answers to Correspondents.....	7
New Publications.....	7
Extension Notices.....	7
*Instrument for Describing Ellipses.....	8
The Progress of Mechanical Invention.....	8
Betting Against the Weather.....	8
*Savery's Improved Expanding Pulley.....	8
Transparent Gelatin Prints.....	8
Balancing of Machinery—The Centrifugal Hydro-Extractor.....	9
Mind Your Business.....	9
Reform in the British Patent System.....	9
The Hoosac Tunnel—Drilling by Machinery.....	9
Supply of Cold Air to Furnaces for Warming Buildings.....	9
Ten Dry Plates in Photography.....	10
The Use of Skilled Labor.....	10
A Question in Pneumatics.....	10
Variation of Watches.....	10
To Repair Worn-out Dies.....	10
A Boiler Test Proposed.....	10
Loss of Gas—Wet Meters.....	10
Patent Claims.....	10, 11, 12, 13, 14
Inventions Patented in England by Americans.....	14

BALANCING OF MACHINERY.—THE CENTRIFUGAL HYDRO-EXTRACTOR.

On page 361, Vol. XVIII., we spoke briefly of the importance of balancing pulleys, gears, fly-wheels, etc., especially such as received a rapid, rotary movement. In that article we alluded to experiments which were in progress to determine the effect of unequal or eccentric gyration, as compared with a steady rotation. The experiments were made in Havermeier's sugar refinery, in Williamsburg, L. I., by a trial between the ordinary centrifugal machines used in separating the molasses or sirup from the sugar, and improved machines recently introduced, the great feature of the latter being their power of self or automatic balancing.

These centrifugal machines are probably too well known to our readers to require any detailed description. They are upright, revolving cylinders of fine wire gauze, enclosed in other cylinders with perforated steel sides. The semi-fluid sugar is thrown in and spread on the bottom of the inner cylinder, which is then rapidly rotated, the centrifugal motion throwing the granulated product against the netting, which holds it, while the sirup is permitted to escape through the interstices of the network.

In the establishment where these experiments were conducted, there were seven of these machines of the ordinary make, and seven of the newer pattern. In the former it is necessary that the material should be very evenly distributed over the bottom of the cylinder, or the machine would shake, pound, and tend to throw itself from the center. Now, from the fact that the sugar is put into the machine in a semi-fluid state, it cannot be expected that, however evenly balanced the load might be when first put in, it would so continue for a long time. The new centrifugal machine is self-balancing. It matters not whether the load, when first put in, is on one side, or that it afterwards becomes one-sided; the machine adapts itself to these varying circumstances, and uniformly maintains its balance. Of course, there must be less wear on the machinery, less friction, and less power required to do the work.

The experiments to which we have referred were conducted with great care, and the results shown below are the mean of three experiments on different days. All the machines were driven by the same engine, through the same line of shafting. The seven old style of machines made about 1,000 revolutions per minute, with an aggregate load of 1,451 lbs., and in running seven minutes discharged 869 lbs. of sugar; the power required being 32.27 H. P. by the indicator.

The seven self-balancing machines, with an aggregate load of 2,093 lbs., running 1,200 revolutions per minute, discharged 1,219 lbs. of sugar; the power absorbed being 22.48 H. P., running, as the others, seven minutes.

Thus, it will be seen, here was a saving of power of 30.34 per cent; gain in product of 30.68 per cent; and superior sugar in dryness of 1.11 per cent, being total in favor of the improved machine a saving of 62.13 per cent. This result was not anticipated by the proprietors of the establishment, even if it was contemplated by the inventor. It was well known that the new machine could do a larger amount of work in the same time than the machines of the old style, but it was believed there would be a corresponding expenditure of additional power. Yet the result showed a less expenditure of power with a larger amount of work performed.

Mechanics may ask, "Why is it that the simple balancing of a machine will save so large a percentage of power as is shown by the result of these experiments?" Perhaps it is easier asked than answered. But suppose an upright cylinder revolves at such a rate its surface moves two miles per

minute, and that a shot of two pounds weight be placed in it. Liberate the shot, and it flies off at a tangent with a force proportioned to the weight of the shot, plus its velocity. Now would not the same amount of force exist if the shot was confined to the interior of the cylinder; in other words, does it not require as much power continuously to retain that shot from flying off, as its flying off would give out instantly? If so, we shall have no difficulty in accounting for the great saving of power by the balancing of the machine, especially if we take into account the excessive friction engendered by eccentric gyration at a high speed.

This improved centrifugal machine is adapted to the drying of clothes in laundries. After the clothes are washed they are put into the cylinder, a jet of warm water is introduced for rinsing, the machine put in motion, and the water, by centrifugal force, is thrown out; the water is shut off, the clothes, after revolving a sufficient time, are taken out nearly dry—just fit for ironing.

It is excellent, also, for woolen manufacturers to dry their wool, after its being washed and colored, and also for bleachers to dry their goods; for tanners to extract the tannin remaining in their spent bark, after it is taken from the vat.

MIND YOUR BUSINESS.

That economic philosopher, Benjamin Franklin, proposed for one of our national coins the legend which forms the heading of this article. For the people of this country, then and now, it had and still possesses a peculiar significance, and its value is not impaired by the circumstances of locality or time. Its observance would remove one great hindrance to progress, and aid in the development of individual exertion. Yet no man can undertake any new enterprise without being overburdened with, and nearly overwhelmed by gratuitous advice.

If a man invents a machine or improves on any mechanical device, straightway he has a number of advisers who can tell him where he has failed and how he may perfect. If one is ailing it is a curious fact that every friend to whom he reveals his annoyance is a medical adviser and can tell him exactly what to do to find relief. If an accident occurs demanding prompt action and amendment, all the bystanders assume to become directors of the job, and are profuse with advice, but very chary of help.

Probably this disposition to offer unasked advice is shown nowhere so prominently as in the workshop. If a workman has a difficult job to perform he finds plenty of advisers, mainly those who, having had no similar experience, can use conjecture instead of fact for a guide. The objects for this gratuitous advice are usually singled from green apprentices, or journeymen new to the ways of the shop. They are considered fair game—proper subjects for experiments—and are tormented, annoyed, and bothered by repeated, antagonistic, and foolish counsel. In mechanics, and in any trade or vocation, it is a matter of pride to the workman to compass his deliverance from an annoying position by his own exertions. A proper pride impels him to prefer his own unaided exertions to the assistance of voluntary teachers. When he needs counsel—the ripe experience of his seniors—if he is not foolishly independent and self-willed, he will ask it. When desired is the time when it is valuable to him. But every man knows that he achieves a greater triumph and a more solid and enduring knowledge by "working out his own salvation" than by depending upon others for assistance.

Undoubtedly the proffers of assistance are often incited by a pure desire to aid; but aid is not appreciated if the recipient does not see his need of it; yet it is always welcome when wanted, and then it will be asked for. If every one attended strictly to his own business, not only would there be more harmony among workers but greater progress would be made in all the improvements designed to aid the race.

REFORM IN THE BRITISH PATENT SYSTEM.

An influential committee of engineers recently waited upon Mr. Disraeli for the purpose of suggesting some improvements in the management of the English Patent Office. It appears from the representations made by some of the members that applicants for patents suffer serious inconvenience from the fact that they cannot, without great trouble and expense, ascertain about the novelty of a supposed new invention. It was suggested that three additional Commissioners of Patents should be chosen from practically scientific institutions, one to be a mechanical engineer, one a chemist, and one to represent science generally; also that there should be comprehensive subject-matter indexes prepared to embrace not only patented inventions, but also references to scientific books generally. It appears that the gross annual revenues of the Patent Office amount to \$600,000, while the expenses are not over \$250,000, therefore it was urged with great force that some of this surplus should be used to increase the efficiency of the office. One of the speakers stated that there was an accumulation of nearly \$1,700,000 over and above that intended as revenue, and yet, strange to say, not one of the speakers suggested a reduction of the unreasonable fees now required from applicants for patents.

Mr. Disraeli assured the deputation that the government would give consideration to the subject. We hope, therefore, that the scientific press of England will urge the importance of a considerable reduction of the charges. It is a gross injustice to tax inventors so heavily for their patents.

THE HOOSAC TUNNEL—DRILLING BY MACHINERY.

It is well known that the boring of the great tunnel of Mont Cenis and also of the Hoosac Mountain is done by machines driven, in both cases, by compressed air. A brief descrip-

tion of the machine used in the latter locality may be interesting. It is the invention, we believe, of Mr. Joseph W. Fowle, of Boston, Mass., but as used in the tunnel has been somewhat modified. His machine is now employed in removing obstructions at the Narrows off George's Island, Boston Harbor, and also on the Union Pacific Railroad.

It is simply a small steam (compressed air) engine, on a bed similar to that of any ordinary horizontal engine, the bed carrying the cylinder, steam chest, slides, crosshead, and piston rod; the latter in this drilling machine is extended and forms the drill proper, sliding through a guide on the end of the frame furthest from the cylinder. The bed with its attachments is suspended by trunnions in boxes which fit in the uprights of a frame, so that the machine may be raised or lowered to suit the elevation where the drilling is to be done. The trunnions also allow the adjustment of the drill at any angle to a horizontal plane. The uprights supporting the machine are mortised into a horizontal bed, which slides on another horizontal carriage, and can be moved back and forth by rack and pinion or similar device, worked by hand or automatically. The turn of the drill between each stroke is effected by the simple mechanism of bell crank and lever or by ratchet and pawl, while the feed of the drill is governed by a screw or rack and pinion.

The parts are simple and strong and all the actuating portions of the machine have a direct motion. If steam is used as a motor the boiler is mounted on the carriage, and the connection between the steam space of the boiler and the steam chest is by means of jointed pipes. In the Hoosac tunnel the drills are driven by compressed air, the power being derived from water wheels.

SUPPLY OF COLD AIR TO FURNACES EMPLOYED FOR WARMING BUILDINGS.

In no department of mechanical construction is an accurate knowledge of the physical laws involved more necessary than in the construction of apparatus for heating and ventilating buildings; and so far as our observation extends, in no other department does greater ignorance prevail. There are, indeed, many inventors, architects, and engineers who are thoroughly posted upon the subject, but the majority of those throughout the country, who, for the most part, are intrusted with the putting up of such apparatus, know little or nothing of the first principles upon which their art depends. Of the true nature of heat, of radiation, convection, or conduction, their practice gives no sign of recognition; and the nature of the impurities which accumulate in rooms crowded with people, and the proper method of removing them without subjecting the occupants to piercing drafts and currents from open windows, are unsolved problems.

There stands in a building in this city a monument of the ignorance of such a bungler: a stove and furnace combined, with flues open at the top and surmounted with a pipe through which not hot air (for there are no openings at the bottom of the flues), but heat is expected to rise to the room above. But the heat obstinately refuses to obey any other law than that which nature imposes, and, save a slight warmth, totally due to radiation, the register above the pipe has no more to do with the warming of the apartment into which it opens than the spittoon. If, upon this mechanical abortion, were inscribed the names of those artisans who do not know that heat, in itself, does not rise, any more than it falls, or moves laterally, and that the supposed rising of heat is nothing but the ascension of air, rendered lighter because it is heated, it would not afford room for the list, though the letters should be microscopic. If, upon such fundamental principles, a want of knowledge prevails, how is it to be expected that anything should be known of the effects of currents of air over the mouths of tubes upon the contained columns, of such great import to the satisfactory working of any apparatus involving the circulation of air through flues and passages. The most that can be expected of such workmen, is that they should know that a chimney would cease to draw when it becomes stopped, or that a stovepipe should not have too many elbows.

We have seen heaters with the hot-air registers lower than the source of supply for cold air, the hot-air registers being immediately at the top of the furnace. We have seen them placed so that the hot-air column, if it discharged itself at all, must do so against the pressure of air in a close room, there being no possible escape for the contained air except at the cracks beside the windows and doors. We have seen the cold-air boxes placed at obtuse angles, with narrow passages between buildings, so that when the wind blew strongly between them, the current would be reversed and the entire column of heated air would pass into the atmosphere outside; and we have seen such furnaces with a fire box of an inch and one-half in thickness, glowing like a cherry, while the register over the furnace was actually cold to the touch.

An observation of such particulars will explain the reason why bills for fuel are often so heavy; why heaters will often work well when some particular wind is blowing; and why, when some rooms are over-heated, others supplied from the same heater are uncomfortably cold.

The season for repairs and renovation of such appliances is usually the middle of summer, when public buildings are unoccupied; and those in charge of such repairs should observe carefully the following particulars:

The furnace should be incased with a good non-radiating material. Galvanized iron is commonly used, but it is not as perfect as is desirable, and it is to be wished that something better could be hit upon. It is no uncommon occurrence to find the basement, in which the furnace is placed, the warmest part of the building. Flues for conveying the cold air of the building to the fire boxes should also be supplied, so that when the fires are first lighted, the cold air can be supplied

from the rooms themselves. As soon as the volume of air in the building is raised to the proper temperature, these can be shut off, and a supply of pure air from the outside substituted. The smoke pipes should be large; much larger than is usual. It is not uncommon to see a six or seven inch smoke pipe attached to a furnace having a fire box capable of holding a charge of 150 lbs. of coal. Such a fire box requires a pipe at least eight or nine inches in diameter to properly avoid the permeation of the air by the gases of combustion. If the external openings of the cold-air boxes are where they are subjected to strong winds, they should be fitted with cowls. Blasts of wind will then aid the passage of air to the heaters, instead of reversing the currents.

When different rooms are to be supplied from the same heater, the conducting flues should never be at right angles with each other. When rooms are warmed by heated air, ventilation should take place from the bottom, never from the top of the room.

It requires no small skill to properly adjust all these requisites, and they should not be left to the care of ignorant or careless workmen. A timely and proper attention to them will more than repay the necessary expense.

The lectures upon heat by Prof. Tyndall, now in course of publication in THE WHEEL, will be found an invaluable aid to those who wish to gain true theoretical and practical ideas of the subject.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

The Use of Skilled Labor.

MESSRS. EDITORS:—I was somewhat gratified to learn from your last issue, page 340, that the scarcity of first-class workmen had attracted your attention. The causes you assigned for the deterioration are correct so far as they go. To say we could not produce as good workmen as formerly with our extended knowledge and increased facilities would be entirely erroneous. We do produce as good workmen and more of them, but they do not adhere so long to their trades. The writer, in referring to his acquaintances and former shopmates, can recall eleven of as good workmen (finishers and pattern makers) as the country could produce; all of them were graduate mechanical draftsmen. Of the number, but one (a pattern maker now in the Washington Navy Yard) is following his trade; three are in the Engineering Corps United States Navy, two are superintendents of mechanical establishments, one an engineer in the merchant service, while four are following other pursuits; all of this has occurred within ten years. I venture the assertion that the parsimony of employers, instigated by their desire to produce work as cheap as possible regardless of quality, and their preference for inferior workmen, when they will work for reduced wages, do more to compel first-class workmen to vacate their trades than any other cause.

A young man may have a natural inclination for a mechanical business; he will go to a trade, working through the day and studying through the evening, will acquire the laws and principles of mechanics, will train his eye to almost mathematical precision, will cultivate his hand to guide the instrument in the path of his eye, but when he becomes of age he is offered mere "hand to mouth" living wages. The consequence is he soon becomes disgusted with a trade, and seeks employment in a more remunerative business.

Another cause arises from the arrogance and intolerance of some trades unions, in demanding that all hands should be paid the same wages instead of according to their merits. The employer not being disposed to pay all as first class hands, and the pay offered not being adequate for a first class hand, the good workman will seek employment elsewhere, often in other pursuits.

Still another cause which tends to the deterioration of mechanical skill, is the iniquitous manner in which some of our public manufactures are conducted, where the drone is placed equal to the meritorious and often above through favoritism. Those things are humiliating to a first-class workman, while they have no tendency to stimulate the inferior one to improve himself. The Government should be able to command the best mechanical skill of the country, but it is notorious that the skill in our navy yards, with a few exceptions, is very inferior; very good workmen generally preferring private establishments than to be classed with drones.

Baltimore, Md.

J. J.

Tea Dry Plates in Photography.

MESSRS. EDITORS:—You have frequently published formulas for dry plate photographic processes, which I have tested in common with other professional and amateur photographers, with varying success. I will confess, however, that with all my long experience, I have found none that gave me entirely satisfactory results. The tannin plates were partially successful, but the many favorable conditions required for chemicals, atmosphere, light, etc., make the process almost impracticable. The acetate of morphia (one grain solution poured upon the sensitive plate, after thoroughly washing with water) gave more satisfactory results for twenty-four or forty-eight hours after sensitizing than any thing else, until one day last week, testing an excellent brand of English breakfast tea, it occurred to me to try it as a photographic preservative. Take eight ounces of tea of the ordinary table strength, and dissolve about three drachms of crystallized or lump sugar. When dissolved, filter, or let settle, until cold. When clear, use it precisely as in the acetate of morphia process. Sensitize the plate in the ordinary manner, and thor-

oughly wash with clean water; then flow it with the tea solution two or three times, and set it away in a dark closet to dry spontaneously. When dry, expose the plate on the view about four times as long as in practicing the wet process under similar circumstances. After exposure, wash the plate with water and flow it with a fifteen grain solution of nitrate of silver. Drain for a moment, and develop with proto-sulphate of iron solution, of the usual strength, or with pyrogallie acid. I much prefer the latter. The following is a good formula:

Pyrogallie acid, 2 grains; citric acid, 1 grain; glacial acetic acid, 10 minims; water, 1 ounce. Add no silver to the developer until it is found necessary to force the development to obtain the proper density. Use the plates within two or three days after preparing them.

How long these plates will retain their sensitiveness I have not had time to determine. I send you a print from a negative made the third day after the plate was prepared. It was exposed with a dim light, late in the day. A plate prepared at the same time with acetate of morphia, and exposed upon the same view at the same time, gave a result much less satisfactory.

I should be pleased to know the results obtained by parties who have opportunity to try the "Black Tea Process."

GEO. G. ROCKWOOD.

New York city.

[The use of tea in the preparation of dry plates is not new. It is probably the tannin, of which there are thirteen parts in black tea, which renders the tea solution useful in preserving photographic plates.—EDS.]

Variation of Watches.

MESSRS. EDITORS: I have been much interested in the articles you published on watches. I have noticed something strange in the behavior of watches, considered good ones; that is, they would lose from two to two and a half minutes in twenty-four hours after being carried on rail cars for several hours. This loss would continue for a time, but whether permanent or not I cannot say. I noticed this discrepancy in my own case, but did not attach much importance to it until my attention was called to it by others. I am anxious to learn if your author has ever noticed anything similar, and his opinion thereon.

DAVID SHIVE.

Philadelphia, Pa.

To Repair Worn-out Dies.

MESSRS. EDITORS:—Noticing in the SCIENTIFIC AMERICAN many hints that in practice prove valuable, I write the following, thinking perhaps it may be of interest to some of your readers.

To make worn-out solid screw dies cut equal to new: After the threads in a die become worn and dull it may be tapped larger by screwing a piece of wood into the thread and filling the holes or grooves with melted Babbit metal or lead; this will prevent a tap from catching. A die when used for some purposes may be upset sufficiently to allow a full good thread to be cut of the original size, but by this process old dies that are in many cases thrown away may be quickly and cheaply made equal to new.

THOMAS H. WORRAL.

Woonsocket, R. I.

A Boiler Test Proposed.

MESSRS. EDITORS:—I would suggest through the agency of your valuable paper, that, at the Exhibition of the American Institute next fall, all patent steam boilers be tested, to ascertain which boiler, burning the least amount of fuel, will produce the most power. The proper way to test them would be to have a tank full of water in which a propeller wheel of coarse pitch connected to a 40-horse engine is arranged to work. The boiler that gets the greatest number of turns out of the wheel with the least consumption of fuel should be pronounced the champion boiler.

If a test of this kind takes place, I for one will furnish a 40-horse boiler of my patent.

H. LESLIE.

Jersey City, N. J.

[Our correspondent makes an excellent suggestion, which we hope may be carried out.—EDS.]

Loss of Gas—Wet Meters.

MESSRS. EDITORS:—On page 338, of Volume XVIII., in speaking of the losses sustained by consumers of illuminating gas, when using "wet meters," I think you omitted to speak of a source of loss which is very liable to occur. It is as follows:—

When the consumption is large, and the working of the axle easy, a momentum will be acquired by the drum, so that the buckets will be only partially filled as they pass over to the supply pipe. The register records the same as with full buckets.

Philadelphia, Pa.

H. H. Y.

A Question in Pneumatics.

MESSRS. EDITORS: Air is 850 times lighter than water, and the pressure of the atmosphere is sufficient to sustain a column of water 33 feet high. Now, if were possible to submerge a quantity of air in the sea to a depth of 28,050 feet and then set it free, would the air still possess buoyancy, and would it rise to the surface of the water?

B.

To SEE THROUGH A GRINDSTONE.—The following curious optical illusion may be new to some of our readers. Roll up a piece of stiff paper in the shape of a tube, with one end just large enough to fit round the eye, and the other end rather smaller. Hold the tube between the thumb and finger of the right hand (do not grasp it with the whole hand); put the

large end close against the right eye, and with the left hand hold a book, or any convenient opaque body, against the side of the tube. Be sure and keep both eyes open, and there will appear to be a hole through the body, and objects are seen as if through the hole instead of through the tube. The right eye sees through the tube, and the left eye sees the object, and the two appearances are so confounded together that they cannot be separated.

THE CALABAR BEAN, one of the Paris journals asserts, has been found to be an antidote to strychnia. The latter destroys by spasmodic contraction; the former when taken alone paralyzes, and consequently neutralizes the action of strychnia if given after that poison. The calabar is the ordeal bean used by the negroes of western Africa in determining the guilt or innocence of accused individuals, a test the effect of which is to immensely swell the criminal lists, as it almost invariably proves fatal, the individual only escaping when vomiting is produced—a rare occurrence. The most interesting effect of the Calabar bean is that of contracting the pupil of the eye, whereby distant objects are apparently magnified and seen nearer, and it is now considerably used for increasing the power of accommodating the eye to distances.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING JUNE 16, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each caveat.....	\$10
On filing each application for a Patent, except for a design.....	\$15
On issuing each original Patent.....	\$30
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On application for Extension of Patent.....	\$50
On granting the Extension.....	\$50
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In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

78,854.—PUMP.—Wm. Adair, Liverpool, England. Patented in England, April 5, 1867.

I claim the combination of the open and closed cylinders, the latter provided with a valve cover and plunger, the two operating by means of valves, and a feed pipe, and a branch thereof, substantially as described.

78,855.—MUSIC TYPE.—Edward L. Balch, Boston, Mass. Antedated June 4, 1868.

I claim the wooden type for printing musical charts, provided with right angled shoulders, B, overlapping each other, whereby continuous and unbroken lines for the musical staff and notes are formed, as herein shown and described.

78,856.—PLOW.—Leonard W. Beal (assignor to himself and A. D. Drew), Dixon, Ill.

I claim, 1st, A plow plate, A, constructed substantially as described, so as to dispense with a land slide and separate point, and operating as specified and described.

2d, The plow plate, A, when constructed in the curved form, symmetrically before and behind its point of attachment to its standard, so as to operate and be reversible, substantially as described and shown.

3d, The combination of one or more plows, A, constructed substantially as described, with a frame, C, and wheels, W, substantially as set forth.

4th, Securing the axle, E, to the frame, C, in such a manner as to be adjustable at pleasure, to vary its direction across the frame, substantially as herein set forth and described.

78,857.—HENS' NEST.—Samuel S. Bent, Portchester, N. Y.

I claim, 1st, A metallic hens' nest, formed with rounded corners, and with the ribs, a, at the front end, as and for the purposes specified.

2d, The lighting shelf, p, in combination with metallic hens' nest, formed as aforesaid.

3d, The side partitions, h, combined with the metallic hens' nest, to separate one nest from another, as and for the purposes set forth.

4th, A movable door or window, s, in combination with the frame and hens' nest, to give access to the same from outside the coop, substantially as set forth.

78,858.—PEPPER BOX TOP FASTENER.—Jas. Bounds, Bridgeport, Conn.

I claim forming a single piece of spring wire, U-shaped, and securing one end of it to the under side center of a box or bottle top, so arranged that said lid will rest upon the top of the bottle, as and for the purpose set forth.

78,859.—HEATING BUILDINGS.—Thomas Boyd, Allegheny City, Pa.

I claim the arrangement of the flues, 1, 2, 3, and 4, fireplaces, m and n, air chamber, s, and valve, o, the whole being constructed, arranged and operating as herein described, and for the purposes set forth.

78,860.—METHOD OF LOWERING CYLINDERS.—Geo. R. Bramhall, Chicago, Ill.

I claim, 1st, The combination and arrangement of the inclined way, D, hinged at the bottom as shown, and the hinged adjustable platform, D', with its means of elevation and depression, substantially in the manner and for the purposes specified.

2d, In combination with the above, the clamps, F f, operating in the manner and for the purposes set forth.

3d, In combination with the hinged platform, D', and ways, D, the linked rods, h, arranged to operate as and for the purposes described.

4th, The frame, L, with its movable bars, M N, in combination with the ways, D, and frame, I, arranged in the manner and for the purposes described.

78,861.—WRENCH.—Daniel W. Colburn, Loami, Ill.

I claim this improved construction of the jaws, A and B, in the manner herein specified, and for the purposes set forth.

78,862.—FORGING MACHINE.—Josiah Copley, Jr., Allegheny City, Pa. Antedated June 4, 1868.

I claim, 1st, Operating the dies, J and K, by means of the slotted lever, C, arm, D, and cam, F, constructed and arranged substantially as herein described, and for the purpose set forth.

2d, The combination of the treadle, I, connecting rod, n, and shifting guides, m, when used in connection with the cam, F, arm, D, and lever, C, as herein described and for the purpose set forth.

3d, The guides, l, when used in combination with the dies, J and K, as herein described and set forth.

78,863.—MACHINE FOR GRINDING KNIVES OF MOWING MACHINES.—M. C. Cronk (assignor to himself and W. Boynton), Auburn, N. Y.

78,868.—SINGLE-TREE BRACE.—C. R. Elmer, Bridgeton, N. J.

I claim the combination and arrangement of the chain, B, and brace, E, with the beam, A, and single tree, F, substantially upon the principle above described and for the purpose set forth.

78,869.—PLOW.—Charles M. French, Rochester, Pa.

I claim a construction of a plow as that the joint between the share and mold board shall be about on a line at right angles to the plane of the share bar or land side of the plow, said joint being so arranged with relation to the share and mold board as to give depth and strength to the forward part of the share bar, and also so that the several parts may be duplicated, the whole being constructed, arranged and operating substantially as herein described and for the purpose set forth.

78,870.—MANUFACTURE OF ILLUMINATING GAS.—George P. Ganster, New York city.

I claim, 1st, In an apparatus for carbureting air, the arrangement of the inner and outer drums, D and E, through which the air passes from the pump, A.

2d, The combination and arrangement of the carbureting apparatus shown and described, with the air forcing apparatus in the same case or cylinder, substantially in the manner set forth.

78,871.—GAS BURNER.—Sam'l Gardner, Jr., New York city.

I claim, 1st, The combination of the coil, C, with a key, D, formed with one or more notches, apertures, or grooves, as at a, so as to permit a slight leakage of gas when the main supply is turned off, as shown and described.

2d, The combination of the coil, C, or its equivalent, with the hood or cap, B, substantially as and for the purpose specified.

78,872.—SUSPENDER.—Alexander W. Harris, New York city.

I claim, 1st, A suspender or brace, substantially as described, consisting of a single piece of webbing, leather, cloth, or equivalent material, passed through and sliding freely in two button strap loops, and the two ends connected by a buckle or equivalent means, by which the length can be adjusted at pleasure, as and for the purpose specified.

2d, As a new article of manufacture, a suspender or brace consisting of a single piece of webbing or other equivalent material, constructed substantially as described, in combination with a slide to secure an adjustable crossing of the webbing or other material, substantially as described.

78,873.—COMBINED INFLUX AND VENT VALVE.—J. H. G. Hawes, Newark, N. J.

I claim the arrangement with the pipe, A, D, of the two valves, C E, separate and independent of each other, adapted to operate substantially as and for the purpose specified.

78,874.—COMPOSITION FOR THE MANUFACTURE OF BEER, ALE, PORTER, ETC.—Thomas Hawks, Rochester, N. Y.

I claim as a new product the extract of malt and hops, or as I term it, concentrated wort, prepared in suitable proportions for the manufacture of ale, beer, and other malt liquors or beverages, when condensed to a sirup or substance of thick consistency, substantially as herein described, either with or without the addition of gelatin, or with or without the addition of cane sugar, substantially in the manner and for the purpose herein set forth.

78,875.—CONCENTRATED MALT EXTRACT.—Thomas Hawks, Rochester, N. Y.

I claim as a new product or composition of matter, the extract of malt, or, as I term it, concentrated malt, when condensed to a sirup or substance of thick consistency, substantially as herein described, either with or without the addition of sugar cane, or with or without the addition of gelatin, substantially in the manner and for the purpose herein set forth.

78,876.—BED BOTTOM.—Winford R. S. Hunter, Blackberry Station, Ill., assignor to himself and H. T. Rockwell.

I claim the combination of the cross sill, A, springs, B, blocks, D, slats, C, with the slats, C, and elastic strap, B, all arranged in the manner and for the purposes herein set forth and shown.

78,877.—CHURN.—F. A. Jewett, Shrewsbury, Mass.

I claim, 1st, The combination, with the cylinder, I, of the stationary arms or floats, N, substantially as and for the purposes set forth.

2d, The combination of the stationary arms, N, with the stationary shaft, K, substantially as and for the purposes set forth.

3d, The combination, with the cylinder, I, of the stationary shaft or spindle K, and stationary arms, N, or their equivalents, substantially as and for the purposes set forth.

4th, The combination, with the stationary shaft, K, and one of the arms, N, of the air or vent hole, F, substantially as and for the purposes set forth.

5th, The combination of the cap G, with the vent arm, N, substantially as set forth.

6th, The combination, with the cylinder, I, and spindle or shaft, K, of the flanged or hub pieces, B, C, substantially as and for the purposes set forth.

7th, The combination and arrangement, with the cylinder, I, of the arms, R, B, spring bar, P, screws, W, W, and cover, O, substantially as and for the purposes set forth.

8th, The combination, with the cylinder, I, of the holding screw pad, I, substantially as set forth.

9th, The combination, with the front frame pieces, A, A, and brace, E, or its equivalent, of the swing table or shelf, G, substantially as and for the purposes set forth.

78,878.—DISTILLING PETROLEUM.—Arthur Kirk, Allegheny City, Pa., Antedated February 10, 1868.

I claim, 1st, Effecting a continuous distillation of petroleum, or other distillable substance, by causing it to flow through a succession of stills, giving off in each still the more volatile ingredients, the stills being connected with trap pipes, X, Y, Z, etc., so as to prevent the backward flow of the substance to be distilled, substantially as above set forth.

2d, A nest or battery of stills, for purposes of distillation, two or more in number, connected together by pipes, each pipe leading from the upper part of the still to the lower part of another still, substantially in the manner and for the purposes above set forth.

3d, In connection with a still, for distilling petroleum, and other distillable substances, the use of a float, S, with suitable index lever, I, arranged and operated substantially as and for the purposes hereinbefore set forth.

78,879.—WATER WHEEL.—Thomas Leffel (assignor to himself and Henry C. Barnett), Springfield, Ohio.

I claim, 1st, A wheel, formed of a series of single floats, the faces of which are constructed in the form described, and which are centrally attached to the ring, K, and arranged to receive and discharge the water, substantially in the manner set forth.

2d, The combination of the floats, L, and ring, K, when respectively constructed and connected, substantially as set forth.

78,880.—GUIDE FOR BAND SAWS.—John Lemman (assignor to J. A. Fay & Co.), Cincinnati, Ohio.

I claim the combination of the roller, B, with fixed lateral guides, C, C, one or more, arranged and operating substantially in the manner and for the purposes specified.

78,881.—NURSING BOTTLE.—H. W. Libbey, M. D., Cleveland, Ohio.

I claim, 1st, The disk, A, B, provided with central and marginal openings, C, D, E, for the purpose specified.

2d, The elastic covering, F, in combination with the disks, A, B, for the purpose set forth.

3d, The tube, H, shell, G, valve, B, and elastic tube, I, all constructed and arranged to operate in the manner and for the purpose substantially as set forth.

78,882.—MACHINE FOR CUTTING STAVES.—Henry Martin, Galveston, Ind.

I claim the cutters, E, E, constructed as described, attached to the fingers, C, of the saw machine, extending above their upper ends, and having an inclination inward and obliquely over the top edge of the stave, thereby bevelling or chamfering its ends, as herein shown and described.

78,883.—TRUCK FOR MOVING HOUSES.—John S. Millikan, Thompson, Ind.

I claim a truck for moving buildings, having traverse bars, C, C, bolts, D, D, and guides, E, E, constructed, combined, and arranged substantially as herein specified.

78,884.—SEWING MACHINE.—Mortimer B. Mills, De Witt, Iowa.

I claim, 1st, The feeding slide, and the manner in which it is worked.

2d, The mode and operation of punching the holes.

78,885.—WATER INDICATOR FOR STEAM GENERATORS.—William Moore, Kokomo, Ind.

I claim the arrangement of the hollow valve, Y, with its side apertures, S, C, of the valve machine, extending above their upper ends, and having an inclination inward and obliquely over the top edge of the stave, thereby bevelling or chamfering its ends, as herein shown and described.

78,886.—STAGING.—Duncan Morrison, Portland, Me.

I claim, 1st, The combination, with the center standards, of the levers, C, and spring catches, D, connected with the platform, B, in the manner and for the purpose herein set forth.

2d, In combination with platform, B, the crank, C, pulley, P, cord, V, shaft, U, and cords, T, as and for the purpose herein set forth.

3d, The combination of cranks, K, cords, K, and springs, I, connected with the cranks, K, as described, and for the purposes set forth.

4th, The combination of the bars, M, with the clamps, N, and springs, H, on the platform, to release the said springs, as and for the purposes herein set forth.

5th, The combination and arrangement of the staging, so that it may be folded, as herein described, in the manner and for the purposes set forth.

78,887.—ERASER.—William A. Morse and John G. Powell, Philadelphia, Pa.

We claim an eraser blade made from thin sheet metal, when the same is etched by corrosive action as shown and described, for the purpose set forth.

78,888.—SHOE LACING DEVICE.—Henry L. C. Muller, Bridgeport, Conn., Antedated June 8, 1868.

I claim a string holder, D, for shoe lacing, made and operating substantially as herein shown and described.

78,889.—HARVESTER CUTTER.—John T. Norris, Tiffin, Ohio.

I claim, 1st, The knife, B, provided with slot, A, as constructed, with the bar, A, provided for the purposes herein set forth.

2d, The combination of the knife, B, as constructed, with the bar, A, provided with pins, A, set screws, C, and wedge, C, or their equivalents, substantially as and for the purposes herein set forth.

78,890.—WARMING CLOSET ON COOKING STOVES.—Daniel E. Paris, Troy, N. Y.

I claim, 1st, A warming oven to a cooking stove, situated underneath and supported by the bottom of the same, situated between and in combination with the supporting legs of the stove, when made in framework and constructed substantially as herein shown and described.

2d, In combination with the warming rack below, and the reservoir set above, a hot oven or closet, made in framework, the different parts being put together by means of bolts, locks, or lugs, and without the use of solder or other adhesive material, when constructed substantially in the manner and for the purpose herein shown and described.

3d, A warming rack, situated below a warming closet, having its rear side partly or wholly supported by pendant bars, or their equivalent, attached both to the rack and the closet above, for the purpose and substantially in the manner herein shown and described.

4th, The slide, M, or its equivalent, placed in baking ovens or warming closets, and made to be self-supporting, when drawn out of said oven or closet, for the purpose herein described and set forth.

78,891.—HEARTH AND ASH SIFTER IN COOKING STOVES.—Daniel E. Paris, Troy, N. Y.

I claim, 1st, A movable sifting grate or grates, placed permanently within the hearth or ash pit of a stove, and made to vibrate by means of a handle or shaker, operated from the outside of the stove, in combination with the surrounding walls of said hearth, or their equivalent, which act as the sides of a pan, to hold the ashes and coals on said sifting grates as they fall from the fire grate above.

2d, A covered sifting chamber, the sides of which are formed by the hearth or ash pit of the stove, and by the slide or conducting plate below the fire grate, the bottom of which is formed by an open or perforated sifting grate or grates, and the top by a movable cover to said hearth, in combination with an ash pan or ash chamber, situated just below said grate or grates, when the latter are constructed substantially as herein shown and described.

3d, An opening at the lower front of the hearth or ash pit of a stove, of a sufficient capacity to remove the ashes or an ash pan from the chamber below the sifting grate or grates, and in combination with said grate or grates, when the latter are constructed substantially as herein shown, or are placed permanently within the hearth or upper part of the ash pit of a stove.

4th, The closing of said opening at the lower front of the hearth by a drop door or falling plate, having its lower edge or ends attached to the hearth or ash pit, and so constructed that, when it is let down at or near a level with the bottom of said hearth, it will thus remain, for the purpose of supporting, and in combination with the ash pan, when the latter is made to be drawn out in the manner and substantially as herein shown and described.

78,892.—CONSTRUCTION OF TOE CALKS FOR HORSE SHOES.—Charles H. Perkins, Providence, R. I.

I claim a toe calk for horse shoes, furnished with chisel edged tenons or spurs, B, set opposite to each other, and with their faces parallel with each other and with the longitudinal axis of the calkin, substantially as described, for the purposes specified.

78,893.—UMBRELLA.—George Willis Pierce, Boston, Mass.

I claim, 1st, The clamp 1, (represented by figs. 2 and 3,) provided with one or more prongs, A, for the purpose specified, the whole made and operating substantially as described, and for the purpose specified.

2d, The clamp 5, in combination with the ring 4, (represented by fig. 4,) when made, combined, and operating substantially as described and for the purpose specified.

78,894.—VENTILATING APPARATUS.—William Potts, Handsworth, England.

I claim, 1st, The improved method, herein described, of ventilating rooms and buildings, by constructing and arranging, at the highest convenient part of the room or building, two independent or separate channels, extending at different levels along one or more sides of the room or buildings, and provided throughout their length with ornamental or other perforations, or wire gauze, through which the vitiated air is drawn into the upper channel, and the fresh air passes from the lower channel in the manner specified, whereby the room may be ventilated without creating a perceptible or injurious draft.

2d, The arrangement, in the corners of rooms or building, of two independent and separate ventilating channels, and the ornamental or other perforations or wire gauze with which the same are provided, for dividing and distributing the air drawn from and discharged into the place to be ventilated in the manner and for the purposes shown and set forth.

78,895.—LUBRICATING DEVICE.—Benjamin H. Reynolds, Canterbury, and John Bachelder, Norwich, Conn.

We claim, 1st, The wiper, J, J.

2d, The arrangement of the pin, E, and groove in the hub of the lubricating wheel, D, to provide for expansion and contraction.

78,896.—APPARATUS FOR CUTTING THE TEETH OF WHEELS.—Edward Roberts, Philadelphia, Pa.

I claim the combination of the spindle, collar, and clamping nut, for supporting and clamping the wheel, with the device, consisting of the two cutter disks, stretcher, tightening nut, and adjustable shaft or arbor, all arranged substantially as described.

78,897.—FAUCET.—Alfred Rooker, London, Eng. Patented in England Sept. 25, 1867.

I claim, 1st, The annular cutting edge, B, and the hollow part, B, applied to a tap having perforations therein and acting substantially as herein described.

2d, The cutting edge, B, of the hollow part, B, of the stem, which receives the excess plug, in combination with the stop, C, all substantially as and for the purpose herein set forth.

78,898.—BEEHIVE.—S. P. Shipley, Olenia, Ohio.

I claim the parts, A and B, constructed with slotted top, combined with each other and with the cap, D, as and for the purpose substantially as set forth.

78,899.—LOCK NUT.—A. D. Smith, Grafton, Ohio.

I claim the mode, herein shown and described, of securing nuts from turning, substantially as and for the purpose set forth.

78,900.—WEATHER STRIP.—J. E. Smith and M. H. Dasenbrook, Warrenville, Ill.

We claim the combination of the strips, D B, spring, S, arranged in a recess, as shown, when said spring is operated by the rod, S, and arm, B, in the manner and for the purposes specified.

78,901.—TEAPOT.—W. W. Stevens, Portland, Me.

I claim the improvement in the construction of pots liable to melt from the influence of heat, consisting of the bottom, as herein shown, and applied as illustrated for the purposes set forth.

78,902.—CLOTHES DRYER.—R. B. Stillman, Almond, N. Y.

I claim the series of spiral hubs or studs, D, D, D, binged slats or bars, B, B, B, as constructed and arranged, in combination with the frame for holding and folding up the bars, substantially as and for the purposes herein set forth.

78,903.—FASTENING FOR BUTTONS.—Rebecca Weaver, Washington, D. C.

I claim, 1st, The button or stud constructed with heads, E, and F, connected together by posts, I, between which are one or more eyes, substantially as and for the purposes specified.

2d, The chain, C, E, fastening slide or sliders, J, J, and bodkin, B, arranged and applied for fastening buttons, substantially as and for the purposes herein set forth.

78,904.—HARVESTER.—Thos. Welch, Churchville, N. Y.

I claim, 1st, A vibrating gear and finger-bar frame in harvesters, in combination with a jointed counter shaft, B, for the purpose set forth.

2d, With a two wheeled jointed bar harvesting machine, counter shaft, B, in combination with two frame, D, and the other shaft, B, and other shaft, B, working freely in all variations of either frame, as set forth.

3d, In a two wheeled jointed bar harvesting machine, a triple gear, mounted upon two shafts, and meshing together, the wheels, H, J and N, with their pinions, M, I and L, representing said gear, the whole operating in the manner and for the purpose set forth.

78,905.—GUIDE FOR BAND SAW.—Wm. P. Welch, Boston, Mass.

I claim the adjustable guide block, C, D, having the elastic guide rollers, L, L, and L', arranged in relation to each other and cheeks, A, B, all constructed and operating in the manner and for the purpose substantially as described.

78,906.—CONSTRUCTION OF OIL CANS.—H. B. Wellman, Indianapolis, Ind.

I claim the use of water chambers, so combined with an oil can that the oil from said can must pass through the water in its passage to the spout, as and for the purpose set forth.

78,907.—GRAIN CHAFFING MILL.—George Wilcox, Neenah, Wisconsin.

I claim, 1st, The shoe, A, which incases the sieve, and compresses the blast upon the rear part of sieve.

2d, The attaching of the shoe, A, to levers, C, C, and holes, F, and Y, whereby the whole may be raised or lowered at will when attached to the thrashing machine.

3d, The guides to front and rear end of sieve.

4th, The arranging of the conical sieve within the shoe, A, as set forth.

5th, The brace, K, as attached to shoe, A.

6th, The arranging of shaft, S, with rollers, 2 and 3, and pulley, I, for propelling the sieve.

7th, The machine herein described, when its several parts are arranged and combined as set forth.

78,908.—CORN HUSKER.—C. O. Yale (assignor to himself and T. W. Mabier), Rome, N. Y.

I claim, 1st, The rolls, C and D, in either form, as described, in combination with the reel, F, or its equivalent, when the parts are arranged and combined as described, and for the uses and purposes mentioned.

2d, The combination of the endless cord, D, and spring, D, constructed and arranged substantially as described and for the purposes mentioned.

3d, The conveyer, H, and arms, H, and H, constructed and arranged substantially as described and for the uses and purposes mentioned.

4th, The conveyer, H, and the lashing rolls, L, and L, constructed and arranged substantially as described and for the uses and purposes mentioned.

5th, The rings, M, M, constructed and arranged substantially as described and for the uses and purposes mentioned.

6th, The plate, K, and the arms, B, constructed and arranged substantially as described and for the uses and purposes mentioned.

7th, The combination of the table, B, and F, constructed and arranged substantially as described in combination for the uses and purposes mentioned.

78,909.—MACHINE FOR GRINDING THE CUTTERS OF MOWING MACHINES.—G. P. York and W. H. Wilson, Westfield, N. Y.

We claim, 1st, The combination with a table provided with means for holding a cutter bar, as described, of a grinding wheel, arranged to slide laterally substantially as and for the purpose described.

2d, The combination with the posts, L and L, of the gages, M, substantially as and for the purpose described.

3d, The combination with the cutter grinding apparatus of the posts and gages, provided with the pieces of wood or other soft material, substantially as and for the purpose described.

4th, The combination with a grinding stone provided with means for effecting a lateral movement thereof, of the guides and posts, substantially as and for the purpose described.

78,910.—MACHINE FOR CARVING WOOD.—H. H. Adams, Newburyport, Mass.

I claim, 1st, In combination with the vertical adjustable frame, J, of the vibrating frames or supports, A, and laterally sliding or adjustable cutter head and its cutters, under the arrangement and for operation as herein shown and specified.

2d, The combination with the frame, J, laterally adjustable cutter head and its cutters, by which the cutter head is supported, of the lever, Z, vibrating frame frames by which the cutter head is supported, and arranged to operate substantially as and for the purposes set forth.

78,911.—PACKING FOR PISTON HEADS.—J. U. Adams, Richmond, Mich.

I claim, 1st, The springs E, and rings, D, in combination with piston head B, substantially as described.

2d, The copper, H, or other metal, inserted in the manner described and for the purposes specified.

78,912.—HAY RAKER AND LOADER.—John Adams, Tradersburg, Pa.

I claim, 1st, The rake, C, constructed as described, of the curved teeth, I, attached at their upper ends to the head, H, and the curved bars, J, attached at their outer ends to said head, and adapted to turn freely upon the axle of the roller, B, by being hooked over the same, as herein shown and described.

2d, The adjustable frame, D, carrying the rollers and endless belt of hooks, when recessed at its lower end to rest upon the axle of the roller, B, to which it is held by the tension of the endless belt, G, as herein shown and described.

78,913.—WAGON.—J. F. Applegate, New Albany, Ind.

I claim, 1st, The perch pole, C, used in combination with the case or sheath of the rear hounds, substantially as and for the purpose set forth.

2d, The body, G, provided with the stop, I, and J, and used in combination with the rollers, A, and the extension perch pole, C, as and for the purpose set forth.

3d, The extended kingbolt, G, in combination with the body, G, and the perch pole, C, as and for the purpose set forth.

78,914.—FASTENING FOR POCKETBOOKS, ETC.—J. C. Arms, Northampton, Mass.

I claim the clasp consisting of the stationary piece, B, and the slide, C, which said parts are constructed and united, substantially as shown and described.

78,915.—MACHINE FOR POLISHING METAL PLATES.—E. C. Atkins, Indianapolis, Ind.

I claim the combination of the stone, Q, running adjustably upon the yoke, R, adjustable plates, S, attached to the latter, and the rollers, M and N, and spring bearings, therefore, attached to the plates, S, said parts being arranged in relation to each other, substantially as and for the purpose set forth.

78,916.—DRILL CHUCK.—Eli H. Babcock, Canandaigua, N. Y.

I claim, in combination with the chuck, A, the nut, B, and the reducer, C, substantially as and for the purpose described.

78,917.—HYDRANT.—H. J. Bailey, Pittsburgh, Pa.

I claim, 1st, The construction of the tube, E, valve, B, removable seat, F, and plate, I, arranged to operate in connection with the valve, V, substantially as shown and described.

2d, The hollow valve tube, E, the nut, M, the plate, I, and the valve seat, F, constructed, arranged, and operating substantially as and for the purposes described.

78,918.—PRUNING SHEARS.—Thomas S. Bell, Wapello, Iowa, assignor to himself, G. R. Reed, and J. S. Andrews, Louisa county, Iowa.

I claim the blades, A and B, serrated on their beveled sides, and connected at their rear ends, and operated by means of the handles, C and D, and bar, E, substantially as and for the purpose set forth.

78,919.—WOOD-TURNING LATHE.—A. P. C. Bonte, Cincinnati, Ohio.

I claim the adjustable counterpoise, H, constructed substantially as described, and arranged, relatively to the chuck B, F, of an eccentric or elliptical turning lathe, to operate in the manner and for the purpose specified.

78,920.—STUMP EXTRACTOR.—John G. Boyer, Springfield, assignor to Moses Wiant and George Gorr, Lehigh county, Pa., Antedated March 27, 1868.

I claim the portable power, consisting of the mechanism arranged substantially as described, and provided with the chain, J, having movable books, I, and the stationary hook, M, all mounted on the frame, A, constructed as set forth.

78,921.—WIND WHEEL.—J. Tobias Braun, Randolph Center Wis.

I claim, 1st, The device for connecting the crank, B, of the axle, B, with the cranks, B, h, on the spindle of a windmill, said device consisting of the jointed bifurcated rod, J, and angular plate, M, in combination with the jointed rods, J', P, and plate, O, all made and operating substantially as described.

2d, The jointed bifurcated rod, J, connected with the axle, B, with the spindle of a windmill, in combination with the jointed rod, J', angular plate, M, plate, O, and rods, J', all made and operating substantially as herein shown and described.

78,922.—CLAMP OR HUB-BORING MACHINE.—G. Y. Brecht, St. Louis, Mo.

I claim, as a new article of manufacture, a clamp, A, for a hub-boring machine cast or formed with slots for the reception of nuts, and provided with projections, A, and

hook, B, and lock lever, C, substantially as and for the purpose herein specified.

79,997.—CORN MARKER.—W. E. Phelps, Elmwood, Ill.

I claim the frame, A, provided with the two wheels, C, C, one at each end, in combination with the bar, D, connected to the rear of the frame, A, by a joint, e, and provided with a wheel, E, all constructed and arranged substantially in the manner as and for the purposes set forth.

79,998.—COMBINED HARROW, DRILL, PLANTER AND ROLLER.

David B. Platt, Madison, Ind.
I claim, 1st, The combination of the rollers, I, with the removable seed box, C, drill shaft, E, wheels, F, adjustable plows, B, and frame, A, constructed, arranged and operating substantially as described.

2d, The combination of the removable seed box, S, shaft, T, planting rollers, U, pinion, W, toothed rack, S, and lever, Y, with the adjustable plows, B, and frame, A, all constructed, arranged, and operating substantially as set forth.

3d, The combination of the pivoted tongue, L, bar, M, connecting rod, N, pivoted lever, O, perforated standards, P, R, and frame, A, substantially as described and for the purpose specified.

4th, The combination of the slides, G, plates, H, removable seed box, C, roller, E, and wheels, F, substantially as described.

5th, The frame, K, with its front and rear cross bars, K1 K3, are provided with teeth, in combination with the removable toothed cross bar, K3, substantially as set forth.

79,999.—SCRAPER.—Frederick Post, Plano, Ill.

I claim the combination of the scraper, A, chains, E, rollers, M, ratchet wheel, I, ratchet, L, spur wheel, F, pinion, G, and crank, D, all constructed substantially as described and operating as specified.

79,000.—DEVICE FOR FITTING WRIST PINS.—George Raft, Erie, Pa.

I claim the improved device herein described for boring out the eyes for wrist pins.

79,001.—CULTIVATOR.—Samuel Reed, Rising Sun, Md.

I claim, 1st, The combination of the forked draft bar, I, curved notched bar, J, and sliding catch, K, and their substantial equivalents, with each other and with the frame, A, and lever, Y, with the adjustable plows, B, and described and for the purpose set forth.

2d, The pointed or rubber teeth, C, removably attached to the pivoted shanks, D, for the purpose of pivoting the said teeth to the frame, A, substantially as herein shown and described.

3d, The combination of the long lever, F, short slotted levers, E, pivoted shanks, D, and pointed or rubber teeth, C, with each other and with the cultivator frame, A, substantially as herein shown and described and for the purpose set forth.

4th, The combination of the lever catch, G, with the long lever, F, and with the curved and notched rack, H, attached to the cultivator frame, A, substantially as herein shown and described and for the purpose set forth.

79,002.—CHURN.—Christian C. Reese, Attica, Ind.

I claim, 1st, A churn dasher consisting of the vertical shaft, F, radial arms, G, H, dashers, I, J, L, and gatherers, K, L, the whole being arranged and operating substantially as herein described and set forth.

2d, In combination with the elements, F, G, H, I, J, K, L, of the preceding claim, the pinion, D, spur wheel, E, and winches, e, e', for the purpose specified.

79,003.—ESCAPEMENT FOR CLOCK.—Christian Reinhart, New Haven, Conn.

I claim, 1st, The double-tooth crown wheel, A, as constructed, in combination with the verge collet, B, and stop collet, E, operating substantially as and for the purposes herein specified.

2d, The verge collet, B, stop plate, E, as constructed and arranged, in combination with the forked lever, D, pin, B, arm, K, and balance wheel, H, as set forth.

3d, The forked lever, D, with its open space, m, stop pin or stud, n, when the lever is balanced on the verge shaft, C, so as to dislodge the motion of the collet, B, and stop plate, E, to allow the points, a, to escape through the incline openings, e, e, and opening, f, as herein described.

79,004.—DIE FOR CUTTING SPOON BLANKS.—F. A. Rich and H. W. Bassett, (assignors to Hall, Elton & Co., Wallingford, Conn.)

We claim the arrangement of the cutter, G, on the one part, and the corresponding edge, a, on the other part, of the die, C, and punch, E, and in such relative position thereto that the whole will operate in the manner substantially as set forth.

79,005.—WAGON BOLSTER.—George Richards, Richland Center, Wis.

I claim the combination, with the bolster A, of the cap B, spring d, and jug C, substantially as and for the purpose described.

79,006.—MACHINE FOR PLANING MOLDINGS.—E. H. Ripley, North Chelmsford, Mass.

I claim, 1st, The combination of the feed box J', to the plate F', attached to the upper end of the vertical shaft D' substantially as herein shown and described and for the purpose set forth.

2d, The eccentric plate, F', and frame Y, constructed substantially as herein shown and described, in combination with the vertical shaft D', as and for the purpose set forth.

3d, The combination of the adjustable connecting rod U, and weighted or balanced lever, Q, with the cam O, and pivoted eccentric plate or frame, V, substantially as herein shown and described and for the purpose set forth.

4th, The combination and arrangement of the slotted lever B, centrally pivoted to the vertically adjustable support X, Y, and rod Z, and step A', with relation to the cam P, and vertical shaft D', all constructed and arranged to operate in the manner and for the purpose substantially as herein shown and described.

5th, The combination of the adjustable arm V', and slotted rigid arm U', with the vertical shaft D', and pivoted collar E', through which said shaft passes, substantially as herein shown and described, and for the purpose set forth.

79,007.—CORN SHELLER.—Wm. Roberts (assignor to himself)

Asstn Roberts and Welcome Sprague, Farmham N. Y.
I claim supporting the journals a', of the toothed roller A, within the slots or recesses b', in combination with the blocks C, and springs C', or their equivalents, when the e' parts are constructed and operating in the manner substantially as herein described.

79,008.—CHURN.—J. H. Rowe, Fort Wayne, Ind. Antedated June 6, 1868.

I claim a churn dasher constructed in the manner and for the purpose herein specified and described as an article of manufacture.

79,009.—HARVESTER REEL.—William F. Rundell, Genoa, N. Y.

I claim the constructive of the elbows E, of the two longitudinal parts, with bolts passing transversely through the two parts, and also through the arms and beaters, substantially in the manner as and for the purpose herein set forth.

79,010.—EXPLOSIVE POWDER.—F. M. Ruschhaupt, New York city. Antedated June 4, 1868.

I claim the use of naphthalene, in a manner as described and for the purpose set forth.

79,011.—CORN-HUSKING MACHINE.—Daniel Sager, New York city.

I claim, 1st, The picker B, when formed as herein described and for the purposes specified.

2d, The husking rollers D, D, with their grooves, d d d, as and for the purposes set forth.

79,012.—AUGER.—N. C. Sanford, Meriden, Conn.

I claim two or more cutting lips a, b, c, of different radial distance from the axial center of the auger, and in different horizontal planes, all constructed to operate substantially in the manner and for the purpose as set forth.

79,013.—MECHANICAL MOVEMENT.—E. W. Sargent, Lowell, Mass.

I claim, 1st, The cross head K, constructed as described, and provided with nippers s, and combined with the guide rods g, and belt, H, in the manner and for the purpose substantially as described.

2d, The combination of all the parts and operative parts specified, arranged to operate substantially as and for the purpose set forth.

79,014.—LAMP BURNER.—J. W. Schreiber, New York city.

I claim, 1st, The secondary tube D, arranged around the main wick tube B, of burner, and projecting above the same when said secondary tube is by means of springs a, a, that fit under a plate E, projecting from the tube, held and adjusted up and down, as set forth.

2d, Closing the chimney of the lamp burner by means of a perforated plate E, which is held up against a contracted portion of the chimney by means of springs a, a, as described, so that all the air will have to pass to the flame through the said plate E.

3d, A lamp burner consisting of the body A, tube B, and base plate E, springs a, cap G, and spring holders F, F, or their equivalents, all made and operating substantially as herein shown and described.

79,015.—TONGUE DEPRESSOR AND ATOMIZER.—O. A. Schulz, Chicago, Ill.

I claim the combination of the atomizer and tongue depressor, provided with atomizing tube, holder B, guard C, and bottle holder D, arranged and operating in the manner as herein described and specified, or in any other manner producing substantially the same result.

79,016.—RAILROAD RAIL TIE.—W. F. Serjeant, St. Louis, Mo.

I claim, 1st, The holding down cross tie which is constructed with jaws upon its ends which will embrace the rails when said tie is secured to and adapted for being secured to the wooden bed of the track by means substantially as described.

2d, A metallic cross tie constructed of one piece of metal with jaws a, upon its extremities, and with transverse perforations through it, as herein described and shown.

79,017.—TICKET REGISTER.—S. Sichel and S. Faust, New York city.

We claim the combination of the rollers J, plates g, cam I, crank L, spool D, bell G, hammer H, with any suitable train of wheels, connecting the rollers with the dial of any suitable registering apparatus, all substantially as shown and described and for the purpose set forth.

79,018.—OVEN RACK FOR SHIP STOVES.—F. L. A. Smith, Brooklyn, N. Y. Antedated June 4th, 1868.

I claim, 1st, The adjustable rack E, containing a meat pan F, suspended on rollers, as to uprights A, A, all constructed, arranged, and operating substantially as described.

2d, The grooved uprights or standards A, provided with a series of holes through which a removable plate, e, is passed for sustaining the journals or trunnions a, of box E, substantially as and for the purpose described.

3d, The application of the bars b, to the frame in which the box E, is suspended, to prevent the tilting or tipping over of the frame within the oven, substantially as set forth.

79,019.—CONNECTING-ROD ADJUSTMENT.—R. D. O. Smith, Washington, D. C.

I claim a connecting rod or pitman, constructed in two parts, and united by the sh-eve D, with right and left screws, substantially as and for the purpose set forth.

tion with the deflecting plates C C, substantially as and for the purpose set forth.

2d, The flues E, constructed with corrugated walls e, hollow cones f, substantially as and for the purpose set forth.

3d, The deflecting plates C C, or their equivalents, to deflect the upward currents of air against the radiating surfaces of the furnace.

79,021.—STEAM FIRE EXTINGUISHER.—John Souther, Boston, Mass.

I claim, 1st, A self-operating fire alarm and extinguisher consisting of the pipes A and H, valve B, valve C, lever F, and weight E, or their equivalent, all constructed and arranged to operate substantially as herein described.

2d, The pipes A and H, fusible plugs e, d, j, and valve stem K, constructed and arranged to operate substantially as herein described and for the purpose set forth.

79,022.—GAS STOVE.—J. D. Spang, Dayton, Ohio.

I claim the burner, consisting essentially of the parts m, n, constructed as described and operating in the manner and for the purpose set forth.

79,023.—THREAD SHOW CASE.—A. Steward, Plano, Ill.

I claim the show case for containing spools of thread consisting of the ends A, top a, partitions D, stops E, and inclined planes G, substantially as specified.

79,024.—FABRIC FOR COVERING HORSE COLLARS.—Eugene Sullivan, New York city, assignor to the American Horse-Collar Co., Boston, Mass.

I claim the within-described improved elastic water-proof covering for the bearing surfaces of horse collars.

79,025.—FARM GATE.—Abner Taylor, New Hartford, Conn.

I claim the gate A, posts B B', rail C, bar d, rod e, the whole being constructed and arranged as and for the purpose described.

79,026.—CALENDAR CLOCK.—W. A. Terry, Bristol, Conn.

I claim, 1st, The use of thirty-two teeth in the month wheel instead of thirty-one, substantially as herein specified.

2d, The use of a month wheel with a year wheel, or four years' wheel, revolving together upon a common axis, and so arranged that the year wheel or four years' wheel shall change its relative position to the month wheel one fourth or division at a certain point in each revolution, substantially as herein described.

3d, The combination of the disk A, with the wheel C, the pawl, a, a', the wheel D, and the pinion g, or its equivalent, constructed and operating substantially as described.

4th, The disk A, in combination with the pointer B, so arranged that the same pointer shall indicate the month and the day of the month, substantially as described.

79,027.—IMPLEMENT.—Augustus Thayer, Albany, N. Y.

I claim the implement consisting of the parts A, A', having the head B, back holder D, roughened surfaces b b', c c', d d', notches j, holes k, n, cutters i, i', grooves, projections n, saw set n, screw driver k, and claw g, all constructed and arranged to operate substantially as and for the purposes herein shown and described.

79,028.—SUBTERRANEAN WALL.—Max Thode, Mattoon, Ill.

I claim in the formation of subterranean structures, the employment of double walls, e, g, with the space between them filled with pitch, m, or asphaltum or other impervious material, to be melted and poured therein as the walls are built up; and a bottom formed by the layers b, d, with a layer of pitch or asphaltum m, between them, all constructed and arranged as described and for the purpose specified.

79,029.—CAR WHEEL.—W. R. Thomas, Catsanqua, Pa.

I claim a cast metal wheel provided with the hollow enlargement A, hollow arms B, communicating with the same, and the in-turning rim metal webbing, all constructed and arranged substantially as and for the purpose described.

79,030.—MACHINE FOR GRINDING MOWING MACHINE KNIVES.

John A. Thompson, Auburn, N. Y.
I claim, 1st, Providing the bar C, with the rollers L, and the clamps K, provided with the rollers, J, substantially as described.

2d, In combination with the bars C and C', connected by the jointed links b, the plates A and D, constructed and arranged to operate as set forth.

3d, The bar C, connected to the index plate A by the jointed links b, and the levers E and E', substantially as represented in figs. 7 and 8.

4th, In combination with the apparatus constructed as last above described, arranging the bar C, to slide longitudinally thereon, for the purpose of moving the sickle along without changing the position of the frame, as set forth.

5th, The auxiliary stone, H, when arranged to be adjusted on either end of the shaft, I, in use in connection with the main stone, P, substantially as and for the purpose set forth.

79,031.—MACHINE FOR CLEANING THE INTESTINES OF SLAUGHTERED ANIMALS.—John A. Thompson, Bucyrus, Ohio.

I claim, 1st, The cleaning of the intestines of animals by revolving brushes, substantially as herein described.

2d, The cleaning of the intestines of animals by machinery which operates to draw the intestines through between two revolving brushes, by means of continuous rollers, substantially as herein described.

3d, The driving wheel a, pinion d, grooved or flanged roller c, gear wheel e, gum roller b, fluted roller, i, and brushes, A, when arranged, combined, and operated, substantially in the manner herein shown and described, for the purpose set forth.

79,032.—BEVEL AND TAPERING GAGE.—Dennis H. Tierney, New York city.

I claim, 1st, The combination of the slide B, angular bar A, adjustable slide bar C, and adjustable blades e, e, all arranged substantially as and for the purpose specified.

2d, In combination with the subject matter of the foregoing claim, the adjustable arm, g, arranged substantially as and for the purpose specified.

3d, The arrangement of the graduated scale plate m, adjustable blade c, and bar A, substantially as and for the purpose specified.

79,033.—WASHING AND WRINGING MACHINE.—Robert K. Tomlinson, Brownsville, Pa.

I claim, 1st, Imparting an alternate reciprocating motion to each series of upper and lower rollers A, A', by means of cams D, and a rotary motion to the rollers by the double series of cords, i, when the cords of the upper series are driven from the upper wing roll, and the cords of the lower series from the lower wing roll, as herein described, for the purpose specified.

2d, The cam wheels, D, D, in combination with the rubbing surfaces, A, A', by which the reciprocating motion to those surfaces is imparted.

3d, The combination of the upper and lower series of rollers A, A', cams D, levers P, bar R, double series of cords i, and wringing rolls J, arranged and operating as described, for the purpose specified.

79,034.—STAMP MILL.—Richard Uren and John Walker (assignors to themselves and John Uren), Houghton, Mich.
We claim, 1st, The supplementary cylinders H H' and pistons J J', in combination with the cylinder G, piston F, stamp C, and coupling D, substantially as described, for the purpose specified.

2d, The supplementary pistons J and J', in combination with the yokes K K1, stamp C, and coupling D, substantially as described, for the purpose specified.

3d, The rock shaft h, adjustable cam i, fixed cam x, and arm y, in combination with the coupling D, and stamp C, substantially as described, for the purpose specified.

4d, The crank shaft S, cam p, connecting rods W W', and valves O O', in combination with the rock shaft h, cam x, coupling D, and stamp C, substantially as described, for the purpose specified.

5th, The bracket R', lever j, and floats i, in combination with the cam i, stamp C, and coupling D, substantially as described, for the purpose specified.

6th, The horizontal shaft a, cam b, valve 2', and valve rod d, in combination with the coupling D, substantially as described, for the purpose specified.

7th, The combination of the spring b-d 23, rod m, spring n, spring catch o2, tappet p, arms, Y u, and spring t, substantially as described, for the purpose specified.

79,035.—CHURN.—W. H. and L. Waddell, Churchville, Va.

We claim the combination of the wheel, roller, and lever beam, as above described, for the purpose of operating the common churn.

79,036.—MACHINE FOR FORMING LAMP TUBES.—Wm. Wallace, Ansonia, Conn.

I claim the arrangement of the two bars a and b, their outer edges parallel to each other, or nearly so, so as to receive the cylindrical tube, and combined with a device to force the said bars, so as to flatten and form the tube, substantially in the manner herein set forth.

79,037.—SEWING MACHINE.—Enos Waterbury, Stamford, Conn.

I claim the combination of the pivoted right-angle arm M, pin J, slotted carriage G, and shuttle driver K, substantially as described, for the purpose specified.

79,038.—CORN PLANTER AND SEED DRILL.—Jacob Weaver, Elizabethtown, Pa.

I claim, 1st, The seed tubes and cultivator bar or frame I, provided with the teeth J, in combination with the frame A, lifting lever L, and seed wheels or rings E, all arranged and operating as described.

2d, The arrangement of the rag wheel or ratchet b, on the axle, in combination with the toothed lever or brake b', operating as described.

79,039.—LAMP SHADE.—Alfred M. Weekes, New York city.

I claim providing the lamp shade with one or more elongated projections a, a, substantially as and for the purpose herein shown and described.

79,040.—WIRE SPRING MATTRESS.—Franz R. Wegman, Saxony, assignor to himself and Tobias Kohn, Hartford, Conn. Patented in Saxony March 6, 1865.

I claim, 1st, A mattress or cushion composed of spiral wire springs, braided or linked together in two or more series, so as to form one connected web of woven wire, substantially as herein described.

2d, The combination of the struts H H', with a mattress of wire springs, substantially as described, for the purpose of stretching it and rendering it more elastic.

79,041.—STOVEPIPE DAMPER.—D. A. White, Chagrin Falls, O.

I claim the herein described stove damper, consisting of the convex disk A, and deflectors B, constructed and arranged in the manner as and for the purpose specified.

79,042.—HARROW.—F. R. Wilson, Columbus, Ohio.

I claim the arrangement of the outer rails A, and inner rails B, and the grooved teeth-holding blocks K, pivoted in the manner described, and the perforated bars D, D, when the several parts are constructed and operated substantially as specified.

79,043.—INKING APPARATUS FOR COLOR PRINTING.—George W. Wood (assignor to himself and James W. Slater), Richmond, Ind.

I claim, 1st, The combination of the reciprocating bed, B, ways, C, adjustable table, D, D1 D2, and rollers, G G1 G2, substantially as described.

2d, The combination of the reciprocating bed, B, and roller frame, F, so connected by intermediate mechanism that the movement of the former shall communicate motion to the latter in an opposite direction, substantially as and for the purpose set forth.

79,044.—PNEUMATIC GRAIN ELEVATOR.—S. W. Wood, Cornwall, N. Y.

I claim the combination and arrangement of the atmospheric conveying

pipe or passage, A, exhaust chamber, B, and pump or blower, C, substantially as and for the purpose herein specified.

In combination with the foregoing, the self-acting discharge valve, D, operating substantially as and for the purpose herein set forth.

Also, the additional chamber, H, and discharge valve, I, alternating with the valve, D, substantially as and for the purpose specified.

Also, the contracted aperture, o, of the receiving nozzle, for the purpose specified.

Also, the combination of a pneumatic pipe or passage, for conveying grain, with a mechanical grain elevator, as herein specified.

Also, the curved or bent discharge nozzle, g, arranged in combination with the discharge pipe or spout, so as to distribute the grain by its own gravity, substantially as herein specified.

79,045.—PRINTERS' INK.—Charles Wulsten, Lafayette, Ind.

I claim an ink, for all the purposes for which printers' ink is used, in which the silicate of alumina, white clay, or Jersey clay, or kaolin, prepared with sulphate of zinc, and with or without dilute sulphuric acid, is partially substituted for lamp black, blue, green, or other coloring matters, with drying materials and varnish, prepared as and for the purposes substantially as shown and described, and for the purposes set forth.

79,046.—SASH FASTENER.—Francis Zell, Louisville, Ky.

I claim, 1st, The spring, D, so attached to the spring belt, B, that when the latter is retracted it shall be retained in its retracted position, but be partially projected from its casing by the movement of the sash, so as to be brought against a projection, released, and thrown into the socket when the sash is closed, substantially as and for the purpose set forth.

2d, The pivoted handle, F, provided with a projection or finger, f, for locking the bolt, and operating in the manner and for the purpose explained.

79,047.—SHUTTER FASTENER.—Francis Zell, Louisville, Ky.

I claim, 1st, The fastening device, consisting of the successive cylindrical portions C C1 C2, the thumb piece 3, and shouldered head C1, in combination with two matched retaining plates, substantially as and for the purpose set forth.

2d, The plates, D D, constructed with slots having diverging sides, and with corresponding projections, d d, substantially as and for the purpose set forth.

REISSUES.

2,984.—BEE HIVE.—James M. Bebee, Casadaga, N. Y. Patented November 12, 1867.

I claim, 1st, The combination and arrangement of the out case, A, ventilating board, H, inner hive, and packing material, J, substantially as and for the purpose set forth.

2d, Securing the said comb frames together by means of a wire ball, b, and wedge, e, in the manner shown and described.

2,985.—BRICK MACHINE.—Helmuth Dueberg, New York city. Patented November 26, 1867.

I claim, 1st, The channel, F F', extending in opposite directions from the tapering spout, E, and carrying the compressed clay to the reciprocating table, H, substantially as and for the purpose set forth.

2d, The feeder or pusher, K, in combination with the forming dies, F F', as molds, I I', substantially as and for the purpose set forth.

3d, The rocking lever, M, carrying the followers, L L', and operating in combination with the reciprocating table, H, molds, I I', and press boxes, G G', substantially as and for the purpose described.

4th, The recesses, h, in the press boxes, G G', to allow the surplus clay to escape as set forth.

5th, The pieces of flannel, or other absorbent material, supplied with oil from cups, m, in combination with the reciprocating table, H, molds, I I', and followers, L L', constructed and operating substantially as and for the purpose described.

2,986.—GRASS HARVESTER.—Jonathan Haines (assignee, by means assignments, of himself), Pekin, Ill. Patented Sept. 4, 1855. Reissued April 13, 1855. Division D.

I claim, 1st, The two longitudinal ways or rails, o o, located between the two driving and supporting wheels for the purpose of supporting the driver's seat, substantially as set forth.

2d, The use of an adjustable seat for the driver, when said seat is mounted upon two longitudinal rails or ways, or their equivalents located between two driving and supporting wheels of a jointed finger-beam machine, so that the driver can, at pleasure, shift his seat backward or forward, to enable his weight to balance the machine, substantially as set forth.

2,987.—HORSE HAY FORK.—Samuel Harris and Daniel A. Harris, Shippensburg, Pa. Patented April 23, 1857.

I claim, 1st, The combination of a fork, so constructed as set forth, in a horse hay fork of a slotted main bar or shank, v, a lifting finger, C, pivoted centrally in the slot of the shank, and a link rod, D, connecting the finger with a forked lever, E, pivoted to an arm, F, projecting from the shank, and having the tripping rope attached to its upper end, whereby the lifting finger is automatically locked in a horizontal position by the weight of the load.

2d, The combination and arrangement of the fork, in a horse hay fork, of two parallel rigidly connected shanks, with pivoted fingers, for the purposes specified.

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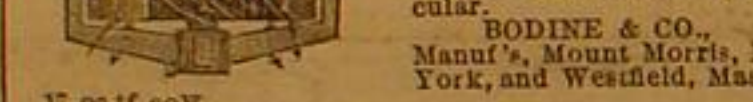


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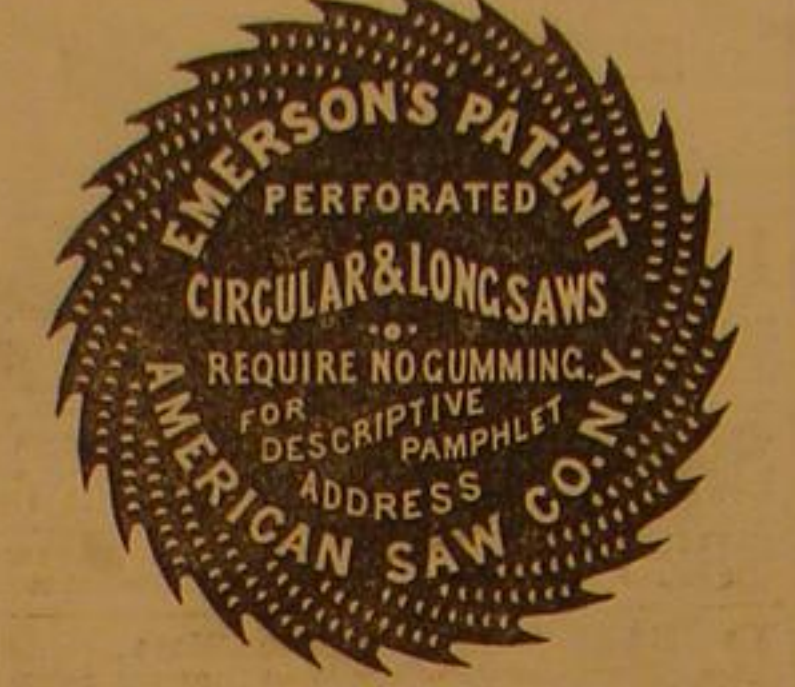
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Vol. XIX.—No. 2.
[NEW SERIES.]

NEW YORK, JULY 8, 1868.

\$3 per Annum.
[IN ADVANCE.]

Improvement in Machines for Forming Rings, Watch Case Centers, etc.

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The spirit with which scientific men have looked upon these phenomena, has been unfortunately such as has retarded their solution. Skepticism as to their reality, although corroborated by evidence that would be convincing upon any other subject, refusal to investigate, except upon their own conditions, and ridicule not only of the phenomena themselves, but of those who believe in them, have marked their course ever since these manifestations have laid claim to public credence. Such a spirit savors of bigotry. The phenomena of table-tipping, spirit-rapping (so called), and the various manifestations which many have claimed to be the effect of other wills acting upon and through the medium of their persons, are exerting an immense influence, good or bad, throughout the civilized world. They should, therefore, be candidly examined, and if they are purely physical phenomena, as has been claimed, they should be referred to their true cause. This is due to truth, and the common duty which all owe to their fellow men.

The following extract from an English journal, relative to the proposition made by Prof. Faraday, in 1861, to investigate the phenomena reported to have occurred in the presence of Mr. Home, a celebrated English medium, and also relative to the controversy which is now in progress between Prof. Tyndall and Mr. Home, in regard to a similar investigation, which Prof. Tyndall expressed himself willing to undertake, under similar conditions to those stipulated by Prof. Faraday,

will sufficiently exhibit the manner in which scientific men have been disposed to treat such subjects:

"He (Mr. Faraday) felt a profound contempt for the whole thing, for which we are by no means inclined to blame him; and he seems to have been a little annoyed at the attempt to draw him again into what he considered ridiculous and futile investigations. It is likely that if Prof. Owen were invited to lecture on and dissect Barnum's woolly horse, he might reply somewhat tartly; it is not improbable that Sir John Herschel would chafe at being invited gravely to investigate Parallax's theories about the shape of the earth and its rela-

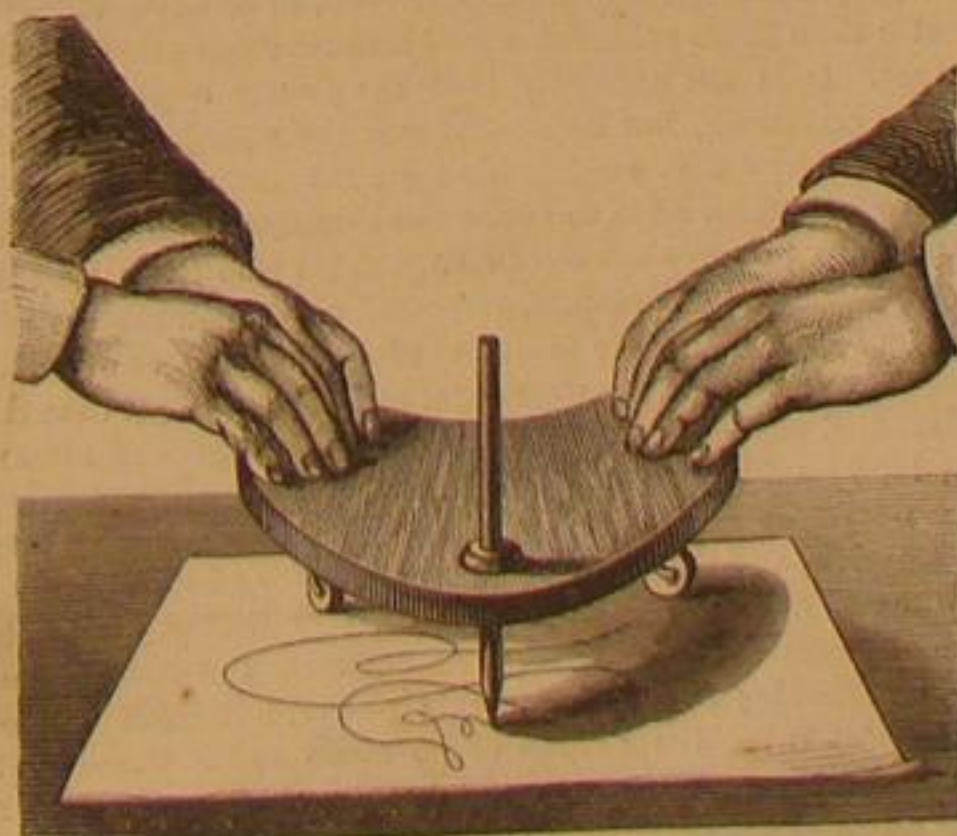
some way, by virtue of his pretensions, exerting a vast influence upon society, tending to subvert creeds and to introduce new codes of morals, Prof. Owen could not do the world a greater service than to demonstrate to the world, by cutting him up, and thereby cutting down the falsity of his pretensions. Nothing that affects the welfare of mankind should be considered beneath the notice of a true philosopher. What incalculable benefit might have resulted if the same amount of study had been given to the subject of witchcraft, at the time of its occurrence, that has since been bestowed upon it. When such things become matters of history, there are always enough who do not think it derogatory to their dignity to devote their time to speculation upon their causes. How much wiser is it to throw aside prejudice, and to look at the facts themselves in a spirit of candor, and earnest desire for truth.

The latest of the phenomena belonging to the class alluded to above, are those exhibited through the agency of the "Planchette." We purpose in this article to give a brief description of this singular instrument, and also to describe some of the remarkable things which it appears to perform. In thus opening our columns to the discussion of the subject, we say at the outset that we desire any communications that may be called forth upon this matter,—which we know to be attracting great attention in both hemispheres,—to be written with an evident purpose to add to the knowledge already possessed by the public in relation to it, or to give some rational explanation of the cause of the phenomena, which are generally considered so inexplicable. And we further beg correspondents to remember that ridicule is not argument, that it only tends to exasperate, and we assure all who are disposed to deal in that style of discussion, that hard heads, and men of the most materialistic tendencies, have been puzzled and nonplused by the maneuvers of Planchette. The name Planchette is of French origin, and signifies literally a little board. We have seen several styles, differing from each other only in trivial details, the general form being the same in each.

It will be seen by reference to the cut of the instrument, which we give herewith, that it is a heart-shaped piece of board, mounted upon three supports. It is seven inches from the depression in the base of the

PECKHAM'S PATENT FORMING MACHINE.

tions to the planetary system. Mr. Faraday did reply in language which was not encouraging. He prescribed certain conditions which it would have been utterly impossible for Mr. Home to accept, whether that gentleman be an apostle of a new science, or a mere pretender and humbug. In fact, Mr. Home was invited, as a condition precedent to Faraday's entering on the investigation, to acknowledge that the phenomena, however produced, were ridiculous and contemptible. He was also required to pledge himself to the most entire, open, and complete examination—a condition which, of course, Mr. Faraday knew quite well Mr. Home could never



accept. So the gentleman who was apparently acting for Mr. Home—we believe, the late Mr. Robert Bell—declined going any further; and it does not appear that Mr. Home was particularly consulted in the matter at all. At the present moment, Mr. Tyndall offers to investigate the phenomena, but he offers to do so 'in the spirit of Mr. Faraday's letter'; and, of course, Mr. Home replies that 'as such spirit is not that of logic, nor according to the true scientific method,' he declines to lend any aid to the inquiry."

Now we believe that if Barnum's woolly horse was in

heart to its apex, and seven inches measured across its widest part. Two of the supports are legs of wood or brass, terminating in pentagraph wheels or casters, usually of iron, bone, or hard rubber. The third support is a pencil thrust through a socket at the apex of the heart. Makers claim that the wood used in their manufacture is peculiar, whether artificially rendered so or otherwise we are not informed, but we have been unable to detect any peculiarity in the appearance of the wood in any that we have seen. Those that we have met with look as though they were made of mahogany or black walnut, lightly varnished, and with little attempt at adornment. In the center of the board we have occasionally seen a disk of metal, having the appearance of German silver, but whether it was for use or ornament, we are unable to say.

The instrument is usually operated by two persons, or perhaps we should say it generally operates when two persons lay the tips of their fingers gently upon it. Occasionally it operates with less force when only one places his hands upon it, and it has been asserted in some of the English journals, that there have been instances of its working when a string was attached to one of the legs, the remote end being held in the hand of a powerful medium, at some distance from the machine.

The phenomena attributed to the Planchette are various, but they consist essentially in writing and drawing. The latter we have never witnessed, but we state it upon good authority. In fact, the wonders of Planchette are backed by the statements of the most reliable people—statements which constitute such a mass of evidence that we should feel bound to accept the facts stated, even though we had not witnessed them ourselves.

You may hold a conversation with Planchette, provided your own part in it consists of interrogations. Its replies, so far as we have seen, are sometimes true and sometimes false. So are the replies often given by human respondents. It sometimes refuses to write at all, and plays the most fantastic tricks, in apparently willful disregard of the feelings of those who are anxious that it should do its best. When, however, it chooses to be good, it moves gently and steadily over the

110615

paper upon which it is placed, the pencil point tracing letter after letter, until the reply is written, when with a rapid sweep it announces its conclusion by rushing swiftly back to the left, and stopping suddenly at the edge of the paper. These motions seem to those whose fingers rest upon the board to be entirely independent of their own wills, their only care being to avoid any resistance to its motions. The fact that it is impossible to suppose that the wills of two persons could be by their own desire mutually coincident, without previously concerted action, forms one of the most puzzling features of the subject, as the nature of the questions asked and answered precludes the possibility of collusion.

We have thus stated the facts relating to this mysterious little machine, carefully avoiding the expression of opinion, pro or con, in the hope of accumulating more data in regard to it, and because we believe that the key to the solution of the class of phenomena to which we think it undoubtedly belongs, may be discovered in the investigation of the cause of its movements.

THE IMPOSSIBLE IN CONSTRUCTIVE SCIENCE.

In a brief article in No. 1, current volume, we spoke of the necessity of observing the laws governing mechanical science, and the folly of trying to evade them by denying their existence, or, at the least, doubting their immutability. The following from the *Engineer* treats more at length on this and cognate subjects:—

There are men who seize with avidity on any idea, however chimerical, which is novel, and apparently contains the germ of possible future greatness or wealth. Such men may be found in every walk of life; they are not rare in the ranks of any profession or calling. Sanguine of temperament, and blessed not only with great faith in themselves but with an almost childlike confidence in the powers which can be invoked by science, to them nothing is impossible. In their eyes the present is but a period of pure transition. The deeds of past giant intellects are as nothing compared to what future giants will achieve. Watt, Davy, Faraday, Stephenson, Arago, have but dug the trench and put in the concrete on which a magnificent edifice is to be reared up. Their puny battalions have but explored a few mountain passes—a little scrap of fertile land in a vast continent, which is in the future to be subjugated and made over as a whole to mankind by a select few of their fellow creatures yet to be born. To such simple minds the world owes something, yet not much. The excessive domination of hope in energetic, albeit ignorant men, has aided the great work of progress beyond question; but it is to be observed that few men of science, properly so called, now hold that much remains to be discovered in the great arcana of nature which can materially promote our happiness or our wealth; and the testimony of those who are most learned in the laws of natural philosophy, goes to show that the world has not perhaps quite so much to hope from the future as some would have us suppose. We do not hold that great discoveries may not yet be made, or magnificent inventions produced; but we do hold that it is very unlikely that either discovery or invention will ever again be given to a civilized people which can add to their comforts, or promote their wealth or happiness as greatly as past inventions and discoveries have blessed Britain. The more our knowledge extends the more evident does it become that walls of adamant stand between us and further progress in certain directions on the great highways of science. We admit that many roads remain unexplored. No man in his senses would attempt to prove the contrary; but the balance of evidence goes to show that discoveries out of the realms of pure science must be excessively rare, and that really great inventions—great as a means of materially promoting the happiness and well being of mankind, must be still rarer.

To the student, the enthusiastic inventor, and the ignorant alike, these statements will be eminently distasteful, yet they admit of being proved—proved at least in the sense that the records of the past, and the results of experiments and inquiry made from day to day and hour to hour now, confirm them. To illustrate our position we may cite a favorite argument with those who believe much in the future, little or nothing in the present. We are all more or less familiar with the man who laughs at the notion that we shall sink in the scale of nations when our coal fields are gone. He tells us cheerily that long before our coal is exhausted we shall have ceased to rely on steam as a motive power; that agents far more subtle and more energetic will have been made our willing slaves. Not thirty years ago such a proposition would have met with general acceptance. It would have been received as true because, having made a little progress in the study of nature's laws, we had achieved great things by the aid of the knowledge acquired. But it will not be received now by the philosopher. Groping in the dark, men found the steam engine. The brightest rays of the torch carried by the genius of knowledge fell to show us aught better. The researches of Grove, of Faraday, of Joule, ending in the discovery of the conservation of energy, dashed the hopes of the inventor to the ground. For fifty years men have labored to produce a motor better and more economical than the steam engine, and they have utterly failed. This is as nothing compared to what lies behind. The more we learn of the laws of nature the more evident does it become that no better motor than steam will ever be discovered. The thing does not apparently come within the possible in mechanical or chemical science. Neither the engineer, nor the chemist, nor the electrician, can help mankind to anything much better than the child of James Watt's brain. And observe the results following on each addition to our knowledge of the laws of motion. The moment the electro-magnet was dis-

covered hundreds of minds jumped to the conclusion that here was a substitute for the steam engine; yet no electro-magnetic motors are now used save for the most trifling duties. The reason why such machines cannot compete with heat engines was not comprehended for some time. At last it was proved that all the power which an electro-magnetic engine could produce was represented by the oxidation of a given weight of zinc. The metal contained a store of power which was not present in the oxide, but was imparted in the deoxidation of the ore by the combustion of coal, in which alone the germ of power resided; and it is far more economical to burn coal to store up power in water than to burn it to store up power in zinc. We now know that nothing is to be hoped from electro-magnetism as a motive power. It has been assumed that the electricity should be derived not from zinc, but from some such arrangement as the remarkable induction machine illustrated in a recent impression. Apparently nothing is to be done but turn a handle to supply electricity *ad libitum*. There is no friction against rubbers to resist the revolution. Even here, where least expected, the great law of the conservation of force asserts itself once more. A sensible resistance to rotation is experienced precisely proportional to the quantity of electricity generated, and the truth is rendered apparent that the machine creates no new power. It does but transmute some of the energy expended in putting it in motion into the different form of electricity, which may yet again be transmuted into heat, light, or magnetism. Far from realizing more power, we cannot thus get back even the major portion of that which we imparted. And so it is, seek as we will. The more elaborate our search the more fully is the conviction borne in upon us that no means of producing motive power will ever be found to compete with the combustion of carbon or hydrogen.

In fact, as a result of the operation of this great law, that coal is the best power producer known to practical science, we find that the impossible is far closer to us than those possessing that little knowledge called a dangerous thing would have us believe. We cannot drive a ship at thirty miles an hour through the ocean, nor is there any reason to believe we ever can. The resistance increases up to a certain velocity as the cube of the speed; beyond that point, in a still more rapid ratio, not precisely determined. No combination of wood or iron could sustain the strain necessary to impel a ship sufficiently large to carry a little coal and an engine of adequate power across the Atlantic in three or four days. Here the impossible makes itself not only seen but felt.

In railway work, again, the progress made during the past fourth of a century has been really very small. At first the public held that a speed of ten miles an hour was impossible of attainment; thirty miles were reached, and the popular opinion flew over to the other extreme—why not travel at a hundred miles an hour? Obstacles all but insuperable stand in the way, and we are as far from travelling at the proposed rate now as we were before Stephenson was born. Many men will be slow to accept the proposition that progress becomes more difficult each year. It is none the less true. The path of the inventor becomes rougher and steeper the further he advances, and all the teachings of science go to prove that there is a limit to man's progress which he cannot pass; laws which he can neither break nor alter, work as he will. When things are brought before us which we know must depend for success on the infraction of some great ordinance of nature we assert that they are impossible, and men of intelligence admit that, assuming the law to be correct, we must be right. But they argue that we do not know the law, that it has never been written nor made clear. That this holds good of many laws, or assumed laws, in natural philosophy is true, but it is not true in those few and simple laws with which constructive science is most concerned. These are as familiar to the man of science as household words; none attempt to dispute their truth but those who lack education.

It is to the last degree unlikely that as much progress will be made during the last half of the present century as marked its first fifty years; but it is certain that progress of some kind will be made. From unlettered men, however, nothing is to be expected. An untutored Stephenson would have no chance of making a name in the present day. He who proposes to go beyond his fellows, to achieve victories greater than those achieved already, must come armed to the combat. It is not necessary that the young engineer must know everything, but he should make one subject his specialty, and know that subject and all the laws relating to it well, or he cannot hope to make the smallest advance. If he proposes to improve the steam engine let him learn all that can be learned about motors, and build on the foundation laid for him by others; if he means to construct bridges of wider span than the world has ever seen, let him study all that can be studied of the laws of strains and the strength of materials; let him learn as well what to avoid as what to adopt. The untaught genius has not the ghost of a chance in the present day, and this is why the necessity for education is felt now as it never was felt in this country before. Only the man of education can distinguish between the possible and the impossible; and, lacking this power, hundreds of men possessing inventive genius of no mean order waste their strength in endeavoring to climb inaccessible precipices or to beat down or elude barriers subtle, indeed, as a spider's web, but stronger and more infinite in their range than average intellects can conceive.

A MEAN SWINDLE.—In another place we give an account of a glaring abuse of the franking privilege, wherein the frank of the Hon. John B. Logan is used to circulate the advertisement of an obscure Patent Agent. Now it is our opinion that no firm is worthy of confidence composed of persons who are too poor or too mean to pay their own postage.

Dangers in the Use of Photographic Chemicals.

M. Davanne, lately read a paper on this subject before the French Photographic Society, Paris. An unfortunate photographer had been endeavoring to prepare some chloride of gold and potassium, but, making some error in mixing or making his solutions, he spoiled them. Upon consulting some one as to how he could get back his gold, he was advised to add ammonia to the solution, instead of the more wise plan of using sulphate of iron, formic acid, or sulphite of soda, etc. Chemical readers would not have added the ammonia, knowing that the dangerous compound known as fulminating gold would be produced; but all photographers are not chemists, although they should be. The poor man added ammonia, and made the explosive compound in considerable quantities. It naturally exploded, and, sad to relate, destroyed one eye completely, and injured the sight of the other very seriously, beside other damage.

Among other dangers to which photographers are exposed, is that which arises from the heavy character of the vapor of ether. Although all light may be a long distance away from the bottle from which the ether is being poured, yet the heavy vapor rolls down and over the receiving vessel, and finds its way to the ground like a stream of water; and if there be an open fireplace or furnace near, the draft from it will draw on the stream of ether vapor, and, igniting it, the flame will run along to the bottle as if along a train of gunpowder, and set fire to the ether in the hands of the operator, probably killing him by burning. Then the mixture of alcohol and ether vapors with atmospheric air forms a mixture as explosive as fire damp, and circumstances may arise in photographic manipulations when this dangerous mixture may be produced.

M. Davanne, who is a professor of chemistry, now proceeded to a practical demonstration of some of the properties of the dangerous substances that photographers might produce in their operations. He had prepared at home some of these, but, as he said, in very minute quantities; for, irrespectively of the danger to himself in making them, and the risk of injury to his audience in exhibiting them, there was the chance of doing damage and creating a disturbance on the Boulevards as he came with them to the meeting. He took a solution of chloride of gold and added ammonia to it, and showed the precipitate of fulminating gold, which had done so much injury to his correspondent, and, taking a minute quantity of it, which he had previously dried, he caused it to explode by merely touching it on a glass plate with a glass rod. A piece of filtering paper, on which was a minute portion, was held over the flame of a spirit lamp, and exploded immediately; and a capsule in which was a little was shattered to atoms and scattered over the room.

M. Davanne then called attention to a similar compound of silver, which might be easily produced by an unwary photographer, especially that solutions of oxide of silver in ammonia are now so frequently recommended for photographic purposes. A solution of nitrate of silver in ammonia is harmless (*i. e.*, a solution of oxide of silver and nitrate of ammonia, with excess of ammonia); but if the oxide be precipitated from this solution by caustic potash, a compound is produced of even greater explosive properties than fulminating gold, viz., fulminating silver. This dangerous compound, not content with "going off" when dry, is so unstable that it will detonate under water!

Then, photographers with a smattering of chemistry may know that iodine and iron combine and make iodide of iron without danger, and, by a wrong process of reasoning, may conclude that iodine and ammonia will combine quietly and produce the iodide of ammonium for their collection. Nothing is more fallacious, and now that the ammonio-iodides are again before the photographic public, manipulators who "prepare their own chemicals" will do well to be cautious in mixing iodine and ammonia. This mixture, unless accomplished as recommended by the Rev. J. B. Reade many years ago, will produce an iodide of nitrogen in the form of a brown powder, which is so explosive that if only touched with a feather when dry, will immediately explode.

Another frightful compound of nitrogen is produced whenever nitrogen is passed through a solution of sal ammoniac (chloride of ammonium); and although at present photographers are not likely to have anything to do with this fearful compound, M. Davanne wished to point out its properties. It is an oily liquid, and explodes almost without actual touch, smashing lead dishes in which it may be placed, and carrying destruction all around. The discoverer was maimed twice with it, other experimenters have not fared much better, and M. Davanne confessed he had never seen the compound, and never wished to do so.

But there is still another compound of silver which is dangerous, and which a photographer might unwittingly produce—the fulminate of silver. If a solution of nitrate of silver containing nitric acid be warmed, and alcohol added, a white precipitate forms, which is the compound in question, and which is very dangerous, as will be conceived when we remember it is that compound to which percussion caps owe their good qualities, and which, when carelessly handled, not unfrequently will blow up a whole factory, machinery and all. A photographer evaporating to dryness an acid bath which had been in use long, and contained alcohol, might find himself and his dishes elsewhere toward the termination of the boiling down of the solution.

The fastest time, to the best of our knowledge, ever made by a steamboat, was the late run of the *Daniel Drex*, from Yonkers to this city, a distance of fourteen and a half miles, in thirty-four minutes and forty-five seconds, or at a rate of over twenty-five miles per hour.

Railroad Track-layer in California.

WE have before alluded to the success of a railway track-layer used on the California section of the Pacific Railroad. It appears from recent intelligence to be working regularly at the rate of a mile a day, with the promise of better results when some small defects are obviated. Some of its work has been done at the rate of two miles in twelve hours, but one mile is considered as its present working capacity. The contractor and directors of the Vallejo and Sacramento Railroad, although most of them were skeptical, and some quite dissatisfied about the delays in getting it into operation, give it the highest praise, and have made their arrangements in reliance upon it.

The machine is a car sixty feet long and ten wide. It has a small engine on board for handling the ties and rails. The ties are carried on a common freight car behind, and conveyed by an endless chain over the top of the machine, laid down in their places on the track, and when enough are laid a rail is put down on each side in proper position, and spiked down. The track-layer then advances, and keeps on its work until the load of ties and rails is exhausted, when other car loads are brought. The machine is driven ahead by a locomotive, and the work is done so rapidly that sixty men are required to wait on it, but they do more work than twice as many could do by the old system, and the work is done quite as well. The chief contractor of the road gives it as his opinion that when the machine is improved by making a few changes in the method of handling rails and ties, the necessity of which changes is now apparent, it will be able to put down five or six miles per day unquestionably. This will render it possible to lay down track twelve times as fast as the usual rate by hand, and it will do the work at less expense.

The invention will be of immense importance to the country in connection with the Pacific Railroad, which, it was calculated, could be built as fast as the track could be laid, and no faster; but hereafter the speed will be determined by the grading which cannot advance much more than five miles a day. Thirty millions of dollars have already been invested on the Pacific Railroad, and if the time of completion is hastened one year by this track layer, as it will be if the Central and Union Companies have money enough to grade each five miles a day, there will be a saving of \$3,000,000 on interest alone, on that one road.

The track of the Sacramento and Vallejo Road has been laid for eight miles out of Vallejo, and it is to go on directly to Suisun, which is to be reached before the 1st of June, and thence to go on to the crossing of Putah Creek where the cars are to run by the 1st of July. The road passes over a good deal of tule within fifteen miles of Sacramento, where the grading cannot be done till the Fall, so no time is fixed for the completion of that part of the work, except that it must be as soon as possible, and before the 1st of November in any event. The Company has fifty thousand ties on hand, and has lately contracted for fifty thousand more, to be delivered as fast as needed.

New Cement-Liquid Glue.

FEW things are in more constant demand among mechanics than cements, and it must be admitted that most of those in common use are open to improvement. We have recently met with some receipts in the French and German journals, which we put together for the information of our readers. The first is an iron cement, which looks likely to be useful. It is made by mixing from four to five parts of dry clay, two parts of iron filings, one part oxide of manganese, half a part of salt, and half a part of borax. When the cement is wanted for use, this mixture is made with water into a paste, which is applied immediately to the pieces to be joined. It is then allowed to dry gradually, and is subsequently heated to whiteness. After this the cement will resist water, and of course heat. Another, said by Stinde to be a very useful cement, is made by mixing equal parts of oxide of manganese and oxide of zinc, and making them into a thinish paste with the solution of silicate of soda of commerce. This paste must be applied quickly, as, no doubt, it sets very rapidly. It is not calculated to resist heat and water—the latter, at all events, not for any length of time. Another receipt we find is for a strong liquid glue. To make this the inventor puts three parts of glue with eight parts of cold water, and lets them stand for several hours to soften the glue. He then adds half a part of muriatic acid and three-quarters of a part of sulphate of zinc, and heats the mixture to 185 deg. Fah., for ten or twelve hours. The mixture remains liquid after cooling, and is said to be very useful for sticking wood, crockery, and glass together.—*Mechanics' Magazine.*

Paint for Stoves.

BLACK lead is a great institution in this country, and probably few but cooks and housemaids would care to see its use diminished. It certainly has its recommendations, but it can hardly be said to be ornamental, while it entails an immense amount of labor on our servants. In Germany, where a stove and sort of kitchen range are continually to be found in the common sitting-room of a respectable family, the unsightliness seems to have been felt, and a suggestion has been made to do away with the black lead, and paint the stoves and ovens. Oil paint, of course, cannot be employed, but water-glass (silicate of potash) colored with pigment to match the paint of the apartment is the material recommended. Before this is applied the iron must be thoroughly cleansed from grease, and all spots must be rubbed off with a scratch brush. Two or three coats of the paint may then be put off and allowed to dry, after which the fire may be lighted without fear of injury to the color, which may, indeed, be heated to redness. Grease or milk spilt over the

paint has no effect upon it, and it may be kept clean by washing with soap and water. Dutch ovens and like utensils may also be coated with the same materials, and the labor spent in polishing be saved. A good coating of the paint, the author says, will last a year or two.

The Strike at the Iron Works in Troy.

A CORRESPONDENT furnishes the *Times* with some interesting facts concerning the above serious strike. It appears that a number of men employed at the rolling mills owned by H. Burden & Sons, Erastus Corning & Co., and John A. Griswold & Co., is about seventeen hundred; the weekly earnings, \$25,000; value of one week's productions, \$105,000; consumption of coal per week, 1,700 tons; weight of pig iron used per week, 1,200 tons.

The strike is now in the third or fourth week of its career, the puddlers and their helpers being the parties chiefly concerned, although some of the rollers and heaters are believed to sympathize with them.

The puddlers earn about \$20 weekly, (five days' work), and the helpers make about \$11 in the same time, including lighting up. The cost in wages of making one ton of bar iron from the pig is about \$22. The advance asked by the strikers would increase the cost about \$3. This the proprietors of the mills affirm, will take away all the profit they are making on bar iron; for this reason they had rather close their mills than agree to the strikers' terms.

The men are acting peaceably, a considerable number of them having gone as laborers to build the railroads now being constructed from Chatham Four Corners to Bennington and from Glens Falls to Fort Edward, although they are in receipt of less wages than if working at the mills. They expect by this to force the mill owners to accede to their terms and at the same time earn enough to keep themselves and families until the lighting up of the mills.

It is impossible to say to what extent the mill owners may be inconvenienced by unfilled orders, but it is generally reported that they can get their pressing orders filled at other works without loss, waiting until their hands are tired of the lock-out or on the approach of cooler weather get other hands to take the place of those who choose to hold out. It is a well-known fact that it does not pay to run iron works in the hot weather, the quantity of coal consumed being much greater for the same production than in cooler weather. For this reason some works are closed in July and August, at which time they take inventory and make their annual repairs.

If this plan was generally adopted it would be alike beneficial to owners and workmen, as the former would save fuel, and the latter would be unemployed at the season of the year when their services would be in demand in the country.

A "Devil Fish."

The *Charleston Mercury* says: "We had the pleasure of a conversation with Prof. Holmes yesterday afternoon, in relation to the submarine monster recently captured by a fishing boat, and now on exhibition on South Bay. The Professor says it is what is known as the sea eagle or clam cracker, a fish very common and abundant in our waters. It is also known by the name of eagle ray or stingaree, a corruption of Singaray. Very large specimens, some weighing as high as five hundred pounds, were caught here some years ago, their heads and teeth preserved, and may be seen at any time in the Charleston College Museum. They have a snout similar to that of a hog, and root in the mud for clams, which they crush in their mouth with perfect ease; the jaws, instead of being formed of flesh and teeth, having a series of bony plates. The present specimen weighs between 250 and 300 pounds. It is five feet two inches wide from tip to tip of the wings, and four feet long from the snout to the base of the tail. The tail measures five feet, thus making the whole length of the fish nine feet. The negroes in their fright after its capture, in order to disarm it, broke off the stinger, a protuberance from the base of the tail, which is used by the fish as its greatest means of defense."

Microscopy and Cholera.

At the last meeting of the Royal Microscopical Society in London, a paper of great interest was read by Dr. Thudichum, "On the relation of microscopical fungi to pathological processes, especially to the process of cholera," in which, after explaining the hypotheses advanced by those who maintain the parasitic origin of cholera, he severely criticised the methods by which their conclusions had been arrived at, and showed the unsatisfactory nature of the conditions under which their experiments had been made. He showed further that the so-called fungoid bodies found in the "rice water" evacuations of a cholera patient were not of vegetable origin, neither were they specific forms, but were identical with those which were equally found in all other decomposing animal tissues and secretions. The results of a large number of personal experiments and observations, extending through various epidemics since 1850, were adduced to show that the choleraic process was the result of chemical, and not of vegetable parasitic action.

At a meeting of the Société de Photographie, of Paris, M. Civiale made some observations upon the employment of sulphur cyanides in toning and fixing. He stated that in the summer of 1867, he fixed about 700 positive proofs by means of potassium and ammonium sulphocyanides. A print, one half of which had been protected from the light, the other unprotected, and which had been exposed for three months, showed only a uniform tint.

Lightning on the Telegraph Wires.

During a recent storm at Cincinnati, Ohio, the lightning followed the wires into the office, and at each flash concentrated in a sheet of flame on the switch board, producing a concussion similar, at first, to the discharge of a score of rockets, quickly followed by two reports as loud and distinct as the discharge of a six-pound cannon, succeeded in turn by a volley of musketry. It became necessary to disconnect all the wires, and keep them disconnected about an hour and a half. Some of the operators, who were unused to such severe electric displays, supposed at first that the "day of reckoning" had come.

Editorial Summary.

JOHN BOURNE, the well-known author of the "Catechism of the Steam Engine," and other engineering works, has recently undertaken a new work upon "Modern Steam, Air, and Gas Engines," in which it appears that he claims to have originated nearly all the improvements made in the steam engine since the days of Watt. Part one only has been issued, which gives evidence of considerable self-satisfaction on the part of the author; at the same time it attests his ability to furnish valuable information. The dry engineering details of Mr. Bourne's work are to be relieved by some self-glorification which will no doubt be quite readable.

The Engineer and *Engineering*, both able journals, published in London, are quarreling about their respective circulations, and *Engineering* goes so far as to twit *The Engineer* of having published falsehoods in relation to the matter. We regret that our dignified cotemporaries should permit themselves to war upon each other in this unseemly manner. We do not wish to become parties to this controversy, as it does not much concern us, but we think that if the *SCIENTIFIC AMERICAN* had a circulation of not more than 5300 copies per week, we should be very careful to keep out of a quarrel about it. The *SCIENTIFIC AMERICAN* has a greater weekly circulation than the whole of the English and American scientific papers combined, but we do not propose to quarrel about it, on the contrary we are quite happy.

GALIBERT'S APPARATUS IMPROVED.—We have previously given a description of this patent hood, by means of which any person can penetrate into poisonous atmospheres without danger. While communication is kept up with the external atmosphere, the wearer of the apparatus is obliged to rebreathe the air expired by his lungs, and the latter soon becomes surcharged with carbonic acid. M. Galibert now obviates this difficulty by providing a receiver into which he puts potash, the effect being to absorb the poisonous gas and make the expired air again fit for respiration.

THE London local Post Office is one of the best conducted institutions in the world. It employs 1,152 letter-carriers, who distributed 76,000,000 letters in 1863, and in 1868 it is estimated will deliver 90,000,000; that is, 1,730,000 letters per week, and 288,000 per day. Carriers are paid about twenty-five shillings per week, nearly \$8.75, and the expense of the department is estimated at £120,000. The net profit amounts to nearly £300,000, or two millions of our money.

CARBONIZING TIMBER.—A Mr. Payen is reported in an English exchange as favoring the process of superficial carbonization of timber, as known and practised by the Romans. He recommends that the whole surface of ships should be carbonized, and for this purpose suggests the use of the gas blow pipe, or when gas is not at hand a blow-pipe and lamp fed with heavy petroleum oils. The carbonization of wood exposed to wet is no doubt useful. It has been employed for many years for preserving fence posts, but it would be rather expensive to apply the process to the hull of a ship as proposed.

MUSKETOS.—A correspondent complains that he is so much annoyed with mosquitoes that it would be a great blessing if some one would suggest a wash to be applied to the skin that would drive them off. We cannot recommend a wash for their purpose, but have heard it said that the faint odor of crystallized phenitic acid will drive insects from a room.

COLORS.—It has been found, while firing at the "running man" target, at Wimbledon, England, which is scarlet on one side and gray on the other, that the scarlet dazzles the eye, and is hence the most difficult to hit, from leaving a red streak behind it, which unsettles the aim. The gray side was struck seventy-four times and the red only forty-two times. It is a curious fact, too, that those with gray eyes hit fairer than those with eyes of other colors.

PERSONS who wear kid gloves in hot weather, and who perspire freely, will find that injury to the gloves will be prevented by applying ordinary corn starch to their hands (dry) before drawing on their gloves.

HUMBOLDT regards the climate of the Caspian Sea as the most salubrious in the world. Here he found the most delicious fruits that he saw during his travels, and such was the purity of the air that polished steel would not tarnish even by night exposure.

DURING a thunder storm at Birmingham, England, meteoric stones from one eighth to three eighths of an inch long, and about half those dimensions in thickness, fell in immense quantities in various parts of the town.

THE death of a little girl at Kimmiswick, Mo., resulting from the sting of a locust, is noted by the local papers.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Morality of Employees.—The Duties of Employers.

MESSRS. EDITORS:—I have often thought, when reading your wonderful paper—the father of a score of papers, living and dead—that you contribute the “mint, anise, and cummin,” and neglect the “weightier matters of the law.” Fifteen years ago, I tucked your paper with my oily fingers under my apron, and at noon-time read it, with my tin kettle on my knee, holding your paper in one hand, and my bit of salt pork in the other.

You take in all subjects; astronomical calculations, the motion of the seas, the products of the earth, and of the air. In the factory, you discourse of the senseless metals; you tell us how they may be made to minister to the comforts of man; you tell us how the shop tool may be most useful; you inform us of the temper and habits of every thing we see; you give us laws and rules, so that we can extract and get the greatest amount of usefulness from the old knife with which I scraped my pencil an hour ago, to the ponderous engine which drives the belt above my head. All are illustrated and explained in the paper under my elbow. Yet I have always believed that you have failed to notice something of vital importance, the neglect of which has caused more loss and trouble in the factory, and sorrow elsewhere, than seems to be comprehended by employers.

Six months ago, you told us that this city produced, in one year, \$200,000,000 worth of manufactured articles; and another authority—the census—tells us that there are 80,000 persons, men, women, and children, employed in making this amount of fabrics. Did the census tell us of the habits of the persons who produced all this? Did the SCIENTIFIC AMERICAN tell us of, or suggest anything in relation to the condition, the habits, good or bad, of a vast number of human, immortal beings, who spun and hammered out this vast sum of wealth for the State? Your paper tells us—as nobody else can tell us—about inorganic matters. Do you enlighten us about the productions of a man's hands, and let the man himself pass unnoticed? Do you think that the metals should have attention, and leave the mind of the man who works the metal in darkness and neglect? Did you ever hint to employers that they are responsible for the influence which the “hands” exert upon society;—that employers should be teachers of morals and manners, as well as of methods? Did you ever tell employers that they cannot, with safety, “play horse” out on Broad street, and leave the control of their “hands” in the hands of an ignorant and, very often, dishonest foreman, without mischief to the community and himself?

The condition of “hands” in Philadelphia is disgraceful, and would be disgraceful if found in the kraal of a Hottentot. The Prison Discipline Society should pay a visit to us occasionally, and suggest some reforms to employers. The management is often disgraceful, and more cruel than that of our public prisons. In well regulated prisons, those who are wholly vicious are not allowed to pollute the younger sinners. They are kept in separate apartments, so that the man who murdered a family, and the boy who stole a newspaper, may not come in contact. In our factories, this rule is neglected, and bad men are often filling the places of foremen. Young men—mere boys, with the country grass on their shoes—are placed in contact with grown men leprous with crime. The innocent and the weak are pushed to the wall by the strong and the dissolute. Employers have no other idea than that of extracting so much labor out of them. The man who sucked the alcohol can, pours his filth for sixty hours a week into the ears of that smooth-faced lad who left his mother in tears, in Jersey, a week ago.

The employer says, “I have no time to attend to this matter. I don't trouble myself about the men. Let preachers attend to them. Let them settle their accounts in the next world. It's none of my business.”

The employer does not always have to wait till the next world to settle his account with society for the mischief he does in this world. Do you know, Mr. Employer, that you cannot come in at 11 o'clock A. M., rush through your place, and then leave your factories, schools for the education of vice, and not be guilty of a high crime? Do you know that the loss by materials stolen, added to that of the misdirected labors of your hands, often amounts to a moiety of your gains? Do you never turn uneasily on your bed as you hear the heavy tramp of ruffians upon your pavements at midnight? How much extra tax do you pay in supporting the law for punishing the villains? Do you keep a debt and credit account with prisons and almshouses? Or, have you an account current with the hanging committee? Do you ever think that in the mutations of the world the branches of your own family tree may interlace with this poison tree that your own hands have planted? Do you know that vice, like the cholera, visits rich and poor? I know a manufacturer who declared, as you do, that he had no control, yet when a policeman came with some gold watches which had been stolen, when a succession of robberies and a morning murder alarmed him, he became convinced that it was his business. From many years' experience the writer is justified in making these statements.

A man who keeps one of the establishments I have described should be indicted for maintaining a public nuisance, far more mischievous than if he kept a brothel or a bagnio.

When an employer begins to neglect his business, and “play horse,” he should dispose of his business, or the horse. He cannot keep both.

Employers who destroy the health of their fellow men by keeping them confined in filthy, ventilated rooms, with the

thermometer at 110°, make a poor atonement to the world by endowing hospitals for diseases of the chest. The ears of the Pharisee stick out above the garb of philanthropy. Nobody is deceived.

Philadelphia, Pa.

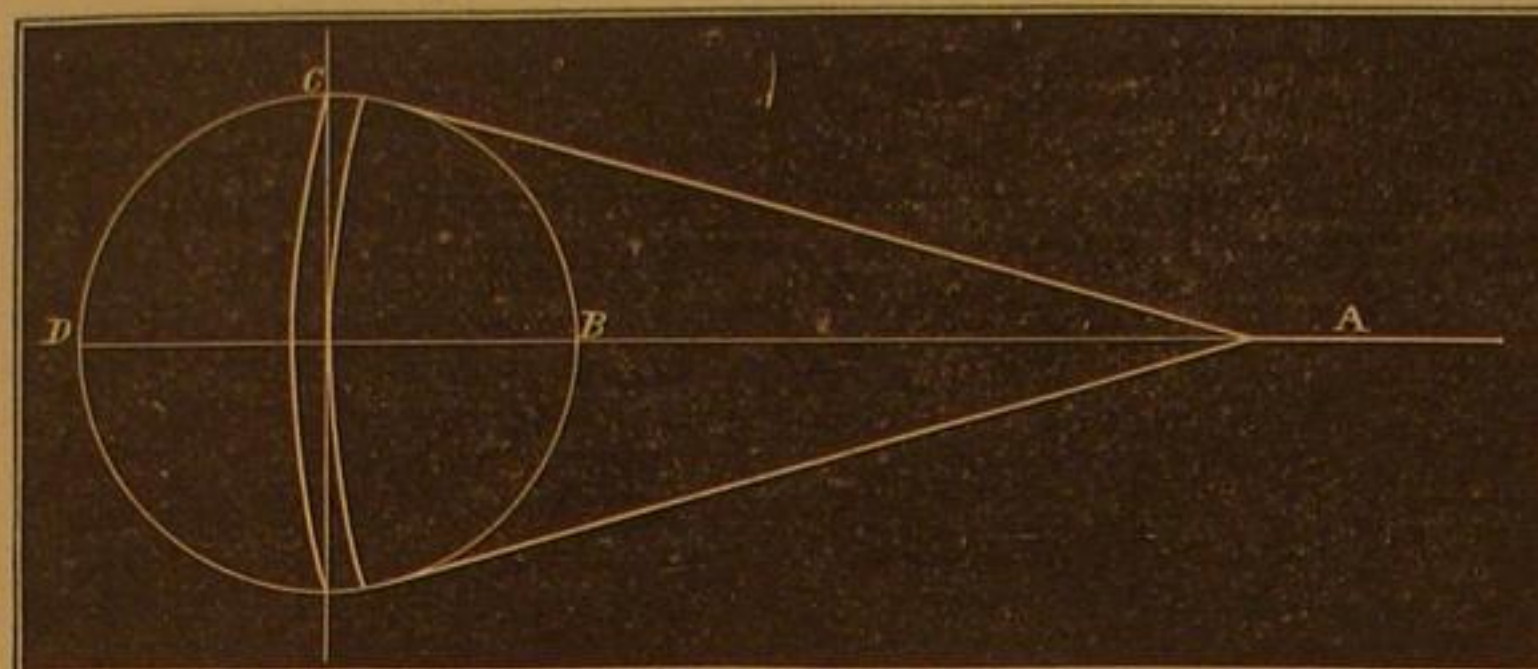
[Nothing we can say in extenuation of the neglect charged upon us can add to the caustic severity of our correspondent's article. We have no doubt that his remarks apply to the mismanagement of many employers, but there are many honorable exceptions.—EDS.]

Apparent Variation of the Steam Engine Crank.

MESSRS. EDITORS:—Will you explain why it is that a piston rod, A, of an engine travels further while the crank is moving over the first quarter, B to C, than while it is moving over the second quarter, C to D?

Macedon, N. Y.

[In reply to this correspondent we have engraved a diagram which sufficiently explains the seeming paradox. It will be seen that the stroke of the piston is governed by a circle, the center of which is the center of the bearing of the connecting rod on the crosshead. The quarter stroke, then, representing the half-stroke of the piston, is not the straight cross line at the point, C, but the radial line on the crosshead side. Thus,



if the crank travels to the point, C, the piston will have moved more than half its stroke in the cylinder. The difference is proportionably less as the connecting rod is longer and proportionably greater as it is shorter.

But it is a notable fact, that many engine builders set their valves by the piston of the crank—on its dead center and its half stroke, as found by the rotation of the crank—without regard to the effect of the radial line formed by the positions of the connecting rod and the arc resulting therefrom, as described by the crank and connecting rod together. The consequence is, an unequal working of the engine, to such an extent, in some cases, that one end of the cylinder develops five eighths, and even more, of the power which is shown by the indicator. Sometimes the unequal noise of the valves will show that there is an error, but its extent and the remedy can be accurately ascertained only by the indicator.—EDS.

Connecting Shafts by Pitmans.

MESSRS. EDITORS:—I am fond of contemplating the various parts of machinery, and anything novel in this department of the arts is very interesting to me. I was pleased with your illustration in No 24, last volume, of a new method of converting a reciprocal or oscillatory motion into a rotary one, and its publication reminded me of a plan, by which I overcame a difficulty some three or four years ago, which may be useful to some of your readers.



I wished to revolve one horizontal shaft by another driven by a belt directly under it, but, for reasons unnecessary to specify here, the use of great wheels or belt as connections was out of the question. I succeeded by employing the device shown in the illustration. The ends of the shafts carried two cranks of equal radius, connected by a pitman, having a longitudinal slot in its center, in which fits a pin secured to some fixed beam, post, or other immovable object. This brief description, in connection with the engraving, will be sufficient to explain the operation of the device.

JOHN ALLEN.

Delaware City, Del.

The Frictional Area of Millstones.

MESSRS. EDITORS:—On page 339, Vol. XVIII, Geo. Rule, of Iowa, says, if I understand him correctly, that the frictional surface of a stone per minute is equal the area of its face multiplied by the number of revolutions it makes per minute. His calculations, based on this principle, give the “frictional surface, or area in feet per minute, of a 4-foot stone, making 180 revolutions, as equal to 2,261.94 feet; and that of a 3-foot stone making 240 revolutions per minute, he says is 1,696.44 feet per minute, a difference in favor of small stones of 565.50 feet per minute.”

I differ from him, and give the frictional surface, or area in feet per minute of a stone as equal the area of its face multiplied by its velocity per minute, which velocity is equal to one half the velocity of the circumference. Or, if we multiply the area of the face by the circumference of the stone, and this by one half the number of revolutions per minute, it will give the same.

According to this, the number of square feet rubbed per minute of a 4-foot stone making 180 revolutions per minute is 14,212.29, and in the case of a 3-foot stone at 240 revolutions per minute, it will be 7,994.41, “a difference in favor of small stones of” 6,217.88 feet per minute, instead of 565.50, as stated in the article referred to.

C. A. L.

Locksley Hall, Tenn.

Utilization of the Waste from the American Process of Amalgamation.

MESSRS. EDITORS:—In the process of amalgamation adopted in America, great waste is incurred, owing to the formation of calomel which is not recovered. It has been estimated that during the last two hundred years six million cwt. of mercury have thus been lost in the American mines. The object of this article is to show a economical method of recovering this mercury from the waste. The waste is washed carefully until all the soluble matter is dissolved out; the residue being placed in a large vat is treated with nitrate of soda and hydrochloric acid in slight excess. The calomel is thus converted into corrosive sublimate, which is soluble, the reaction being rather complicated; probably, $\text{Hg}_2\text{Cl}_2 + \text{NaO} + \text{Na}_2\text{O} + 2\text{HCl} = 2(\text{HgCl} + \text{NaO}) + \text{NaCl} + 2\text{H}_2\text{O}$.

By mixing with hot water and agitating thoroughly the chloride of mercury is dissolved, and the solution is then run off, by means of a siphon, into another vat. There are now two methods of obtaining the metallic mercury from this solution of chloride. The first, consists in the evaporation to dryness of the liquid, and its reduction by means of slaked lime. This method is objectionable, owing to the volatilization of some of the chloride of mercury without undergoing reduction, thus largely diminishing the yield of

mercury. The second and better plan is as follows: A solution of sulphide of calcium, which is formed as a waste production during the reduction, as will be presently described, is added to the liquid in the vat until all the mercury is precipitated as black sulphide of mercury, thus— $\text{Hg}_2\text{Cl}_2 + \text{CaS} = \text{Hg}_2\text{S} + \text{CaCl}_2$. This precipitate is allowed to settle, and the supernatant liquid is then run off. The moisture is expelled from the precipitate by heating to a temperature not exceeding 300° Fah., and the dry sulphide is then reduced in the following manner: After being intimately mixed with from one-half to an equal weight of slaked lime, it is distilled in cast-iron retorts, and the reduced mercury is condensed in receivers partly filled with water, while sulphide and sulphate of calcium remain in the retorts. $4\text{Hg}_2\text{S} + 4\text{CaO} = 4\text{Hg} + 3\text{CaS} + \text{CaO} + \text{SO}_2$. This residue, by lixiviation with water, forms the solution employed for the precipitation of the sulphide of mercury.

G. H. MANN.

The Negative Slip of the Screw.

MESSRS. EDITORS:—The screw has three kinds of slip, positive, lateral, and negative. The first of these is so well understood that anything relating to it would be superfluous.

By lateral slip, is meant the penetration of the blades of the screw sideways, that is to say, the medium in which it works being of such a yielding nature the blades are enabled to penetrate it bodily without transmitting any forward motion of the ship. To the lateral slip, the centrifugal action of the propeller may be chiefly attributed. The tendency of the screw when making lateral slip is, as well as penetrating the water, to carry a certain amount around with it between the blades, which water will be liberated as it nears the surface, for it then encounters the least resistance. Consequently the raising of a bank of water over the screw, is dependent in a great measure on its lateral slip, which slip is always increased as the forward motion of the ship is resisted.

This proves the superiority of deep immersion of the propeller, for the deeper it is sunk, the denser will be the medium in which it works, thereby counteracting to a certain extent the lateral slip. In vessels, the positive slip varies between fifteen and thirty per cent. The smaller the vessel, the greater usually is the loss from this cause.

We are all acquainted with the result of negative slip, and understand the term to express that the actual progression of the ship through the water is greater than if the screw worked in a solid nut. In a vessel making negative slip, it is evident by looking at the engines that they are driving something, for the screw shaft will still show the same amount of thrust. The following theories are usually adopted to explain the phenomenon:—

In vessels with a full stern there is a large following current of dead water in which the screw works, and this current gives part of its momentum to the propeller. If a log be thrown overboard, whether it be of the patent kind or not, it will not take cognizance of the speed of the current; but if it was placed so that it could be affected by the forward motion of the current, it would then show the real slip that the screw was making in the moving mass of water, which no doubt would be much larger than was expected.

The centrifugal action of the screw has a tendency to pile the water up at the stern of the vessel, and this acts by its hydrostatic head in pressing the vessel forward, and making the ship as it were, continually slide down an inclined plane. The centrifugal action of the screw causes negative slip, or perhaps better expressed, aids in annulling the positive slip, by drawing in water at the center of the screw and

throwing it outward. This water has a forward as well as a centrifugal motion, and a part of it is introduced between the blades and the medium upon which they are acting, thereby making the propeller pass through a greater space than is due to the pitch and number of revolutions.

In vessels making negative slip the only thing that can be done is to introduce a coarser pitched screw, for it is a fact that fine pitches and quick speed of the propeller are usually to be found in vessels having negative slip. If a patent screw be introduced, arranged with a variable pitch, it will be found that when the blades are set at a fine pitch, and all of them are in use, a certain amount of negative slip can be produced, but if two of the blades be removed and the pitch remain unchanged, this slip will, probably, disappear. This shows that a diminution in the number of blades is equal to an addition to the pitch. It is also probable that four bladed screws are more liable to negative slip than those of two, on account of their greater centrifugal action.

No possible benefit is derived from the existence of such slip, as in all cases it shows a great want of power, and it also prevents the ship, when resisted by headwinds, from having the same propelling power. I think that in all screw vessels the positive slip is much reduced from some of the causes stated, and that this slip, if measured correctly, would always show that the screw was, to a certain extent, making negative slip, but in the majority of cases, not enough to cause the positive slip to disappear entirely. ENGINEER.

Mechanical Distribution of Electricity.

MESSRS. EDITORS:—It has long been claimed by electricians, that the inner surface of metallic tube cylinders, etc., cannot be charged with electricity. Prof. Faraday states in his "Researches," page 366, that he constructed a hollow cube, insulated it, and charged it with electricity, and he went inside with delicate electrometers, but they did not show any signs of excitement, although the outside was heavily charged. Prof. Henry, in the Patent Office Report for 1859, page 470, illustrates a similar experiment with cups, charged so that sparks could be drawn from the outside and no excitement within. Prof. Douglass, of the University of Michigan, makes the same statement in 1867, and many others have been led into the same error, by neglecting to fully investigate the subject. Without denying the facts stated by those leaders in electrical science, I claim that sparks could have been drawn from the inner surface of Prof. Faraday's cube, and from the inner surface of any hollow cylinder globe or tube, as readily as from the outer. I have even drawn them from the cavity of a man's mouth.

A year ago I tried the following experiment at the Illinois State Normal University. I placed a pithball electroscope within a deep cup, and when the whole was charged with electricity, the balls would not diverge so long as they remained below the edge of the cup, but did diverge when raised above the edge, although they had no communication with the electrical machine, except from the inner surface of the bottom of the cup. I then, with a ball on the end of a small wire, drew sparks from the inner surface of the cup and from smaller tubes. The fact that the inner surface surrounding the balls is charged, would account for the non-divergence of the balls—for there is no unsaturated matter to attract them outward, or, to use the common form of explanation, I should say that the repulsion of the electricity on the inner surface, counteracted the repulsion of that on the balls, and they would remain at rest. I think the full investigation of this subject will lead to a complete revolution of the theory of distribution of electricity, and perhaps oblige us to discard the idea of repulsion.

G. WRIGHT.

Fire and Water.

MESSRS. EDITORS:—When fire occurs in a lower story of a building, the plan of Messrs. R. Hoe & Co. to arrest its progress to the upper stories, seems well adapted to effect that purpose. But when a fire occurs in an upper story, past experience shows, that if there arrested, it is usually with great damage by water to the contents of the stories below. Might not this, in a great measure, be prevented by giving a pitch to the floors toward the outside wall of the building with scupper holes through the outside wall to let the water out, to be used over again if need be? The thresholds of the doors and collars around openings through the floor, to be made high enough above the level of the scuppers, to keep a sufficient bed of water on the floor to prevent its burning, and the scuppers to be closed by valves at ordinary times, to keep out the air.

Providence, R. I.

[That buildings might be made water proof as well as fire proof is susceptible of demonstration. The plan, however, of inclining the floors toward either wall appears to be objectionable. Such a floor would be inconvenient to walk upon, and in many ways would annoy. Floors of fire and water proof material might be used, and be at the same time perfectly flush and perfectly safe.—EDS.]

Long and Short Screwdrivers.

MESSRS. EDITORS:—In reference to a long and short screwdriver mentioned in your issue of June 20, 1868, you attribute the fact of a long one driving a screw home with more ease than a short one, to the greater leverage it has over a short. I most respectfully beg leave to differ from you.

I am inclined to believe the principal reason or cause is in the spring of the material (the twist spring) of which the screwdriver is made. Take, for instance, two screwdrivers made of the same material, and the same size in every respect,

with the exception of the length. Place them in a guide over the holes prepared for the reception of the screws, and I think you will find the long one will drive the screw home with more ease than the short one, which in this case cannot be attributed to any greater leverage, but to the greater twist spring in the material of which they are made, i. e., the longer the screwdriver the greater the spring.

MATTHEW SENIOR.

Philadelphia, Pa.

A Question in Rowing.

MESSRS. EDITORS:—I am able to row a boat three miles in one hour, in still water, without current. If the tide runs five miles per hour, and I use the same exertion as before, with the tide, starting from a given point, how far have I actually (not apparently) rowed, at the end of one hour?

A. D. B.

Ans.:—You have actually rowed three miles.

Absorption of Gases by Charcoal.

In Watts' excellent "Dictionary of Chemistry," Vol. 1, p. 761, there is an account of the absorptive power of charcoal upon gases, which has been taken chiefly from the late researches of Dr. Stenhouse. Having repeated and somewhat extended these experiments, I have thought that so much as follows may be of general interest.

Some pieces of charcoal prepared from a cocoa-nut shell, and which were of a dense, lustrous character, were placed in a tube, and a stream of sulphureted hydrogen, previously dried with chloride of calcium, passed over them. After the lapse of ten minutes, the tube was detached, and indicated on the balance an increase of weight, due to the absorbed gas. A current of oxygen was next passed over the charcoal; the tube became slightly warm, owing to the oxidation of the hydrosulphuric acid, but in no case, in a number of experiments, was there (as I have seen it stated) a spontaneous ignition. On heating with a spirit lamp, vapor of water was condensed upon the sides of the tube, and sulphur deposited; sulphurous acid not perceptible. When platinized was substituted for ordinary charcoal, the amount of moisture and sulphur was increased. Even in this instance, however, ignition was not spontaneous, but followed on the application of the spirit lamp for a few moments.

By depositing finely divided platinum upon the surface and in the pores of the charcoal, a variety of interesting results were obtained. This may be effected by boiling charcoal in lumps or powder in a solution of bichloride of platinum, for five to fifteen minutes, according to the size of the pieces, and then heating the charcoal to redness in a platinum crucible; holding the charcoal in the flame of a spirit lamp will answer. A piece platinized in this way was immersed in a jar, containing one measure of oxygen and two of hydrogen; the charcoal glowed with a dull, red light, and effected a silent combination of the mixed gases. A more highly platinized fragment lit up instantaneously, the jar became clouded with smoke, and union was determined with explosion. In a stream of hydrogen the platinized charcoal, which was previously at the temperature of the room, ignited quickly throughout and set fire to the gas. In oxygen, no action apparent. Held before the nozzle of the compound blowpipe, the jet was speedily lighted. When previously warmed, the platinized charcoal became incandescent in burning gas, but did not inflame it, owing to the high temperature at which coal gas ignites. In alcohol vapor, there was no action apparent in the cold, but a spark previously formed in the flame of a lamp increased in size with the production of acid vapors. A mixture of one volume of hydrogen and one of chlorine was not ignited; whether hydrochloric acid was silently formed at a slow rate was not determined. The importance of such experiments in relation to ventilation and disinfecting will be readily perceived.—Prof. A. R. Leeds in the Franklin Journal.

Reappearance of Brorsen's Comet.

The recent appearance of Brorsen's comet, says a writer in the Boston Transcript, has furnished another opportunity for verifying the results arrived at by spectroscopic observation regarding the constitution of cometary matter. This comet is of the small number whose periodicity is well established. It was first discovered on the 26th of February, 1846, by M. Brorsen, in Denmark. It was found that the observations made upon it would be best satisfied by the assumption that it revolved in an ellipse around the sun in about five and a half years and its return in September 26, 1851, was predicted. At that date, however, the portion of the heavens in which it was supposed to be moving was unfavorably situated for observation and was not detected. The next return by theory, would take place in the spring of 1857, to which time the astronomical world looked forward with great interest. The comet was in fact rediscovered by Bruhns, at Berlin, on the night of March 18, 1857. It followed very closely the track which had been laid down for it. Another return occurred in September, 1862, but owing to unfavorable circumstances, similar to those in 1851, it eluded detection. But early this year faithful to prediction, it again appeared, passed its perihelion, and is now rapidly receding from the sun. Father Secchi, of the College Observatory at Rome, says:

"The spectrum of the comet is discontinuous; it consists first of a feeble light filling the field of view, is superposed by three bands so vivid as to appear more dilated than the rest of the field. The brightest of these bands is the middle one, which is in the green, and corresponds to the region between the magnesium and the hydrogen, but much nearer the former; the breadth of this band is very small, not great-

er than one fifth of the distance between the two rays. At moments when the atmosphere is particularly favorable it is reduced to a bright hue of the same apparent breadth as the nucleus of the comet. Another bright band, but of much less intensity, is in the green yellow, between and equidistant from the sodium and the magnesium. Another band, in the red, may sometimes be distinguished, but its position can be fixed only with the greatest difficulty. The third luminous zone, nearly intermediate between the two preceding, is near the blue end.

"This band is bright enough to admit of measurement, and to produce by scintillation the linear appearance. These observations lead us at once to results of considerable interest. It seems first a justifiable inference that this comet shines not merely by reflected solar light; the only solar light is perhaps that diffused in the field of view. The comet is, then, self luminous, and its light is very like in color that of the nebulae, but very different in position from that of the nebulous rays."

The Trades of Animals.

The following observations, which we copy verbatim from an "Old Curiosity Shop," have reference to animals, and exhibit their at least apparent knowledge of the sciences; also their professions, occupations, and enjoyments: Bees are geometers—their cells are so constructed as, with the least quantity of material, to have the largest-sized spaces and least possible loss of interstice. So also is the ant lion—his funnel-shaped trap is exactly correct in its conformation, as if it had been made by the most skillful artist of our species, with the aid of the best instruments. The mole is a meteorologist. The bird called the nine-killer is an arithmetician; so also is the crow, the wild turkey, and some other birds. The torpedo, the ray, and the electric eel are electricians. The nautilus is a navigator—he raises and lowers his sail, casts and weighs his anchor, and performs other nautical evolutions. Whole tribes of birds are musicians. The beaver is an architect, builder, and woodcutter—he cuts down trees, and erects houses and dams. The marmot is a civil engineer—he not only builds houses, but constructs aqueducts and drains to keep them dry. The white ants maintain a regular army of soldiers. The East India ants are horticulturists—they make mushrooms, upon which they feed their young. Wasps are paper manufacturers. Caterpillars are silk spinners. The bird plover is a weaver—he weaves a web to make his nest. The prima is a tailor—he sews the leaves together to make his nest. The squirrel is a ferryman—with a chip or piece of bark for a boat, and his tail for a sail, he crosses a stream. Dogs, wolves, jackals, and many others, are hunters. The black bear and heron are fishermen. The ants have regular day laborers. The monkey is a rope dancer. The association of beavers present us with a model of republicanism. The bees live under a monarchy. The Indian antelopes furnish an example of patriarchal government. Elephants exhibit an aristocracy of elders. Wild horses are said to select their leaders. Sheep, in a wild state, are under the control of a military chief ram.—Once a Week.

The New Steamship Holsatia.

This new steamer of the Hamburg American Packet Co., which has just arrived in New York, was built by the firm of Caird & Co., of Greenock on the Clyde. The steamer has a straight stem, round stern, and a flush deck, running clear from stem to stern, affording the crew a fine opportunity to work the vessel, as also an excellent promenade for passengers. Her hull is constructed entirely of the best wrought iron, and is divided into eight water-tight compartments. Her dimensions are as follows: 450 feet length of keel, 45 feet beam, and 38 feet depth of hold; and she measures about 3,200 American register tons. The main deck is made of heavy iron plates, covered with a wooden sheathing of four-inch planks. She has two iron masts, which are braced and provided with the latest patents and improvements.

The engine, which is provided with a superheating apparatus and surface condenser, is of 600 nominal horse power, but may be worked up to 2,600 horse power by the indicator. The diameter of the cylinders is 72 inches, with a stroke of 4 feet, 6 inches, are supplied with steam from four large boilers, containing 24 furnaces, and consuming about 65 to 70 tons of coal per day. The propeller measures 17½ feet in diameter, and has a pitch of 27 to 29 feet. The engine, which is a vertical direct acting one, can make 54 revolutions per minute, and when doing so the vessel will attain a speed of 14½ knots per hour, without sails.

The Cunard screw steamer *Java* consumes about eighty tons of coal per day, and the *Scotia*, a side wheel, consumes more than double that amount. English engineers express the belief that the *Scotia* is the last side wheel steamer which will be built for crossing the Atlantic, as the screws are much more economical in every way.

New Patent Extension Bill.

Senator Ferry, from the Committee on Patents, has reported back, without amendment, a bill which provides that it shall not be lawful to extend any patent where, upon the hearing, it shall be shown that the invention for which said patent was granted was publicly known or in public use in any foreign country for more than six months prior to the issuing of the patent here. It provides, also, that in all applications for the extension of a patent to be hereafter decided, the final hearing shall not be had at an earlier period than three months prior to its expiration; and the duty of hearing and determining all such applications, heretofore vested in the Commissioner of Patents, is henceforth to be vested in the Board of Examiners in Chief.

The Secrets of the Ocean.

Mr. Green, the famous diver, gives the following sketch of what he saw at the "Silver Banks," near Hayti: "The banks of coral on which my divers were made are about forty miles in length and from ten to twenty in breadth. On this bank of coral is presented to the diver one of the most beautiful and sublime scenes the eye ever beheld. The water varies from ten to one hundred feet in depth, and is so clear that the diver can see from two to three hundred feet when submerged, with but little obstruction to the sight. The bottom of the ocean in many places is as smooth as a marble floor; in others it is studded with coral columns, from ten to one hundred feet in height, and from one to eighty feet in diameter. The tops of these more lofty support a pyramid of pyramidal pendants, each forming a myriad more, giving reality to the imaginary abode of some water nymph. In other places the pendants form arch over arch; and, as the diver stands on the bottom of the ocean and gazes through in the deep winding avenues, he finds that they fill him with as sacred an awe as if he were in some old cathedral which had long been buried beneath old ocean's wave. Here and there the coral extends to the surface of the water, as if the lofty columns were towers belonging to those stately temples that are now in ruins. There were countless varieties of diminutive trees, shrubs and plants, in every crevice of the corals where water had deposited the earth. They were all of a faint hue, owing to the pale light they received, although of every shade, and entirely different from plants that I am familiar with that vegetate upon dry land. One in particular attracted my attention; it resembled a sea fan of immense size, variegated colors, and the most brilliant hue. The fish which inhabit these 'Silver Banks' I found as different in kind as the scenery was varied. They were of all forms, colors, and sizes, from the symmetrical goby to the globe-like sunfish, from the dullest hue to the changeable dolphin."

DECISION IN A REISSUE CASE.

In the Supreme Court of the District of Columbia, before Justice Geo. P. Fisher, June 3, 1868. In the matter of the appeal of Gage & Whiteley from the decision of the Commissioner of Patents:—

It appears in this case that the appellants surrendered their original patent more than three years ago, and for various causes which it is unnecessary to recapitulate, a reissue has been withheld from them by the Commissioner until a few weeks since. Upon the determination of the Commissioner to grant the reissue, demand was made by the appellants that the reissued patent should be antedated back to the date of the surrender of the original patent. This demand was refused by the Commissioner, upon which the appellants have taken their appeal. The question to be determined by me, therefore, is whether a party surrendering an original patent by reason of a defective or insufficient description or specification, or by reason of its having claimed in its specification, as his own invention, more than he had a right to have, is entitled to have his reissued patent dated back to the day on which the surrender was made. In my opinion he is entitled to have it so antedated. I think the language of the act of Congress is clear upon this point. The thirteenth section of the act of July 4, 1836, contains this language: "That whenever any patent . . . shall be deemed inoperative, etc., it shall be lawful for the Commissioner, upon the surrender to him of such patent, etc., to cause a new patent to be issued . . . for the residue of the period then unexpired, for which the original patent was granted," etc. Section eight of the act of March 3, 1837, provides: "That whenever a patent shall be returned for correction and reissue, the Commissioner shall not grant the reissue until the applicant shall have altered his specification of claim in accordance with the decision of the Commissioner." These are the only provisions which relate to the time at which a reissue is to be granted. It would seem from the language of these provisions that so soon as the original patentee shall have made surrender of his original patent and altered his specification of claim so as to conform it to the decision of the Commissioner, he is at once entitled to have the reissued patent, for the residue of the period then unexpired, that is to say, the residue of the period unexpired when he shall have made the surrender and altered his application containing his corrected description and specification of claim, altered in accordance with the Commissioner's decision.

The law contemplates that the Commissioner shall grant the reissue "upon the surrender" to him of the defective patent, the payment of the fee, and the conforming of his specification to the Commissioner's decision. If we ask the question, at what time the reissue should be made, the thirteenth section of the act of 1836 furnishes the answer in the use of the word "whenever," that is to say, so soon as or at whatever time the surrender shall be made of the original patent and the filing of the corrected description and specification, and also in the use of the words "the Commissioner, upon the surrender," etc., shall cause a new patent to be issued. Beside, every consideration of justice and sound policy supports this construction. The object of the patent laws is to encourage the efforts of honest inventive genius by giving to each inventor, upon the payment of the prescribed fee, a monopoly in the manufacture of his discovery or invention for a limited period in consideration of the benefit which the public is to derive from the production of his genius. It can neither be honest nor politic to say that when an inventor, by reason of a mistake honestly made by himself or his agent in describing the contrivance he has invented, comes forward to have that mistake corrected, and to alter the words of his original patent, he shall have the other half of the term of his Patent Office before him, the time of his surrender and the time when the reissue is actually granted. The case before us furnishes an instance of the manner in which the life of a patent may be wasted in the effort to have such honest mistake as the law contemplates corrected by a reissue. Believing that the law leaves no discretion in the Commissioner when the surrender of an original patent, and the other prerequisites which it requires, have been made and complied with, but peremptorily commands him to reissue to grant the reissue, so as that the inventor may be put in the position of enjoying his discovery for the residue of the term of his original patent, commencing with the date of the surrender and the amended specification, the decision of the Commissioner in this case is overruled, and it is ordered that the reissue be antedated accordingly.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

Owing to a break in the Delaware and Raritan Canal, about three weeks since, there was an accumulation of ten miles of canal boats, laden with coal, sufficient to supply this city with anthracite fuel for three months.

The Waltham (Mass.) Chemical Works cover an area of eight acres, three of which are roofed over. The principal product of the works is sulphuric acid, and in the manufacture 10,000 pounds of sulphur are used each week. The company have five platinum retorts of the capacity of one hundred gallons each. These vessels cost the company \$15,000 in gold apiece.

In the vicinity of Virginia City, Nev., are several miles of flumes, all lined with blankets, which require hundreds of men, to change every few hours. The arrangement is for collecting the tailings from the mills, and they yield a much larger profit, according to their cost of production, than is realized from working the ores in the mills. Nearly one third of the bullion shipped from Storey county, in Nevada, is obtained from the waste of these mills, collected in flumes.

A new railway is projected, to connect Buffalo, N. Y., and Baltimore, Md., by a direct route. The road is styled the Buffalo and Southern railway, and with proper connections will only require 120 miles of new rails to be laid, although making the distance between these two cities equal to that between Buffalo and Albany. The company is already organized, and the route is to be surveyed at once.

At Swindon, the London and Great Western railroad company have extensive mills for re-working iron rails. At this establishment, Mr. Hewitt saw a steel-headed rail, made by balling up cast steel turnings in a common balling furnace, and placing the resulting bar on top of a rail pile. The fracture was admirable, and the weld appeared perfect.

Railway postal car. It is reported, by July 1st will be established on a continuous line from Bangor, Me., to Washington, D. C., and from Bangor to Toledo, O. When the service between Toledo and Chicago is established, there will be a continuous line from Bangor to Omaha.

The discovery of a large bed of porcelain clay in Pope county, Southern Illinois, promises to inaugurate a new branch of industry, and develop an important source of prosperity in that county. The clay resembles magnesia, and produces a ware rivaling, if not surpassing, the iron stone of Liver-

The gross earnings of all the railroads of the United States, the past year, amounted to \$240,000,000, or equaling about twenty-one per cent of their total cost. This sum averages ten dollars per head for our entire population. The ratio of expenses to earnings is fully seventy per cent, and the net earnings of the northern roads is said to be six and a half per cent of their total cost. In 1840, there was one mile of railway for every 7,465 people in the country; in 1850, there was one mile to 3,298 inhabitants, and in 1860, one mile to every 905 of our population. Mr. Poor thinks that by 1870 we shall have 45,000 miles of road opened, or one mile for every 837 inhabitants.

In the American Watch Factory, at Waltham, Mass., steel screws are made so small that to the naked eye the thread is invisible. It takes 500,000 of them to make a pound, and the iron which at first may have been worth two or three cents, in its new form is a product valued at \$4,000. The jewels for, and watches, until lately imported from Europe, are now all cut, polished, and drilled by machinery, in the establishment. Twenty thousand jewels are used per month. Most of the finest work in the factory is done by girls.

In the recent address of Mr. Amos Lawrence, before the Cotton Spinners and Planters' Association, it was stated that the production of cotton cloth increased 16 per cent between the years 1850 and 1860, making it in that year 45½ yards for every individual of the land. There are now in this country above 6,400,000 spindles. During the past winter these have averaged a daily product of 4½ skeins—twenty-four to the pound—or 16,000 bales of cotton of 400 pounds per week, which is \$32,000 bales per year. This is higher than the average, despite dull times. Some years ago we manufactured one-seventh of the cotton produced in the United States, now we manufacture one-third, and whenever we begin again to export cotton goods, as we did in 1860, the manufacturers will require much more.

One of the finest of railway bridges in Great Britain has just been thrown across the Mersey river, at Runcorn. It is a girder bridge 1,000 feet long, and is supported on stone piers rising seventy-five feet above high-water mark. The span of each division is 337 feet, and there are ninety-seven arches, each of sixty feet span. By the completion of this bridge the distance between London and Liverpool is shortened by fifteen miles. The cost of the structure is about \$1,250,000.

Turkey proposes a railroad undertaking on quite as extensive scale as the Pacific road. Belgrade on the Austrian frontier, and Bassora on the Persian Gulf, are to be put in railroad connection, the line passing through Constantinople and traversing both European and Asiatic Turkey entire. With certain branches, the road will be nearly 8,000 miles long, and the estimated cost is \$300,000,000. The Turkish government guarantees the interest on this sum, seven per cent on a part, and five per cent on another part, amounting to about \$175,000,000 a year. The engineers are now at Belgrade, arranging with the Servian government as to the route through Servia.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

FENCE.—W. D. Hillis, Elgin, Ill.—In this invention upright wooden pickets are supported by horizontal wire rails, to which they are attached in a novel manner, the rails being themselves fixed to the posts by a different method than any heretofore practiced, whereby great lightness and strength are combined, and the fence is rendered convenient to handle and cheap in construction.

BEVEL SQUARE.—W. T. Fisher, Lenoir, Tenn.—This invention has for its object to furnish an improved tool, simple in construction and convenient in use, and which shall combine within itself many of the separate tools now necessarily used in every workshop, such as a bevel square, right-angle square, plumb and level, and rules for measuring distances, measuring heights, taking angles, etc.

PASSENGER REGISTER.—John Enright, Louisville, Ky.—This invention has for its object to furnish an improved apparatus for registering the number of passengers or persons entering street cars, ferryboats and other places, which shall be so constructed and arranged as to register said passengers accurately, and, at the same time, so arranged that it cannot be falsified or made to register an incorrect number without breaking the apparatus and thus showing that it has been tampered with.

WASHING MACHINE.—William Hachenberg, White Pigeon, Mich.—This invention has for its object to improve the construction of washing machines so as to make them more convenient and effective in operation.

COMBINED NECKTIE AND WATCH GUARD.—Thomas J. Flagg, New York City.—This invention has for its object to combine a necktie and watch guard with each other so as to furnish a neat, convenient, and serviceable article.

HOP STRIPPER.—Sidney Holt, Baraboo, Wis.—This invention has for its object to furnish a simple and convenient machine for stripping the hops from the vines, and, at the same time, breaking the clusters into pieces.

RAILWAY STRUCTURE.—John G. Cross, Brattleboro, Vt.—This invention has for its object to improve the construction of railroad rails and chairs, so as to enable the rails to be made stronger and lighter, and so as to make the surface of the track continuous.

LEATHER ROLLER.—James T. Harris, Swampscott, Mass.—This invention has for its object to furnish an improved attachment for rollers for rolling leather, so as to make the machine more convenient in use, and to do away with the annoyance now so frequently experienced from the wet leather adhering to the roller.

BLIND OPENER AND FASTENER.—Martin Streeter, New Haven, Conn.—This invention has for its object to furnish an improved device by means of which window blinds and shutters may be opened, closed and secured in place, when fully closed, when fully opened, or when opened at any desired angle, which shall be simple in construction and easily operated.

THRILL COUPLING.—James P. Thorp, Southington, Conn.—This invention is designed to regulate the ordinary leather safety straps which are employed to obviate accidents in the event of the breaking of the coupling, the casual detachment of the bolt therefrom, etc. The invention consists in having a hook formed on the plate of the clip, said hook passing through the thrill rein in part of the eye through which the bolt passes, whereby the desired end is attained.

PORTABLE DEVICE FOR GRINDING TOOLS.—Daniel W. Ayres, Sheldon, Ill.—This invention relates to a new and improved portable device for grinding tools of various kinds, but more especially for grinding the knives of the sickles of grain and grass harvesters.

FRISKET.—T. W. M. Castle and J. B. Conner, Adrian, Ind.—This invention relates to a new and improved frisket for printing presses, and it consists in a novel construction and application of the former to the tympan of a press, whereby the frisket is operated, opened, and closed, automatically by the raising and lowering of the tympan.

COMBINATION OF HAMMER, RULE, SCREWDRIVER, NAIL HOLDER, AND TACK CLAW.—J. H. Goodwin, Scotland Neck, N. C.—The object of this invention is to combine, in a very simple and inexpensive manner, a hammer with a series of implements used most generally in connection with it, so that several tools or implements may be manufactured in connection with a hammer nearly as cheap as the hammer alone.

MECHANICAL MOVEMENT.—Kendall John Winslow, Twickenham, England.—This invention consists of an improved method of obtaining motion from a treadle by means of oscillating collars provided with ratchet paws and retracting springs of cords, and may be arranged for one or two treadles.

MANUFACTURE OF BUTTER FROM WHRY.—Ira Page, Adams, N. Y.—This invention relates to a new and improved mode of manufacturing butter from whry.

GRIST MACHINE.—Carl Müller, Sandoval, Ill.—This invention consists in providing on a suitable frame a vibratory screen to which the grain is first fed, to remove the straw and coarse material from which the grain is delivered to a vertical conical smutter made of an outer shell and interior drum of perforated sheet metal, and provided at its base with a fan through which the grain is passed to a vertical conically shaped washing appa-

ratus, also provided with a fan at its base, through which the grain is also passed, to another vibrating screen, and thence to the hopper for grinding.

RAKING DEVICE FOR HARVESTERS.—Henry F. W. Deterding, Alton, Ill.—This invention relates to a new and improved device for raking automatically the cut grain from the platforms of harvesters, and it consists in a peculiar construction and arrangement of parts, whereby the desired work may be performed in a perfect manner.

MITER BOX.—C. O. Hansen, Memphis, Tenn.—This invention consists in hinging two boxes to a vertical post having a laterally projecting arm, which serves as a guide for a slide to which the two swinging boxes are connected by connecting rods of equal length, and by which the said boxes are caused to oscillate around the said post to bring them to the required angle, by moving the said sliding blocks in either direction on the said laterally projecting plate or arm, and in providing on either end of the said arm opposite to that on which the sliding block works, a post, through which and through a post which forms the axis of the swinging boxes, slots are formed to guide the saw in sawing the angle; and in providing on the said arm a scale indicating the proper position of the boxes for sawing miters for frames of figures having different numbers of sides, and also in arranging the sides of the said boxes so that they may be applied to any body having an angle of any degree, and setting the same thereby, so that miters may be sawed in the boxes without further adjustment of the same to fit the said angle.

EXTENSION HORSE OR TREESTLE.—George H. Pierce and Martin T. Glimsdal, Mineral Point, Wis.—This invention relates to a portable trestle horse for scaffolding and other purposes, and consists of certain elevating and extension devices for accomplishing the purpose.

HINGE FOR WINDOW BLINDS AND SHUTTERS.—E. H. Benjamin, Oak Hill, N. Y.—This invention relates to certain improvements in window blind hinge, whereby the same is held open by the automatic action of the hinge and weight of the shutter.

TIRE BENDING MACHINE.—Robert Tyrrell, Sumner, Ill.—The object of this invention is to accomplish the bending of wagon tires in an easy and expeditious manner. It consists of revolving disk operated by a lever arm, by means of which the tire is drawn between the periphery of the disk and a roller wheel, and bent around the disk, together with other devices perfecting the whole.

HORSE RAKE.—Jacob Gintner, Mier, Ill.—The object of this invention is to provide a horse rake which will operate more satisfactorily than those of similar construction heretofore made. It consists of mechanism for revolving the rake proper.

TRACE BUCKLE.—Martin Gayhart, Young America, Wis.—The object of this invention is to provide a buckle for leather traces or tags, which shall be simple, effective, and easily operated. It consists of two parts, which are pivoted together, and which pinch the trace when strain is brought upon the two parts, whereby the pinching action relieves the tongue from a portion of the draft strain of the trace.

DEVICE FOR STOPPING AND STARTING CALENDER ROLLS.—Wm. T. Porter, Wilmington, Delaware.—The object of this invention is to operate the friction clutch of calender rolls in paper machines by means of a rod bar or bolt running through the axial center of said roll.

HAY FORK.—Henry L. Doane, Green Oaks, Mich.—The object of this invention is to furnish a hay fork of the class generally known as horse hay forks. It consists of a pair of hinged or swinging tines connected with a corresponding pair of fixed tines, the construction and operation of which is exceedingly simple and effective.

HOISTING APPARATUS.—Dexter Head, Medusa, N. Y.—This invention relates to a new device for elevating loads of suitable description, and consists in the application of a system of levers, known under the denomination of lazy tongs. By the use of this invention articles can be elevated to considerable heights, with the aid of inconsiderable motive power.

PLOW.—J. M. Wilson, Lexington, Mass.—This invention relates to a new plow, to be used by cotton planters; the object being to work the ground, when the young cotton plant is just out. Cotton, when young is a very delicate plant, and is difficult to work the first time; my improved plow is intended to work close to the plants without injuring the same, leaving the cotton on a very narrow space at the surface, yet with sufficient base at the bottom of the furrow, to prevent it being knocked up by the hoes, when they are used in working through the drill. The plow will also turn up the soil sufficiently to thoroughly cover up the middle of the row. This plow will work in every kind of land more effectually than the ordinary turning plow.

CARPENTERS' GAGE.—A. H. Blaisdell, Newton Corner, Mass.—This invention relates to a new carpenter's gage for drawing marks parallel to the straight or curved lines of a board or other article, and the invention consists in the use of V-shaped tusks or fingers, pivoted to a sliding block, said tusks being by means of rods connected with a beam that is pivoted to another fixed but adjustable block. The ends of these fingers form the edge of the gage, and they will when the gage is drawn along the curved edge of the beam, always adjust themselves, by swinging around their pivot pins, so as to keep the marking point the required distance from the board's edge.

SHOE LASTER.—Peter Thompson, Sardin, Ohio.—This invention relates to an improvement in pliers or for other purposes, and consists in combining four jaws which are operated by the ordinary plier handles or levers.

HORSE POWER.—Joseph H. Kleppinger, Cherryville, Pa.—This invention relates to a new manner of arranging the mechanism, for converting the power of horses or other animals into rotary motion for driving thrashing and other machines. The object of the invention is to equalize the motion of the driving shaft, so that if the horses should not move quite regular or should be slightly disturbed in their work, the machine should not also acquire such irregular motion, but should continue in equal motion and move with the same velocity.

MEAT CUTTER.—S. L. Stockstill and H. H. Dille, Medway, Ohio.—This invention relates to a new machine for cutting meat for the production of sausages, hams, and other articles of food, and consists chiefly of two rollers, of which one carries a set of cutters that work between arms projecting from the other and through a stationary slotted plate. The cutters and the arms are set spirally around their respective rollers so as to feed the cut meat toward one end of the machine, where it is discharged.

HAT BLOCKING MACHINE.—Jacob Eberhardt, Newark, N. J.—This invention relates to a new device for pressing hat bodies into the required form, and consists in the use of a rubber or other elastic punch, which is of suitable shape, and upon which the unshaped hat body is fitted, and of a counter-sunk die, in which the hollow has the required shape to be given to the hat. By forcing the punch into the die it will become pressed, so as to assume the shape of the die, and the hat will thus be easily formed.

GAS BURNERS.—A. C. Rand, New York City.—This invention relates to a new manner of constructing gas burners of that class in which the gas issues through a long, narrow slot, and consists in making the width of the aperture adjustable, so that a larger or smaller jet may be discharged from the burner, as may be desired.

FRAME FOR FLOWER DESIGNS.—C. Hochbrugh, New York City.—This invention relates to a new manner of constructing the frames for flower ornaments of that class in which suitable designs, such as wreaths, anchors, hearts, stars, etc., are made of amaranth or other suitable flowers or plants. The invention consists in making these frames by winding wire around moss, and in strengthening the whole by means of strong wire or other stays.

TOY CANNON.—George H. Hutchinson, Cleveland, Ohio.—This invention relates to a new spring toy cannon which is so arranged that it can be easily set, and easily discharged, and consists chiefly in arranging the device for retaining the compressed spring upon the body of the cannon, and not at the breech end of the same, as is now generally done. The invention also consists in confining the front portion of the spiral spring in a barrel, so that a pin, which forms part of the detaining apparatus, can, by falling in front of the barrel, detain the compressed spring.

TAILORS' MEASURE.—Wm. Sinsott and John McNaughton, Brooklyn, N. Y.—This invention relates to a new device for facilitating tailors to take correct

measures for gentlemen's coats, and consists in the use of an adjustable quadrangular frame, composed of metal bars, upon each of which a graduating scale is marked. This frame when laid around the arm of the person whose measurement is to be taken, can be adjusted to give the exact width of the arm, and the distance from the shoulder to the armpit.

SADIRON.—James Gray, Newark, N. J.—This invention relates to a new self-heating sadiron, which is so arranged that the cover of the iron will remain cool, and so that the draft can at all times be regulated at will. It consists in the use of a perforated body fixed stationary in the lower part of the hollow sadiron, its interior communicating with the outside air by a hole in the side of the iron; the hole being arranged high enough to prevent the falling out of ashes.

POCKET COOKING STOVE.—Joseph Smallwood, St. Johns, N. B.—This invention relates to improvements in portable stoves for workmen and others, whereby they are enabled to heat their coffee or tea, and warm their dinners, when laboring in the field or wood.

INNER SOLES FOR BOOTS AND SHOES.—R. A. Webster, Sandisfield, Mass.—This invention relates to a new and useful improvement in soles for boots and shoes, whereby such boots and shoes are rendered impervious to water, and soft and pleasant to the wearer.

HOT AIR CHAMBER.—Wm. H. Lee and Charles M. Hardenburgh, Minneapolis, Minn.—This invention relates to a method of constructing hot air chambers, to be combined with air-heating furnaces, for heating public buildings and private dwellings by heated air.

CARBURETING AIR.—Henry C. Appleby, Conneaut, Ohio.—This invention relates to a new and useful improvement in an apparatus for carbureting or charging atmospheric air with the vapor of hydrocarbon liquid, for illuminating purposes.

CONVERTIBLE LOUNGE.—Lewis H. Baker, Tarrytown, N. Y.—This invention relates to the construction of lounges or sofas whereby they are made to serve various purposes, and are made much more convenient as an article of household furniture than the ordinary kind.

ORGAN.—Isaac Roush and J. W. Truby, Otto, N. Y.—This invention particularly relates to a connection and arrangement of parts, whereby the stops can be operated without requiring the use of the hands, and enables all double levers to be dispensed with.

TABLE CUTLERY.—R. H. Fisher, West Meriden, Conn.—This invention consists in the use of a bifurcated or split tang, which is formed at the end of the blade, in such a manner that the outer edges of the two tines or prongs will be flush with the edges of the handle. The ends of the prongs are bent in so as to have a firm hold in the wooden or other handle. The bolster is fitted into recesses formed in the edges of the tang, so as also to be flush with the edges of the handle and tang.

SAFETY GUARD FOR MIXING SHAFTS.—E. O. Leermo, Gold Hill, Nevada.—This invention consists in the arrangement in a transverse, dovetail groove in the rail, a short distance from the mouth of the shaft of a sliding bar, the upper surface of which projects above the top of the rail sufficiently to block the wheel of a car when it is moved in the right position, which sliding bar is caused to slide in front of the wheels of the car, to block it by the action of a spring when the car is not ready to secure the car, and which is drawn away from before the said car wheel by the action of a lever, which is actuated by the car when the latter is moved into the right position to receive the car, whereby the car is allowed to run on to the said car.

THREAD CUTTER.—C. A. Woodbury, Woodstock, Vt.—This invention consists of a circular cutter of somewhat larger diameter than the spool having a central hole and provided with a shield of larger diameter than itself, having notches in the edge forming rounded points or teeth. Near the center the shield is provided with springs projecting therefrom in an axial direction. The shield is attached to the cutter by inserting the springs in the eye of the cutter and bending the pointed projection of the edge over the edge of the cutter, which when so constructed is attached to the spool and held thereby by inserting the springs in the axial hole of the spool.

CULINARY DEVICE.—Clayton Denn, Frankford, Pa.—This invention consists of a gridiron provided with a flange projecting downward from the bottom for fitting into the stove hole, also an upward projecting rim and a hollow handle so inclined with reference to the grate as to admit the gravy to flow therefrom into the handle. It also consists of a cover provided for the said gridiron with a rim to fit over the rim of the latter hollow handle which serves as a cover to that of the gridiron, and flanges projecting upward from the top whereby it may be used separately from the gridiron to serve as a cake griddle by turning it bottom side up and setting the said flange in the stove hole. An opening is provided through the rim of the gridiron in the direction of the handle, whereby a wire gridiron also having a handle may be set within the above described device, when it is desired to cook oysters, or other small things which would fall through the bars or grates.

CONNECTING LEAD PIPES.—Isaac Davis, Brooklyn, N. Y.—This invention relates to a new method of connecting the ends of lead pipes, without soldering, so that they can be easily secured together and easily taken apart.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at \$1.00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

Ezekiel Moores, Mount Vernon, Ill.—Twenty dollars received without advice.—What is it for?

U. S. of Mich., asks, "How much lead is it advisable to give an engine 14 inch cylinder by 30 inch stroke making 54 revolutions per minute and cutting off at seven-eighths? 3d, How much cord wood ought such an engine to burn in a day running 23 hours and generating 23 actual horse power, the wood being mixed, hard and soft, half seasoned? 3d, Can you give me a rule for setting the axle of ordinary wagons with regard to the set and "gather," and other points necessary for wheelwrights? As for the lead of your engine we can give no positive answer without knowing the style of your valves. 1. The exhaust can be controlled independent of the inlet, close the exhaust at nine tenths the stroke of the piston and you will not require any steam lead; the "cushioning" of the steam will answer the same purpose. If you cannot cushion on the exhaust, set your valves so they will be just perceptibly open when the engine is on the center. 2d, If your engine is in order, cutting off at seven-eighths of the stroke, it would require about 6 lbs. of anthracite coal per hour for each indicated horse power. A cord of well seasoned hard wood is reckoned as about equal to half a ton of anthracite; one pound of the first being calculated to raise 5,000 lbs. of water to one degree of heat and the same amount of anthracite 9,500 lbs. 3d, See page 217, vol. XV, SCIENTIFIC AMERICAN.

E. B., of Mass., asks if some of our correspondents will give the reason of the long continued sound of thunder. "Distance, reverberation, echo, etc., are referred to as the reason. Do they sufficiently explain the phenomenon?"

C. L. A., of D. C., asks, "Is there any scientific objection to the construction of a railroad on the following plan: Track 8 feet wide between rails; wheels 32 feet diameter, of wood and iron combined (curves never less than the radius of a mile)? In running 100 miles car wheels of 8 feet diameter make about 26,000 revolutions, while those of 12 feet diameter would make only about 14,000 revolutions. It appears to me that ease of draft and movement and greater speed, with less strain on the wheels, would be attained. Is there any reason why railroad companies, at some and abroad, have adhered to small wheels and narrow gage? It is a notable fact that wide gage roads—6 feet—as compared with the narrow gage—4 feet 8 inches—have in this country proved unprofitable. The excessive

weight of the rolling stock, its greatly enhanced first cost, the additional expense of the road bed, etc., have more than counterbalanced the increased capacity for freight—there is no increased carrying capacity for passengers. Wheels of 12 feet diameter could not be as cheaply or strongly made as those of less diameter, and the combination of wood and iron would hardly receive the approval of sensible engineers, except as wood is employed in the Griggs' patent to hold locomotive tires in place.

T. C. M., of Wis.—The weight of water being 1, that of cast iron is 7.2, and of lead, 11.3. For further information as to the relative weight of different substances we refer you to any manual on mechanics or treatise on natural philosophy.

J. R., of Pa.—The information on petroleum you desire, can only be obtained in the petroleum regions, from those who make it a business to bore wells, and strike oil when they can. Very little has been published on the subject, it being entirely new.

R. S., of R. I.—There is no danger whatever of coal or wood ashes taking fire by spontaneous combustion, after they are once cold and thoroughly extinguished; only do not pour linseed oil or another similar substance on them.

J. D., H.—1st, Mica can be bought in pretty large slabs, say one foot square, without cracks; however it is never as uniform as glass. 2d, There is no other transparent substance known impervious to water and fire-proof. 3d, You can bend it to any shape, like cardboard, provided thin plates are used, as they are very elastic, but their rigidity increases with their thickness.

J. B. F., of R. I.—There is no difference in the useful effect of a suction or lifting pump of the same size when the same amount of water is attempted to be raised to the same height by the same power employed only in the lifting pump the lower position of the piston, necessitates longer rods, more weight to carry, and more exertion to overcome. In this respect the suction pump may sometimes have a slight advantage.

J. P., of Pa.—Iron bolts may be cleaned from grease, by moistening them with benzine, and rolling them in dry sawdust; afterward brushing.

J. D., Idaho Ter., wants a simple method to treat sulphurets in the raw and unworked state by the wet process, in quantities of at least 500 lb. This is exactly the result that thousands of metallurgists are at present seeking after, but so far without success.

J. A. W.—Condense your ideas on boiler explosions. We have not room to publish so much.

B. K., of Pa.—The plan of using compressed air as a generator of power is one of the usual hobbies of men of limited information; it must be remembered that compressed air acts like a spring wound up, never can more force be got out of it, than is put in.

E. R., of Wisconsin, is a new inventor of perpetual motion. He proposes to use compressed air for working an engine which moves an air pump, and thereby keep up the full pressure of air in the vessel, which again works the engine, several other engines besides, and so on; he says if he "were blessed with a large share of this world's goods" he would "develop the idea, though it might cost thousands of dollars." We think it fortunate for our correspondent that he has no money to waste.

R. H. D., of Pa.—Matches without sulphur or phosphorus are made of three parts chlorate of potash, three of ground glass and three of bichromate of potash, two of Dextrine or gum and eight parts water; There are several receipts more or less reliable, the simplest is perhaps chlorate of potash two parts, gum arabic three parts, and soot one part.

T. W., of Vt.—Without having a sample of the deposit on your pans to analyze, we cannot tell what will dissolve it; if it is a compound of lime, hydrochloric acid is the most ready solvent.

E., of M.—A round flue having less interior surface in proportion to the area of its section, gives less resistance to draft. When the flue is wide enough, the form is not so essential as the smoothness of the interior surface. A rough flue gives much more obstruction to draft, than is generally supposed, especially when flat or narrow. When wide enough to give exit to all air and smoke, and long enough to insure the steady and powerful ascent of the heated gases, there is nothing gained by widening it at the top, except when the lower part is too narrow, then a widening at the top may compensate for this to a certain degree.

G. W. B., of Va.—Curiosities of the kind you mention are not very salable, in fact of little value except to some amateur whose fancy induces him to buy.

J. R. C., of Iowa.—You cannot compare the effect of the pressure of a body in rest, with that when in motion; it is the old problem of the eleventh revived. Your hammer of 1400 lbs. falling 30 feet, has an effect which cannot be compared by single pressure; after a certain theory it would be equal to 1,200,000 lb. falling 1 foot or nearly 200,000,000 pound falling 1 inch, but the effects are so much influenced by the relative weight of hammers, piles, nature of soil, etc., that no general rule can possibly be arrived at. Imagine only a very small weight driven by great velocity on a heavy mass; it will of course not move it, but its effect will be only confined to the locality of contact. You may find further explanations in any good book on Dynamics.

J. B. W., of Washington.—Your well written communications are not adapted for our paper, being too speculative. Articles to be accepted must be on practical subjects and condensed as much as possible. You rightly attack old logism in science, but our advice is to study the modern doctrine of the correlation of forces. For instance in Tyndall's recent work "Heat considered as a mode of motion," you will find an essay on the subject you treat, Cosmogony, and will discover that combustion and chemical action generate only a very small amount of the heat distributed in the universe; they are not the primary producers of heat, but a deeper cause is at the bottom of all these and other phenomena of caloric action. The above mentioned or other recent works of Mayer, Joule, Helmholtz, Grove, etc., explain all this in detail.

EXTENSION NOTICES.

William Thornley, of Philadelphia, Pa., having petitioned for the extension of a patent granted to him the 19th day of September, 1854, for an improvement in safety washers for securing wheels to axles, for seven years from the expiration of said patent, which takes place on the 19th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 31st day of August next.

Abner Whiteley, formerly of Springfield, Ohio, now of Piasse County, Mo., having petitioned for the extension of a patent granted to him the 19th day of September, 1854, for an improvement in grain and grass harvesters, for seven years from the expiration of said patent, which takes place on the 19th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 31st day of August next.

Harry H. Evans, of Chicago, Ill., having petitioned for the extension of a patent granted to himself and A. J. Brown as assignees, the 31st day of October, 1854, for an improvement in shingle machines, for seven years from the expiration of said patent, which takes place on the 31st day of October, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 13th day of October next.

Stephen J. Gold, of Cornwall, Conn., having petitioned for the extension of a patent granted to him the 3d day of October, 1854, for an improvement in warming houses by steam, for seven years from the expiration of said patent, which takes place on the 3d day of October, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 14th day of September next.

Business and Personal.

The charge for insertion under this head is one dollar a line.

Carbonate of Barytes wanted in large quantities. Address A. G. Hunter, Fair Haven, Conn.

If you desire to invest moderate capital, safely and profitably, we offer City, County, State, or the entire right in "That Dipper," "The Universal W. Ighing and Measuring Cup," "The Little Wonder," or "Combination Funnel," (with six distinct uses), and the "Adjustable Dredge." Address Marsh & Co., 33 Maiden Lane, New York, Gen'l Agts for U. S.

Wanted—a six horse portable engine and boiler. Address, with particulars and price, Edward Park, Fitzhampton, N. Y.

Wanted—illustrated priced list of all kinds of shingle, stove, barrel, and heading machinery. Address L. T., Valley Forge, Mo.

Brick Machine.—Lafley's New Iron Clad has more advantages than any other ever invented. For descriptive circular address J. A. Lafley & Co., Albion, Orleans county, N. Y.

Adams' improved air cylinder graining machine, in operation daily and specimens of work at 44 Murray st. Send stamp for circular, full particulars, prices, etc. Address Heath, Smith & Co., as above.

The surest detective of low and high water, and high steam in boilers yet invented. Springer, Hess & Co., Philadelphia, Pa.

Bartlett machine and needle depot, 569 Broadway, New York. Needles for all machines, hackle, gill pins, etc.

Merriman's patent bolt cutters—best in use. Address, for circulars, etc., H. B. Brown & Co., New Haven, Conn.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

Winans' Boiler Powder, for 12 years a positive remedy for incrustations, is so extensively imitated and pirated, by pretended agents that it is not safe to buy except at 11 Wall st., N. Y.

NEW PUBLICATIONS.

THE BLOWPIPE. Its Practical Use. By G. W. Plympton, A.M. D. Van Nostrand, 192 Broadway, New York.

The object of the compiler of this volume is to present to the beginner in chemical analysis, plain, practical instruction on the use of the blowpipe in the laboratory and workshop, with full directions for its manipulation, descriptions of the best reagents, etc. It is illustrated with cuts and contains valuable tables of the reactions of metallic oxides and metallic acids, with a copious index for reference. It will be found to be advantageous not only to the beginner but to those more advanced in chemical science.

THE AMERICAN CARBON MANUAL.

Photographers will be glad to know that they can now obtain, in the above work, full and complete directions for producing their prints, without silver, by means of the new carbon process. This method has been so improved and simplified that it may be readily practiced with success by all photographers. The pictures produced by it are very uniform, and any desired tint or shade may be easily imparted. The book before us is from the pen of Edward L. Wilson, the accomplished editor of the Philadelphia Photographer, Published by the Scoville Manufacturing Company, 33 Park Row, New York.

THE FAMILY RECORD. Biographic and Photographic. Arranged for recording in detail the personal incidents in the life of each member of the family. By John H. Griscom, M. D., New York.

The author of this record has arranged a very convenient and practical work, which ought to be possessed by every family. The first page is set apart for the names, birth, marriage, etc., of both husband and wife, and also a space for photographs. There is also room for personal incidents, and it contains a register for the different maladies which afflict children. A book of this kind, if well kept, would be invaluable to families, not only for present but for future reference.

NEW YORK CITY DIRECTORY, for the year ending May, 1869. Compiled by H. Wilson. John F. Trow, publisher, 52 Greene street.

The task of collecting the names, business pursuits, and residences of 185,751 citizens, alphabetically arranging the same, and publishing the whole in the space of a few weeks' time, is one of the magnitude of which can be known only to those who have attempted similar undertakings, and is only made possible through the perfected system of obtaining information which long experience has taught the publisher of this volume. The yearly growth of the city and the increasing demands of business make us a migratory people, and necessitate the re-completion of the entire work annually. "The whole city is like a huge kaleidoscope which annually dislocates itself and forms a new figure," and to point out these changes is the province of the "Directory." The number of names this year, as stated above, is 185,751, being an increase of 8,434 over the number contained in the issue for 1867-8.

FOOTPRINTS OF LIFE, OR FAITH AND NATURE RECONCILED. By Philip Harvey, M. D. Published by Samuel R. Wells, 389 Broadway, New York.

This volume embraces a poem of considerable literary merit. It traces the origin of the body through a progressive development to the end of life. It also treats of the soul and of Deity with pious reverence.

A GUIDE TO THE STUDY OF INSECTS, and a Treatise on those Injurious and Beneficial to Crops, for the use of Colleges, Farm Schools, and Agriculturists. By A. S. Packard, Jr., M. D., of Salem, Mass. Part I. Price 50 cents.

This very instructive and excellent pamphlet of 60 pages is copiously illustrated with wood cuts of a great variety of insects, and deserves to be read by all those who are engaged in the culture of the soil.

HALL'S HEALTH TRACTS.

This volume contains an interesting series of practical tracts on health, which have appeared from time to time in Dr. Hall's Journal of Health. The author is a prolific writer, and aims to bring to the reader's attention a sensible way of preserving the health by other means than the quack medicines, which curse our go-ahead countrymen and women more than any other people in the civilized world. The French are probably the healthiest people in Europe. They stay out of doors a good deal of their time, and take little medicine.

Inventions Patented in England by Americans.

(Compiled from the "Journal of the Commissioners of Patents.")

PROVISIONAL PROTECTION FOR SIX MONTHS.

- 1,604.—APPARATUS FOR SEWING OR FITTING SEPARATE PARTS OF A VOLUME.—H. G. Thompson, New York city. May 16, 1868.
- 1,618.—APPARATUS USED IN THE MANUFACTURE OF IRON AND STEEL.—A. L. Holley and J. B. Perkins, Swanton, Vt. May 15, 1868.
- 1,644.—APPARATUS FOR OPENING SARDINES AND OTHER PRESERVED MEATS, AND CUTTING SHEET METALS, ETC.—Belinda Froehlich, New York city. May 20, 1868.
- 1,661.—POWER LOOM.—E. B. Bigelow, Boston, Mass. May 20, 1868.
- 1,664.—MARKING AND CREASING TUCKS UPON A SEWING MACHINE.—MARY ANN DUDY, New York city. May 20, 1868.
- 1,684.—FRICTIONAL GRINDING.—Albin Warth, and Eberhard Faber, New York city. May 21, 1868.
- 1,699.—GRATE BAR.—A. C. Fletcher, New York city. May 22, 1868.
- 1,707.—MANUFACTURE OF LEAD PIPE AND LEAD PIPE LINED OR COATED WITH TIN OR OTHER METAL.—Wm. A. Shaw, New York city. May 28, 1868.
- 1,777.—PLAYING SPOONS, ETC.—Marshall Forbes, West Meriden, Conn. May 29, 1868.
- 1,800.—PAPER SATINING MACHINE.—Thomas Christy, New York city. June 2, 1868.

Improvement in Planting Machines.

Devices for diminishing the labor of planting corn and other crops are quite numerous, but not always satisfactory in operation from their complication or their difficulty of management. The accompanying engraving gives views of one of the simplest machines of this class that has come under our notice; cheap, easily managed, and not liable to get out of order.

Fig. 1 is a perspective view of the machine, and Fig. 2 a vertical elevation of the principal working parts. The frame is rectangular, with two guiding handles rising from its rear portion, between which runs a wheel, A, and carrying a hopper, B, which contains the corn or other seed to be dropped. The front part of the machine is sustained by a small wheel, C, the supports of which can be adjusted to the height required by means of set bolts in slotted ears, D. In front of the hopper is a transverse marking bar with a pointer on the end to mark the ground for laying out the next row. This bar and pointer is hinged and adjustable so it can be at once changed to the other side of the machine.

In the bottom of the hopper is a slide, having an aperture through it, which can be adjusted, by an adjustable gage working in the seed slide, to deliver a greater or less number of kernels, or a greater or less amount of seed. The seed slide is actuated intermittently by a curved lever, E, its fulcrum being at F, one end engaging with the seed slide and the other being operated by pins on the side of the wheel, A. This wheel may be of any size required, and the pins may be placed as desired, the distance between the hills of corn be determined by these means. The wheel, A, may be changed quickly for one of a larger or smaller size. A hinged clapper or valve, operated by the lever which moves the seed slide, and by a suitable spring, closes the delivery spout, G, while the machine is passing from one hill to the other and opens it for the delivery of the seed when the spout arrives at the proper spot for placing a hill.

Patent obtained through the Scientific American Patent Agency, May 12, 1868, by Wm. H. Fish, Jr., who may be addressed at Scarsdale, Westchester Co., N. Y.

Improved Device for Opening and Closing Window Blinds.

The annoyance, and even danger, of having to lean out of the window for the purpose of unfastening and closing an open blind, and the necessity of opening the window in the most inclement weather, either for closing or opening, seem to give peculiar value to any device by which this annoyance and danger may be avoided. The plan illustrated in the annexed engraving seems to be effectual in permitting the manipulation of window blinds from the inside of a room without raising the window.

Centrally, in the window sill, is a catch, A, operated by the knob, B, which depresses the catch when pulled, while the catch is returned to place by a common spiral spring. This catch secures the blinds when closed. To the rear bottom portion of each leaf of the blind a bar or lever, C, is attached by a hook engaging with a metal plate recessed into the blind. This bar passes through a recess in the window sill and terminates in a knob inside the room. The bar or lever has slots which engage with the edges of a metallic plate let into the inside face of the window sill, and secures the blind wholly open, or held at any angle desired. Except the central catch, no springs are used, and as all the parts are secured from the weather, no opportunity for injury or disarrangement occurs. The knobs projecting into the room may be made ornamental. The device appears to be well adapted to the purpose designed.

Patented by John Solan, Dec. 18, 1860. For further particulars address Maj. W. B. Richards, at Hoy, Kennedy & Co's, No. 111 Liberty street, New York city, or Geo. W. McGovern, Richmond, Va.

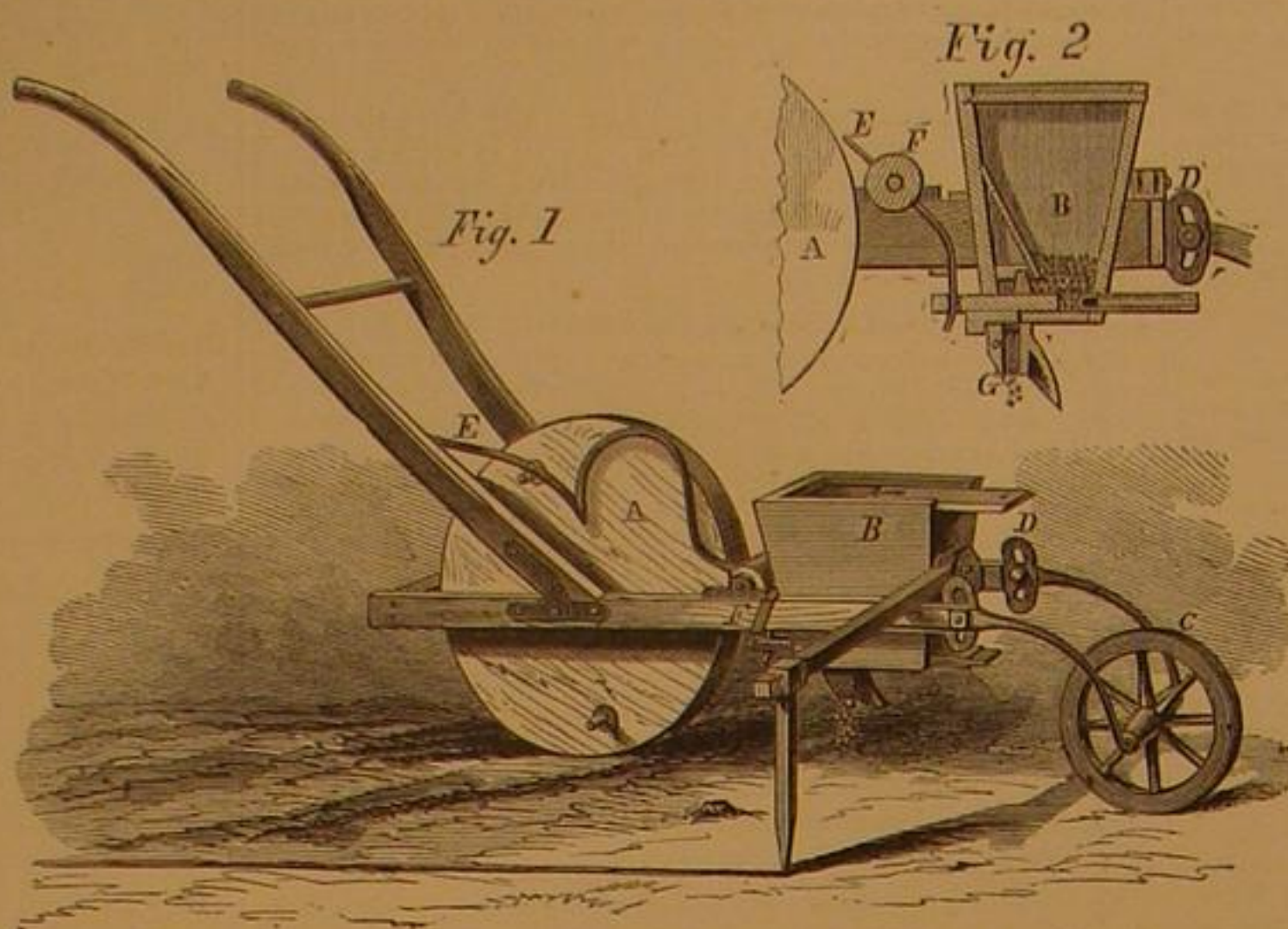
WATER BLOWING THROUGH ENGINE CYLINDERS.

A correspondent mentions some of the facts attendant upon the collapse of a boiler in the foundry of Wood, Frisbie & Co, Newburgh, N. Y., and gives his opinions upon the accident. We give his statements in brief, with some remarks. He says:—

"The boiler was twenty-four feet long, four feet in diameter, with two fifteen-inch flues. I examined the boiler and found the heads bulged out about three inches, as far up as the fire surface. The flues collapsed their entire length, and were broken at each end. The iron was scaled by heat. The upper half of the boiler was as perfect as new. The boiler was set about on a level with the engine, the steam pipe leading to the cylinder somewhat in the form of a siphon. The steam was about thirty-five lbs. pressure, the fires new and of intense heat, and the water known to be at the third gage

"I account for the collapse, that it was caused by a want of water in the boiler, and that the water was instantly drawn

from the boiler without the knowledge of the engineer. I have seen the water issuing from the escape pipe with such velocity as to have emptied the boiler in a very few minutes, and this occurs frequently on high pressure boilers with small steam room. The syphon-like form of the steam pipe, from the boiler to the engine cylinder would tend to draw the water from the boiler when once started. The main difficulty is to ascertain the exact time, and to know the cause of the water flowing out of the boiler, through the cylinder and escape pipe. This generally happens when the water is high in the boiler, with a low pressure of steam, and the steam room occupied by water so as to leave small steam space, not sufficient to supply the cylinder. Most of the explosions happen in



FISH'S PATENT CORN PLANTER.

about one, or one and a half hours after the engine has started, as in this case. In the cases of the explosions of the *Metropolis*, some thirteen years ago, John J. Roe, in 1861, the *Princess*, in 1860, the *St. Nicholas*, and the *Sultana*, the water was seen to issue from the escape pipe before the explosion took place."

We agree with our correspondent that this was a case of low water, if, as stated, the flues were so heated as to be scaled. But if the water was "instantly drawn from the boiler," there would seem to be not much opportunity to form heat scales. We have grave doubts about the water escaping through the engine as rapidly as the statement of our correspondent would imply. The heads of the cylinder, the crank, or bed would be broken, or the connections crippled; beside, the pounding of the piston would probably have been heard throughout the foundry. If the water had gone off as stated, there could hardly have been time left to heat the flues sufficiently to scale them. Our opinion is that the supply of wa-

It is hard to say whether some of its features of utility were originally incidental to facility of construction, or whether they were not directly sought after for their own sake. The form of the cask is a truncated, oblate spheroid. The conveniences of this form are the attainment of a base upon which the cask will stand firmly, and, at the same time, perfect facility in movement when it lies upon its side. Theoretically, when in the latter position it rests like a sphere upon a single point. It can then be whirled about upon its vertical axis with the application of a very slight force, or rolled in any direction. We say rolled in any direction—it may be rolled endwise. Of course, the flat ends, or heads, interfere very much with the process, but a cask may nevertheless be rolled longitudinally, with a very much less expenditure of force than a cylinder of the same weight.

In our youthful days, we were very much impressed with the performances of a rustic Sampson, who used to "end up" very heavy casks with one hand, by taking advantage of a rocking motion which he imparted to it, and applying his strength in full force at the moment the cask rested upon a point very near the chime. What then appeared to us wholly a feat of vast strength, we now know to be dependent in a great measure upon the application of sleight.

Another advantage resulting from the spheroidal form of casks, is that they may be rolled easily over uneven surfaces without deviating from the direction of the motion imparted to them, a great convenience in placing them in proper positions upon decks of vessels, or moving them about upon wharves.

Great strength also results from this form, as the force of any external blow is transmitted to, and distributed over all parts of the structure.

A familiar conversation with a friend, in which he claimed that the advantages of the spheroidal form were obtained incidentally, the

probable original design being merely to obtain a form in which the staves could be held together by the hoops, suggested this article. We stated in reply to his views, that the hoops would be retained, and the staves would be held by them as well, if the cask were given the form of the Dutch churn with two heads. It is easy to see, however, how the advantages, which are peculiar to the spheroidal form, would be all lost if the shape of the churn were substituted for it.

On the whole, there are few things that answer their purpose better, or give more evidence of perfection resulting from design, than casks.

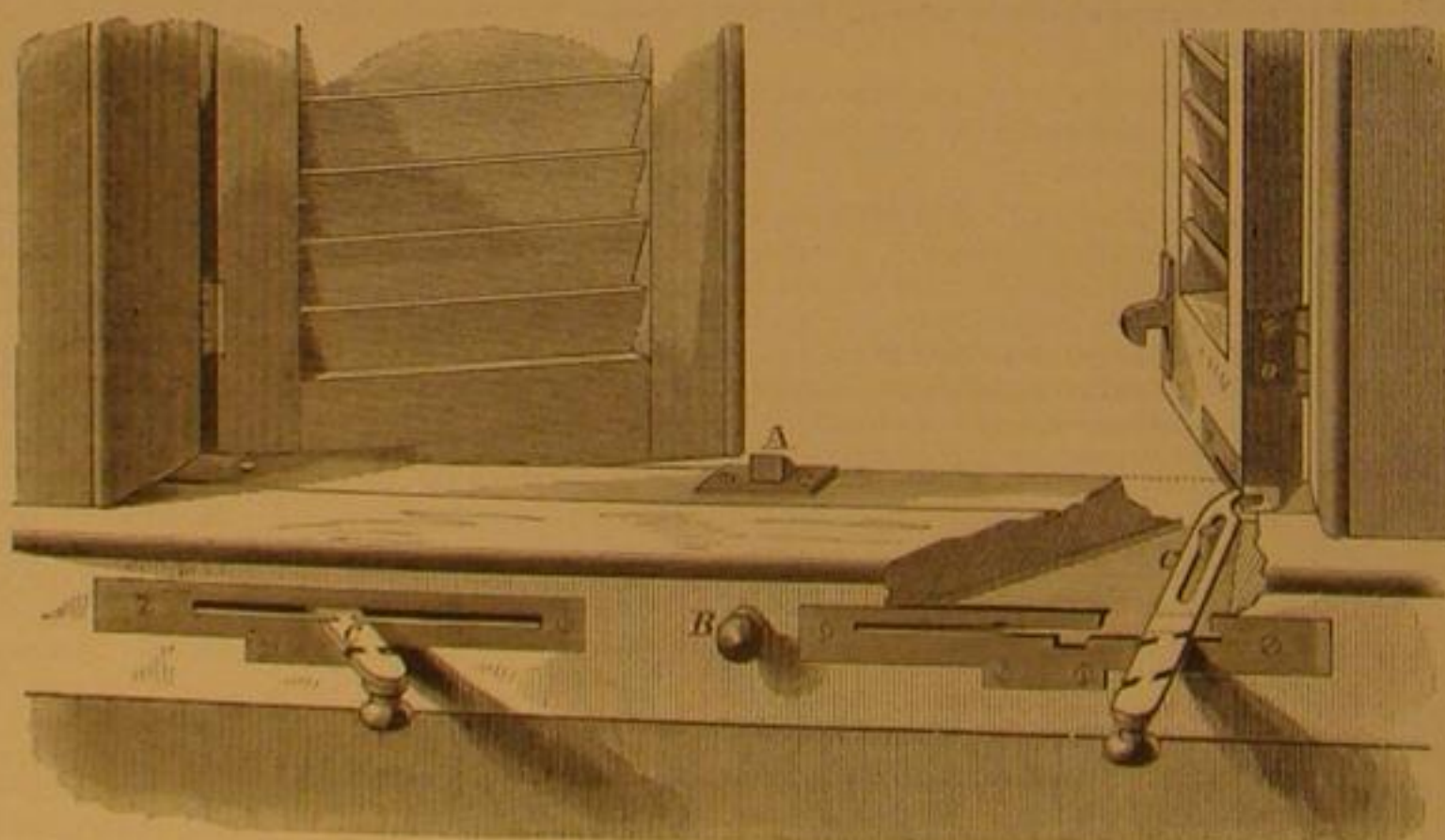
A Noble Benefaction.

The English papers unite as with one voice in lauding the liberality of one of their most eminent mechanical engineers, who has lately founded thirty scholarships, each of the yearly value of one hundred pounds sterling, these sums to be applied for furnishing as many young men of English birth with advanced instruction in mechanical science and practice. The author of this benefaction is Mr. Joseph Whitworth, whose system of gages is generally accepted as a standard in this and other countries, but whose name is perhaps even better known because of his great attention bestowed of late years upon the construction of ordnance, and his exhaustive experiments on rifled guns and ammunition.

The object in making this princely endowment is to advance the cause of technical education, and the promotion of engineering and mechanical industry in his own country. In competing for these scholarships, proficiency must be shown in the use of one or more of the following classes of tools: the ax, file, saw, and plane; hammer and chisel, and the forge; as also a satisfactory knowledge of the elementary mathematics and mechanics, practical and descriptive geometry, and free hand drawing. By making these requisites, the student, combining some practice with theory, and the artisan, who combines some theoretical knowledge with perfection of workmanship, start on fairly equal terms.

In carrying out the ideas of Mr. Whitworth, the successful competitors for these prizes may attend universities or colleges affording scientific or technical instruction, or he may travel and study abroad. As the full scholarships can only come into full operation by degrees, the founder proposes to make the fund which will ultimately be available for the scheme to be placed at the absolute disposal of certain towns and educational institutions in order that they may be awarded to youths who desire to be qualified to contest for the scholarships in May, 1869.

BETTER ROOT SUGAR.—During the last twenty-eight years, the production of the cultivation in France of the sugar beet root has advanced from 23,000 tons to 222,000 tons. The total annual product in European countries amounts to 638,500 tons, and now produces more than one-fourth of all the sugar known to be consumed in the world. Indeed, the success now uniformly achieved on all sides shows that, though the same causes which long retarded the progress of the beet industry in France will more or less obstruct it elsewhere, nevertheless its ultimate triumph is certain in every country where it is introduced with care and cultivated with reasonable patience and skill.



SOLAN'S PATENT BLIND OPENER.

ter by the pump was insufficient to furnish the requisite amount for the generation of steam, and that the scaling was the result of a radical and long continued difficulty of this sort.

A reliable low-water detector and reporter (and there is such in the market) would, in this case, have prevented the collapse, if the flues had been of sufficient strength to resist the boiler pressure.

CASKS.

Casks have been used from a very early period, and the cooper's art is accordingly a very old one. Many improvements in the method of their manufacture have been introduced during the last twenty-five years, such as machines for cutting heads, staves, and bungs, but the cask itself remains in all its essential features the same as it was a century ago. Certainly, anything must have attained to a high degree of perfection, if it could pass unchanged through a century of such development in the mechanical arts as the present has been; still more is it remarkable of a thing so universally used as a cask.

We believe that there is nothing in general use which comes nearer a perfect adaptation to all requirements than the homely and useful article about which we are writing.

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

For the American News Company, Agents, 121 Nassau street, New York.
For the New York News Company, Agents, Spruce street.
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VOL. XIX., No. 2....[NEW SERIES.]...Twenty-third Year.

NEW YORK, WEDNESDAY, JULY 8, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

*Improvement in Machines for Forming Rings, Watch Case Centers, etc.	17
*What is Planchette?	17
The Impossible in Constructive Science	18
Dangers in the Use of Photographic Chemicals	18
Railroad Track-Layer in California	19
New Cement—Liquid Glue	19
Paint for Stoves	19
Strike at the Iron Works in Troy	19
A "Devil Fish"	19
Microscopy and Cholera	19
Editorial Summary	19
Lighting on the Telegraph Wires	19
Morality of Employers—The Duty of Employers	19
*Apparent Variation of the Steam Engine Crank	20
*Connecting Shafts by Pitmans	20
The Frictional Area of Millstones	20
Utilization of Waste from the American Process of Amalgamation	20
The Negative Slip of the Screw	20
Mechanical Distribution of Electricity	21
Fire and Water	21
Long and Short Screwdrivers	21
A Question in Rowing	21
Absorption of Gases by Charcoal	21
Reappearance of Broesen's Comet	21
The Trades of Animals	21
The New Steamship Holatia	21
New Patent Extension Bill	21
The Secrets of the Ocean	22
Decision in a Reliance Case	22
Manufacturing, Mining, and Railroad Items	22
Recent American and Foreign Patents	22
Answers to Correspondents	22
Extension Notices	22
New Publications	22
Inventions Patented in England	22
by Americans	22
Improvement in Planting Machines	23
Improved Device for Opening and Closing Window Blinds	24
Water Blowing Through Engine Cylinders	24
Casks	24
A Noble Benefaction	24
Effect of Labor-Saving Machinery upon Wages	25
Modern Telegraphy	25
Abuse of the Franking Privilege	25
Quality of Musical Sounds	25
The Suture Tunnel	26
Recent Boiler Explosions	26
Importance of Regular Habits	26
Patent Claims	27, 28, 29, 30

EFFECT OF LABOR-SAVING MACHINERY UPON WAGES.

In a former article, we discussed the effect upon the relation existing between capital and labor, produced by the increasing use of labor-saving machinery. Our present purpose is to show that the substitution of machinery for manual labor has greatly increased the rewards, or wages of labor. In our former article we endeavored to show, that in their effect upon the aggregate amount of labor required to supply the general demand, improvements calculated to decrease the particular amount of labor necessary to produce a single article of necessity or luxury, were rather, on account of the demand for greater quantities of such articles caused by the reduced cost of their production, to be called *labor creating* machines, than the reverse.

The history of all improvements shows that the introduction of machinery calculated to facilitate and cheapen production, has increased the demand for labor. This increased demand could, notwithstanding the increase of population, never have been met, if some of the improvements referred to had not been so great as to almost entirely remove the necessity for manual labor in certain occupations, and thus transfer the laborers from those fields to others where their services were needed. Another way in which the increased demand for labor has been met, has been by the creation of entire new classes of laborers. The employment of children and females to operate the machines which have created certain branches of labor, has been the only way in which such machinery could have been profitably introduced and worked. Should these and other classes of laborers, that labor-saving machinery has created, be withdrawn from the general stock, the effect upon the industrial interests of the world would be crushing.

The increased demand for labor has raised its price in the market. The law of supply and demand applies to this as to everything else; but if the effect of mechanical improvement is to increase demand, wages must increase also with every advance in the arts. We believe that in the future the march of improvement will be no less rapid than in the past, and consequently, from this cause alone we argue continued increase of wages.

But there is another law of increase that is just as potent as the law of demand and supply, and which should not be overlooked in forming correct opinions upon this subject. Wages, or rewards for labor, should not be estimated by current value in dollars and cents. Operatives never fail to see this point clearly when prices of provisions, clothing, and rents rule high; that is, they never fail to perceive it in its particular application to their own circumstances. When one dollar buys only two pounds of butter where it formerly purchased four, and when other articles have advanced in proportion, they at once realize that two dollars per day is no better than one was when prices were only half as high. But they fail, generally, to see the more general advance of wages estimated by the amount of the comforts of life that can be obtained for a given sum, that has been going on steadily in accordance with the constantly decreasing cost of manufacture. We have shown that with each new invention which enables a given amount of labor to increase its rate of production, a corresponding decrease of price takes place. This decrease of price has been so great within the last fifty years, that ordinary mechanics are now enabled to live in a style that formerly was possible only to the moderately wealthy. Fifty years since, a mechanic wore the coarsest fabric, and ate the plainest food, because he was obliged to do so. His house was destitute of carpets; its furniture was such as he now would be ashamed to exhibit to his friends.

A piano would have been beyond the most extravagant hopes of his ambitious daughters. Books were few and costly; newspapers were so rare that when one was obtained the whole neighborhood congregated to hear it read. Facilities for travel were few and expensive. Family portraits entirely out of the question. The most limited education was all that he could hope to give his children; and the long hours of his daily toil were uncheered by the ameliorations which are now considered essential in every well-ordered workshop. All these things are now within the reach of the mass of mechanics, and it is not too much to say, that if the things which were formerly considered luxuries, but which are now from long habit considered necessary, were avoided, and mechanics should limit their expenditures to the supply of such articles as would have contented a mechanic's family half a century ago, their savings would be more than treble what artisans could have made at that period.

In view of these facts, we believe Trades Unions, as permanent organizations, are, to say the least, unnecessary, and we believe them to be hurtful to the best interests of operatives in all branches of manufacture. We believe it must soon appear that the tendencies of such organizations are injurious to the best interests of the working classes.

MODERN TELEGRAPHY.

"Modern Telegraphy" is the title of a considerable pamphlet recently prepared by Prof. Morse for the purpose of correcting some errors respecting the origin of the recording telegraph.

It appears that Great Britain has recently conferred knighthood upon Charles Wheatstone for establishing the telegraph "not only in the United Kingdom but also throughout the whole civilized world." To say the least, this appropriation of the invention of the telegraph to the credit of Prof. Wheatstone, is a cool proceeding. It might, however, pass unnoticed but for the fact that the United States have a counter claim to set up in behalf of one of their own distinguished citizen, Professor Morse, who shows in the pamphlet now before us, that the means and process of imprinting or recording signs automatically by an electro-magnetic arrangement, were devised by him, and that this was the first realization of a telegraph in the strictest sense of the word. The American system of communicating at a distance is a TELEGRAPH, and we believe it was the first telegraph. The English system, on the contrary, is simply a SEMAPHORE or sign telegraph, which does not propose or pretend to imprint or record.

The two inventions are not identical. But even admitting that they are, which no scientific man will contend, Morse claims priority of discovery. The American telegraph was invented in 1832, and exhibited in 1835. The English semaphore was devised by Cooke not earlier than 1836, therefore Morse has the precedence.

In opposition to the assertion that Wheatstone has established the telegraph throughout the civilized world, the facts are a complete refutation of this claim. The American telegraph system is established throughout the Western Continent, not merely in the United States, in Mexico, South America, and the West India Islands, but in Canada and the British American possessions; it is the system adopted in the British Colonies of Australia and of India: it is the system adopted by the International Telegraph Convention of 1865, in Paris, in which all the principal nations of Europe were represented (except England); and thus the "whole civilized world" (with the above exception) appear to have unanimously adopted the American telegraph, and have acknowledged their obligations to the American inventor by designating it the "Morse System." The English semaphore is not used out of the United Kingdom, and if we mistake not, even there it is gradually being superseded by the Morse system, which is extensively used, but generally without acknowledgment.

Prof. Morse has maintained his claims legally against all comers, and it will not do now to undertake to rob him of those rights by conferring honors upon others.

ABUSE OF THE FRANKING PRIVILEGE.

Our attention has been frequently called to the subject, and our observation confirms the fact, that Members of Congress are in the habit of franking letters and circulars for their friends to a large extent, and thus rob the Post Office Department of a considerable portion of its revenue. Claim and Patent Agents seem to be among those most favored by our Honorable Congressmen. Formerly it was required of those entitled to the franking privilege that they should write their names on the envelope, but latterly the custom of using an engraved *fac simile* of the signature has become general, and thus the M. C. is relieved of the onerous task of doing his own franking.

A boy can, with the convenient modern hand-press, print many thousand signatures in a very short time, and probably the office boys of some of those Claim and Patent Agents who flood the country with their printed circulars are permitted to do this printing for their employers. We do not know that this is so, but if some of the M. C.'s do the presswork on all the envelopes that are mailed with their *franks*, they are more industrious than the public generally accredit them.

We are led to call public attention to this abuse of the franking privilege, not at all because it is a new feature, but at the suggestion of an indignant correspondent, who sends us a twenty page advertising pamphlet of a Washington Patent Agent, mailed to him under the frank of Hon. John A. Logan, M. C.

We find, by referring to the postage account of the SCIENTIFIC AMERICAN Office for the year ending in May, that we

have used over \$6,000 worth of postage stamps. Supposing it were generally known that a dozen or two of like stamp-consuming firms should obtain permission to use the franking stamp of some Honorable M. C., would not the public be justly indignant, and feel that the postal department was being defrauded?

Of the extent to which the franking privilege is used and the extent to which it is abused, we believe the public have but slight conception. Were it not that it is the legislators themselves who keep the law in force, we should hope to see it speedily repealed. But as it is, there is no hope of that, and but little probability that any notice will be taken of the fact that the custom of franking for business firms is becoming more and more general.

QUALITY OF MUSICAL SOUNDS.

A difference of opinion seems to exist among savants, as to the cause of peculiar qualities of different musical sounds, exclusive of pitch and volume. Prof. Tyndall attributes the difference of quality to the harmonic sounds which attend all musical tones, and says that in the organ the overtones (the name given by him to the tones hitherto known to musicians as harmonics) are felt to be so necessary to a good musical clang, that they are introduced by small pipes. He also asserts that the vowel sounds are due to accompanying harmonics.

On this side of the world, other views are advocated. In the *American Journal of Science and Arts* for May, an excellent article upon the Musical Ratios, by Prof. H. W. Poole, contains an allusion to a proposition laid down by Prof. Tyndall, and strong objections are urged against it.

Mr. Poole argues that the pleasant quality of a sound depends greatly upon its purity, both as regards pitch and its freedom from the harmonics, which Professor Tyndall considers so desirable. He remarks that it was considered "a triumph when the pianoforte was made to give less of the jangling harmonics, and more of the pure fundamental tone of the string."

Without assuming to be arbiter of the opinions entertained by men so distinguished in this department of science, we incline to the views of Prof. Poole. We believe the quality of different musical sounds consists partly in the manner in which vibrations, independent of rapidity or amplitude, are transmitted to the sensorium, by the delicate and as yet unexplained mechanism of the internal ear. We base this opinion upon the fact that the internal ear does at times produce within itself certain sounds not dependent upon external causes. Every one has experienced bell-like, ringing sounds, or buzzing and sibilant noises, that are the result of deranged action of the auditory apparatus. These sounds sometimes last for days, after the ear has been stunned by an explosion; and sometimes they may be heard, for a few moments, when no external cause can be assigned, ceasing often for a short time to recommence in another form. Our theory is, that when any musical sound is produced, the ear in its transmission qualifies it according to the nature of the minute wavelets of air which are produced by the texture of the vibrating body. Thus a violin string, when so much worn that many fibers exist upon its surface, gives a peculiar harsh and muffled tone, as though the bridge were weighted with something that interfered with its vibration, only in a less degree. The harshness of the sound of filing, also, is probably caused by the clashing of minute waves of air, emanating from the teeth of the file. We have often noticed in the filing of a bar of steel, that the harshness of the sound ceased with the removal of the file, the bar continuing to vibrate in a clear, musical tone for some time after. In the filing of saws we have also observed that the purity of the tone produced after the file was removed, was greater in large saws, having but few teeth in proportion to the extent of their surface, which seems to show that the waves produced by the teeth, like those produced by the fibers of the worn string, tend to give harshness to the tone produced.

When the bridge of a violin is damped, a very peculiar quality is imparted to the tones, yet each string retains all the harmonics which it originally possessed.

We conclude, then, that the characteristics of musical sounds, other than pitch and volume, depend upon the texture of the sonorous body by which they are produced, and the modifying influence of that part of the mechanism of the ear, the office of which is yet undetermined.

All the modifications of sound which characterize the vowel sounds, may be given in whispers, yet we do not think that whispers can be considered as musical tones. It is possible to speak, but not to sing in whispers. We cannot, therefore, accept the theory that absence or presence of the harmonics is the cause of difference in vowel sounds.

Neither do we accept the theory that harmonics are necessary to the production of good musical tones. On the contrary, they so frequently seriously interfere with good harmony, that the softening effect of distance, which renders them imperceptible, is universally acknowledged to add sweetness to music. Spohr, in his celebrated "School for the Violin," says that "the artificial harmonic tones must be rejected, because they so totally differ from the natural tones. It would be degrading this noble instrument to play whole melodies in such childish foreign tones." He, therefore, rejects all harmonics except those natural to each string, namely, the octave, the fifth of the octave, and the double octave.

The thorough investigation which is now in progress in the science of acoustics, will undoubtedly soon throw light upon some of these perplexing questions, which constitute one of the most interesting scientific topics of the time.

It has recently been discovered that cheap claret wines in France are adulterated by alum, which produces gastralgia.

THE SUTRO TUNNEL.

The silver vein known as the Comstock Lode, situated in the State of Nevada, is probably the most important gold and silver bearing vein now worked. Its yield, during the six years ending Jan. 1, 1868, was \$75,000,000. Its present annual yield is \$16,000,000, but owing to the depth now reached, and the high price of fuel, the expenses for pumping have become so great, that very small profit is realized by the Companies (thirty-five in number,) now at work upon it. The \$16,000,000 now produced involve an expenditure of almost the entire amount to cover the expense of raising ores, pumping, etc.; and these expenses are increasing so rapidly, with increasing depth, that unless something can be done to obviate the present difficulties, attending the working of these mines, their total abandonment, at an early period, is inevitable. Forty-seven engines are now at work to keep them free from water. The fuel for these engines is wood, and costs, delivered at the mines, sixteen dollars in gold per cord.

In view of such facts, it has been proposed to open a tunnel called the Sutro tunnel (because projected by M. Adolph Sutro), which shall cut the Comstock Lode 2000 feet below its highest point, for the purpose of draining and ventilating the mines, and transporting ores therefrom to a point upon the Carson River, where their concentration may be cheaply and conveniently accomplished.

The estimated cost, including a large margin for unforeseen contingencies, is \$8,000,000, and its dimensions are as follows:—

Length of main tunnel.....	21,178 feet.
Aggregate length of branches.....	17,688 "
Aggregate depth of shafts.....	4,220 "
Total.....	43,086 "

The section of the tunnel is twelve feet square, and is intended to afford passages for two lines of cars, each car having a capacity of five tons. A drain beneath the roadway of the cars will carry off all the water from the different mines.

The advantages of such a tunnel are so great, that some time since the several mining companies at work upon the Comstock Lode were induced to take \$365,000 stock in a company then organizing for the purpose of constructing it. The whole amount of capital stock was placed at \$5,000,000, and it was thought that if \$500,000 of it were taken by the mining companies themselves, the remainder would be easily secured from New York capitalists. Unanticipated difficulties have, however, been realized in the attempt to raise the required capital. So many such projects have proved themselves mere schemes to procure profit to their projectors at the expense of those who have been induced to invest in them, that, added to the general distrust which seems to pervade money centers, in regard to mining operations, the effect has been adverse to the success of the Sutro Tunnel enterprise.

The State of Nevada, although extremely anxious to aid a work so important in its bearings upon her future destiny, found herself restrained from so doing, by constitutional inhibitions. Nothing remained but to memorialize Congress, and ask the aid of the General Government, which was accordingly done by the legislature of Nevada, Jan. 25, 1867. The memorial was referred to the Committee on Mines and Mining, who reported a bill June 3, 1868, providing for the loan of government credit to aid the construction of the proposed tunnel. The bill and report were ordered printed, and now await further action. We have given some attention to the merits of this subject, and we are convinced that the Sutro tunnel, if constructed, is destined both directly and indirectly to benefit the whole country. Directly, by largely increasing the amount of bullion, thereby cheapening money, which amounts to the same thing as decreasing our national debt; and indirectly, because it will ultimately put an end to what has been so properly characterized as "Piratical Mining" in this country, and initiate in its stead a permanent and effective system.

There can be no doubt remaining in the minds of experts about the continuity of the Comstock Lode to depths beyond any that can be worked. There is also little doubt that other veins than the Comstock would be crossed by the Sutro tunnel; but capitalists who are not conversant with the facts upon which these opinions are based, can be convinced of their truth only by ocular demonstration. It is of little use to talk to them about "true fissure veins," and the like; to them "seeing is believing," and faith in the continuity of gold and silver veins to great depths being once established upon sight, would, by initiating a rational system of mining, develop such an extent of mineral wealth as would command the admiration of the world. We should no longer pursue the wasteful and ruinous system of surface mining which has prevailed to such an extent hitherto, but ores that have heretofore been considered too poor to be profitably worked, would be made to swell the amount of the precious metals at present produced. That we have not overestimated the benefits of deep tunnelling, will be seen when we state that the Comstock Lode is estimated by the best authorities in Europe and America, as being capable of a yield of \$50,000,000 per annum, upon the completion of the tunnel; more than three times the amount at present produced.

So far are we from believing that our Government should hesitate about establishing a precedent in the assistance of mining enterprises, that we think it has hesitated too long. The history of the internal improvements of almost every other nation goes to show unmistakably, that until such enterprises are fostered by the general Government, nothing like a full development of mineral resources will be attained. We believe however that the Government needs but to de-

monstrate the feasibility of deep tunnelling in this country, in order to turn the flow of private investment into similar channels.

The securities offered the Government for the loan, are such as to justify its negotiation. We see then nothing that can be considered a valid argument against the passage of the bill reported by the Committee; on the contrary, we see so much that renders it desirable that we trust it will speedily become a law. The interests not only of one section or of one industry are involved in the success of the Sutro tunnel, but all sections and all branches of industry are involved in common.

That such a measure should meet with opposition, is only what is to be expected in an enterprise of such magnitude. The improvements from which the United States as a nation, and the several States have individually received the greatest benefit, met with the most violent opposition at the outset. But as the opponents of the measures alluded to have been put to shame by the utter failure of their predictions, so we confidently believe, will those who have set themselves to oppose the Sutro tunnel, eventually be compelled to acknowledge their want of judgment and foresight.

RECENT BOILER EXPLOSIONS.

From a correspondent we have an account of a destructive steam boiler explosion which occurred at Westphalia, Clinton County, Mich., June 15th, by which an extensive flouring mill was destroyed and one man killed and two others injured. Our correspondent says he examined minutely the wreck. The iron was rent as though it were paper; the seams were started in many places, the rivets being pulled partially through, or cut off in the seam, in the latter case leaving them smooth and bright. In some cases the rupture was parallel with the seams, not four inches from them. The dome or steam chamber and safety valve, placed about midway of the boiler, and weighing about four hundred pounds, was thrown a distance of thirty rods, and evidently went to a great height. The boiler was fifteen feet long, five feet in diameter having eighty-three inch flues, had been used two years, and run two engines of forty and thirty-five horse power. At the time of the explosion only one was running, driving a saw, planer, etc.

The engineer says he had just pumped water to the second cock and had, according to the gage, fifty-five lbs. of steam, and was letting the steam down preparatory to going to dinner. The boiler was broken into eight large pieces beside smaller fragments, and the flues and the debris were scattered in all directions. The boiler had evidently burst at the middle, as the ends lay about sixty feet each way from the arch. The pieces which had formed the lower side appeared to have been exposed to great heat. The safety valve was stuck fast.

EXPLOSION OF A STEAM FIRE ENGINE.

At a fire in the Bowery, New York city, on the evening of June 18th, one of the steam fire engines, of the Metropolitan Fire Department exploded her boiler, causing the death of six persons and wounding over a score. The explosion occurred just after the engine was started succeeding an interval of rest. At the time of this writing the official examination and report has not been made, but we made a personal examination of the engine the next morning. The rupture occurred on that side of the fire box opposite the inlet pipe. The inner skin of the water leg was torn, the rivet heads broken off, and the sheet itself bent up on the torn edges. The crown sheet did not appear to be burned, as it had a coat of soot. From appearances low water and the injection of cold water on the heated plate were the probable cause of the explosion. The safety valve appeared to be stuck to its seat, but this may have been caused by concussion when the engine struck the pavement after being overturned. The official investigation is not concluded as we go to press, and that may throw more light upon the matter.

TUG BOILER EXPLODED.

On the morning of June 20th, the boiler of the tug *La Vergne* exploded while rounding the Battery, New York harbor, having in tow a lumber barge. As the vessel sunk a few minutes after the accident, we have no data derived from examination of the boiler to guide us as to the cause of the accident. We copy a notice of the catastrophe from one of our dailies, the *New York Sun*:

The crew were thrown by the violence of the shock into the water, and with the exception of one were rescued; but all were more or less injured by the sad mishap. The mate, Henry Lynch, who was steering the boat at the time of the disaster, has not since been seen, and it is feared he was either blown to pieces, or sank with the vessel. The Captain, David Decker, who was near the boiler when she exploded, was only slightly bruised and scalped, and, although thrown from his feet by the shock, was enabled to escape in a boat before the vessel went down, which happened soon after the explosion. The engineer, Daniel Taulman, was blown over the side of the vessel, and sank; but on rising to the surface he was rescued by the boatman who had gone out to the help of the sufferers. He was very seriously injured, his left arm being badly scalded and cut, and his leg severely bruised. He had but a few moments before left the engine room to speak to the captain, and he states that the steam was only 74 pounds to the inch—three pounds below the fixed limit—and that there was plenty of water in the boiler. He had examined the gages but an instant before the boiler burst, and therefore could not account for the mishap. John Lewis, the steward, was forced nearly fifty feet into the air, and then fell into the water, whence he was rescued by the boatman. He received a compound fracture of the arm, a severe scalp wound, and had his face fearfully lacerated. His condition is thought to be critical. Edward Wilson, a deck hand was blown over the side of the boat, but received no serious injuries, and James Burke, the fireman, was but slightly hurt. The more severe cases were promptly taken to the New York hospital, where every care and attention was given to the sufferers.

The Captain, in his statement, alludes to a leaky rivet in the boiler, which defect he had previously pointed out, but which was not considered by the authorities to be of any serious consequence. He also states that the vessel was not at the time under a full head of steam, and further, that no recklessness of conduct was manifested by either himself or the engineer. In fact, all the statements agree in one thing, and that is, no satisfactory reason can be assigned for the explosion. The propeller was not an old boat, and her boilers had recently been overhauled and repaired. They were furthermore cleaned out that morning, and could not therefore, have been encrusted with rusty or saline matter.

One thing will strike the practical engineer queerly, that in this, and many other accounts of boiler explosions, it should be thought necessary to apologize for, or, at least, to mention the fact of a leak in the boiler. We cannot conceive that a leak in a boiler can in any way tend to an explosion. That the leak may deaden fire or diminish the pressure of steam, or that it can aid in a rupture is possible, but that it tends to an explosion we have yet to learn.

IMPORTANCE OF REGULAR HABITS.

A person visiting New York for the first time, and curious to observe the peculiarities of the metropolis, would probably immediately notice the great number of restaurants, eating houses, and stands in the markets and streets, loaded with eatables. Go where he would, by day or night, he would find accommodations for eating, and people availing themselves of them. The facilities thus afforded for obtaining meals at all hours, are, without doubt, leading to great irregularities in eating, and thus exciting a deleterious influence upon the public health. It may, therefore, not be amiss to devote a brief space to the consideration of the effect of all irregularities in habits of living upon the animal economy.

It is a fact well recognized by physiologists, that the constitution of living beings possesses a recuperative power that is capable of resisting attacks from external agencies, or, rather, is able to restore the damage caused by such attacks. The lower in the scale of existence an animal is found, the stronger is the power of its organism to restore parts removed by mechanical means, and the less is its susceptibility to the influences which cause disease. If from individuals of the lower orders of animal a limb, or even a portion of the body be removed, a new one will grow in its place, and in many cases the part removed will supply the necessary parts which are absent, and become a complete organism. In vegetables this is almost universally the case, and the propagation of plants by slips cut from the parent stem, is a process of daily occurrence in horticulture. The recuperative power is indeed so great in many plants that they can, by the most extreme efforts, be scarcely removed from a soil where they have once obtained a foothold. The plant known to farmers as Quack-grass is a good example.

The power to restore parts which have been lost extends to the highest orders of the animal creation. Teeth which have been removed by mechanical means have often grown again in the human jaw years after the second set which take the place of the first, in the regular course of nature, had been supplied. This is, however, probably the only organ that the human recuperative energy has power to restore.

As age advances, this power becomes less, so that repair takes place slowly, and in very advanced age ceases altogether. Broken bones refuse to unite, and abrasions of the skin become chronic ulcers.

There is, however, a striking characteristic of the power of recuperation, which has a most important bearing upon the health, both of men and animals. It is this: The power to restore increases with the regularity of the power and periods of attack. It is as if the constitution were a citadel, upon the reduction of which two kinds of tactics were employed. So long as the attacks are made at regular intervals the garrison may sleep while the besieging forces are withdrawn, and rise refreshed to increased resistance; but attack it at unexpected times, and with irregular force, and unremitting vigilance must at last wear out the strength of the besieged.

Many phenomena which cannot be accounted for in any other way, at once find an explanation by the application of this truth. A man who is addicted to the use of alcoholic liquors may often drink very freely for years without any apparent serious detriment to health, if he is regular in the times and quantities of his potations; while another, who only takes an occasional "spree," will suffer from the consequences of his indulgence.

The taking of proper exercise, pure air, sustenance, sleep, and recreation, may be compared to the withdrawal of the attacking forces. If the withdrawals are regular, the attacks will also be regular, and the resisting power of the vital structure will in the meantime have accumulated.

We believe that six hours of sleep per diem, begun and ended at uniform times, are as good as eight taken at irregular periods. It follows, then, that regular sleep gives two hours at least more time per day, available for business, pleasure, or study, than can be otherwise obtained.

In short, nothing is so economical as regular habits. Less food, less sleep, less clothing, less medicine is required to sustain nature, and better health, more happiness, more wealth, more knowledge, and longer life are obtained in their exercise.

SHADOWS FROM TRANSPARENT BODIES.—By means of the electric light a piece of glass can be made to throw a perfectly black shadow. This will be the result provided the two surfaces through which the ray passes are not perfectly parallel, the deepness of the shadow depending upon the variation.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING JUNE 23, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each caveat.....	\$10
On filing each application for a patent, except for a design.....	\$15
On issuing each original patent.....	\$20
On appeal to the Commissioner of Patents.....	\$20
On application for Reissue.....	\$20
On application for Extension of Patent.....	\$20
On granting the Extension.....	\$20
On filing a Disclaimer.....	\$10
On filing application for Design (three and a half years).....	\$15
On filing application for Design (seven years).....	\$15
On filing application for Design (fourteen years).....	\$15

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

79,048.—CANNIBER.—Henry C. Appleby, Connecticut, Ohio.

I claim, 1st, Discharge a current or currents of air into hydrocarbon liquid, by centrifugal force, substantially as shown and described.

2d, In combination with a carbureting apparatus, the valve, I, operated by the weighted lever, J, and the serrated disk, B, substantially as and for the purposes described.

79,049.—DEVICE FOR GRINDING TOOLS.—Daniel W. Ayres, Sheldon, Ill.

I claim an implement for grinding or sharpening tools, composed of a stock, gearing, and winding wheel, one or more, arranged to operate in the manner substantially as shown and described.

79,050.—LOUNGE.—Lewis H. Baker, Tarrytown, N. Y.

I claim in combination with a furniture lounge, an extension or folding washstand, arranged and operated substantially as described.

79,051.—SELF-LOCKING SHUTTER HINGE.—E. H. Benjamin, Oak Hill, N. Y., assignor to Gilford, Potter and Company.

I claim, 1st, The reversible pin, I, provided with a curved recess, the pin, F, and pin, I, adapted to be secured to the ar, b, of the right angled plate, B, by means of the tongue, I, and screw, K, all constructed and arranged as described, for the purpose specified.

2d, The perforated projection, I, cast upon the plate, A, and provided with the notched rib, Z, and semi-circular extension, F, in combination with the recessed pin, I, and right-angled plate, B, having the stops, S, S', all constructed and arranged as described, to produce a reversible shutter hinge, as herein set forth.

3d, The semi-circular rib, Q, or its equivalent, substantially as shown and described, in combination with the screw, K, and the pin, I, for the purpose of holding the latter firmly, and for the purpose set forth.

4th, The tongue, I, of the pin, I, or its equivalent, substantially as shown and described, in combination with the notched projection, B, for the purpose of permitting the firm attachment of the pin, I, all as set forth.

79,052.—CARPENTERS' GAGE.—A. H. Blaisdell, Newton Corner, Mass.

I claim the fingers, E, E', pivoted on the sliding block, C, and operating so that their ends will always remain in contact with a curved or straight edge, substantially as herein shown and described.

79,053.—PRINTING PRESS FRISKET.—T. W. M. Castle and J. B. Conner, Andover, Ind.

We claim constructing the frisket of the parts, D, D', attached to the tympan, A, substantially as shown, in combination with the pulleys or semi-pulleys, E, E', springs, G, G', and the prongs, e, e', all arranged and applied to operate in the manner substantially as and for the purpose set forth.

79,054.—RAILWAY.—John G. Cross, Brattleboro, Vt.

I claim, 1st, The rails, A, formed with rounded heads and branched or arched bases, and having their ends joined vertically to overlap and fit upon each other, substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the two tie chair, B, having a sub-rail, C, formed upon or attached to it, with the overlapping ends of the contiguous rails, A, substantially as herein shown and described, and for the purpose set forth.

3d, The sub-rail, C, made solid with and upon the chair, B, substantially as herein shown and described, and for the purpose set forth.

4th, The detachable sub-rail, C, secured to the chair, B, by means of the lug, B', formed upon the outer lip, B', of said chair, and entering a notch or opening in the lower edge of said sub-rail, substantially as herein shown and described.

5th, The ends of the main rail, A, having its ends secured to the sub-rail, C, and to the chair, B, by the bolts, D, and wedge keys, E, substantially in the manner herein shown and described, and for the purpose set forth.

79,055.—CONNECTION FOR SOFT METAL PIPE.—Isaac Davis, Brooklyn, N. Y.

I claim a lead pipe connection, consisting of the screw clamps, C, D, applied over flanges, a, a', and packing, all substantially as and for the purpose set forth.

79,056.—GRIDIRON.—Clayton Denn, Frankford, Pa.

I claim, 1st, The gridiron, A, constructed substantially as and for the purpose set forth.

2d, The combination with the gridiron, A, of the cover, F, substantially as and for the purpose described.

3d, The combination of the gridirons, A and L, and the cover, F, substantially as and for the purpose described.

79,057.—HARVESTER RAKE.—H. F. W. Deterding, Alton, Ill.

I claim, 1st, The wheel, I, rack, J, gearing, e, k, L, and the shafts, M, O, Q, all arranged and applied as shown and described, for the purpose of operating the endless chain, V, and rake, substantially in the manner as and for the purpose set forth.

2d, The pivoted plate, X, and spring, n, in connection with the recessed, o, q, in the inner edge of the plate of the metallic framing, Q', and the bent rake tooth, h, x, of the rakes, or falling rake, all arranged to operate with the slotted, p, a, for the purpose set forth.

3d, The coiled spring, j, in combination with the rake head, I, and socket, W, whereby the rake teeth, h, are held in a vertical position, as herein described, for the purpose specified.

79,058.—HORSE HAY FORK.—H. L. Doane, Green Oak, Mich.

I claim, 1st, The swinging tines, E, E', constructed of one piece of metal, when the parts, E, E', are crossed at right angles, whereby their points are brought, obliquely across the points of the fixed tines, as and for the purpose herein set forth.

2d, The two pairs of tines, A, A', B, B', each formed on one continuous rod or bar of metal, and hinged together by the cross part, G, and bent eyes, a, a', substantially as shown and described, and for the purpose set forth.

79,059.—HAT BLOCKING MACHINE.—Jacob Eberhardt, Newark, N. J.

I claim the brim preserver, consisting of the elastic annular plate, E, between the metallic annular plate, D, and frame, B, in combination with the elastic male die, A, and metallic female die, C, as herein described for the purpose specified.

79,060.—PASSENGER REGISTER.—John Enright (assignor to himself and James R. Del Vecchio), Louisville, Ky.

I claim, 1st, The combination of the doors or bars, I, shaft, B, radial arms, G, having stop pins, p', or its equivalent, attached to them, spring pawls, J, and bent lever, F, L, with each other, when placed at the entrance of a car, boat, room, or other place, substantially as herein shown and described, and for the purpose set forth.

2d, In combination with the above and with each other, the toothed wheel, Y, attached to a shaft, S, having a single tooth or cog, E', formed upon it, and carrying an index finger, G', the toothed segment or wheel, B', carrying an index finger, I, the dial plate, H', lever or arm, B', pawls, W and A, connection, P, lever, O, rod, J, and gong, K', all arranged and operating as set forth for the purpose specified.

79,061.—CUTLERY.—R. H. Fisher, West Meriden, Conn., assignor to Beaver Falls Cutlery Co., Beaver Falls, Pa.

I claim, 1st, The bifurcated tang, B, provided with hooks, e, e', fitting into the recesses in the handle, C, thereby secured in position by means of the bolt, B', fitting into the recesses, b, b', and over the end of the handle, as herein shown and described.

2d, Securing the bifurcated tang, B, to the handle, C, by compressing the arms, a, and slipping the bolt, B', into the recesses, b, as herein shown and described.

3d, Securing the bolt, B', to the handle by means of the rivet, d, passing through the handle between the arms, a, b, of the tang, substantially as herein shown and described.

4th, The arrangement of the fixed index, G, and movable index, H, with relation to each other, and the stock, A, graduated blade, B, and its retracting, D, when, by the required adjustment, the blade with the stock is determined, as herein shown and described.

5th, The described arrangement with the slotted stock, A, graduated blade, B, slotted protractor, D, fixed index finger, G, movable index finger, H, and set screws, E, F, all operating as described, for the purpose specified.

79,062.—NECK TIE AND WATCH GUARD COMBINED.—Thomas J. Flagg, New York city.

I claim as a new article of manufacture the combined neck tie and watch guard, A, consisting of the widened part, a, and the narrow part, a', a', the latter being adapted to receive the slide, a', which is secured to the button on the shirt by its loop, a', thereby holding the neck tie in proper position on the neck of the wearer, the ends, a', being also provided with a suitable means for attaching to the watch, the whole constructed and arranged as herein set forth.

79,064.—TRACE BUCKLE.—Martin Gayhart, Young America, Wis.

I claim the parts, A A A' A'', and B B B', pivoted together by a rod, a,

and provided with a rigid tongue, e, corrugated cross piece, A' and B', all constructed and operating substantially as shown and described, and for the purpose set forth.

79,065.—HORSE RAKE.—Jacob Githner, Mier, Ill.

I claim, 1st, The described arrangement of the trip stick, d, having a ratchet handle, g, foot, b, pivot d stop rod, e, and spring brace, f, with relation to the hinged bars, I, carrying the rake, A, said bars, I, being adapted to be elevated and lowered by means of the cord, a, drum, o, and lever, j, all as and for the purposes herein shown and described.

2d, The combination of the ratchet rack and trip stick, substantially as described.

79,066.—HAMMER.—J. H. Goodwin, Scotland Neck, N. C.

I claim as an improved article of manufacture, the tool consisting of the combination of a hammer with graduated handle and tack claw, with a screw driver, constructed as described.

79,067.—SADIRON.—James Gray, Newark, N. J. Antedated June 13, 1868.

I claim, 1st, The cover, D, constructed as described, consisting of the plates b, c, forming a cold air chamber, the upper plate b, being slotted for the passage of the arm, e, of the catch damper, G, as herein shown and described.

2d, The adjustable sliding damper, G, when arranged below or near the mouth of the smoke pipe, C, of a hollow, self-heating smoothing iron, substantially as and for the purpose herein shown and described.

3d, A self-heating smoothing iron, when provided with a perforated cap fixed to the interior of the hollow iron, with a double cover, D, and with an adjustable damper, G, all made and operating substantially as and for the purpose herein shown and described.

79,068.—WASHING MACHINE.—Wm. Hachenberg, Wild Pigeon, Mich.

I claim the combination of the curved sides, B, bearing the rollers, C, segmental rubber, E, whose journals, e, are hung in vertical slots, slotted bar, F, connecting bar, G, lever handle, H, shell, I, shaft, J, bars, K, and spring lever, L, all arranged as described for the purpose specified.

79,069.—BEVEL SQUARE.—C. O. Hansen, Memphis, Tenn.

I claim the bevel constructed as described, and consisting of the graduated plate, B, longitudinally slotted, the pivoted arms, A, links, C, and sliding clamp nut, D, all arranged to operate substantially as herein shown and described.

79,070.—LEATHER ROLLER.—J. T. Harris, Swampscott, Mass.

I claim the guards, D and E, either or both, and whether made separate or in one piece, in combination with the rollers of a leather rolling machine, substantially as herein shown and described, and for the purposes set forth.

79,071.—HOISTING APPARATUS.—Dexter Head, Medusa, N. Y.

I claim the lazy tongs, C, arranged to operate in connection with the derrick, A, slotted frame, B, the pulleys, cord, e, and winches, f, as herein described, for the purpose specified.

79,072.—HORSE STRIPPER.—Sidney Holt, Baraboo, Wis.

I claim, 1st, The combination and arrangement upon the frame, A, of the fixed and sliding bars, E, F, respectively, substantially as and for the purpose set forth.

2d, The combination and arrangement, with relation to the toothed cylinder, J, of the endless carrier, D, rollers, B, and vertically adjustable hangers, C, as herein shown and described for the purpose specified.

3d, The toothed bar, L, in combination with the toothed roller, J, substantially as and for the purpose herein set forth.

4th, The described arrangement upon one frame, A, of the horse-stripping device, consisting of the parts, E, F, G, H, I, the breaking device, J, K, L, M, N, and the endless carrier, D, passing around adjustable rollers, B, all constructed and combined to operate in the manner and for the purpose substantially as set forth.

79,073.—TOY CANNON.—Geo. E. Hutchinson, Cleveland, O., assignor to himself and J. B. Brown, Peabody, N. Y.

I claim a toy cannon having an enlarged chamber, c, at the rear end of the bore and having the front end of the spring confined in a sliding barrel, E, in combination with the lever, F, and pin, d, all made and operating substantially as herein shown and described.

79,074.—HORSE POWER.—J. H. Kleppinger, Cherryville, Pa.

I claim the wheel, E, with the toothed face, and the loose wheel, F, with the jaws, b, all arranged as described, in combination with the shafts of a horse power, and with the fly wheel, H, mounted on one of them, as specified.

79,075.—HOT AIR FURNACE.—Wm. H. Lee and Charles M. Hadenbergh, Minneapolis, Minn.

I claim, 1st, The arrangement and combination of the furnace drum, A, with the vertical air tubes, a, the angular fire drums, C, the smoke flues, D and E, and the chimney flues, F and J, substantially as described for the purposes set forth.

2d, The partition plates, H, and damper, G, in combination with the furnace drum, A, and angular fire drums, C, smoke flues, D, E, and chimney flues, F, J, as herein shown and described.

79,076.—SAFETY GUARD FOR MINING SHAFT.—E. O. Leermo, Gold Hill, Nevada.

I claim the combination with the railroad track and the cage of a mining shaft of the automatic safety guard attachment, substantially as and for the purpose set forth.

2d, The combination of the spring buffer, H, spring lever, E, and slide, D, substantially as and for the purpose described.

79,077.—SMUT MACHINE.—Carl Millar, Sandoval, Ill.

I claim the smut machine, C, with its screen, B, and blower, E, in combination with the brush, G, blower, H, and screen, K, when constructed and arranged in the manner and to operate substantially as described.

79,078.—MANUFACTURING BUTTER FROM WHEY.—Ira Page, Adams, N. Y.

I claim the improved mode of manufacturing butter from whey, substantially as and for the purpose described.

79,079.—EXTENSION TRELLIS OR HORSE.—George H. Pierce and Martin T. Ghisetti, Mineral Point, Wis.

We claim, 1st, The traveling boards, B, U', constituting the platform of trellis or horse, substantially as described, in combination with the braces, A, A', and their respective bolts, r, r', all as and for the purpose set forth.

2d, The screws, G, in combination with the cross bar, I, and the hooks, f, substantially as shown and described, and for the purpose specified.

3d, The slotted girders, D, D', in combination with the legs, A, A', platforms, B, B', and bolt, r', substantially as shown and described and for the purposes specified.

4th, The plates, m, substantially as shown and described in combination with the braces, A, and the slotted girders, D, D', all as and for the purpose set forth.

5th, The cross bars, I, substantially as shown and described, in combination with the legs, A, braces, h, and slotted girders, D and D', all as and for the purpose set forth.

6th, The cross bars, I, substantially as shown and described, in combination with the screw, G, and legs, A', all as and for the purpose set forth.

7th, The brace, a', when combined with a cable, a'', and bolt, r', all constructed and operating substantially as shown and described and for the purpose specified.

8th, The hooked and binged cross bar, I', substantially as shown and described, in combination with the legs, A, slotted girders, D, D', and platform, B, B', all as and for the purpose set forth.

9th, The chains, e, in combination with the bolts, r, and legs, A, all substantially as and for the purpose shown and described.

10th, The notches in the legs, A, in combination with a corresponding notch on the girders, and the screw, G, all substantially as shown and described and for the purpose specified.

11th, The clamp device of the metallic strap, k, and eccentric roller, v, substantially as shown and described, in combination with the legs, A, and supplementary legs, A'', and strips, p, all as and for the purpose set forth.

12th, The tongue and its groove, e', in combination with the girders, D, D', substantially as shown and described for the purpose specified.

79,080.—DEVICE FOR STOPPING AND STARTING CALENDER ROLLERS.—Wm. Porter, Wilmington, Del.

I claim the rod, F, passing through the roll, A, and connected at one end to the shaft, D, of the roller and friction disk, by a swivel joint, its other extremity fitting within the hub block, H, provide with the hand wheel, G, all constructed and arranged to operate substantially as and for the purpose herein set forth.

79,081.—GAS BURNER.—A. C. Rand, New York city.

I claim a gas burner in which a movable check is adjustable towards or away from the stationary check, as herein described for the purpose specified.

79,082.—ORGAN.—Isaac Roush and J. W. Truby, Otto, N. Y.

We claim the grooves, R, in a surface, in combination with a block moving in such grooves, substantially as and for the purpose described.

79,083.—TAILORS' MEASURE.—Wm. Sinnott and John McNaughton, Brooklyn, N. Y.

We claim the adjustable quadrangular frame, composed of the metal bars on each of which a graduated scale is marked, in combination with the vertical bar, q, sliding upon the lower bar, h, of the quadrangular frame, and carrying the adjustable tape measure, C, as herein described for the purpose specified.

79,084.—PORTABLE STOVE.—Jos. Smallwood, St. Johns, N. B.

I claim the furnace or part, A, and the boiler or part, B, when constructed so that they will slide or fold together, as seen in fig. 2, and when used for the purposes set forth, or in combination with a lamp, substantially as described.

79,085.—MEAT CUTTER.—S. L. Stockstill and H. H. Dille, Medway, Ohio.

We claim, 1st, The inclined slotted plate, E, attached to opposite sides of the shell, A, below the spikes, A, whereby, as the two halves of the shell are brought together, the inner edges of the plates fit against each other, to form a partition, as herein described for the purpose specified.

2d, A meat cutter consisting of two wheels, B and C, carrying spikes and cutters respectively, and working within a case, A, that b, by means of a slotted partition, E, divided into two compartments, as set forth.

rod, h, provided with the nut, j, and gudgeons, k, all constructed and arranged to operate substantially as herein set forth.

79,090.—INNER SOLES FOR BOOTS AND SHOES.—R. A. Webster, Bangsfield, assignor to himself, John Dowd, and R. J. Dowd, Lee, Mass.

I claim the inner sole, A, constructed substantially as described, for the purpose set forth.

79,091.—PLOW.—J. M. Wilson, Lexington, Miss.

I claim, 1st, A plow consisting of the combination of the arrow, C, with the scraper, D, all made and operating substantially as herein shown and described.

2d, Providing the scraper, D, with notches, a, b, to facilitate its fastenings to the standard, A, and arrow, C, substantially as herein shown and described.

79,092.—APPARATUS FOR CONVERTING MOTION.—Kenelm J. Winslow, Montpelier Row, Twickenham, Eng.

I claim, 1st, The combination of the four hollow drums, C, hinged pawls, D, link connections, E, E', friction pulley, H, fixed ratchet wheel, B, and shaft, A, all constructed and arranged substantially as and for the purpose herein shown and described.

2d, In combination with the above, the retarding rings, K, and spring, L, and also the card, O, and pulleys, Q, all constructed and arranged to operate in the manner and for the purpose herein shown and described.

79,093.—THREAD CUTTER.—C. A. Woodbury, Woodstock, Vt.

I claim, 1st, The thread cutter consisting of the disk, A, having a sharp edge, the guide shield, B, and springs, a, substantially as herein set forth.

79,094.—STEAM GENERATOR.—John Armstrong, New Orleans, La.

I claim the central line or set of vertical tubes, A, in combination with the outer lines or sets of tubes, and with the system of oppositely inclined connecting flues, B, arranged in the manner and for the purpose set forth.

79,095.—WASHING MACHINE.—A. A. Atherton, Waterbury, Vt.

I claim the combination of the board, D, with the knuckles, and the board, E, with rollers containing holes which allow the water to flow freely through them, as and for the purpose specified.

79,096.—WRINGER.—Alfred M. Bailey (assignor to Metropolitan Washing Machine Co., Middlefield, Conn.)

I claim, 1st, In clothes wringers and other machines in which two rollers are required to operate at varying distances from each other, the employment of a spring whose ends extend beyond the bearings of the upper or driven roll, in the manner described, so that the ends of said roll shall bear against the spring at points intermediate between the bearing points of said spring, as and for the purposes set forth.

2d, In combination with a spring whose bearing points are located with relation to the points where it is in contact with the upper or driven roll, in the manner specified, the employment of screws or equivalent devices for regulating the pressure of the spring, arranged immediately above the points where the upper roll bears against the said spring, as shown and set forth.

3d, The herein described combination and arrangement of the spring with the upper roll, the frame, and the regulating screws, so that the said spring may be readily applied to or removed from the machine.

79,097.—CULTIVATING HOPS.—Nelson Baker, Algazee, Mich.

I claim the herein described method of destroying insects upon hop vines in the open field, by subjecting the vines to the action of pyrolytic gases, sulphurous, hydrocarbon, or other similar vapors, in the manner specified.

79,098.—MEDICINE FOR HOOD CHOLERA.—Joseph P. Ball, Lebanon, Ind.

I claim the improved and newly discovered medicine for the cure and prevention of cholera, compounded and prepared of the materials and substances in the manner and for the purpose specified, as herein set forth.

79,099.—SAW.—Samuel Barry, Dayton, Ohio.

I claim the mode of attaching the teeth, B and C, to the saw plate, A, substantially as shown and described.

79,100.—IMPLEMENT.—B. F. Bean, Schuylkill, Pa.

I claim the combined implement herein described, consisting of the tongs, B, C, and screw wrench, C, D, E, the movable jaw of the latter being made adjustable upon the arm or handle, C, by a nut, H, which is fitted to a screw thread cut upon the arm, C, the whole constructed and operating in the manner and for the purpose specified.

79,101.—WASHING MACHINE.—E. E. Brewster, Cleveland, O.

I claim, 1st, The soap drawers, J, in combination with the perforated washboard, B, for the purpose specified.

2d, In combination with the above, the arrangement of the frame, D, brush, H, and standards, C, all arranged to operate in the manner as and for the purpose specified.

79,102.—MACHINE FOR CUTTING SOAP.—David S. Brown, Jr., New York city.

I claim, 1st, The combination and arrangement of the bar, B', arms, B, B', racks, C, wheels, D, shaft, E, wire frame, H, and bench, A, the whole being made and operated as shown and described.

2d, The arrangement of the frame, I, of the stamping bar, d, stamps, e, e', toggle-jointed bar, a, and lever, b, for the purpose of stamping a number of bars of soap simultaneously the whole being made as shown and

whichever side of the boat comes uppermost, it is all readily accessible to those on board, all for the purpose and in the manner substantially as described.

79,112.—HARVESTER PITMAN.—George B. Garlinghouse and Cyrus B. Garlinghouse, North Madison, Ind.

We claim the pitman connection with the cutter of a harvesting machine, the single or conical pivot point on the pitman entering into a corresponding hole in one side of the knife-beel, in combination with the clamp or its equivalent, arranged to work on the opposite side of the beel, on a center coincident with the point of the pitman, for the purpose of affording free movement in turning the beel, and to take up the slack caused by wear in working the machine.

In combination with the pitman and cutter bar of a harvesting machine, the separate detachable holding device or clamp, D, constructed as described for the purpose of keeping the pitman in proper position with the knife beel and to be easily removed.

79,113.—BOX.—W. B. Guernsey, New York city.

I claim the improved box, made of veneer, with its sides fitted and cemented into perpendicular grooves in the heads thereof, as a new article of manufacture.

79,114.—HULL OF STEAMBOAT.—Wm. Hagerty, Monongahela, Pa.

I claim the geometrical system or rule, as illustrated in fig. 1 of the drawings, for drafting the cross members, so as to form a segment of a conoid in the hulls of vessels, substantially as set forth and described.

79,115.—DRILL STOCK.—M. Hainque (assignor to himself and John Lowth), San Francisco, Cal.

I claim the combination of the drill stock, A, with the lever, D, the plain or corrugated g.b., C, and the elev. R, the said parts being constructed and arranged substantially as described.

79,116.—JOINT CLAMP.—D. E. Hall, Detroit, Mich.

I claim the herein described metallic clamp, when constructed in the manner as and for the purpose set forth.

79,117.—WASHBASIN OVERFLOW AND DISCHARGE PIPE.—B. Haysnash, New York city. Antedated June 18, 1868.

I claim the trap, c, and pipe, f, below the drip pan, d, in combination with the hollow column, g, supporting the basin, and arranged to receive its discharge and overflow, as and for the purpose set forth.

79,118.—SASH BALANCE.—Andrew B. Hester, North Vernon, Ind.

I claim the sash balance consisting of the plate, A, with the pulleys, 1, 2, 3, as arranged thereon, the pulley, B, the cord, K, the cap, C, and the lever, F, the whole constructed and arranged substantially as described.

79,119.—CULTIVATOR.—J. H. Hill, Clinton, Ill.

I claim, 1st, the frame, A and C, and the lever, F, combined and operating substantially as set forth.

2d, The shovel handles, G, arms, H, and connecting bar, I, arranged substantially as described, in combination with the frame, C, and its adjuncts, substantially as and for the purpose set forth.

79,120.—CORN PLANTER.—J. H. Hill and J. T. Hammond, Clinton, Ill.

We claim the combination and arrangement of the slides, H and I, and plates, A, with the tongue, B, chute, F, and plow, E, as set forth.

79,121.—FENCE.—W. D. Hillis, Elgin, Ill.

I claim, 1st, the combination of wire rails, E and I, constructed as above described, with the slotted pickets, F, and the pins, C, C', substantially as and for the purpose set forth.

2d, The metallic plates, D, when constructed with the slots and recesses above described, and with the enlarged space, m, in, and used in combination with the screw, A, and the wire rails, E and I, substantially as and for the purpose set forth.

79,122.—FLOWER FRAME.—C. Hochbrunn, New York city.

I claim the frame for flower ornaments, constructed and arranged as herein shown and described.

79,123.—BOOK BINDING.—Amos Holbrook, Jr., Lynn, Mass.

I claim, 1st, connecting two or more signatures of a book by a parallel thread passing within the fold of each signature, and through the slit in the end to the next signature, substantially as described and for the purpose set forth.

2d, Combining with the parallel thread, arranged as set forth in the first claim, series of chain stitches, substantially as described and for the purpose set forth.

79,124.—GLOBE JOINT.—J. F. Hollister, Plano, Ill.

I claim, 1st, the mode of connecting the globe, C, by means of straps on its poles, or their equivalent, substantially as set forth.

2d, The couplings, K, K', and the vibrator, C, bar, B, combined with the globe, C, and pitman, A, the whole constructed and operating substantially as described.

3d, The lips, L, L', L'', for the purposes set forth.

4th, The figure, M, in bar, B, for the purpose set forth.

79,125.—DOOR SPRING.—S. W. Huntington, Augusta, Me.

I claim a spring for closing doors, etc., consisting of a strip or cylinder of vulcanized india-rubber, and rollers, m, m', in which the ends of the same are held, connected and arranged as described, and applied to the edge of the door and jamb, to which the door is hinged in the manner set forth.

79,126.—MACHINE FOR MANUFACTURING TELEGRAPHIC CABLE.

A. F. Joliveau, Paris, France.

I claim, 1st, the improved method of forming telegraphic cables by the application of successive layers of bitumen, separated and maintained by spiral bands of bituminized paper, and consolidated by coils of bituminized twine or yarn, the whole protected, when necessary, by an outer covering of metallic wire, substantially as above specified.

2d, The improved combination of machinery, by aid of which the manufacture of the said cable may be effected with facility, certainty, and economy, substantially as herein set forth and shown in the figures of the accompanying drawings.

79,127.—STOVEPIPE SHELF.—H. C. Johnson (assignor to himself and C. H. Johnson), Delevan, Wis.

I claim, 1st, A stovepipe shelf, which is made in pieces, B and B', with leaves, C and C', secured to a stovepipe, substantially as described.

2d, Loops, D and E, in combination with hooks, F, to secure leaves, C and C', to the center shelf, B and B', constructed as described, one loop being wide and the other narrow, on each piece, B, to provide for the parts, B and B', being adjusted.

3d, Forming hooks, F, straight, on top, and with the semicircle projection on the bottom, as described, for the purpose of easing down the leaf and holding it in place.

79,128.—QUARTER BOOT FOR HORSES.—Wm. H. Jones, Boston, Mass.

I claim the quarter boot, as made with one or more grooves, arranged as described, in its outer surface, and especially about its heel, such being to receive the fastening strap or straps, as set forth.

Also, the arrangement of the fastening strap within a groove going around the heel and through either or both the sides or quarters of the boot, in manner substantially as specified.

Also, the boot, as made with a heel projection, a, and the back rest, k, arranged as and for the purpose set forth.

Also, the arrangement of the canvas quarter facings with the shoe and the strap, in manner as described.

79,129.—ELEVATOR.—Gilman Joslin, Boston, Mass.

I claim, 1st, The arrangement of the upper sprocket wheels and independent journals, leaving the space between the two wheels open for the passage of the carriage, substantially as described, and for the purpose set forth.

2d, The guide, S, operating in combination with the carriage, substantially as described, and for the purpose set forth.

3d, Beveling the bottom of a chain-elevator carriage and arranging the top of the partition, V, substantially as described and for the purpose set forth.

4th, The narrow trap door, X, arranged and working substantially as described and for the purpose set forth.

5th, The endless chain or band inclosed within guides, substantially as described and for the purpose set forth.

79,130.—GRAIN AND HAY ELEVATOR.—Henry Keck, Canaan, Ohio.

I claim the combination and arrangement of the windlasses, B, B', platform, C, pulley and crank, c, block and tackle, E, E', rake, F, and double pulley, g, in shown and set forth.

79,131.—MACHINE FOR GRINDING GLASS PLATE, ETC.—Jonas Kendall, South Framingham, and Addison Hathaway, Lenox, assignors to A. T. Serven, Lenox, Mass.

We claim, in combination with the series of disks or grinders, rotating around a common axis and over a reciprocating table, giving to each disk or grinder a positive rotary motion on its own axis, substantially as described.

Also, in combination with the rotary grinding disks, the mechanism for automatically effecting their downward movement as the grinding progresses, substantially as described.

79,132.—MACHINE FOR POLISHING GLASS.—Jonas Kendall, South Framingham, and Addison Hathaway, Lenox, assignors to A. T. Serven, Lenox, Mass.

We claim the combination of the horizontally reciprocating table, c, the laterally reciprocating carriage, l, the rotary shaft, m, and the polishers, n, when arranged to operate substantially as described.

Also, giving to each polisher a capability of upward yielding movements by means of a spring, x, substantially as set forth.

Also, giving to each polisher a capability of rocking movement, substantially as described.

79,133.—IMPLEMENT FOR SHIELDING PLANTS FROM A HOE.—Alexander Kirkpatrick, Newark, N. J.

I claim the shield, single or double, for protecting plants from injury by the hoe, constructed in the manner and for the purposes specified.

79,134.—LATHE DOG.—R. H. Lecky, Allegheny City, Pa. Antedated June 6, 1868.

I claim the body, A, cam, B, thumb screw, f, and groove, x, constructed, arranged, and operating substantially as herein described and for the purpose set forth.

79,135.—HAY LOADER.—A. W. Lozier, New York city.

I claim, 1st, The detachable pin clevises, k, k', etc., in combination with the wheel, B, constructed, arranged, and operating substantially as and for the purposes described.

2d, The combination and arrangement of the clevises, the derrick, and the elevating forks, the whole constructed and operating as described and for the purposes set forth.

79,136.—MODE OF SPLICING BELTING.—J. W. Lyder and H. Shreve, Alliance, Ohio.

We claim the four-lipped metallic belt fastener, A, provided with the ridge, c, on its upper or outer side, and with or without the hinge, C, arranged and operating substantially as and for the purposes herein set forth.

79,137.—METALLIC HORSE COLLAR.—C. K. Marshall, New Orleans, La. Antedated June 6, 1868.

I claim, 1st, A metallic horse collar, constructed substantially as described and for the purpose specified.

2d, Braising the metallic plates of which the horse collar is formed, substantially as described and for the purpose specified.

3d, The combination of the plates, A, A', with eyes, e, e', and trace clips, d, d', when the same are constructed and arranged substantially as described.

79,138.—HOISTING APPARATUS.—J. E. Marshall and J. W. Schroeder, Baltimore, Md.

We claim, 1st, the revolving cranes, E, E', in connection with the rope, A, W, from said cranes, arranged and operating substantially as and for the purposes above set forth.

2d, The combination of the beveled gear, c, beveled pinions, e, e', clutches, g, g', and h, h', with the shaft, d, and the rope, A, W, from said cranes, arranged and operating substantially as and for the purposes above set forth.

79,139.—POCKET KNIFE.—J. E. McBeth, New Orleans, La.

I claim the blade, B, with the upper part, a, only sharpened, flanges, C, and 1 claim the handle, E, arranged and operating substantially as and for the purposes above set forth.

79,140.—FIRE KINDLER.—Josiah McFarland, Clinton, Ill.

I claim the within described fire kindler or torch, having a hollow bowl A, filled with porous material, and a perforated burner, B, as set forth.

79,141.—FENCE FOR CROSSING STREAMS.—Wm. McFarlin, Jackson, Ill.

I claim the construction and arrangement of the devices described, substantially as and for the purposes set forth.

79,142.—WASH BOILER.—C. E. Miller, Indianapolis, Ind.

I claim a portable wash boiler, having the elevated and perforated bottom, B, from which depend pins, c, having the oblique and perforated directing flanges, D, in combination, with pipe, E, and adjustable spouts, or spouts, F, substantially as set forth.

79,143.—PUMP.—Geo. F. Nutting, Randolph, Vt.

I claim the combination of the open-bottomed barrel, A, plunger, B, upper removable part, containing the valve chamber, H, eduction pipe, G, suction pipe, I, and valve, J, all arranged in the manner and for the purpose herein described and set forth.

79,144.—SPICE CAN.—C. T. Palmer, Norwich, Conn.

I claim a spice can or powder box as not only made with holes or perforations, a, a', in its cover, but also having a cavity, b, and an annular bed, c, arranged thereon, and with the periphery, d, d', of the top of the cover, substantially in manner as explained, and for the purpose of receiving a disk or plate to cover the perforations, the whole being substantially as specified.

79,145.—SCHOOL SEAT AND DESK.—A. E. Roberts, Des Moines, Iowa.

I claim the arrangement of the slate-surfaced folding lid, E, with its notched and grooved slats, I, in combination with the grooved frame, F, its flanges, a, stationary seat, A, and book-holding partition, B, the several parts being constructed and used substantially as and for the purposes set forth.

79,146.—STOCK PUMP.—A. H. Russell, Adrian, Mich.

I claim a stock pump in which are combined and arranged the rod, U, running through the bore of the pump log, A, the hydrostatic bellows, Z, and the pivoted platforms, C, B and D, substantially as described.

79,147.—AUTOMATIC SWING.—J. J. Rymal, Rochester, Minn.

I claim, 1st, The projecting flanges, C, C', on top of case, A, whereby it can be attached to the ceiling, substantially as and for the purposes herein set forth.

2d, The angle and curve, E, in the bottom of case, A, forming bearings, to hang it on brackets attached to a wall, substantially as and for the purposes herein set forth.

3d, The adjustable legs, D, to set it up or take it down at will, substantially as and for the purposes herein set forth.

4th, The adjustable connecting rod, I, attached to shaft, G, by means of hook, J, and which can be lifted off and on at pleasure, substantially as and for the purposes herein set forth.

5th, The movable arm, d, on the bottom of lever, F, fastened by means of the thumb screw, e, substantially as and for the purposes herein set forth.

6th, The combination of lever, F, arranged on the side of case, A, and cam wheel, B, producing a noiseless vibrating motion, substantially as and for the purposes herein set forth.

79,148.—LEATHER-WORK ORNAMENT.—Lucretia F. Saltee, Peoria, Ill.

I claim the combination of the cement with the leather, untanned hide, cutta perch, and other flexible material, when formed substantially in the manner and for the purposes as herein described.

79,149.—CAR BRAKE.—A. H. Sassaman, Lebanon, Pa.

I claim a brake for railway cars, having lock, F, wedges, V, arms, G, and B, K, and L, L', chais, D, E, H, O, O', and Y, and rods, P, M and O, constructed, combined, and arranged substantially as specified.

79,150.—PUMP.—A. H. Schofield and DeWitt C. Sterry, Worcester, Mass.

We claim the diaphragm pump having a hollow rod with telescopic connections and operating substantially as described.

79,151.—COMPOUND FOR DESTROYING BED BUGS AND OTHER VERMIN.—Peter Seebald, New York city.

I claim, 1st, In preventive for bedbugs a compound which is used as a white wash for walls, substantially as and for the purpose herein set forth.

2d, The compound, composed of the ingredients herein described, or substantially the same, and for the purpose herein shown.

79,152.—MANUFACTURE OF IRON AND STEEL.—L. Sibert, Mount Solon, Va.

I claim, 1st, The use of manganese, in combination with common salt, substantially in the manner and for the purposes herein set forth.

2d, The use of epsom salts in the treatment of iron in the furnace, for the purpose of purifying the iron.

3d, The method of treating the iron herein described, for reducing and purifying the metal, and for securing uniformity in the quantity of the metal produced.

79,153.—UNIVERSAL JOINT COUPLING.—Wm. Smead, Rochester, N. Y.

I claim the pivoting points, C cast on the jaws of an ordinary universal joint coupling, in combination with the clamping iron, B, constructed substantially as herein described and for the purposes set forth.

79,154.—ANIMAL AND BIRD TRAP.—G. C. Stamper, Pella, Iowa.

I claim, 1st, The combination and arrangement of the fixed part, A, and removable part, B, of the case or shell of the trap, with the wheel, B, and platform, C, as and for the purposes set forth.

2d, The box, E, when constructed with foraminous top, trap-door bottom, and trap guard, F, and used in connection with the chamber, D, in which the animal is caught, and the box, G, in which he is drowned, in the manner and for the purposes set forth.

3d, The employment of the underground box, G, in connection with the bottomless chamber, D, and for the purposes set forth.

4th, The combination of the platform, C, and bait hook, c', with the lever, N, and beam, O, as and for the purpose set forth.

5th, The combination of the platform, C, and weighted lever, M, substantially as and for the purpose set forth.

79,155.—WAGON.—G. C. Stamper, Pella, Iowa.

I claim, 1st, The springs, B, when attached directly to and arranged to act directly upon the wheels of a wagon or other carriage, substantially as and for the purposes specified and set forth.

2d, The anti-friction rollers, s, s', w, when arranged upon the connecting rods, O, O', substantially as and to operate as described.

3d, The spring brace, m, as combined with the rear axle and the spring braces n, n', and the front, substantially in the manner illustrated and for the purposes set forth.

79,156.—CHURN.—Andrew Stump, Bodega, Cal., assignor to himself and Charles Colby. Antedated June 6, 1868.

I claim, in combination with the revolving box, A, the interior revolving shaft, F, and arms, c, c', together with the clasp, H, and pin, I, the whole constructed and operating substantially as and for the purpose herein described.

79,157.—POSTAGE STAMP.—J. M. Sturgeon, New York city. Antedated June 19, 1868.

I claim, 1st, A stamping stamp to papers or other surfaces by means of an insoluble ink or cement, prepared substantially as herein described for the purpose set forth.

2d, Printing upon the face or back of the stamp with the colorless and invisible ink above described, or its equivalent, any canceling mark or device which will become visible on being dampened by water or steam, as and for the purpose set forth.

3d, As an article of manufacture, the insoluble mullage or cement above described.

4th, As an article of manufacture, a stamp coated with the insoluble mullage or cement above described.

5th, As an article of manufacture, a stamp having a canceling device printed upon its face or back in the above described colorless ink, or its equivalent, as and for the purpose set forth.

6th, As a new manufacture, the colored vegetable printing ink prepared substantially as described.

79,158.—PLATFORM FOR ROCK DRILLS.—Peter Sweeney and John Bradburn, New York city.

We claim, in a drill stand, rendered adjustable by means substantially as shown, the adjustable guides, C, C', constructed and operating substantially as and for the purpose set forth.

79,159.—HOOK.—Jerome B. Sweetland, Pontiac, Mich.

I claim, 1st, The hooks, A, A', when cast with a chamber and with pins, a and b, substantially as and for the purposes herein set forth.

2d, The triangular plate, B, provided with hook, D, and slots, c, c', and d, substantially as and for the purposes herein set forth.

3d, The combination of the hooks, A, A', triangular slotted plate, B, ring, C, and hook, D, constructed and operating substantially as and for the purposes herein set forth.

79,160.—MANUFACTURE OF FERTILIZERS.—Derk A. Ter Hoeven, Philadelphia, Pa.

I claim the process of making horn-dust as a fertilizer, by the combination of steaming, drying and crushing, as a whole operation, in the manner substantially as described.

79,161.—CULTIVATOR.—Elbert Terril, Cold Water, Mich.

I claim, 1st, The arrangement herein described, for connecting the handles, C, C', and cultivator blades, F, F', with the beam, A, and stationary cultivator points, E, E', so that the whole may be operated substantially as and for the purposes herein set forth.

2d, The combination of the handles, D, D', with their shoulders, c, c', and springs, f, f', in combination with the handles, C, C', for controlling the action of the outside cultivators as herein specified.

79,162.—BOTTLE MOLD.—Lancaster Thomas, Philadelphia, Pa.

I claim the application of a plug or die of any device to bottle molds, when the same is arranged in the manner and for the purpose above set forth and described.

79,163.—RAILWAY SIGNAL.—Samuel C. Thornton, Moorestown, N. J.

I claim, 1st, Frame, composed of, C, P, P', roller, C, R, and curtain, C, bevel-gear wheels, B, V, V', arm, A, shaft, S, arm, A', bevel-gear wheels, B, V, V', arm, A', shaft, S, pinion, P, N, arm, A'', racks, R, and R', all

constructed, arranged, and operating in the manner as above set forth and described.

2d, Racks, R, and R', with their arms, D and D', said racks arranged with or without bearings, and operating in the manner and for the purpose above set forth.

3d, Bumper, H, with its toggle joint and spring, S, P, arranged and operating on arms, D and D', in the manner as above set forth and described.

4th, A railway signal composed of the above described parts, all combined, constructed, and operating in the manner as above set forth and shown.

79,164.—MAKING CHEESE-HOOP.—H. M. Viets, Carlisle, Ohio.

I claim the hoop, C, in combination with the hoop, A, B, in the manner and for the purpose specified.

79,165.—AXLE FOR VEHICLES.—S. D. Wackman, Auburn, N. Y.

I claim, 1st, A trough-shaped axle for vehicles, substantially as set forth.

2d, The combination substantially as set forth, with a trough-shaped axle, of tubular bearings.

79,166.—CORN-HUSKER, STRAW AND STALK CUTTER.—R. Warriner and J. H. Baker, Saratoga Springs, N. Y.

We claim, 1st, The arrangement of the brushes, E, E', upon the sides of the leather covered rollers, D, D', in the manner and operating as and for the purposes set forth.

2d, The brushes, T, T', in the plate, m, on the under side of the lid, S, to operate upon and with the rollers, D, D', as specified.

79,167.—LUBRICATOR.—Gardner Waites, Cincinnati, Ohio. Antedated, March 31, 1868.

I claim an automatic lubricator, the glass of which is provided with a soft metal socket or guard cast not only around but also within the lower portion of said bulb or reservoir, so that the metal shaft from a button against the enlarged or bulging part of the reservoir, substantially as and for the purpose herein set forth.

79,168.—SHAFT COUPLING.—Seth Wheeler, Albany, N. Y.

I claim, 1st, A ball and socket, or other analogous closed coupling, having anti-friction pin, stud, or roller applied to it substantially as and for the purpose set forth.

2d, Constructing the socket, C, with recesses in or through it, adapted for receiving a pin, a, which is applied to an enlargement, D, of a spherical or other shape, substantially as described.

3d, Fitting the driving pin, a, into a flaring hole, b, made through an enlargement, which works in a socket, C, and covered by means of caps, c, c', or their equivalents, substantially as and for the purpose set forth.

4th, An articulating coupling, with a pin, stud, or roller, which is free to roll on its impinging surfaces, and also to vibrate substantially as described.

5th, The combination of the flaring or oblong pin hole or slot in the ball of the coupling with the oblong slots of the socket, substantially as described.

79,169.—STREET LAMP.—Wm. O. Wheeler Deposit, N. Y.

I claim, 1st, A tube of a street lamp of the described construction, when provided with a diaphragm and openings, and having communication effected or cut off by means of an enclosing sleeve, all as described, and for the purpose set forth.

2d, In combination with the above devices, the valves, constructed and operated as described, and for the purpose set forth.

3d, A street lamp, so constructed that the gas may be turned on or off by moving the valve which closes the orifices of the lamp, substantially for the purpose set forth.

79,170.—HARVESTER RAKE.—Wm. N. Whiteley, Springfield, Ohio.

I claim a guide-frame B, constructed with an orifice H, over which the switch, D, or its equivalent, must move in opening and closing substantially as and for the purpose set forth.</

C, embracing the wick tube, F, and operating in connection with the spindle crank, B.

79,188.—MANGLE.—Joseph Beaumont, Chambersburg, Pa.

I claim the rollers, a, c, c', in combination with the enveloping cloth, e, table, A, adjustable brackets, d, d', and springs, e', e'', as and for the purpose described.

79,189.—SEEDING MACHINE.—Sanford Beckwith, Oshkosh, Wis.

I claim, 1st, The screw cylinder, d, cap, m, and adjustable cap, e, arranged relatively one to the other for joint action, substantially as and for the purpose set forth.

2d, The screw cylinder, d, in combination with cap, m, as herein described for the purpose set forth.

3d, The semi-elliptical tube or scatterer, k, l, as and for the purpose set forth.

4th, The slots, n, n', as a means of adjusting the part, l, relative to the part, k, as and for the purpose set forth.

79,190.—BASIN FAUCET.—John Benson, Yonkers, N. Y.

I claim, 1st, The combination of the coupling tube, A, having nuts, b, above and below the slab, with the stop, C, or the cork and locking nut, D, all arranged and operating substantially as shown and described.

2d, In combination with the above, the cap or shell, E, attached to the stop, C, and enclosing the coupling joints, substantially as shown and described.

79,191.—SHEARS.—George Bergner, Washington, Mo.

I claim the slotted bit, b, with its cap, e, spring, o, shoulder, n, all in combination, when arranged in relation to each other and the blades of the shears, substantially as and for the purpose specified.

79,192.—BRICK DRYING KILN.—E. W. Bingham, Williamsport, Pa.

I claim the combination and arrangement of the drying kiln, A, with its apartments, arched entrances, a, a', gates, b, b', side flues, d, d', and the valves, e, e', and the furnaces, B, B', with flues, C, C', and valves, c, c', substantially as and for the purpose herein set forth.

79,193.—SHEARS.—Charles Bishop Trumbull, Conn.

I claim shears, the joint of which is constructed in the manner described, that is to say, the one blade constructed with a circular flange, d, the internal diameter of which is less than the river or screw, the other blade with a recess corresponding to the said flange, d, and so that a portion of the recessed blade will enter, fill, and fit the space within the circular flange on the other blade, and through the center of which a screw or rivet, i, is placed, to secure the two blades together, substantially in the manner and for the purpose set forth.

79,194.—CARD OR TICKET CASE.—Charles C. Blakemore, W. Washington Court House, assignor to George C. Robinson and Henry A. Manning, Cincinnati, Ohio.

I claim the case, A, hinged open face cover, C, rectangular spring, D, and elastic lips, B, combined, arranged, and operating in the manner and for the purpose specified.

79,195.—GRATE.—Edmond Bosdevex, Philadelphia, Pa.

I claim the combination of a permanent grate, B, and a grate, D, hung to the rear side of a fire place, and capable of such adjustment that its front edge may be brought to any desired position on the grate, B, for the purpose described.

79,196.—PAINT COMPOUND.—H. W. Bradley, Binghampton, N. Y.

I claim a paint, produced by combining the oxide of lead or zinc, or other pigment or pigments, with the materials hereinbefore named, mixed and strained in the proportions and substantially in the manner described, for the purpose specified.

79,197.—CHURN.—Joseph W. Bradley and George H. Jordan, Rochester, Mo.

We claim, 1st, The perforated agitator, D, when provided with knives, x, and operated as and for the purpose specified.

2d, The strainer, E, when used in combination with a churn, and constructed as and for the purpose herein set forth.

79,198.—EXPANDING MANDEREL.—John Brewer, Philadelphia, Pa.

I claim the cutter head, E, in combination with the screw rod, D, cap, C, swivel, B, slotted stock, A, and the rod, G, as shown.

79,199.—SEWER.—Jesse Brown, San Francisco, Cal.

I claim the protective cap, when constructed and arranged as described, so as to secure the upper and lower drains of privies, as set forth.

79,200.—HYDRANT.—Thomas Brown, Allegheny City, Pa.

I claim, 1st, The spout, D, and pipe, E, with the inclined slot, B, and movable cap, C, combined, arranged, and operating substantially as described.

2d, The hollow valve, H, and hollowed screw stem, G, with the nut, L, pipe, E, and spout, D, combined, arranged, and operating as and for the purpose set forth.

79,201.—GATE.—John A. Burchard and Richard Tattershall, Baltimore, Wis. Antedated February 12, 1868.

We claim, 1st, Broadly the employment of the double pulley, D, d', pawl, E, ratchet, e, weight, G, and cords, h, h', when constructed, arranged, and operated for the purpose of operating a gate or gates.

2d, Broadly the circular inclined plane, J, when constructed and arranged substantially as herein set forth and described, for the purpose specified.

3d, The latches, n, n', and stops, p, p', in combination with the inclined planes J, J', shaft, C, crank, c, pulley, D, d', cords, h, h', weight, G, gate standards, B, B', rods, b, b', and rollers, I, I', when the whole is constructed and arranged to operate substantially as herein described.

79,202.—KNITTING MACHINE.—W. W. Burson and John Nelson, Rockford, Ill. Antedated June 12, 1868.

We claim, 1st, The combination and arrangement, with the supporting frames, A, D, of the gate, E, vibrating yarn carrier, H, and feed rack, N, the whole operating as and for the purpose set forth.

2d, The two parallel plates, B, B', carrying the loop carriers, e, e', e', constructed and arranged to move in the groove, C, substantially as described.

3d, The combination of yarn carrier, H, with looper bearer, K, groove, n, and pin, m, constructed and operating substantially as set forth.

4th, The combination of yarn carrier, H, constructed in two parts as described, with releasing lever, P, loopers, a, a', and loop hooks, e, e', arranged to knit irregular work, as set forth.

5th, The reversing crank, L, in combination with the looper bearer, K, operating substantially as described.

6th, The combination of the stop blocks, t, t', reversing rods, o, o', and loop hooks, e, e', when constructed and operating substantially as specified.

7th, The combination and arrangement of reversing rods, o, o', cams, s, s', and trip plate, T, when constructed and operating substantially as described.

8th, The combination and arrangement of the feed lever, M, toothed rack, N, and cam opening, Y, constructed and operating substantially as described.

9th, The combination and arrangement of spring, Y, feed bar, M, and crank L, operating substantially as set forth.

10th, The combination and arrangement of releasing lever, P, looper bearer, K, and crank, L, when constructed and operating substantially as described.

11th, Constructing and arranging a knitting mechanism, substantially as herein described, so that the reciprocating motion of the gate, E, shall impart the proper motions to the different parts, substantially as set forth.

79,203.—EDGE PLANE FOR BOOTS, ETC.—F. Buxton and Geo. Crosby, Lake Village, N. H.

We claim the adjustable guard plate, E, constructed substantially in the manner and for the purpose described and as set forth.

Also, constructing edge planes with a bolster or part, L, substantially as described and for the purpose set forth.

79,204.—OPERATING SLIDE VALVES.—Isaac Church, Jr., Norwalk, Conn.

I claim the arrangement of the puppet valves, I, I', with relation to main valve, D, steam passage, H, and piston, B, in such manner as to dispense with all outer connection therewith, substantially as shown and described.

79,205.—WHIPPLE TREE PLATE.—James B. Clark, Plantsville, Conn.

I claim a whipple tree plate, with its shaft, B, tenon, C, bearings, E, and F, and third plate, G, all constructed and operating substantially as described.

79,206.—CAR BRAKE.—Lyman Clark, Pine Island, Minn.

I claim the friction wheels or rollers, C, and shaft, F, combined with the wheels of a railroad car, and with the brakes controlling the same, when operated by a chain or cord winding upon a horizontal rod or shaft beneath the car, substantially in the manner and for the purpose herein set forth.

79,207.—THREAD GUIDING PLATE FOR FILING TATTING SHUTTLES.—Abram Crow, Port Byron, N. Y.

I claim, as an article of manufacture, the guiding plate, A, constructed and slotted as herein shown and described, and for the purpose set forth.

79,208.—TOY HEAD FOR CANES.—Augustus Cooke, Orange, N. J.

I claim, 1st, Forming the top of a cane in the shape of an animal or bird's head, the features of which can be moved by pressing upon knobs in the cane.

2d, The combination of the wires, b, g, and d, with the eyeball plate, a', tongue, e, lower jaw, f, and springs, e', e'', and c', when arranged and operating substantially as described.

79,209.—INSTRUMENT FOR ADDING FIGURES.—Charles Corliss, Haverhill, Mass.

I claim, 1st, Operating the indicator that designates the figure or number to be added, by means of a sliding rod or bar, in such a manner that the said indicator will return to its original position upon each retraction of the rod or bar to its projected position.

2d, The simultaneous resetting of the several indicators, substantially as specified.

79,210.—CLASP FOR HOOP SKIRTS.—Abel J. Cross, Greenport, N. Y.

I claim a clasp for uniting the tapes to the hoops in skeleton skirts, the same being formed of a series of alternate diagonal metallic bars, extending from the penetrating points on one side to the penetrating points on the other side of the clasp, as specified.

79,211.—FLOUR PACKER.—Christian Custer (assignor to himself and Charles K. Bullock), Philadelphia, Pa.

I claim, 1st, The combination in a flour packing machine of a stationary cylinder, G, with a sliding cylinder, H, within which operate the devices for propelling and packing the flour.

2d, The within described propelling device consisting of two propellers, I and J, attached to a shaft, L, one on each side of a cross bar, e, having inclined arms, the whole being combined with the sliding cylinder, H, substantially as specified.

3d, The sliding cylinder, H, and strap bar, N, so connected that the said bar will be operated by the movement of the cylinder, substantially as described.

79,212.—STOVE DRUM.—D. W. Cutting, Cambridge, Vt.

I claim the arrangement of the drum, C, over the fire box, of a cooking or stove, when said drum is provided with an opening near each side, from which project two pipes, B, B', that be parallel to each other in the stove, and are provided with elbows that pass through openings in the side of the stove, opposite to each other, for receiving and transmitting air, as and for the purpose set forth.

79,213.—DEVICE FOR HOLDING ROTARY CUTTERS WHILE BEING GRIND.—Henry Dison, Philadelphia, Pa.

I claim the frame, A, arranged for the reception of the spindle of a rotary cutter, as set forth, in combination of the rear rollers, f, and the vertically adjustable roller, e, substantially as and for the purpose specified.

79,214.—MAIL BAG.—D. Frank Dodge, Lowville, N. Y.

I claim the construction of the mouth frame, A, B, as herein constructed and set forth.

79,215.—STEAM GENERATOR.—Edward Dunscomb, Boston, Mass. Antedated May 7, 1868.

I claim a steam generator constructed and arranged as shown and described.

79,216.—CORK SCREW.—John E. Earle, New Haven, Conn.

I claim the combination of the handles, B, and D, with the cork screw, E, pivoted together so as to operate in the manner shown and described, and with or without the cutters, A, and C.

79,217.—PUMP.—Chas. F. Eastleek, Mantua, N. J.

I claim the pump having cylinder, A, plunger, B, piston, C, pipe, D, platform, E, lever, G, trough, K, constructed, combined, and arranged substantially as and for the purpose specified.

79,218.—SMUT MILL.—John T. Ewan and James R. Glenn, Hillsboro, Ill.

We claim the arrangement upon the frame, A, in the manner described, of the suction legs, K, K', chambers, M, M', check board, L, air trunk, D, and its valves, B, B', dust chamber, O, and spouts, S, S', with the cylinder, F, its wire brushes, J, staves, I, plates, G, H, fan, P, and shaft, C, with their various parts, all constructed and operating substantially as and for the purpose set forth.

79,219.—SUPPLEMENTAL JAW FOR WRENCHES.—Robt. Faries, Indianapolis, Ind.

I claim the applicable wrench jaw, when made substantially as described, as an article of manufacture.

79,220.—LINING FLEXIBLE AND OTHER HOSE AND TUBES WITH INDIA RUBBER, ETC.—James V. Forayth, Boston, Mass., assignor to himself and John H. Choever, New York.

I claim, 1st, Water-proof hose or tubing composed of a tube of woven fabric or other material, and a vulcanized india-rubber lining, the two being held and cemented together by interposed non-vulcanizable gum, as and for the purpose herein set forth.

2d, The method of lining hose, or other tubular articles, by inserting in the article to be lined the vulcanized rubber, or equivalent lining, with its coating or exterior layer of vulcanizable gum, and then expanding said lining, and forcing the said gum or cementing material into the meshes or pores of the article to be lined, by means of steam, hot water, or hot air introduced within the lining, as set forth.

3d, A lining for hose and other tubular articles, composed of a tube of vulcanized rubber, with an exterior coating or layer of vulcanizable gum or cement, with or without one or more pieces of cloth or other fabric, combined and united with the lining as herein set forth.

4th, The method herein described of coating the hose or tubing with vulcanized rubber, both internally and externally, as and for the purpose set forth.

79,221.—LAMP BURNER.—Edward A. Galbraith (assignor to himself and Paul P. Todd), Boston, Mass.

I claim, 1st, The combination with the conduit for supplying air to the flame, of a vapor conducting pipe, leading from the fluid reservoir of the lamp and communicating with the said air conduit, substantially as and for the purpose herein shown and set forth.

2d, A lamp burner in which the divided wick tube with its double wick, the air supply, and the vapor conducting pipe, are combined and arranged for joint operation in the manner herein shown and described.

79,222.—LETTER BOX.—Chas. P. Gorely, Boston, Mass.

I claim, 1st, The combination and arrangement of the, h, bars, D, E, F, wire or chain, G, and spring, S, all constructed and operating substantially in the manner and for the purpose specified.

2d, The introduction of the chains, H, and G, into the length of the bell wires, for the purpose of allowing either of two modes of operation to be used in ringing the bell, without interfering with the other, as set forth.

79,223.—HAMES FASTENER.—Jacob Harding (assignor to Henry I. And & Co.), Schoolcraft, Mich.

I claim, 1st, The straps, A, and B, connected by the lever, C, as and for the purpose set forth.

2d, The projecting feather, E, and groove, F, when operated in connection with lever arm, C, and strap, B, substantially as described and for the purpose specified.

79,224.—HAMES COUPLING.—Geo. W. Heckart (assignor to himself and Christian Kramer), Columbiana, Ohio.

I claim a hames coupling, constructed, arranged, and operating substantially as herein described and for the purpose set forth.

79,225.—STEAM GENERATOR.—H. Heine, New York City.

I claim, 1st, A steam generator composed of an internal main or central part, M, and of an outer annular water space, G, said internal part being provided with a water space, D, and fire flues, a, and communicating with the outer annular water space or pipes, e, q, all as shown and described.

2d, The steam dome, E, rising through the center of the bonnet, L, which covers up the annular water space, G, said water space steam dome being connected by pipes, q, substantially as and for the purpose set forth.

3d, The water pipes, H, situated in the combustion chamber, F, between the central part and the annular water space, substantially as and for the purpose set forth.

4th, The apertures, b, connecting the pipes, H, and the water legs, C, substantially as and for the purpose described.

79,226.—HOT AIR REGISTER.—Wm. Highton, Malden, assignor to Moses Pond & Co., Boston, Mass.

I claim the arrangement and combination of the wheel with the grate, the sliders, and the series of shutters applied to the frame, A, as set forth.

Also the combination of the frame, A, and the ribs, F, with their recesses, r, r', as and for the purpose specified.

79,227.—FASTENING CHECK HOOKS AND TERRETS.—A. L. Hill, Decatur, Ill.

I claim providing the terrets, B, B', and check hook, A, with loops, h, h', as and for the purpose specified.

79,228.—HORSE HAY FORK.—Alfred Houghton, Seville, Ohio.

I claim the checks, E, F, springs, G, in combination with the slide, C, in the manner as and for the purpose specified.

79,229.—MANUFACTURE OF GUNPOWDER.—Wm. H. Jackson, Salem, Mass.

I claim the manufacture of gunpowder by mixing a solution of nitrate of potash, or a known equivalent thereof, with a soluble vegetable extract, such as extract of logwood, or with other soluble organic matter, and by subsequently evaporating to dryness, with or without the addition of sulphur or of pulverized charcoal, substantially as herein above described.

79,230.—GAS HEATER.—William Jones, Chelsea, Mass.

I claim, for the purpose of mixing air and gas to be burned, a plug cock, having a long, open, chambered plug, with inlets, k, k', and outlet, j, arranged to operate substantially as described.

Also, in connection with a burner arranged within a confined space, provision substantially as shown and described, for supplying fresh, unvitrified atmospheric air, to be mingled with the gas passing to the flame, as set forth.

79,231.—PESSEY.—Benjamin Joseph (assignor to himself and Wm. McNeish), Philadelphia, Pa.

I claim, 1st, The hollow vertical shaft, c, in combination with the body, A, as and for the above described purpose.

2d, The combination of the base, B, shaft, c, and universal joint, d, as and for the above described purpose.

79,232.—TICKET PUNCH.—R. J. Kellett, San Francisco, Cal.

I claim a small auxiliary punch so arranged as to punch a hole in the coupon or portion so removed, at the same operation, and so that the punch or coupon or portion of the ticket, thus providing a convenient means for striking and coupons or portions for preservation and reference, as described.

79,233.—BILLIARD REGISTER.—Isaac Kling, Seymour, Ind.

I claim, 1st, Operating the index rod, which shows the number of games played, by the movement of the points to mark the games, as set forth.

2d, The combination of the slotted slides, B, and C, doors, I, I', index rod, D, and spring, e, with the bar, E, and wire, K, when arranged and operating substantially as described.

3d, The pivoted plates, u, u', and spring, d, in combination with the notches, H, for preventing the index rod from being raised from the outside of the case.

4th, The spring, h, and inclined plate, B, for operating the connection and disconnection of the slider and bar, E, as set forth.

5th, The checking points, e, e', provided with springs, e, and latches, e, in combination with the notch, e, and depression, f, for preventing the points from being moved backward and re-marked without counting a game, as set forth.

79,234.—ZINCING BATH.—Fred'k A. Kraft, Philadelphia, Pa.

I claim a zincing bath composed of an outer casing of iron, containing an inner lining or case of copper, or its equivalent, as set forth.

79,235.—SHIPS' FENDER.—Ezra B. Lake, Bridgeport, N. J.

I claim the within described fender, composed of a strip of wood and of vertical and transverse rollers, the whole being constructed and arranged substantially as and for the purpose herein set forth.

79,236.—COMBINED CULTIVATOR AND PLANTER.—Charles L. Lee, Fitchville, Ohio.

I claim, 1st, The adjustable frame, A, platform, K, lever, B', axle-tree, B, and wheels, D, all constructed and arranged to operate in the manner substantially as shown and described.

2d, The slide boxes, J, groove, a, slide, G, and lever, H, as constructed and arranged to operate in the manner and for the purpose specified.

79,237.—MANUFACTURING BOLSTER PLATES.—Wm. J. Lewis and Henry W. Oliver, Jr., Pittsburg, Pa.

We claim a new article of manufacture, viz., iron bars rolled to the shape of a connected series of blanks for bolster plates, substantially as herein described and for the purpose set forth.

79,238.—AXLE BOX.—I. Stone Lister, Philadelphia, Pa.

I claim, 1st, A bearing arranged within an axle box above a journal, and having a chamber and channels leading from the same, through which oil may flow by its own gravity to the journal, all substantially as and for the purpose described.

2d, The combination of the said chambered bearing with the oil reservoir, G.

3d, The plug, I, with its air passages, p, p', and regulating valve, q, in combination with the reservoir, G.

79,239.—BELT COUPLING.—T. S. Livermore, Leicester, Mass.

I claim the above described coupling, consisting of the screw, with its conical head, in combination with a nut of similar form, capable of being drawn into the belt, when constructed and operating in the manner and for the purpose above set forth and described.

79,240.—WATER-PROOF LEATHER CEMENT.—Wm. S. Loughborough, Rochester, N. Y.

I claim the compound composed of the ingredients above set forth.

79,241.—FEVER AND AGUE MEDICINE.—John Mabrey, Jefferson City, Mo.

I claim a remedy for the fever and ague and other bilious diseases, composed of the ingredients, in the proportions, and in the manner herein specified, substantially as described.

79,242.—CARPET STRETCHER AND TACK HOLDER.—R. M. Mansour, Augusta, Me.

I claim the construction of the three pronged plate, with the elastic rubber rings, F, F', as a tool for the purposes set forth and herein described.

79,243.—BEEHIVE.—Jacob McDonald, Buffalo, Ohio.

I claim the guiding board, A, with side strips, g, g', the two sections, C, C', and cross board, I, for the use and purpose as specified and herein set forth.

79,244.—CHURN.—James H. Monce, Hopkinsville, Ohio.

I claim, 1st, The arrangement and combination of the adjustable arm, K, piston, L, and reversible balance wheel, M, as herein described and for the purpose set forth.

2d, The combination of the piston, L, and reversible wheel, M, when constructed and operating as herein described, for the purpose set forth.

79,245.—CAR COUPLING.—Benjamin Monroe (assignor to himself, Wm. E. Chas. Clark, and Nathan N. Cole), Bristol, R. I.

I claim, 1st, The combination of the draw pin, B, constructed as described, with the slotted draw head, A, having an inclined or funnel-shaped orifice, as described.

2d, The combination of the head, H, pin, B, and link, L, all constructed and operating as and for the purpose specified.

79,246.—SHEARS SHARPENER.—Melvin M. Morse and M. V. Collins, Buffalo, N. Y.

We claim, 1st, The adjustable gage plate, D, provided with stops, e, e', arranged and operating with the grinding wheel, B, substantially as set forth.

2d, In combination therewith, the self-adjusting pressure roller, F, substantially in the manner and for the purpose set forth.

3d, The spring, b, arranged with a pressure roller, F, and gage stops, e, substantially as and for the purpose specified.

79,247.—BRICK DRYER.—John M. Moyer, Pittsburg, Pa. Antedated Dec. 23, 1867.

I claim the turn table, with car tracks, with heater beneath, in combination with the rotary wheels, arranged and operating substantially as and for the purpose herein described.

The car, with upright center plate, and hinged folding leaves, constructed and operating in manner and form as described, to and for the purpose intended.

79,248.—SASH FASTENER.—Henry North, New Britain, Conn.

I claim, 1st, The combination of the bolt, D, pivoted at f, with the shoulder, k, and the leaf or bit, L, for the purpose of locking the sash down when the lock is placed in the casing

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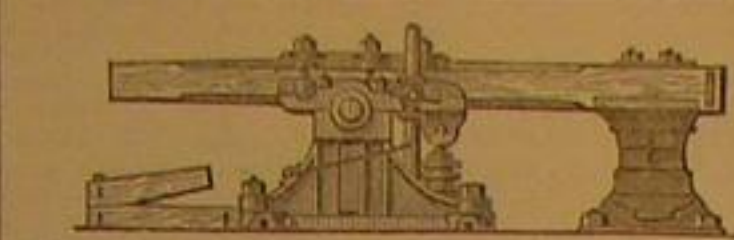
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NEW YORK, JULY 15, 1868.

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drop, as seen in the engraving, so as to be out of the way when not required. It is so constructed as to swivel for cutting miters either way. A light guide, also made to swivel, seen resting against the front of the machine, can be used for light work, its stem traversing a transverse groove in the table.

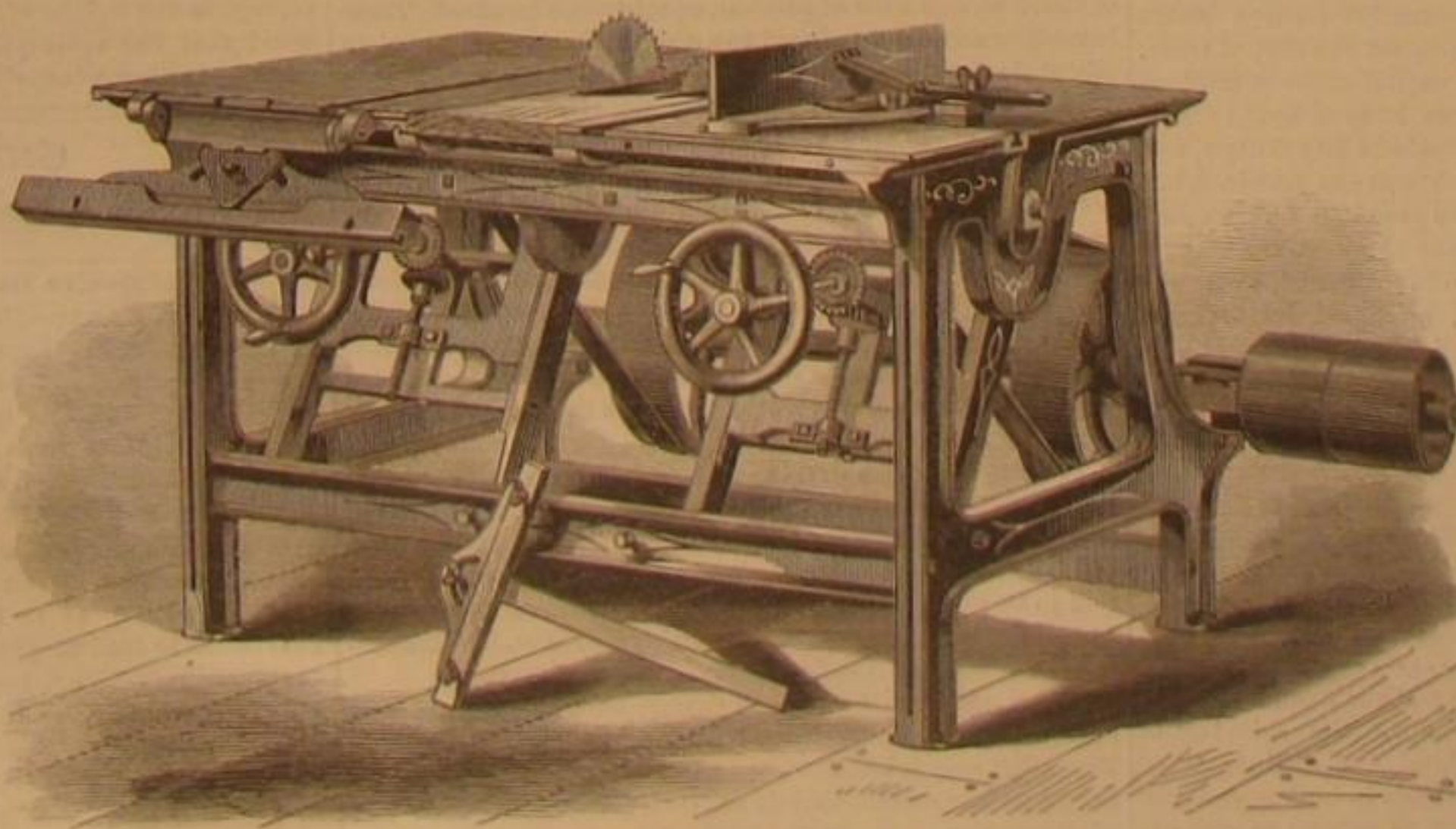
These machines may be made double, as in the illustration, or single, as required, and may be used for splitting, squar-



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The patent was issued to Jonathan P. Grosvenor, of Lowell,



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JUNE-BUGS are so plentiful in France that they are captured in large numbers and from their bodies is expressed an oil said to possess great value as a lubricant.

A Useful Official.

In the new building of the Department of Agriculture, at Washington, the happiest being will be our enthusiast, Townsend Glover, the naturalist, to whom our farmers apply for a knowledge of what birds eat the pippin apples, and what worm gets into the beet root. Glover is a Brazilian by the accident of birth, a Yorkshire Englishman by parentage, a German by education, American by adoption and enthusiasm. He is a singular looking man, short, thick, near-sighted, peculiar, an Admirable Critchton in the practical arts. Agriculture has been his fanaticism for forty years. He paints, models in plaster, engraves, composes, analyzes, and invents with equal facility. His passion is to be the founder of an index museum to all the products of the American continent from cotton to coal oil, from pitch pine to wine. Heretofore he has had only two little rooms in the dingy basement of the Patent Office; hereafter he is to have a handsome museum room in the new building, 103 by 52 feet and 27 feet high. His objects, already largely perfected, are to methodize, by models and specimens, the natural history, diseases, and parasites, remedies of every individual product in America. For example: A man wants to move to Nevada. What are the products of Nevada? Glover has a series of cases devoted to that State, models of all its fruits, berries, prepared specimens of its birds, illustrations of its cereals, flora, grasses, trees. A small pamphlet conveys the same information; the man knows what to expect of Nevada. A man forwards a blue bird; is it tolerable or destructive, to be encouraged or banned? Glover forwards the names of fruits, etc., which the blue bird eats. He will show you, in living, working condition, the whole lifetime of a cocoon; the processes of Sea Island cotton, from the pod to the manufacture; the economical history of the common goat; the processes of hemp, from the field to the hangman. Every mail brings to him a hawk, a strange species of fish, a blasted potato, a peculiar grass which poisons the cow. He is the most dogged naturalist in the world, probably; a wrestler with the continent. He is a bachelor, married to his pursuit—one of those odd beings hidden away in the recesses of government, whose work is in itself its own fame and fortune.

Speed of the Senses.

There are thirty one pairs of compound nerves in the human body, the sensory and motor fibers of which are so mingled as to render it an impossible undertaking to separate them by any means at present known. Now if, for instance, a needle be stuck into one of the fingers, the sensory fibers take the impression through the nerve and the posterior root to the spinal cord and thence to the brain. The command goes out to "draw the finger away." The mandate travels down the spinal cord to the anterior root, and thence through the motor fibers of the nerve to the muscles, which immediately act, and the finger is at once removed. All this takes place with great rapidity, but yet with nothing like the celerity once imagined.

The researches of Helmholtz, a distinguished German physiologist, have shown with great exactitude the rate of speed with which the nerve fluid travels; and other observers have given a great deal of time and patience to this and kindred questions. As the result of many deliberations, it was ascertained that the nervous fluid moves at the rate of about 97.1 feet in a second. Now electricity travels with a speed exceeding 1,200,000 feet in a second, and light over 900,000,000. A shooting star moves with a velocity of 200,000 feet in a second, and the earth, in its orbit around the sun, 100,000. A cannon ball has a mean velocity of 1,800

feet in a second; an eagle, 130; and a locomotive, 95. We thus perceive the nervous fluid has no very remarkable rate of speed—a fact which, among many others, serves to indicate its non-identity with electricity.

Prof. Donders, of Utrecht, Holland, has recently been making some interesting experiments in regard to the rapidity of thought, which are likewise interesting. By means of two instruments, which he calls the *noematachograph* and the *noematachometer*, he promises some important details. For the present he announces that a simple idea requires the brain to act for sixty-seven one thousandths of a second for its elaboration. Doubtless the time required is not the same for all brains, and that, by means of these instruments, we may obtain definite indications relative to the mental caliber of our friends. What invaluable instruments they would be for nominating caucuses for vestries, for trustees of colleges, for merchants in want of bookkeepers; in short, for all having appointments of any kind to make.

For the eye to receive an impression requires seventy-seven one thousandths of a second, and for the ear to appreciate a sound, one hundred and forty-nine one thousandths of a second are necessary. The eye, therefore, acts with nearly twice the rapidity of the ear.—*Galaxy*.

PUBLIC RIGHTS AS AFFECTED BY OPERATIONS OF RAILROAD MONOPOLISTS.

It is well that recent attempts of certain stock-jobbing cliques, headed by men notorious on account of vast wealth, and acknowledged superior skill in controlling the stock market to enrich themselves, have begun to enlighten the people in regard to the extent to which such abuses may be carried, and to demonstrate the wisdom of limiting the powers hitherto granted by legislative action to railroad corporations. They have obtained their power by the abuse of franchises originally obtained from the representatives of the people, through companies in which, by a series of adroit manipulations, they have succeeded in obtaining a controlling interest.

The general indignation which pervaded the public mind, when certain arbitrary restrictions in regard to the shipping of freights over the New York Central railroad were inaugurated, seems to indicate that further imposition might exceed the limit of that forbearance which appears to have been so confidently relied upon in the management of railroad and express monopolies in this country. We are greatly deceived, however, in our estimate of the character of the men who originated and developed the gigantic schemes which have recently created such wide spread apprehension, if the apparent present suspension of attempts to carry out the original plan in all its essential features shall prove to have been finally abandoned. We believe, therefore, that measures should at once be adopted that would immediately and permanently stop all attempted encroachments upon the rights of the public, by the acts of these financial autocrats.

The following exhibit of the manner in which the capital stock of the Hudson River railroad was increased from its original amount, and also of the way in which it was proposed to increase the capital stock of the Harlem and New York Central railroads, is taken from the *Atlantic Monthly*:

Present capital,—Hudson.....	\$14,000,000
Bonds outstanding Jan. 1, 1868.....	5,000,000
Present capital,—Harlem.....	6,800,000
Bonds outstanding Jan. 1, 1868.....	5,000,000
Present capital,—New York Central....	28,990,000
Bonds outstanding Jan. 1, 1868.....	11,347,000

Giving in sum total..... \$71,137,000

The fourteen millions credited to Hudson in the above summary represents only ten and a half millions of actual money, and owes its creation to one of those peculiar financial expedients by which shrewd American capitalists acquire the enviable title of railroad kings. When the head of the dynasty which now dominates over the three affiliated companies made his first move by securing possession of the river route, he inaugurated a system of economical management, special traffic arrangements, and vast construction outlays which afforded a specious pretext for augmenting the capital stock. It was therefore voted that the then capital of seven millions should be increased to fourteen by an issue of bonus shares at fifty per cent. Each stockholder paid in fifty dollars, and received scrip, the par value of which was one hundred, but which sold in Wall street at forty-five premium. This splendid maneuver, by which the company obtained three and a half millions for the construction and repair fund, while the stockholders doubled their money, presented features too large and captivating to lapse into desuetude. It was now proposed to repeat the same operation along all the lines, which at the same time were to be consolidated. The scrip dividend in this second scheme was to be 33½ per cent.

This would give:—

Fresh capital,—Hudson.....	\$6,000,000
" " Harlem.....	3,200,000
" " N. Y. Central.....	9,663,000
With previous sum total of capital.....	71,137,000

Capital of consolidation..... \$90,000,000

In order that dividends might be realized upon this large increase of stock, the restrictions upon the shipping of freights above alluded to were initiated, and an increase of rates for passenger travel and upon goods in bulk was determined upon. To compel the public to submit to such exactions, it was necessary to destroy competition, and to this end the securing control of the Erie Railroad was deemed necessary. The battle for supremacy was hotly waged between the two greatest stock operators this country has ever known, Messrs. Drew and Vanderbilt. Small operators who had not the good sense to shun danger were mercilessly

crushed, and the financial interests of the country were greatly disturbed by the conflict. After days of suspense it at last became apparent that Mr. Drew was more than a match for Mr. Vanderbilt and the latter executed a masterly retreat, which left him apparently little worse for the conflict, and, we are confident, disposed to renew it whenever the opportunity seems favorable.

The developments of this celebrated struggle were such as to give birth to great apprehensions for the future welfare of the commercial interests which so largely depend upon the proper and just management of all the avenues of trade which radiate from the city of New York and connect it with the other commercial centers of the Union. It was seen that the legislatures and courts were made the instruments of these powerful organizations, and that corruption had been carried to an unparalleled extent by unscrupulous agents of the opposing powers. Not these only were found to be adopting such means to attain their ends, but an examination of the contingent expenses of different railroad companies revealed the fact that astounding sums were paid for the manipulation of legislative bodies. "The Union Pacific paid not less than \$500,000 for services rendered to the company by lobbyists at Washington. It recently cost the Missouri Pacific Railroad \$192,178 to secure the possession of that road by State legislation. The New York Central credits \$250,000 to the contingent fund for expenses at Albany in 1866-67. In view of these facts it seems just to modify the popular prejudice against the Camden and Amboy Railroad, which has certainly attained its ends in congress and at Trenton by a far more economical expenditure."

It is much easier to find fault with the existing state of things than to suggest the proper remedy. We believe that the present system of granting charters to corporations is mischievous in its effects so far as it relates to franchises which involve such large and general interests as public highways, canals, and railroads. At least the government should retain the power to assume the control of all such internal improvements by paying the companies their real value, at any time that their defective management seems to call for such a proceeding. A railroad thus removed from the control of those who desire to make it the means of public extortion might be conditionally leased to another company, or operated by the government itself. We admit that certain objections might be raised against this system, but we think that when compared with the advantages which would be derived from it, they would be found neither so numerous nor so formidable as might at first be anticipated.

Some means must be devised by which officials can be cured of their speculative tendencies; we care not what, so long as they answer the purpose, and provide for the proper punishment of any railroad official who deals directly or indirectly in railroad scrip. The suffering of a road to become so shamefully out of repair as the Erie has notoriously been, should be sufficient cause for the removal of its officials and the appointment of suitable persons to fill their places by the government.

That the existing laws under which railroads are organized and operated need thorough revision, seems the inevitable conclusion of a candid and careful consideration of the subject. That delay is fraught with danger also seems certain. We trust that the public will be aroused to timely action upon this matter, and that the possibility for any one man to obtain hereafter the control of any internal improvement, which affects directly every individual in the commonwealth, shall be forever terminated.

Science Familiarly Illustrated.

Gunpowder—Its Manufacture and Uses.

Gunpowder is a solid, explosive, mixture composed of niter, sulphur, and charcoal, reduced to powder, and mixed intimately with each other. The proportion of the ingredients varies very considerably; but good gunpowder may be composed of the following proportions:—seventy-six parts of niter, fifteen of charcoal, and nine of sulphur, equal to one hundred. These ingredients are first reduced to a fine powder, separately, then mixed, intimately, and formed into a thick paste. This is done by pounding them for a long time in wooden mortars, at the same time moistening them with water, to prevent the danger of explosion. The more intimate is the mixture the better is the powder; for, since niter does not detonate except when in contact with inflammable matter, the whole detonation will be more speedy the more numerous the surfaces in contact. After the paste has dried a little, it is placed upon a kind of sieve, full of small holes, through which it is forced. By that process it is divided into grains, the size of which depends upon the size of the holes through which they have passed.

The powder, when dry, is put into barrels which are made to turn round on their axis. By this motion, the grains of gunpowder rub against each other, their asperities are worn off, and their surfaces are made smooth. The powder is then said to be glazed. The granulation and glazing of the powder causes it to explode more quickly, perhaps, by facilitating the passage of the flame among the particles.

When gunpowder comes in contact with any ignited substance, it explodes, as is well known, with great violence. This effect may take place, even in a vacuum. A vast quantity of gas, or elastic fluid, is emitted, the sudden production of which, at a high temperature, is the cause of the violent effects which this substance produces. The combustion is, evidently, owing to the decomposition of the niter by the charcoal and sulphur. The products are, carbonic oxide, carbonic acid, nitrogen, sulphurous acid, and, probably, sulphureted hydrogen. Mr. Cruikshank has ascertained that no perceptible quantity of water is formed. What remains, af-

ter the combustion, is potash, combined with a small portion of carbonic acid, sulphate of potash, a very small proportion of sulphureted potash, and unconsumed charcoal. But that water is produced by the explosion of gunpowder is proved by its presence in the piece after it has been fired. A sufficient quantity is developed to moisten and foul the bore of the piece, and necessitate its cleansing, and to hold *in transitu* the unconsumed portions of the charcoal, or other ingredients. Every practical gunner or expert with the rifle or pistol knows that every discharge of common gunpowder develops more or less of water; else why the cleansing of cannon or gun barrels, after successive discharges, when they become fouled by the remains of the discharges? Explosion releases the water held in combination with the components of gunpowder, as well as the lighter gases. The explosion of gunpowder is as surely a means of liberating the combination of hydrogen and oxygen as of liberating the nitrogen and carbonic acid.

We need a gunpowder, or something to take its place, which will not develop moisture to foul the bore of the gun. Such a discovery we believe to be within the limit of inventive talent.

The elastic fluid which is generated when gunpowder is fired, being very dense, and much heated, begins to expand, with a force at least one thousand times greater than that of air under the ordinary pressure of the atmosphere. And, allowing the pressure of the atmosphere to be fourteen and three fourths pounds upon every square inch, the initial force or pressure of fired gunpowder will be equal to at least fourteen thousand seven hundred and fifty pounds upon every square inch of the surface which confines it. But this estimate, which is that of Mr. Robins, is one of the smallest which has been made. According to Bernoulli, the initial elasticity with which a cannon ball is impelled is, at least, equal to ten thousand times the pressure of the atmosphere; and, from Count Rumford's experiments, it appears more than three times greater than this.

Gunpowder, on account of its expensiveness, and the suddenness and violence of its action, is not employed as a regular moving force for machinery. It is chiefly applied to the throwing of shot, and other projectiles, and the blasting of rocks.

When a ball is thrown from a gun, the greatest force is applied to it, by each particle, at the moment of its explosion. But, since the ball cannot at once acquire the same velocity, with which the elastic fluid, if at liberty, would expand, it continues to be acted upon by the fluid, and its motion is accelerated, in common cases, until it has escaped from the mouth of the piece. The accelerating force, however, is not uniform; and hence, the following circumstances deserve attention:—1. The elasticity is, inversely, as the space which the fluid occupies; and therefore, as it forces the ball out of the gun, it continually diminishes. 2. The elasticity would diminish, in this ratio, even if the temperature remained the same; but it must diminish in a much greater ratio, because a reduction of temperature takes place, both from the dispersion of the heat, and the absorption of it, by the fluid itself, during its rarefaction. 3. The fluid propels the ball, by following it, and acts with a force that is, other things being equal, proportionate to the excess of its velocity, above the velocity of the ball. The greater the velocity the ball has acquired, the less, therefore, is its momentary acceleration. 4. From this change of relative velocity, there must be a period when the velocity of the ball will exceed that of the elastic fluid; and, therefore, the proper length for a gun must be that in which the ball would leave the mouth at the time when the velocities are equal; and all additional length of the piece, beyond this, can only serve to retard the ball, both by friction and atmospheric pressure.

The force of fired gunpowder is found to be very nearly proportionate to the quantity employed; so that, if we neglect to consider the resistance of the atmosphere, then the height to which the ball will rise, and its greatest horizontal range must be, directly, as the quantity of powder; and, inversely, as the weight of the ball. Count Rumford, however, found that the same quantity of powder exerted somewhat more force upon a large ball than on a smaller one.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Explosive Gases in Steam Boilers.

MESSRS. EDITORS:—Almost every one practically conversant or theoretically acquainted with steam boilers, has his theory of the cause of explosions, which he adapts to any and all cases; and this may account for the singularly contradictory evidence given before coroners and judges in cases where the explosion of a boiler is one of the items in the cause. The testimony of practical engineers, however, who have no personal interests at stake, and who have given their personal attention to an examination of exploded boilers, generally agrees as to the proximate cause of explosion. This seems to tend to prove the fact that boiler explosions, under ordinary circumstances, may be accounted for, and the subject is one of very great importance. But occasionally there may be cases which puzzle the heads of the most capable engineers.

One of the theories of boiler explosions is, that when the water gets low, leaving fire or heating surface exposed, or covered only with steam—a poor conductor of heat—the iron becomes heated, and will produce a decomposition of the steam, liberating its gases and absorbing the oxygen of the iron. This produces the combination known as oxy-hydrogen gas, highly explosive. It is rarely that enough of oxygen is eliminated, however, to make the mixture dangerous;

but an admission of oxygen from the atmosphere by the leakage through the feed or water pipe, may suffice to make the mixture of gases really dangerous.

A case within the writer's knowledge seems to give color to this hypothesis. On a Saturday afternoon the supply pipe of a boiler refused to deliver water, and the engineer prudently drew his fire and stopped his engine. The pump was overhauled and repaired, but, being late, the boiler was not fired up again. On Sunday, twenty-four hours after, the engineer opened the man-hole at the end of the boiler, to see if any damage had been done by overheating. The interior being dark, he introduced a lighted lamp, when an explosion occurred, sending the engineer through a wooden partition ten feet away, burning his skin and scorching his hair.

What did it? Not steam. Was it gas, and if so, how was it generated, and how did it accumulate in a cool boiler? An answer from thorough-going engineers is solicited. We need facts, not speculations; the results of practice, not the vagaries of theory.

PRACTICAL ENGINEER.

Mechanical Distribution of Electricity.

MESSRS. EDITORS:—Your correspondent, Mr. G. Wright, when asserting, page 21, that the established theory is wrong,—which teaches that only the outside of conducting bodies can be charged with electricity,—overlooks the fact that when he brings into the inside of a charged body one end of a conductor, of which the other end projects outside this body, the electric charge must flow towards the outward projecting end, which is now further from the center than the outside of the body itself. This is exactly conformable to the established theory, which teaches that the electric charge is always distributed in such a way that the greatest amount is further from the center of the body, or from the common center of any number of bodies which are in electric communication. Hence an equal distribution takes place only on a globe; in an elongated body it is accumulated at the ends, and more so in proportion that these ends are further apart. Experiments teach that when a body charged with electricity is touched in its interior by a conductor, so small that no conducting portion extends outside, but is attached to a non-conducting handle, then this conductor will receive no charge whatever, in fact this is one of the common lecture room experiments which I have performed hundreds of times, before my classes in physics. On this experiment, and on many other well established facts, the common theory is founded. But when Mr. W. attaches his test ball (in place of an isolating handle) to a small wire, as he states, he of course can not only draw sparks from the inside of any body charged with electricity, but even discharge it entirely, if he keeps the wire in his hand. These facts are familiar to every person more or less acquainted with electrical experiments.

It has never been claimed by electricians, that a body could not be wholly or partially discharged from its inside by a good conductor, which is in electric communication with other conductors outside; and this is all that Mr. W. has done. When he tries the experiment in the right way, and attaches his ball to a glass rod or silk cord, in place of a wire, and then tries to charge his ball by touching alternately the inside and the outside of a hollow body charged with electricity, and then tests the charge of his ball by means of a gold leaf electrometer, he will see the difference, and it will give him a better understanding of the established theory.

The fault is, that our common text books on natural philosophy are not explicit enough on many points, and this gives rise to misunderstandings of different kinds, the best remedy for which is the study of more extensive works, in which we find the results of experiments and researches which it would take us a life-time to find out ourselves.

P. H. VAN DER WEYDE, M. D.

New York city.

Loss of Gas—Wet Meters.

MESSRS. EDITORS:—A correspondent, whose letter is published on page 10, Vol. XIX, of the SCIENTIFIC AMERICAN, says in regard to errors which may occur in wet gas meters:

"When the consumption is large, and the working of the axle easy, a momentum will be acquired by the drum, so that the buckets will be only partially filled as they pass over to the supply pipe. The register records the same as with full buckets."

I think this could never occur in a well constructed meter, as the "vis inertia" of the fluid in which the drum revolves, would always compensate for the momentum which would be acquired by rapid motion. Besides, meters, if properly constructed, will not permit such a rapid flow of gas as would make any assignable error in the rotation of the drum.

S. L.

Brooklyn, N. Y.

Inventions Needed.

MESSRS. EDITORS:—I read your notices of "Inventions Needed," in a late number of the SCIENTIFIC AMERICAN, and was pleased to see you stimulating the inventiveness of the country. In imitation of your example, I wish, with your permission, to suggest one or two machines and inventions which might be of service to the inventor. I expect, at no remote day, to put up an indefinite number of bushels of desiccated potatoes. To prepare them for the dry house they should be washed carefully, so as not to bruise them, and not a few at a time, but by the wagon load, or by machinery. In the next place, they must be cut up into pieces not over three eighths of an inch thick, and all of a uniform thickness, so that the drying process will be uniform. If a machine automatically fed and worked with great speed, and not too costly, can be produced, it will pay. Among the parties producing vegetable cutters, no one has yet struck at an apparatus

of this sort. If any one is produced we would like to try its working powers. Address

C. KIMBALL,

Baltimore, Md.

For the Scientific American.

USE OF RAW AND COOKED FOOD.

The design in cooking food is not only to make it more digestible (many varieties being as easily digestible raw as when cooked), but the principal use of cooking is the destruction of microscopic seeds and eggs, often existing in raw food, which would produce vegetable and animal parasites in the system. The last are called entozoa, and the study of them, with the injury they produce in man, now constitutes a peculiar branch of medicine.

The most interesting of these are two species of the tapeworm, one of them originating from raw pork. Swine are subject to a disease called measles, and such diseased pork is full of the germs of future tapeworms in men. When human beings are thus affected they discharge daily thousands of microscopic eggs. When one of these—which may become dry as dust without losing its vitality—enters the stomach of a pig with its food, it produces again the measles in this animal. This explains why Jews are rarely affected with tapeworms—cooks and butchers often. Even raw beef has produced tapeworms by being cut with a knife also used for pork. Cooking, thorough salting, and smoking destroys the germs, but cleanliness, of course, is essential. It is only at present that the sanitary measures prescribed by Moses for the Israelites have been fully appreciated.

Dr. Fleming, last year, read a paper before the British Association on the prevalence of tapeworm in Birmingham, Eng. He supposed it was caused by the water containing sewage contamination. If this is so, it would appear that tapeworms may be propagated by impure water as well as by unclean pork. It is a hint to us to take precautionary measures to have our drinking water as clean as possible. Without containing germs of tapeworms, it may contain many other impurities and parasitical eggs. Cooking, of course, destroys all these, and this is one of the reasons why the general moderate use of coffee and tea has been universally productive of increased health. Simple water becomes flat and unpalatable by cooking, as the heat drives out all the air which it contains in solution; therefore a perfect filter, or melted clear ice, is the best thing for obtaining good drinking water when it cannot be obtained from a deep pure well or spring, purified by natural filtration.

The trichine are another class of parasites, affecting the human system even more frightfully than the tapeworm. They are also produced by the use of raw meat, but there has lately been published so much on this subject that the mere mentioning of it will be sufficient.

The distoma, or fluke, called by the French *douve*, is a large class of parasitical worms, of which more than two hundred species have been studied. One of them is very common in the liver of the sheep and horse, and infests also the human liver. The polystoma, an allied genus, has also several species, two of which are sometimes found in the human body, one inhabiting the veins.

We will only mention the ligula, which infests the abdominal cavities of birds and fishes, and proves fatal to them; the hydatids, which are often found in enormous abundance in the abdomen of quadrupeds, especially of the ruminant order; the cœnurus, common in the brain of sheep, destroying the animal by pressure on that organ; the different entozoa, by which cats and dogs suffer in different parts of their bodies; and, finally, the snake-like worm occasionally developed in the interior of the eyeball of the horse.

Now, as regards the origin of these animals, spontaneous production is out of the question. Every living being is produced from an egg; therefore, the only possible explanation is, that the microscopic small eggs are taken into the system with the food. When their vitality resists the digestive power, these eggs are absorbed, enter in the circulation with the blood, and are developed at that part of the body where the conditions are favorable for their growth. This idea is verified by the latest microscopic examinations about the origin of the infusoria, by which it is proved that the very dust of the air is full of myriads of eggs of all kinds, only waiting a favorable opportunity to be developed into the corresponding animal.

The most common of all human internal parasites are the ascarides, of which the largest species have nearly the shape of a common earth worm, attaining sometimes the length of two feet, and cause alarming symptoms. The small variety is very common in children, and is supposed by some to originate from the eggs of flies deposited on or in the food. Most animals of this class are at first worms, the eggs being laid in some dead animal, meat, cheese, or other article, which gives nourishment to the growing worm, which afterward passes through the regular transformation into a fly. When these eggs are hatched in the intestines, under very different circumstances, they are developed into an animal which differs greatly from that developed in the air.

In healthy, vigorous children the digestive powers will resist the hatching of these eggs, and even the worms themselves will be digested, when accidentally hatched or otherwise introduced in the system. Only those of weak digestive powers are subject to worms, and this observation has lately given rise to a different medical treatment successful in many cases of these infantile troubles, namely, in place of administering to the little sufferers vermifuge and purges (which only give temporary relief and do not remove the cause, when this cause is weakness, but even weaken the system still more), tonics and a strengthening diet are prescribed. In this way the primary cause (the weak digestion)

is removed, as in healthy, strong intestines worms cannot exist, but are at once digested.

Occasionally persons are found who have the peculiar notion of frequently eating raw meat and who give it to their children, with the idea that it possesses more nourishing qualities. But, even if this idea be correct, it is more than fully counterbalanced by the perils we have indicated, and experience teaches us that those persons who have apparent good health are subjected to more diseases than others. Freshly cooked food, therefore, is preferable for the reasons above given.

M. D.

Glyphography.

Having recently made trial of the process of glyphography in connection with the reproduction of engraved plates from photographs, and having obtained a considerable measure of success, we shall describe the process, if not in complete detail, at least so minutely as to enable any of our readers to practice engraving by the process in question with a fair degree of success.

A polished plate of copper, such as is usually employed by engravers, is blackened by being washed over with sulphide of potassium, sulphide of ammonium, chloride of platinum, or other means. The plate is then washed and dried, and is evenly coated with a mixture of wax, resin, and sulphate of lead, the thickness of the coating not exceeding a thirtieth of an inch. This coating is white and smooth, and the plate when thus prepared is ready for being sketched upon, or, as was the case in our trials, for being photographed upon. The details of our method of effecting the photographic part of the operation shall form the subject of another communication.

On the figure thus photographed, or traced by pencil, the artist proceeds to make his drawing with little tools like needle points, fixed in wooden handles. These tools should vary in size, or rather in the thickness of point, according to the nature of the work intended to be accomplished. It will be found most advantageous to use tools one side of which has been filed flat, and a curve given to them near the point by bending them while heated in the flame of the gas. Every touch or stroke of the artist should penetrate through the waxy varnish to the surface of the plate, which, being black, reveals every touch—the work thus appearing black on a white ground, in the same manner as if it were effected by pen and ink on white paper.

The coarseness or heaviness of the lines depends upon the tool by which they are cut; hence broad lines require a tool flattened at the point like a chisel. The drawing must be made as in nature, or non-reversed.

When the picture is examined and found to be right, it is dusted over with plumbago, which, by means of a bushy camel's-hair pencil, is distributed through every line and over every part of the surface. Although we find that other conducting substances, such as bronze powders, act better than plumbago, we have very beautiful pictures produced by Mr. Palmer, in which the coating is the same as that here described.

The plate thus prepared is immersed in an electrotype cell, and a thin tissue of copper is deposited on it by the battery. When the plate has been immersed at night, we find in the morning that the deposit of copper is sufficiently thick to allow of its being removed. The battery we use is Smee's, and the depositing solution is the sulphate of copper, rendered decidedly acid with sulphuric acid.

The cast thus obtained must be backed up with soft metal, *sec. art.*, and in this state it will, if printed from as a wood engraving, yield an exact fac-simile of the original drawing.

If it be required to lower broad masses of white, this can be effected in one or other of the following ways:

After the drawing has been finished, and before it is brushed with black lead, paint over the broad masses of white with melted wax, and let the thickness of the mass thus painted on the surface be determined by the area of the white portion, care being taken not to approach too closely to the lines of the drawing. This having been done, proceed with the plumbago as already directed.

Another way by which to lower the broad whites is to take a cast in plaster of Paris from the original plate, and in this cast to lower any part required by means of a suitable gouge-shaped tool. From the plaster block thus trimmed may be obtained, by means of recasting in plaster and stereotyping, any number of metal blocks in a condition ready for printing.

We have in our possession some pictures which have been obtained from surface blocks prepared nearly as described, and which are so fine and delicate as to warrant any person unacquainted with the method of their production in believing that they were printed from engraved copper or steel plates.—*British Journal of Photography.*

Another Invention Wanted.

Some small, neat thing, to be worn with watch seals, or as a ring, or anywise one pleases, with which to cut open envelopes when one receives letters from the post office, is greatly required. What pulling, tearing, looking for knives, scissors, paper folders, or thrusting in of finger nails, or ripping open and rending by main strength, is daily practiced. Some neat, simple, convenient instrument can be supplied and presented that will sell to nearly every body, and I know the SCIENTIFIC AMERICAN will do the business well, if employed.

K.

ELECTRO-MAGNETIC machines are perhaps the least likely of all inventions to supersede the steam engine. The consumption of a grain of zinc, as Mr. Joule has shown, though much more costly than a grain of coal, does not produce more than one-eighth of the same mechanical effect.

PAPER—ITS MATERIAL AND USES.

From the best authorities it would appear that cotton was the first material used in the manufacture of paper, after papyrus. The exact date is not known, but it is pretty well authenticated that paper from this material was made and used in the eleventh century. The Chinese, since the decadence of the papyrus manufacture in Alexandria, Egypt, may be considered the greatest manufacturers and users of paper. With them this material occupies a place of importance not equaled by any other one substance in use by us. They employ it for clothing, building, decorations, toys, and a hundred other necessities. They utilize linen rags, the inner bark of trees, the fibers of cane and bamboo, and for "rice paper" the stems of a wild leguminous plant. The soles of boots, umbrellas, hats, garments resembling in texture and durability woven fabrics, kitchen and table utensils, boxes, bowls, etc., this ingenious people fashion from paper. Even their pocket handkerchiefs are made of it; and some specimens of their paper are scarcely inferior in toughness and elasticity to the best textile fabrics.

We have scarcely reached their aptness in the quality of the paper, and are far behind them in adapting the material to our every day needs. We make paper water-pipes, row boats, paper hats, and bonnets, paper collars, cuffs, and shirt-fronts. We use it for twine to tie up paper packages; a specimen for machine belting is now on our table. It is doubtful if any other material is susceptible of a greater diversity of uses; yet we seem to lack the means of producing it cheaply enough to supersede other and more costly substances. It is hardly to be believed that knowledge of the manufacture, the various processes to adopt it to manifold uses, is lacking, but rather the difficulty of procuring the material from which it is made prevents us from making a more extended use of it.

For some years past paper "stock" has been very dear. Rags advanced in price, as cotton went up. Wood fibers and straw have been tested with a view of keeping down the continually increasing price of rags and furnishing a cheaper and equally valuable material. Yet these, especially the latter, are not new attempts. So long ago as 1756 the Germans used straw, and in 1776 a book was printed in France the paper of which was made of linden or basswood. In 1800 good white paper was made in England from straw and wood. It is certain that neither straw nor wood have yet been found equal to cotton and linen as a material for the production of paper.

Under these circumstances we have been much interested in the examination of specimens of paper made from the okra plant, which can be grown easily in every state of the union, yielding, even with the most careless cultivation, from four to eight tons of dried stalks per acre. As it can be grown in the immediate vicinity of the mills, and will yield to the cultivator from forty to eighty dollars per acre, exclusive of the market value of the seeds, there would seem to be some reason for looking to this as a proper substitute for the expensive stock now employed in the manufacture of paper. Certainly the specimens of okra paper before us, ranging from coarse brown wrappers to the finest printing, note, and bank paper, seem to offer good evidence of the value of this vegetable production as paper stock.

The subject is worthy the attention of paper manufacturers and others, as in addition to the low cost of the material, the expense of its preparation for pulp is much less than that demanded by the use of rags.

SILK AND ITS CULTURE.

We have almost every variety of soil and climate, therefore there appears to be no good reason why the production of silk should not ultimately become one of the leading industries of our country. Already the subject is arresting some attention in California; but, like all other new branches of industry, it advances slowly. The workmen need experience, the capitalist needs confidence, and the markets need time. If there is haste there is danger, and there is not wisdom in attempting to do business without a thorough understanding of the conditions under which it can be made to pay. The *Alta California* expresses the belief that those who engage in it under favorable circumstances cannot fail of success. Among these circumstances are unincumbered ownership of the land, of soil favorable to the mulberry, a good knowledge of the method of taking care of the worms, eggs, and cocoons, and the facilities of getting labor cheap, such as that of women or children during the busy season.

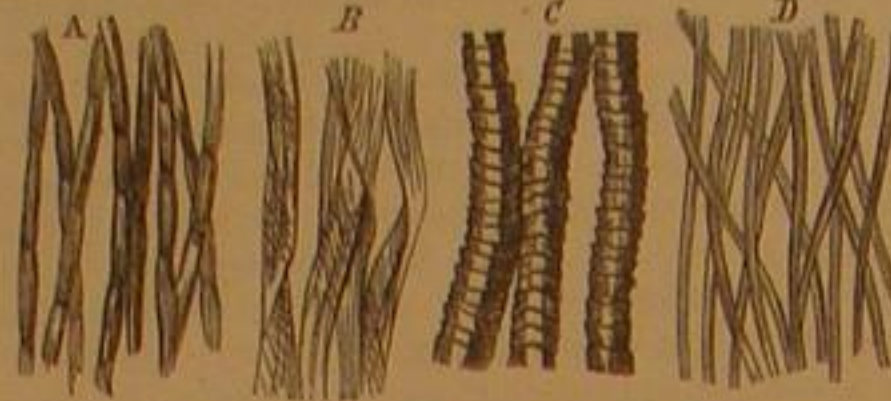
The sale of cocoons raised last year in California numbered 200,000, of which half were killed under a misapprehension, so that 100,000 are supposed to remain for the production of butterflies this summer; and of these 50,000 are females, which should lay 300 sound eggs each. Let us suppose, however, that they lay 200 each, the number of cocoons this year would be 10,000,000; in 1869, 1,000,000,000; and in 1870, 100,000,000,000; that is if there were food and care for all. But neither can be obtained for such a multitude. It is doubtful whether more than 2,000,000 cocoons will be bred this year. There are great numbers of the mulberry trees in nursery, but very few in plantation, as they should stand, to produce leaves for the worms. Until there are extensive plantations of the mulberry, the production of silk must remain unimportant. In the mean time, however, the experience, the confidence, and the knowledge required for success are gradually establishing themselves, so that they will soon be urging the mulberry cultivation ahead instead of lagging behind.

Silk is the produce of a member of the animal kingdom, and occupies the highest position among all the tissues as re-

gards resistance and durability, the average length of each single thread afforded by our worm being about three hundred yards. It has been ascertained that bundles of fibers of equal size, of silk and flax gave the following unequal powers of resistance:—

Silk supported without breaking a weight of.	34 lbs.
New Zealand flax.	23½ lbs.
Hemp.	16½ lbs.
Ordinary flax.	11½ lbs.
Cotton, less than.	7 lbs.

In order to better appreciate the character of these textile materials, single fibers of each have been selected and placed side by side; and to these have been added fibers of wool.

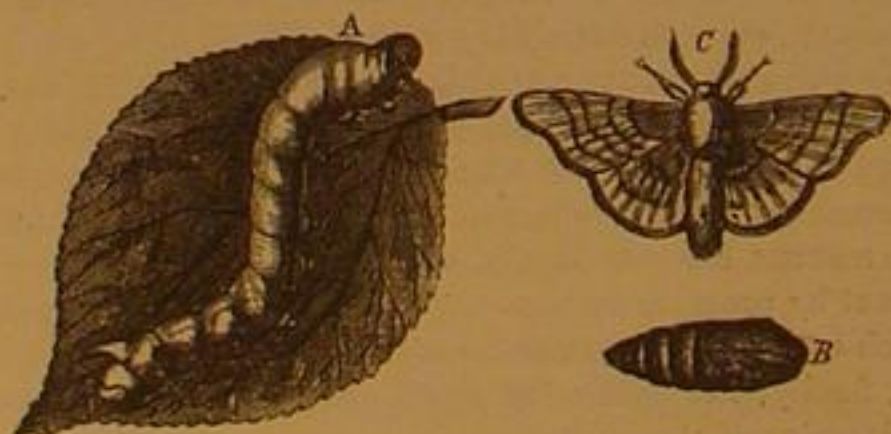


Fiber of flax, A; of cotton, B; of wool, C; of silk, D. placed so that their relative size and markings may be readily contrasted. The fiber or cells of cotton are manifestly much thinner and less resisting than those of the other substances.

The manufacture of silk appears to have been first known and practiced by the Chinese nearly three thousand years before the Christian era, but it was not until the sixth century that the western world received the great boon of a supply of silkworm eggs. The manufacture of silk began to be successful in France in 1521, during the reign of Francis I., and that country now furnishes the world with the finest quality of dress silk.

It will be interesting to consider some of the methods adopted for rearing the worm, and the processes through which the silk passes before it can be used for sewing or clothing purposes. The eggs of the worm are about the size of a pin's head, and are obtained from the moth of the previous year, being deposited on sheets of paper. The Chinese are careful to keep back the hatching of the worm until its food, the mulberry leaf, is sufficiently grown; and to effect which a variety of ingenious methods are employed.

The worm, when hatched, resembles a black thread, and is about a tenth of an inch long. If plentifully supplied with food, it soon increases in size, shedding its external skin as that becomes too narrow for the comfort of its owner—an operation repeated four times during its brief existence of little more than a month. The worm at last becomes sickly, ceases to feed, and begins to spin a delicate thread, which proceeds from two orifices in the head, the two threads being joined together by the mouth. The little creature encloses itself in the fine ball, called a "cocoon"; and having finished this little house, it becomes changed into the chrysalis state, in a similar manner to that noticed in the common caterpillar of our own country.



In the annexed engraving the silk worm is represented. A, the worm feeding, and near its spinning time. B, the chrysalis, as taken from the cocoon. C, the moth, as produced from the chrysalis.

The domestic treatment of the silkworm has been brought to great perfection in Italy. Formerly the eggs were hatched at uncertain periods, depending on the natural warmth of the season, or they were put in manure beds, or were worn in little bags about the person next the skin. They are now hatched in an apartment heated to the proper degree by a stove, but they are first washed in water, and afterward in wine, to separate light eggs, as well as dirt, and the gummy envelope which surrounds the heavy ones.

The temperature of the hatching room is at first 64°, but is gradually raised one or two degrees daily, until it reaches 82°, which it is not to exceed. Pieces of coarse muslin, or of white paper pierced with holes, are placed over the eggs when they are about to be hatched. Through these the worms creep to the upper surface, and are removed as soon as possible to a cooler place. Young leaves and sprigs of mulberry are laid upon the muslin or paper, when the worms eagerly settle on the leaves, and can thus be transferred to trays, and removed to the nursery. This is a dry room of regulated warmth, with windows on both sides, so that free ventilation may be attainable. Chloride of lime should be in use to purify the air, and a thermometer and hygrometer to regulate the heat and moisture; the latter is apt to abound where silkworms are kept, and is very prejudicial to them, moist exhalations arise from the leaves and from their bodies; fermentation also soon takes place if litter and dung be not speedily removed from their trays; these are fertile sources of disease among the worms, and may carry off thousands in a day.

The silkworm is liable to many diseases which can only be guarded against by careful experience and watching. The improved means, first employed in Italy, for preserving the health of these valuable insects, are due to Count Dandolo, who gave particular and scientific attention to the subject,

and superseded many an absurd custom in the rearing of silkworms. According to his method wicker shelves are arranged in a room at convenient distances, and are lined with paper, on which the worms are placed. Such worms only are placed together as have been hatched at the same time, the space allowed them being, for each ounce of eggs, 8 square feet during the first age, 15 feet for the second age, 35 feet for the third age, 82½ feet for the fourth, and about 200 feet for the fifth age. The mulberry leaves are chopped in order to present a large number of fresh-cut edges to the young insect. Four meals a day, as a regular rule, and luncheons between when the worms are particularly voracious, are the liberal allowance for their subsistence. The temperature at which silkworms are healthiest appears to be from 68° to 75°, though they are able to bear a much higher temperature. Alternations of heat and cold are exceedingly injurious to them.

When the silkworms are about to spin they are provided with little bushes of broom, heath, or other flexible substance, arranged upright between the shelves, their tops being bent into an arched form by the shelf above. The bushes are spread out like fans, to allow plenty of space for the cocoons; for if crowded, the worms are apt to form double cocoons, two working together, and these are worth only half the price of single cocoons.

When the time arrives for reeling off the silk, the cocoons are thrown into a vessel containing hot water, the latter serving to dissolve the gummy matter surrounding the true thread. By means of a small wisp the end of this thread is found, and a number of these are wound on to a reel; the fineness of each of the filaments being too great to permit of its being used in the single state. In thus winding the silk, the threads are gradually spread apart, so that they may not adhere together while moist, which they would otherwise be liable to do, owing to the gum remaining on the surface. The color of the silk varies from a beautiful and brilliant yellow to a light grey, or "French white"; and in this state it is exported for the use of the silk throwsters, whose business it is to convert the reeled silk into a thread capable of bearing the wear of subsequent manufacturing operations.

HOW TO ASCERTAIN THE AMOUNT OF IMPURITIES IN WATER.

On page 366 we explained in a short article how to test the purity of water, and mentioned seven different tests relating to the most commonly occurring impurities. We will now show how in the most simple manner the amount of each of these foreign ingredients, dissolved or suspended in water may be ascertained.

QUANTITY OF SOLID MATTER.

The total amount of all kinds of solid matter can only be ascertained by the help of a balance. A certain quantity of water, say a gallon or a pint, is slowly evaporated by a gentle heat—boiling may cause loss of the solid matter also—and after being concentrated to one or two ounces, it is placed in a small porcelain or platinum dish or cup, in which it is finally evaporated to dryness. The weight of the solid matter remaining will tell how many grains there were present to the gallon or pint. To obtain the most correct result, it is best to subtract the weight of the dish when clean, from its weight when coated with the deposit obtained after evaporation.

Fortunately for most of the other tests the use of the balance may be dispensed with in case of necessity, as the amount of impurity may be very correctly arrived at by the amount of the test found necessary to cause a complete precipitation.

QUANTITY OF COMMON SALT, CHLORINE, AND HYDROCHLORIC ACID.

By the assay of silver a solution of the nitrate is made and then a solution of common salt of certain strength is employed to precipitate all the silver, and the amount of silver is arrived at by the amount of the standard salt solution employed for this purpose. This method may be inverted, and for ascertaining the amount of common salt or other chlorides in impure water, we may employ a standard solution of nitrate of silver of certain strength, and watch how much of it is required to precipitate all these chlorides. It is of the utmost importance to use chemically pure nitrate of silver, and as the commercial article is often adulterated with nitrate of potash to such an extent as to contain only about half the proper amount of silver, it may be well to make it by dissolving pure silver in nitric acid, and evaporating to dryness in a clean dish.

It takes very nearly seventeen grains of nitrate of silver to precipitate six grains of chloride of sodium (common salt,) the precipitate consisting of chloride of silver, nitrate of soda remaining in solution. The reason why these relations of quantities exist in these particular substances, depends on the so-called atomic weights of which they are composed, and may be learned from any good text book on chemistry. If now we dissolve 8x17 or 136 grains of nitrate of silver in an ounce (480 grains) of pure water, it will precipitate 8x6 or 48 grains of common salt, that is, 480 grains of this water will precipitate this amount or every drop the tenth part of one grain of common salt; as a drop is very nearly the 480th part of the quantity of one ounce. This is our standard solution by which we may test all chlorides. If now we take one ounce of the water to be analysed, and drop carefully this standard solution in it, every ten drops required to form a precipitate will indicate one grain of common salt, and a single drop the tenth part of one grain of common salt in an ounce of the impure water.

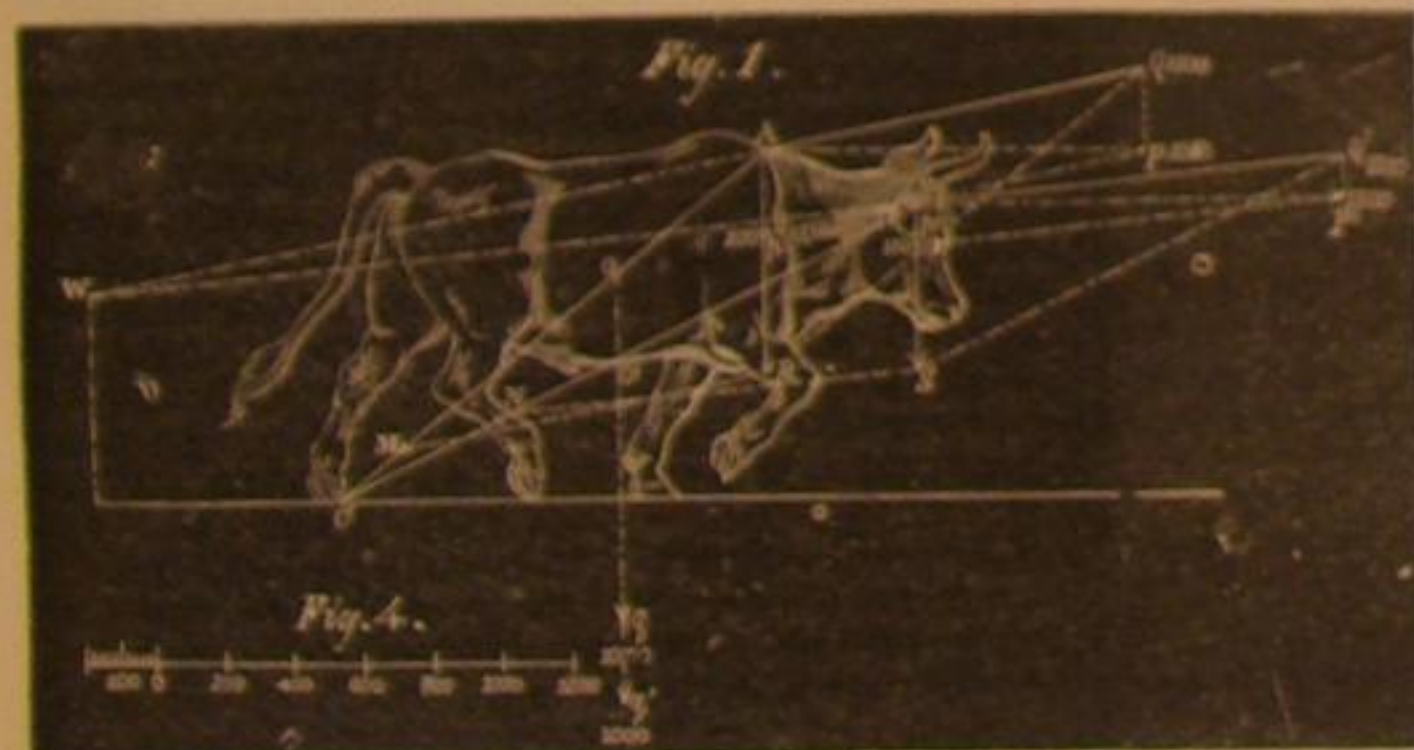
As four grains of nitrate of silver precipitate very nearly one grain of chlorine or free hydrochloric acid each drop will indicate one fortieth part of a grain of these substances

For the Scientific American.
THE BEST WAY OF YOKING OXEN.

Of the three different methods by which the ox is yoked in applying his muscular power as a moving force, the intention of the present article is to determine which is the best adapted to the animal end, or, in other words, how we can employ the ox so as to obtain the greatest amount of work with the least possible degree of inconvenience and fatigue to the animal. The ordinary and almost universal way in this country is to place a collar or bow on the neck so that the ox drags with the shoulder in the same manner as the horse. However well adapted this may be for the horse, it is manifestly unsuited for the ox. That fitting resting place for the collar which the shoulder of the horse presents, is not found in the ox. The ox also carries the head lower, and the bow has then a tendency to rise and come forward at the upper portion and bear entirely against the joint of the leg and shoulder, which has considerable movement and is only lightly covered with flesh. The use of this method, then, involves a considerable amount of unnecessary pain and uneasiness. Second, the most objectionable place of applying the yoke on the ox is on the top of the shoulder bones at the root of the neck. These bones and the top of the backbone being also provided with but little flesh under the skin, present to the yoke sharp ridges, and the animal consequently suffers a hard rubbing pressure on the skin and the sensitive nerves of the back bone. The yoke will likewise rest on these sharp ridges, and has a tendency to slide off. It is also observed that the animal while pulling his load along will constantly move his head up and down, and from side to side, thus expending much of the power in no purpose.

The third and most reasonable and natural method seems to be to put the pressure on the forehead, as we shall endeavor to illustrate. When we apply the draft to the forehead by means of a yoke placed on the neck immediately behind the horns, and a strap running from both ends of the yoke over a cushion placed on the forehead, and secure the side straps or draft ropes to both ends of the yoke, we have a perfectly immovable fixture and the animal will not be disturbed by friction and pressure on sharp rigid bones. The backbone near the joint to the head being covered with thick layers of flesh, gives a broad support to the yoke, which is of some importance as there will be some downward pressure on the same. This downward pressure is one component of a power, acting on the yoke in the direction of the foot of the stretched out hind leg, tending to bend the neck down toward that foot and it will not be inconveniently resisted. An ox when attacking an enemy, attempts to take the shock on the horns; and by placing forehead against forehead ability is frequently shown of pushing back an animal of nearly equal weight. Thus nature has clearly shown how we should put an ox to work; the main strength is placed in the neck and use is made of this strength, whenever attacking one another.

By means of the accompanying diagram Fig. 1, we intend to show, according to the rules of mathematics and irrespective of the convenience to the animal, that the yoke is attached by the head with far greater advantage than when against the top of the shoulder bones.



The diagram represents a well proportioned animal in position to work or push a load along. W represents the place of the whiffle-tree to which the draft straps are attached; A, the point at which the yoke is placed in the second case mentioned; B, the forehead; W A and W B, the draft straps in both cases; C A and C B, lines from the foot of stretched out hind leg to yoke, o q and o' q' represent vertical lines through the centre of gravity of the animal and in length according to the annexed scale equal to the weight of the animal, say 1,000 pounds.

While the animal is pushing on his load, he maintains the represented position by means of the strength of the sinews, and in order to make a mathematical calculation, we shall suppose the animal in this position to be inflexible, so that we have to mark only the points A, B, and C, the lines A C and B C, the points o and o' in which the lines A C and B C are intersected by the lines o q or o' q', the length of the lines o q and o' q', and finally the direction of the side-straps A W and B W.

A C and B C represent levers. At the upper ends, A and B, of these levers the side-straps are attached. These side-straps are represented by the lines in both cases respectively A W and B W, and along these lines on the points A and B of the levers the load will act in the directions from A and B toward W, and tend to turn the levers upward about the point C. The weight of the animal represented by the lines o q or o' q' drawn through the centre of gravity acts vertically on the points o and o' and of levers, A C and B C, and tends to turn the same downward.

In case the load is such that the strain along the side straps is as much as the animal is able to resist, we have the levers, A C or B C, in an equilibrium, neither to be turned up or down by the extending powers, o q, or o' q', and those along the lines, A W and B W. In place of the powers, o q, or o' q', acting at the points, o or o' we can, according to the rules of mathematics, place the powers, A E and B E, acting at the points, A and B, of the levers, A C and B C. The length of the lines, A E and B E, we have found by means of diagrams, Figs. 2 and 3, in which the lines, A C, o q, A E, and B C, o' q', and B E, are parallel, and equal to those of diagram, Fig. 1.

We have now in one case a vertical power, represented by line, A E, acting at point, A, of line, A C, and in the other a power, B E, acting at point, B, of line, B C.

According to the teachings of mathematics, one power represented by a diagonal line of a rectangle or acute angular parallelogram is equivalent to two powers represented by the two sides, all emanating from the same corner. This principle we have applied to diagram, Fig. 1, and to the diagrams, Figs. 2 and 3, which we have given separately to obviate overcrowding of lines. We applied the principles of leverage, the powers being in reversed proportion to leverage.

In one case we have now, power, A E, acting at A, equivalent to the two powers, A H, which is to be overcome by the muscular power of the animal and A Q, or the draft along the side straps. In the other case we have the similar powers, B E, B H, and B Q. A Q we find by our scale, Fig. 4, to be 1,000 pounds, and B Q we find to be 1,210 pounds.

By another application of the rule of the parallelogram we find the power, A P, parallel to the load, or the effective power to push the load along, to be 1,080 pounds, or equivalent to A Q, and a vertical power, A p, or pressure on the neck of the animal.

In the same way we find, in the other case, the effective power, B P, to push the load along, to be 1,200 pounds, or equivalent to B Q, and a vertical power, B p, or downward pressure on the head of the animal.

By the scale we find A p to be 220 pounds in the one case, and B p to be 120 pounds in the other case. Now, to compare our figures, we have:

As 1,080 is to 1,200, so is 100 to 111. By applying the yoke to the head there is a gain of effective power to push the load along of eleven per cent. over the effective power to push the load along when applying the yoke against the top of the shoulder bones.

Further, we have in the latter case a useless pressure to be sustained by the animal of 220 pounds, and by applying the yoke to the head this pressure amounts only to 120 pounds. As we have shown above, this downward pressure on the head will be easier sustained by the animal than the other by applying the yoke at A.

Suppose, now, the animal is able, by yoking as described under the second method, with the effective power of 1,080 pounds, to push along on a smooth road a load, supported on a wagon, of 2,000

pounds, it will be able, by yoking at the head, to push along, with the effective power of 1,200 pounds, eleven per cent., or 220 pounds more, which is a load of 2,220 pounds.

It will be seen that we gain effective power in the last over that in the second case, because the draft straps are nearer to a parallel line with the road, while the downward pressure is diminished from the same reason.

A further advantage of yoking by the head, consequently, is the ability of the animal to regulate the inclination of the draft straps by raising or lowering the head to suit the unevenness of the road.

To use a double yoke seems in any way to be a torture, and the advantages shown under the last case, by using a single yoke with side straps would greatly be reduced by using the double yoke found in some districts of countries.

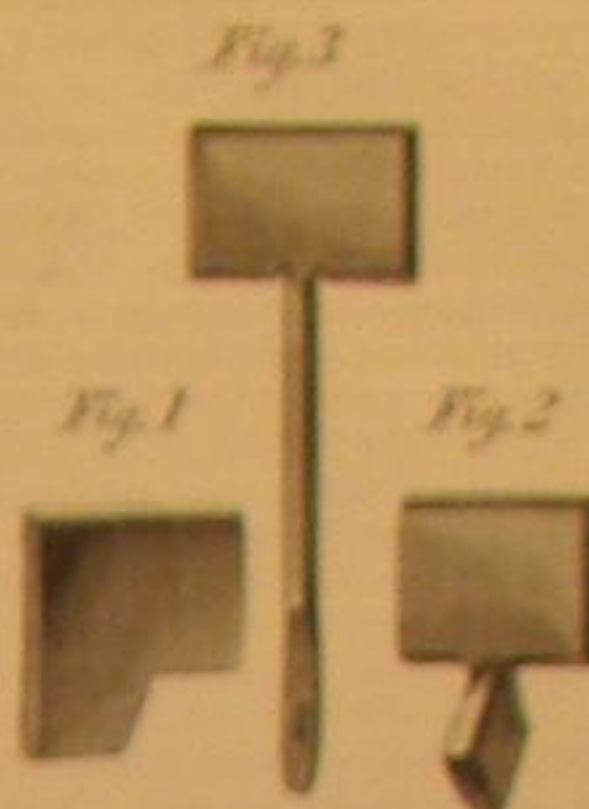
EDWARD WOLFF.

New York city.

RICHARDSON'S PATENT METHOD OF FORGING HOES.

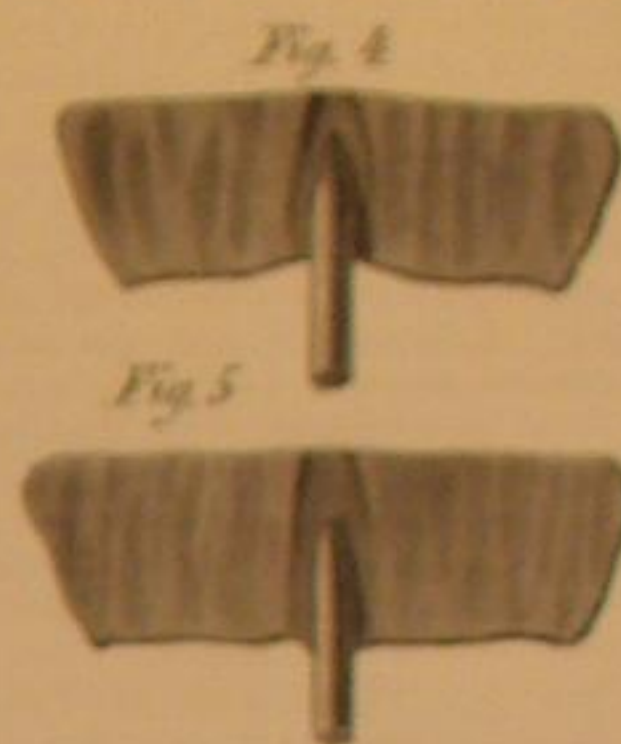
The inventor of the improvements in the processes of manufacturing hoes, illustrated in the accompanying engravings, says that after twenty-seven years' experience in the manufacture of hardware implements, he believes he is safe in saying there is not so much waste of stock and labor in any department of industrial mechanics as in the manufacture of hoes. He saw, a short time ago, a pile of at least one hundred drossen waste or refuse hoes in one manufactory, the remains of only six months' work.

The method of cutting the steel used in forging a hoe generally practiced, is to cut squarely off from the bar sufficient to make two hoes with their shanks, the stock being drawn down in the middle to make the two shanks, and then cut in two. By this plan it is impossible to shoulder down squarely and do the work properly; none but the most skillful being competent, and then there is great waste.

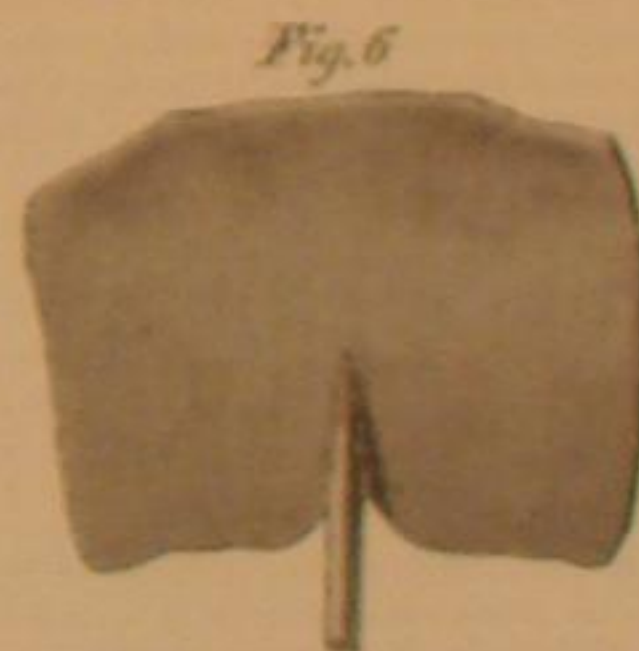


The writer, after a succession of experiments, has adopted the following improvements in preparing the stock:

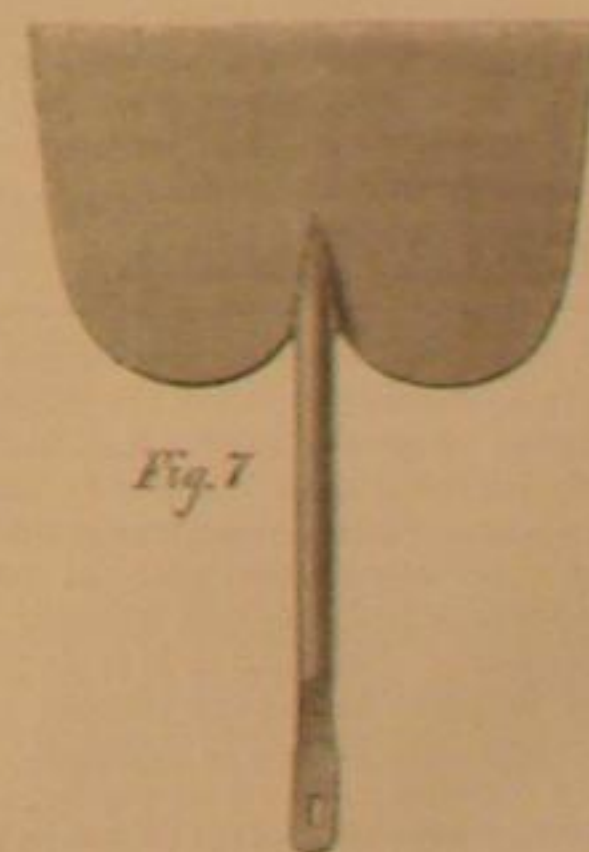
The better method of cutting the steel is that shown in Fig. 1, by which not a particle of the stock is wasted. It will be seen that two of these figures, when joined at the line of



separation, form a parallelogram. Fig. 2 shows the second process, which is to cut in on the whole side, giving a quarter turn or twist to the adhering portion, and then to draw that part out under the trip to form the shank, as seen in Fig. 3.



Next comes the process of spreading, as seen in Fig. 4, known as "plating" among the craft, a work done only by the skillful. In some manufactories it is done by rolling, which facilitates the work, but does not always obviate the difficulty of giving a proper form to the ears. Fig. 5 is an



extension of the process seen in Fig. 4. Figs. 3 and 5 obviate the difficulties heretofore experienced, as they do away with the necessity of plating up the ears of the hoe before rolling. Thus prepared, the hoes come out uniform, as seen in Fig. 6, when the hoe is ready to go to the press to be trimmed and prepared for the temper, as seen in Fig. 7. By these processes every hoe is perfect and alike.

This principle of cutting out and forging hoes was patented through the Scientific American Patent Office, May 26 1868, by L. T. Richardson, who may be addressed at Clayville, Oneida Co., N. Y.

AN ENGLISH ECONOMIST ON RAILROAD REFORM.

The conveyance of letters by post is one of the few industrial enterprises which can only attain its highest perfection by being placed under governmental control. The regularity and precision which are absolutely indispensable for the proper working of the postal system, together with safety and expedition in transmission and delivery of mail matter, and the facility of realizing an immense revenue with a minimum and essentially uniform rate of tariff, are advantages which, on such a grand scale, could never be attained by individuals nor corporate bodies. Such success attending the working of the postal system, it is quite natural that the idea should suggest itself of putting the conductor of the post—the telegraph service—on the same basis. In Belgium, the system has always been under the control of government, one tariff, and that a very moderate one, being charged for the transmission of despatches throughout the kingdom. In Switzerland, likewise, the telegraph lines are the property of the state. A strong movement has recently been made in England to make the British lines government property, the experience gained in the two continental countries before referred to being urged as proof that under a general and more economical system, the lines can be and have been worked at rates greatly reduced below those charged when owned by private companies, and yet with a large profit to the government. The measure has of course met with determined opposition from the existing telegraphic companies, but what its fate has been, we are unable to say. A resolution looking to substantially the same end as the English movement was some time since introduced into Congress but we believe no action has ever been taken upon it.

An English economist has issued a pamphlet in which he proposes to make even the railroads of the kingdom government property, to be regulated and managed as is the postal service. We have on several occasions stated the purposes of an organization in this country for making the freight railway lines the property of the different States, but Mr. Brandon, the author of the plan under consideration, goes still further than either what Mr. Quincy of Massachusetts, or the American Cheap Freight League has proposed. In a pamphlet entitled "How to make Railways Remunerative to the Shareholders, and Beneficial to the Public" the writer seeks to show that the public have not yet obtained the full benefits to be derived from railway traveling, as well as that the shareholders might reap advantages in proportion to those conferred upon the public by the adoption of a better system. These desiderata, it appears to him can only be accomplished by the government taking up all the railways in the kingdom. He estimates that the average profits of the British railways are 4.25 per cent., and suggests that railway shares should be exchanged for government railway stock, bearing 4.25 per cent. guaranteed interest, the price at which to convert the shares being the average price for the past seven years. Government is to unite the whole of the railways under one general management, so that they should become a recognized branch of the public service available for the whole population.

Further: Mr. Brandon proposes to establish one uniform price on every road, carrying passengers one journey of any distance in one direction for the equivalent of twelve, twenty-five and fifty cents, for third, second, and first class passengers, respectively, estimating that at these rates six times the number of passengers would be carried, at small, if any additional expense. He calculates—with an exactness which is certainly surprising—that 755,879,586 passengers would travel annually with single journey tickets; of these one-seventh would be first-class, two-sevenths second class, and the remainder third class passengers, yielding an aggregate income of \$133,000,000. The fares for single journeys are to be paid by government stamps, which are to be issued like postage stamps and delivered up on the completion of the journey; a passenger not provided with a ticket to pay double fare. Mr. Brandon regards his scheme as the completion of the postal system, and refers to the advantages already derived from the letter, book, and sample post, and to be anticipated from the annexation of the telegraph as evidence of the benefits derivable from the development of his project.

Editorial Summary.

"BELLATOMY" is the name given to a curious practice lately introduced into Germany, whereby the efficiency of a leech in blood letting is greatly increased. This result is effected by making an incision in the side of the animal, which serves as an outlet, while, unconscious of the rupture, the leech continues vigorously sucking until the patient has parted with an ounce or even double that quantity of blood from a single application. The cutting is made preferably on the left side of the leech, and at the moment when the gormandizer has nearly filled himself to repletion. The operation must not be regarded as an act of cruelty, but quite the reverse, as serving a good turn for the animal in allowing him the means for prolonging his rich feasting almost indefinitely. After being removed from the patient, if carefully treated, the leech can be kept until the wound is healed, and in this way several incisions may be made in one animal.

METEOROLOGICAL.—Those who have lamented the supposed extraordinary amount of rain that has fallen this year, will be surprised to learn that for the first six months of 1868, the amount of rain and melted snow in this latitude was 4.75 inches less than last year, though being in excess of the average for thirty years past, of 3.03 inches. In the mere number of rainy days, however, this season has been remark-

able, statistics proving that considerably more than half the number of days during this period were rainy, the wind blowing meanwhile from some point in the east on 133 out of the first 172 days of the year.

ONE of the most interesting cases of chemical synthesis recently published is that in which Mr. W. H. Perkins has succeeded in producing artificially the odoriferous principle of new hay. Naturally, the delicious fragrance of freshly mown grass is due entirely to the presence of the species of gramine known to botanists by the name *anthoxanthum odoratum*, but ordinarily called sweet-scented vernal grass. The same substance constitutes the flavoring principle which the Germans employ in making their favorite beverage, May wine.

It has been found by experiments that a stream of electricity derived from a powerful electro-magnetic machine, driven through a solution of brown unrefined sugar, will bleach it, electricity being thus made to perform the function of charcoal. It appears that one of Wilde's electro-magnetic machines, driven by a 15-horse power engine, has been set up for this object in a sugar refinery in Whitechapel.

EUROPEAN PATENTS are obtained through the SCIENTIFIC AMERICAN office in Great Britain, France, Belgium, Holland, Prussia, Russia, Saxony, Austria, Bavaria, Wurtemberg, Italy, Spain, and in Provinces wherever patents are allowed. We invite careful attention to our facilities for procuring *Foreign Patents*. We have offices in London, Paris, Brussels, Berlin, through which we are able to prosecute claims with the utmost dispatch, and at prices less than are usually charged by other solicitors. Parties having applications to make will find it for their interest to consult with Munn & Co.

FISH CULTURE.—Seth Green is breeding fish in Western New York and at two or three points in New England. He is now at Holyoke, most actively engaged in propagating shad, and writes: "I am hatching about seven million shad every day." The Connecticut River, at this rate, will in two or three years, be thoroughly stocked with this superior fish. Mr. Green's example could be followed with great profit by others, who, with a little time and study, might acquire the whole art of fish breeding. There is no reason why the Hudson, Potomac, and numerous other rivers extending from the coast should not abound in shad.

THE NORTH GERMAN MERCANTILE NAVY.—The mercantile navy of the three Hanse-Towns consists of 795 ships of 204,589 tons burden; the Grand Duchy of Mecklenburg-Schwerin, 447 ships with 52,452 tons; the Grand Duchy of Oldenburg, 190 ships with 26,863 tons. The fleet of these five States comprises in all 1,432 ships with 287,904 tons. The complete mercantile navy of Prussia alone numbers 5,413 ships, with 321,987 tons. The united mercantile fleet of the North German Confederation consists of 5,845 ships with 609,891 tons.

THE PRODUCTION OF PHOSPHORUS by a direct process from phosphate of lime, is the invention of two French chemists Apatite, bone, or any other natural phosphate of lime, is mixed with twice its weight of sand, both being powdered. To the mixture is added 25 per cent of the weight of phosphate of charcoal dust, the whole being heated in a retort to an orange-red heat. At this temperature phosphoric acid is set free, and being reduced by the charcoal, the phosphorus is collected in the ordinary manner.

THE ALBERT MEDAL, which was instituted to "reward distinguished merit in promoting arts, manufactures, or commerce," has this year been awarded by the Council of the Society of Arts to Joseph Whitworth, of Manchester.

Hydrophobia Cured by Salivation.

A new remedy for this most distressing of maladies, comes from Northern India, and is attested by the medical officer at the Hoosiarpor Charitable Dispensary. "The patient on admission was suffering from violent and frequent attacks. He was tied on to a chair, surrounded with blankets, leaving the head free, a large vessel of boiling water was placed under him, and a mixture of equal parts of mercury and sulphur well rubbed together were placed in a broken piece of chatty over a charcoal fire, and put alongside of the vessel of boiling water; 15 grains of calomel were given at once, and 5 grains repeated every hour, the mercurial vapor bath being kept up till all symptoms subsided. In about four hours the man was perfectly calm and free from bad symptoms; he was removed from the chair and placed on a bed. The after treatment was simply tonics, nourishing food, and gargles, etc., to remove salivation. On the 13th he was discharged cured."

The Loss of Power by the Crank.

The crank is simply a mechanical medium of transmitting motion, or rather of transmitting the direction of power. No loss of the power has ever been discovered by the use of this means, and no real advantage gained by the substitution of other means of changing rotary into rectilinear motion, or vice versa. Practically, the speculative objections against the crank with the experiments based on them have never produced any device superior. The continued battle carried on against the crank, as a means to the end in view, has always ended in the discomfiture of the aggressor; the best method would seem to be to produce a new device and prove its superiority to the crank. The discovery will be welcomed by every earnest and honest mechanic.

Modern Gunnery and What it can do.

Some interesting practice was carried on the other day at Shoeburyness with the twelve inch muzzle loading rifled gun of twenty-three tons, firing common shell of six hundred pound weight, with the ordinary charge of sixty pounds of powder. The gun is mounted on a wrought iron carriage and platform, placed on a turn table in rear of a wooden structure representing an iron fort, through the portholes or embrasures of which the gun is laid and fired. The object was to ascertain how quickly the gun could be loaded, aimed, and fired by an ordinary detachment of one officer, one non-commissioned officer, and seventeen gunners. The gun was carefully laid each round at a small target one thousand yards' distance, and five rounds were fired in seven minutes and thirty-nine seconds, or at an average of one minute and thirty seconds for each round. The practice was excellent. We leave our readers to imagine what would have been the effect produced on an enemy's ironclad had she been under the above fire with Palliser projectiles fired with battering charges. She would have them struck every time, and in less than eight minutes would have received from one gun alone the impact of 3000 lbs. of iron, representing a total "energy" of 24,800 foot tons.

A Great Tunnel.

The project has been revived in England of tunneling the channel to France. Evidence has been obtained that the soil over which the sea flows is white chalk, gray chalk, and green sand further below. This fact was ascertained by borings on the English and French coasts, the two points on each side of the channel being not more than twenty miles from each other. It is but reasonable to suppose that the same material will form the submarine soil from coast to coast. The chalk can be easily worked, and the expense is placed at \$50,000,000, gold, twice the cost of the Abyssinian war.

The project of bridging or tunneling this ugly channel is, to say the least, a very doubtful one, but extensive docks might be erected, and much larger and more comfortable steamers put on than the miserable, sea-sickness engendering tubs at present in use. With properly constructed vessels and docks, cars might be run on to boats and easily transported across the channel. The present system seems to us a needless cruelty.

THE peat speculation is unprofitable in Connecticut. The *Hartford Times* says: "Losses have occurred in this and Tolland counties to the extent of about \$150,000 in this speculation, and large sums in other parts of the State."

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

MECHANICAL MOVEMENT.—James See, Mitchell, Ind.—The object of this invention is to furnish a device by which the application of motive power to machinery may be regulated, controlled, and directed, in conjunction with a set of weights, levers, and ratchets, that a great saving of power shall be effected thereby, enabling the operator, by any given amount of power at the main shaft, to obtain results at the point where the power is to be used, exceeding, by nearly one hundred per cent, the results of any other apparatus hitherto invented for a similar purpose.

PAPER RULING MACHINE.—Wm. S. Wilder, New York city.—This invention has for its object to furnish a simple, convenient, and accurate paper ruling machine for ruling bill heads, etc.

CULTIVATOR.—Major E. Hanover, David D. Bailey, and Fordyce M. Harwood, Lamoille, Ill.—This invention has for its object to furnish an improved cultivator, easily and quickly adjusted, and effective in operation.

NAIL EXTRACTOR.—J. B. Breathitt, Arrow Rock, Mo.—This invention has for its object to furnish an improved nail extractor which shall be simple in construction, durable, and cheap.

MACHINE FOR SAWING STAVES.—Miller J. Hine, Equality, Ill.—This invention has for its object to furnish an improved machine for sawing staves, which shall be simple in construction, effective in operation, and convenient in use.

LATHING MACHINE.—O. C. Macklett, Saint Paul, Minn.—This invention has for its object to furnish an improved machine by the use of which laths may be attached to the scantlings and joists more rapidly and accurately than is possible when the lathing is done in the ordinary manner.

CHURN AND ICE CREAM FREEZER.—Charles Higley, Port Byron, N. Y.—This invention has for its object to furnish an improved machine so constructed and arranged that it may be used with equal facility as a churn and as an ice cream freezer, and which will do its work in either capacity more thoroughly and quickly than it can be done with the machines ordinarily used for these purposes.

HANDLE FOR SADDLERS, ETC.—Stephen H. Cummings, Norway, Me.—This invention has for its object to furnish an improved handle for saddles, tailors' gowns, stove cover lifters, and other metal articles, which it is necessary to handle hot, and which shall be so constructed as to prevent the hand piece from becoming hot, and protect the hand from the heat radiated by the object lifted.

VARIABLE CUT-OFF FOR STEAM ENGINES.—James McPherson, Brooklyn, N. Y.—This invention relates to a new variable cut-off for steam engines which is connected with the governor, so that it will be automatically adjusted as the pressure of the steam comes above or below a certain desired degree.

HOP PRESS.—Henry Taylor, Middletown, Wis.—This invention consists of a of a stout frame, composed of two vertical posts and two horizontal beams, which compose the sides, top, and bottom walls of the same, the posts being jointed to the bedplate or beam in a manner to allow them to be spread out after the bale has been formed, to facilitate the release of the same, and provided with removable side planks, a follower, and operating screws.

COW-MILKING MACHINE.—L. O. Colvin, New York city.—This invention consists of a simple, cheap, and effective apparatus for operating the milking device, so arranged that the latter may be readily applied to the udder of the cows, while standing in any position within the stall, wherein the machine is arranged, and which may operate the milking device in a manner to simulate the action of a sucking calf, either when the cow gives down her milk freely, or when she refuses to give it freely, as is sometimes the case.

EXPANDING REAMER FOR PETROLEUM AND OTHER ARTESIAN WELLS.—A. J. Salisbury, San Buenaventura, Cal.—This invention relates to a method of expanding branches of a well reamer by a positive downward thrust of the superincumbent shafting by which the reamer is actuated in the operation of reaming, and consists of a toggle joint attached to and between the said branches at certain suitable distances from the points of the cutter and operated by the direct vertical thrust of the shafting to which the reamer

is attached, acting upon a shank pivoted to the toggle joint, together with other devices perfecting the whole.

WRENCH.—Wm. Bradshaw and Chas. Lyon, Delphi, Ind.—The nature of this invention relates to the class of wrenches generally called "monkey wrenches."

WATER CLOSET.—George Conron, New York city.—The object of this invention is to provide a simple and effective water closet, whereby the hinged pan and other complicated devices, which are expensive and liable to get out of repair, are dispensed with.

MOWER AND REAPER.—Darius Babcock, Warsaw, Ill.—This invention relates to a new and improved method of constructing machinery for mowing and reaping, whereby the same is more economically done, and whereby also the machines are made more certain in their action and are rendered more durable and less likely to get out of repair.

BROADCAST SOWING MACHINE.—Alfred B. Beaumont, Grand Rapids, Mich.—The object of this invention is to perform the sowing of grain or fertilizing material in a regular and rapid manner. The machine is provided with devices for adjusting the quantity of material sown as well as the direction and distance to which it is projected.

MEDICAL COMPOUND.—A. J. Hobbs, Van Wirt, Ga.—The object of this invention is to provide a vegetable medicine for treating gonorrhea, syphilis, and other venereal diseases, and also for the treatment of uterine affections, and other disorders of the female genital organs. It is also a valuable tonic, to brace the system when reduced by excessive venery or debilitated by chills and fever or other malarious fevers. It is also an excellent palliative for rheumatism and kindred disorders.

CARS, WAGONS, AND OTHER VEHICLES.—Thomas Stone, Plainfield, Ind.—The object of this invention is to accomplish the discharging of the contents of a wagon box, when such contents are of a loose character as sand, coal, and the like. The invention consists in forming the bottom of the box of shutters or leaves extending across the box and pivoted to the same by means of journals or gudgeons working in holes in the wagon box.

HAY LOADING DEVICE.—N. B. Douglas, Cornwall, Vt.—This invention relates to a new and improved device for raking up and loading hay upon wagons, and has for its object the obviating of hand labor in pitching hay on wagons. The invention consists in a peculiar construction and arrangement of parts, which form an attachment capable of being applied to the rear part of any ordinary farm wagon, and so as to operate in the most efficient manner.

SEWING MACHINE.—A. Q. Allis, Dayton, Ohio.—The nature of this invention consists in the arrangement of a coil spring as the moving power of a sewing machine for ordinary domestic use, in order to dispense with the treadle for operating the machine with the foot, as usual, together with a device for regulating the motion.

LETTER POUCH.—P. Davis, Newport News, Va.—This invention relates to a new and improved letter pouch, and it consists in forming the same with a flap and a band or a slit to receive the end of the flap. The exterior of the pouch is ruled or lined off at equal distances apart, and the several spaces are numbered, and the names of the places or addresses written or printed upon them.

HORSE RAKE.—C. E. Murray, Sugar Valley, Pa.—This invention relates to a new and improved revolving wire tooth horse rake, and it consists in a peculiar means employed for holding the rake and revolving the same at proper intervals, in order that it may discharge its load, and also in a certain means to allow a vertical play to the teeth; to admit of them conforming to the irregularities of surface over which they may pass.

REEL FOR BOLTS.—Joseph G. Harris, Gravois Mills, Mo.—This invention relates to a new and useful improvement in the construction of reels for bolts. The object of the invention is to admit of the bolting cloth being stretched uniformly at the inner sides of the ribs of the reel, whereby all obstructions to the free passage of the flour through the bolting cloth are avoided, and the flour separated from the bran and coarse particles of the meal by a sifting process solely, and not by the raising of the meal and falling of the same within the bolt as it rotates, as is now the case, owing to the ribs which are at the inner side of the bolting cloth catching the meal and operating upon it in that way, and which leaves more or less fine bran to be forced through the bolting cloth than would otherwise pass out with the coarser portion at the tail of the bolt. The bolting cloth also is liable to become choked and clogged up with this fine bran.

TIE OR FASTENING FOR SHEAF BANDS, BAGS, BALE HOOPS, ETC.—Edward Trulow, New York city.—This invention relates to a new and improved tie or fastening for sheaf bands, bags, bale hoops, etc., and it consists in bending or forming a piece of sheet metal, or casting a piece of metal in such form that a string, wire, or metal hoop may be secured in it with a very simple manipulation, one end of the string, wire, or hoop being attached to the tie previously to its application to the article to be bound or tied up and the free or disengaged end secured in the tie or fastening after it is passed around the article to be bound or tied up.

VENTILATING AND HEATING BUILDINGS.—E. L. Roberts, New York city.—This invention is designed to accomplish perfect ventilation in all parts of a room or building, whether large or small, and a uniform heating of the same at all times and seasons, by causing a constant, steady, and uniform flow of fresh air into and through the room in a manner to be diffused throughout the whole space, and take up and carry off all impure and noxious air or vapor that may be discharged into the room from any cause.

WHIP.—Dexter Avery, Westfield, Mass.—This invention relates to a new whip, and consists in forming the outer covering of the same by threads, which are interwoven like regular fabric, instead of being braided as usual.

MIXING MACHINE.—J. B. Peterson, Brooklyn, N. Y.—This invention relates to a new machine for mixing flour and other materials, and consists chiefly in the use of a revolving grate, upon which the material to be mixed is deposited, and when it is in minute quantities thrown off by centrifugal force. Besides this plate there are also suitable stirrers employed.

HAMMER.—Peter C. Havely and Wm. W. Coggeshall, Rensselaerville, Pa.—This invention relates to a new and useful combination of certain tools with a hammer, whereby a very convenient combination tool is obtained, for carpenters' use; one which will facilitate labor by diminishing the loss of time in taking up and laying down different tools in the prosecution of carpenters' or joiners' work, and which, in many cases, will allow of one workman performing alone what now requires the aid of an assistant.

CLOTHES DRYER.—J. B. Watkins, Maine Prairie, Minn.—The object of this invention is to furnish to the public a simple, cheap, and durable device for confining and holding the arms of a clothes dryer, and for supporting the same from the vertical walls of the room or building where the instrument is in use.

MILL STONE DRESSING MACHINE.—Azel Lane, Addison, N. Y.—This invention consists in the arrangement of a horizontal shaft which forms the axle of the pick handle, and which is provided with pinions on each end in a pair of sliding head blocks, which are caused to move back and forth on a platform; the latter also serve as guides for the head blocks, the motion being communicated to the said pinions by a hand wheel on the end of the shaft or by a worm gear on a counter shaft.

KEY BOARDS TO PIANOFORTES AND OTHER MUSICAL INSTRUMENTS.—J. S. Allen and A. P. Wilkins, Allen's Grove, Wis.—The present invention consists in adding to the ordinary key board now in use, two or more rows, or series of shorter keys, which are placed immediately behind the long keys, and in the same line horizontal therewith through, and by means of which short keys a tone an octave higher or lower, as the case may be, than the key directly in front of it, can be sounded, and thus if two additional keys are used, enabling a tone to be produced two octaves higher than the original and front key of the series.

LUBRICATING DEVICE.—Lucius A. Dodge, Keeseville, N. Y.—This invention consists in providing a chamber within the stock to which the forging roller is received, and on which it is carried around the above axes provided with openings for supplying it with oil, and provided also with passages communicating with the axis of the said forging roller, and with packing of absorbent material, and set screws for compressing the said packing so as to regulate the flow of the oil.

MACHINE FOR MAKING HORSESHOE NAILS.—George D. Walcott, Jackson, Mich.—This invention consists in a novel construction and arrangement of parts, whereby, in connection with a hammer or furnace, a machine is obtained which will work up into horseshoe nails a rod of any proper or desired length without any other work or labor than the introducing of the rods to the machine and the keeping of the fire in proper order.

ADJUSTABLE LEVEL.—Homer Lewis, Bennington, Vt.—This invention relates to a new adjustable spirit level, in which both the horizontal as well as the plumb ball can be regulated so as to be set when not true.

BEER HOPPING APPARATUS.—W. S. Haight, Waterford, N. Y.—This invention relates to a new apparatus for hopping beer, and for extracting beer from hops, and consists in the application of a stirrer in the extractor box, and of suitable pipes for drawing off the liquid and for preventing its overflow; also in the arrangement of a valve in the lower part of the apparatus for discharging the spent hops.

MACHINE FOR DRYING AND FINISHING TUBULAR FABRICS.—O. C. Sweet, Albany, N. Y.—This invention relates to a machine for drying, stretching, brushing, heating, and calendering knit or other tubular fabrics, and consists in such an arrangement of all the parts, that the said fabric is completely finished and wound upon a roller, after having passed through the machine, provision being made that the straight direction of the meshes is retained, and that the fabric is not twisted or laid spirally, whereby the value of the article would be greatly diminished, and whereby it would be made to shrink when washed.

ICE PITCHER.—C. C. Foote, New Haven, Conn.—This invention relates to a new ice pitcher, which is enameled on the inside, so that the metal cannot be scratched or injured by the ice while the taste and quality of the water cannot be spoiled by the corrosion of the metal.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at \$1.00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

C. J. H., of Ohio.—You are entirely mistaken in asserting that the appearance of solidity in the stereoscope is due to one lense having a shorter focus than the other, or that this causes one picture to appear before the other. The two lenses of a stereoscope are, and ought to be perfectly alike, but the pictures are different. The statement of the correspondent, page 331, Vol. XVIII., which you criticize is perfectly correct.

A. B., of N. Y.—The answer to A. J. G., of Conn., page 327, was not to the question of the cause of the appearance of solidity in the stereoscope, which is well settled at present, but to his question why a single photograph will often show this appearance as well, especially if seen through a magnifying glass.

W. D. B., of Mass., asks why the air in an air-chamber of a force pump or ram is not absorbed by the water under pressure. It is in many instances so, the air-chambers become entirely filled with water, and several patents have been taken out, to prevent or supply this waste of air. In some circumstances however, (turbulent water supply, leakage of pumps etc.) air bubbles are incidentally carried along with the water, and thus keep the air supply in the chambers.

D. W. D., of Troy.—A large body of the same material and form, will fall faster than a smaller one, as it offers to the resistance of the air a lesser surface in proportion to its mass. In vacuo a cannon ball fired upward would fall with exactly the same velocity as it ascends, the resistance of the air however, makes the velocity of descent less than that of ascent.

F. B. C., of Mass.—When gas is burned so as to give light, it will give less heat; when you burn it mixed with air (as is done in the Bunsen burner and in good cooking stoves) so that it gives little light it will give more heat. You may easily verify this, by trying to boil water over a common kerosene burner, or over a Bunsen burner, using exactly the same gas supply, it will take in the first case, more than twice the time that is required in the second.

J. E. H., of Wis.—If you study the subject of atmospheric pressure thoroughly it will "patch up" your notions on that subject in such a way, that you will see that "Galileo and the SCIENTIFIC" are right and that you are all wrong.

J. T., of New Jersey, sent us sometime ago, a "document," in which he imagines to have demonstrated that there exists no gravity between the celestial bodies; we have now received an explanation of the tides founded on a "directly conflicting strain," in the motion of the earth. We advise our correspondent to study first the admirable theory of gravitation, as established by the greatest minds, after the most extensive research and profoundest study, before he sets up criticising Newton and Laplace.

W. A. S., of Syracuse.—The prescription for tinning and soldering iron which you sent us is old, and at present known to almost every tinsmith; it was published in the SCIENTIFIC AMERICAN by a correspondent page 71, vol. XVIII. An improvement was made in it, in 1860 by Schoefer, in Germany, which consisted in changing it into a dough by the addition of starch, so that a sufficient quantity may be placed on the surfaces to be tinned or soldered, without which the operation often fails. We think it will give very poor results when used for mending knifeblades, it is only a tin solder.

W. H., of Pa.—Your inquiry about a fire-proof roof over boilers is partially answered by an article on such a covering, appearing elsewhere in this paper. The different low water indicators have all a tolerable fair degree of reliability, but should never entirely be depended upon. A watchful sober engineer is not only the most reliable safeguard against low water, but also against excess of steam pressure.

G. W. J., of Ind.—You misunderstand and misquote our article on page 333, vol. XVIII, on long and short screw drivers; we did not say that "all the advantages gained by a long screw driver is obtained by moving the handle out of the line of the axis of the screw," but we said: "the long screwdriver admits of considerable play from side to side without releasing the screw, while the short one admits of very little;" every one knows the annoyance of this slipping of screwdrivers with short handles, and the ease of turning those with long and heavy handles, and the steadiness of their position.

R. M., of Cal.—We agree that the fine bone dust as used for making opaque glue is not exactly the thing, but the addition to the glue of carbonate of soda, sulphate of zinc, and oxalic acid, which in fact form an oxalate of soda and sulphate of zinc, which you mention, is of very doubtful utility; probably you have not tried it.

H. D., of Pa.—You will find the information you seek about nitro glycerin on page 87 of our last volume. It is a dangerous substance in the hands of inexperienced persons.

J. B. of Ohio.—The idea that a little quicksilver put into a millpond, would cause the dam to break is entirely erroneous; it will simply sink in the interstices of the bottom, and there remain. It would take an enormous amount of quicksilver by its pressure and weight at the bottom, to injure even a very small dam.

J. B. F., of R. I. asks: "Has the common suction pump any advantage over the lifting pump? Suppose we have two pumps by which it is required to raise water a certain distance. One is an ordinary suction pump, the barrel and pipe of a given size the other is a lifting pump, where the piston is placed in the water, barrel and pipe the size of the other, lever of both to be alike. Now can not a given quantity of water be raised

with less power by the suction than by the lifting pump? "Where the valve box of the pump is placed under the water the whole weight of the column of water must be lifted by the mechanical means employed; i. e. by the direct application of the power. This is what our correspondent calls a "lifting" pump. In the "suction" pump the pressure of the atmosphere can raise the water about 33 feet without mechanical power. The conclusion is obvious.

J. A. W., of —, believing boiler explosions and ruptures to be occasioned by unequal tension of the iron—unequal expansion and contraction by unequal heating—proposes that the boiler, after being put together, and before the caulking is done, should be subjected to a red heat that the plates and rivets may accommodate themselves to their positions; after which the caulking should be done and the hydraulic test for leakage applied. The plan of heating or annealing boilers is not new, but we do not yet understand that it has proved to be of real benefit. We cannot see how the equal heating of a new boiler can prevent the after action of an equal expansion and contraction.

A. K. S., of Ohio.—The question of wages paid to mechanics and that of the fees charged by professional men are so different in their character that a discussion of the subject could be of no practical value. The work of a mechanic is usually of much more value to the community than the services of a professional man, but circumstances change the character of the service. There can be no fixed rule of comparison.

A. P. S., of Me.—"Is it possible to separate cotton from wool or hair after they are interwoven? Can it be done by rotting it? If so how?" It is not possible by any process known to us to separate cotton from woolen fiber sufficiently clean for any purpose except chemical analysis. A lens and a pointed instrument are the means for effecting such separation on a small scale.

J. W. K., of La.—"In smothering the flame of some burning tallow, contained in an open vessel, the flames were extinguished below, but continued to burn near the ceiling for some moments, finally exploding with a report like the discharge of a pistol. Will you please give an explanation of the above?" Flame is incandescent gas. When tallow is sufficiently heated, an extremely inflammable gas is generated, which when mixed with proportion of atmospheric air is highly explosive. The continuation of the combustion after it was extinguished below, the final explosion is thus accounted for.

J. C. B., of Ky.—The conversion of cider into vinegar may be hastened by leaching it through beech shavings, grape stalks, birch twigs, or cobwebs previously soaked in vinegar and placed in properly constructed tubes, the apartment in which the operation is performed being kept at a temperature of from 80° to 100° Fah. Skum and other impurities not dissolved in the vinegar may be removed by filtering. To make a pale bright colored vinegar from dark sorghum, you should first decolorize the sorghum molasses by passing it through bone black.

E. A. T., of Ill.—"Isochrone," or equal timed, is applied to the pendulum, when it does not oscillate in the arc of a circle but in a cycloid. In the first case oscillations in a large arc will occupy more time, in the second case, it is indifferent if the oscillations are small or large; it was invented by Huygens in Holland two centuries ago. The same word is applied to the hairspring or spiral attached to the balance of a watch, when it is so constructed that the so-called amplitude of the oscillations have no effect on the time occupied by them. This was the invention of Breguet in France, at the end of the last century.

J. A. P., of Wis.—That a person standing on a swing can start himself by pitching his body, is simply due to the fact that by pitching his body backward he moves his center of gravity backward, and as the center of gravity in a swing as in a pendulum will always tend to move under the point of suspension, the swing will move forward; for the same reason when pitching his body forward the swing will go backward, and so he may augment the pendulum motion by pulling the rods, as which he keeps in his hands apparently against the direction of the motion, and he may counteract this motion by pulling apparently in the same direction as the swing when moving.

A. T. C., of Mo.—There are several varieties of hickory which explains why some trees put forth their leaves earlier than others. The difference in the varieties is only known to a practical botanist.

Business and Personal.

The charge for insertion under this head is one dollar a line.

Wanted.—Purchasers for spool and bobbin wood. Address J. H. Lord, Box 773, New York city.

Stamped brass goods, small wares, steel dies, brass labels. Patent goods made to order. T. N. Hickox & Co., 280 Pearl st., N. Y.

Information required about water works. Address Moody & East Engineers, Omaha, Nebraska.

Wanted.—Manufacturers of water wheels, circular saws, and mill gearing, to address J. P. Adams, Whitney's Point, N. Y.

Lathe wanted.—2d-hand. Address Geo. C. Bailey, Pittsburgh, Pa.

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Wilkinson & Co.'s Illustrated Catalogue is invaluable as a reference book for tools, materials, etc., sent on the receipt of 50c.

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Merriman's patent bolt cutters—best in use. Address, for circulars, etc., H. B. Brown & Co., New Haven, Conn.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

Winans' Boiler Powder, for 12 years a positive remedy for incrustations, is so extensively imitated and pirated, by pretended agents, that it is not safe to buy except at 11 Wall st., N. Y.

WARREN'S PATENT AUTOMATIC MUSKETO BAR.

The accompanying engraving represents a musketo bar for windows, applicable to either the upper or lower sash. It not only prevents the entrance of flies and musketoes, but adds greatly to the comfort of rooms by allowing the upper sash to be lowered and the lower one raised, which is always essential to ventilation. The contrivance is simple, durable and effective. It can be applied to any window, whether actuated by spring or weight. Its cost is slight, and its construction does not necessitate the change of appliances according to the season now demanded by the devices in common use. With this appliance a room can be kept free from insect pests without the costly and smothering nettings over beds and berths now required, while ample room for the admission and exit of air is afforded. Thus, it will be seen, that while it is adapted to use in dwellings, it is specially convenient for steamboats, sleeping cars, etc., adding much to the comfort of the traveling public.



In the transverse rail of the upper and lower sash a semi-circular groove is made for the seating of the roller. The netting is wound around the roller, one edge being fastened to the frame of the window by tacks. On each end of the roller is a pulley operated by a stationary cord, which is fastened at the top and bottom of the sash. When either sash is closed no part of the machinery or netting is visible; but when the bottom sash is raised or the upper sash lowered the netting fills the space otherwise left open.

For convenience of opening the window to adjust outside blinds, the lower edge of the netting connected with the lower sash, may be secured to the window ledge by hooks and loops, or hooks and a wire stretched across, so as to be readily unfastened as desired, and as easily secured again to place.

The pulley, A, being as large as the roller when filled by the wound netting, will not let the netting over-issue, but keeps a tension sufficient to secure a perfect plane surface. The small pulley, B, runs loose when the roller issues the netting, and being as small as the roll when the netting is delivered, keeps a tension upon the netting and tends to take it up. If the cords should get slack they can be tightened or taken up by turning a screw, C, having a hole through its shank for the reception of the cord, as seen in the engraving, similar in operation to the screws on a violin, harp, or pianoforte. The action of the roller, A, can be readily understood by reference to the section, D. The design is well worthy the attention of housekeepers.

Patented through the Scientific American Agency June 30, 1868. All orders for State and County rights and all communications for information should be addressed to Warren & Co., No. 54 Pine street, New York.

PHILOSOPHY OF THE USE OF BLUEING IN THE STARCHING OF LINEN.

It is often worth while to think upon and discuss those things which are apparently of small importance. The laws of nature apply to small as well as to large operations, and the explanation of phenomenon of great importance may frequently be found in the investigation of trifling occurrences.

Mr. Ruskin, should this meet his eye, would no doubt smile, while he would acknowledge the truth of the statement, that the same natural principles, by the observance of which the great Turner (who he asserts was the only artist who ever did paint water true to nature), obtained his effects, include

the one by which a washerwoman makes a bosom assume a whiteness of snowy purity.

All tints are heightened by transmitted light. No artificial pigments or dyes whatever can approach the glory of the prismatic colors; but if artificial colors are laid upon a transparent surface, and light permitted to pass through them, the effect of transmitted light will at once be seen. The stained windows of churches are good illustrations of the increased beauty of color by the transmission of light.

The effect of transparency may however be produced in some degree by artificial means. Light in passing through transparent substances is more or less separated into its primary colors by differences in thickness and density, and the form of the surface. Moreover the color of the transparent body itself has effect in the absorption of other colors, so that light rarely passes through transparent bodies unchanged. It took a long time to discover a means by which the dispersion of light, when it passes through the lenses of optical instruments, could be obviated, so that the image presented to the eye should exhibit the colors of the object inspected by their aid. It is obvious then that if a tint be added to a color so delicately that the impression produced by it does not change the original tint essentially, something of the effect produced by the transmission of light will be attained. The less of admixture with other colors any tint possesses, the more easily will light be transmitted through it; or perhaps it would be proper to say, that unless the mixture be so perfectly compounded that a distinct new tint is produced without a muddy crude appearance, the transmission of light will be more or less interfered with. This perfect blending is what is called by artists purity of tint. It is seen in perfection everywhere in nature, in the clouds, in water, in flowers, leaves, and fruit. An absolute white has a dead, dreary appearance, caused by the utter absence of the effect of transparency. It is, therefore, rarely used in ornamental work unless it be so placed as to be enriched by delicate reflections from adjacent objects. What is generally called a pure white has more or less of a very delicate yellow, green, or blue tint, the absence of which would be very sensibly felt, although its presence, as a tint, is scarcely perceived. This is why blueing is used in the starching of linen, though we venture to say, that the reason for it has rarely been thought of sufficient importance to repay analysis.

MILITARY TELEGRAPHS.

The Military Telegraph system now used in the U. S. Army is probably the most perfect in the world. At the recent examination of Cadets, at the U. S. Military Academy, West Point, N. Y., the operation of the Telegraph Corps attracted great attention. Wires were laid, and the telegraph put in operation at the rate of a mile in ten minutes. The best wire for such purposes is a fine steel wire, covered with copper. This makes a splendid line wire, and only weighs twenty pounds to a mile. A soldier starts off on the run, carrying on his back a couple of reels containing two miles of wire, which he lays along on the ground; he is followed by others, who carry and set the insulating stakes, attach instruments, batteries, etc. But ordinarily the wire is laid from a wagon carrying the reels from which the wire is unrolled, followed by the insulator wagon, and the instrument and battery wagon. Reels are also provided for use on horse-back.

CHEAP FIREPROOF COVERING FOR STEAM BOILERS.

Many complaints are made that the common felting used to retain heat in steam boilers sometimes becomes charred and burned above the water line, when the boilers are so arranged as to be able to carry dry steam, or steam superheated to a slight degree, and that this constitutes a cause of danger for fire on board of steamboats. Nothing is easier than to cover a boiler with an incombustible and cheaper substitute, such as paper pulp, or the pulp of prairie grass or pembo, mixed with equal parts of powdered soapstone and half the quantity of asbestos; when this is mixed with a solution of silicate of soda or waterglass, it may be made into a thick paint or paste, which being applied to boilers in several layers or coats, will adhere strongly, and form a nonconducting covering. Waterglass which once had the reputation of being waterproof, does not possess this quality, but is fireproof, and at the same time a nonconductor of heat.

A SCOTTISH "CRAN-NOG."

During twelve years past great archaeological interest has been centered in Scotland from the fact that in various parts of the country lake-dwellings have been discovered, which, though differing in size and structure from the Swiss and Italian lake-dwellings, are evidently sufficiently similar in idea, to form another link between the ancient populations inhabiting these widely-separated lands.

The first cran-nog was found upon draining a fresh-water loch in Arisaig. It appeared to have been placed in deep water, as the soft and wet mud around it is not fathomable by a long pole; the nearest point of land is about two hundred and fifty yards distant. It is formed of the trunks of trees, some of which are of very large size; one that was measured is twenty-eight feet long and five feet in circumference, at two feet from the base; another is thirty-nine feet long, and five feet eight inches at the base. The structure consists of several tiers or layers of these trees; two layers have been partially washed away by returning tides; four layers were exposed to view in examining the building, and a probe of eight feet long detected timbers at that further depth. Each layer in succession lies across the one below it, forming a strong, firm structure of rectangular shape; the sides are

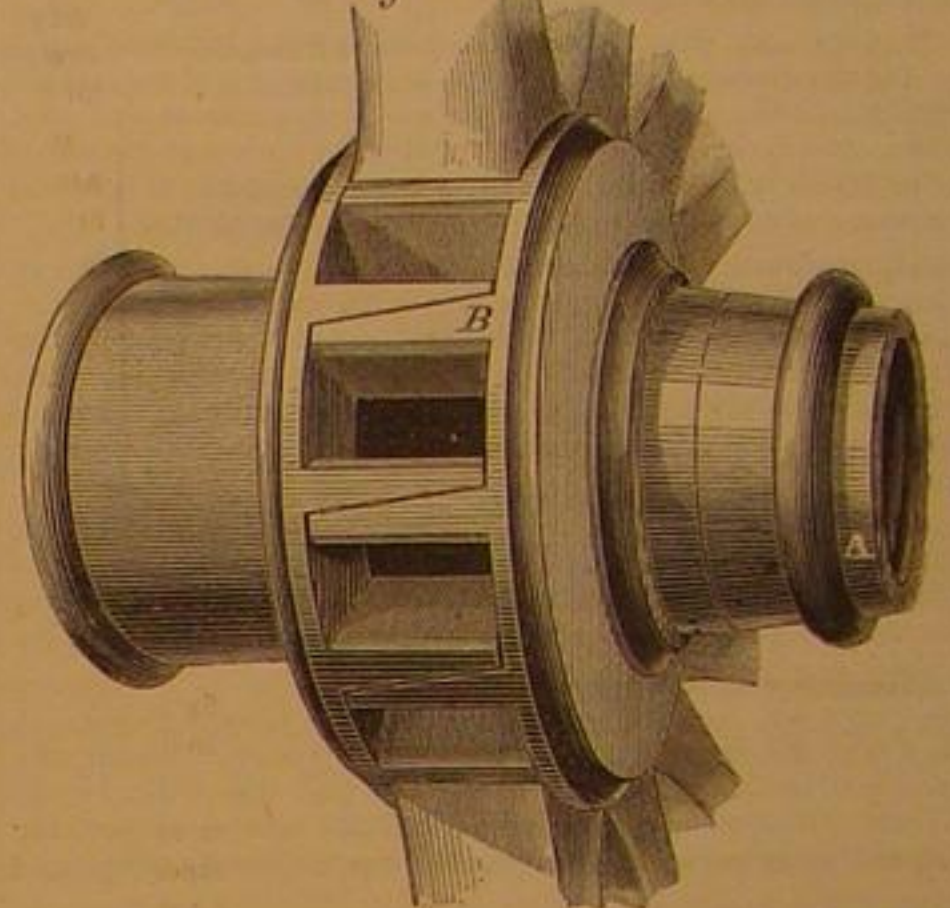
forty-three feet by forty-one feet. On the floor were several flagstones in three or four places, which evidently had been the fire-places of the inhabitants. At a distance of about two feet six inches from the building was a rampart, formed of upright posts, inclined inwards and sharpened at the top, across which are placed large trees that were fastened at the corners by a hollow scooped out of the wood.

THE PATENT METALLIC WHEEL HUB.

The two engravings show a patent hub for securing the spokes in carriage wheels, which was patented through the Scientific American Patent Agency, May 9, 1868.

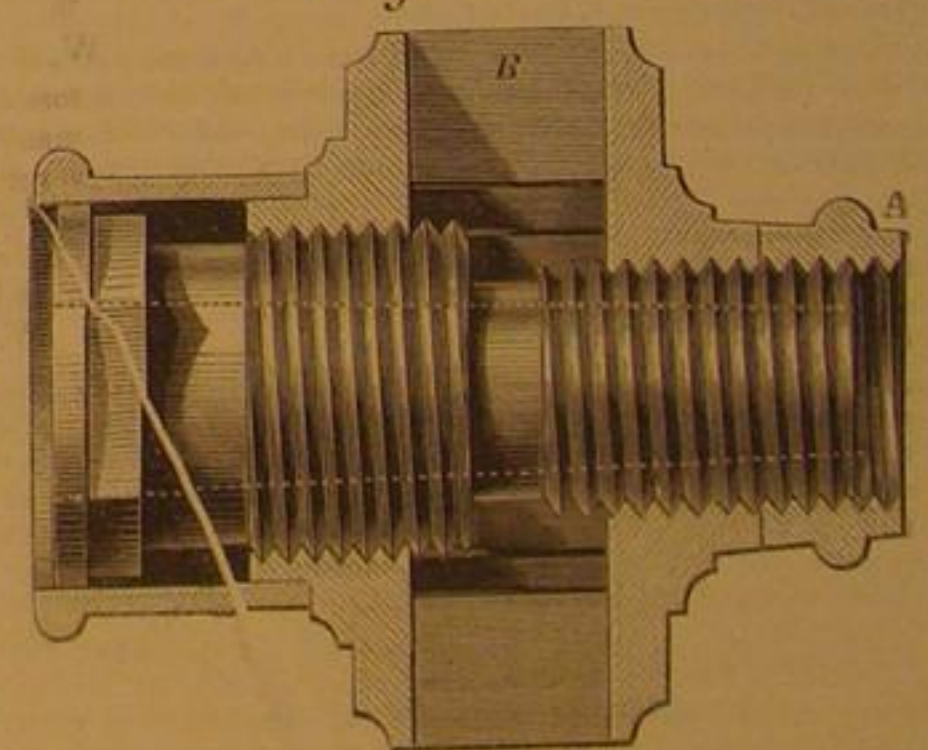
On the outside of the sleeve, which is of two different diameters, are cut screw threads, one engaging with one half of the hub and the other with the other half. On the outside end of the sleeve the cap, A, is screwed. Each half of the hub is furnished with wedge-shaped radial projections, B, which, when screwed together, make a mortise for the spokes, holding them very firmly.

Fig. 1



The engravings present very plainly the peculiarities of the device. The rims may be made of good cast or malleable iron, or gun metal. The back band—that nearest the stock of the axle-tree—may be shrunk on the sleeve or threaded to screw on, as may be desired. If required, the front band or cap may be dispensed with by casting that side of the hub long enough to cover the thread on the sleeve. The practical wheelwright will understand how the mortises should be tapered to give the proper dish to the wheel, and he can have his patterns made according to his judgment. To drive the spokes it is necessary only to remove the caps from the fin-

Fig. 2



ished hub and turn the box back two or three threads, enough to open the space from one sixteenth to one eighth of an inch, then drive the spokes, with slips of leather on the tenons of the spokes, if desired. Then the parts of the hub may be screwed up by a wrench and the flanges will hold the spokes locked as though dovetailed. If the parts of the hub are properly finished and the rim true, the spokes and the rim of the wheel will also be true.

For other information relating to this invention, and for rights for all the states, address Henry Poth and E. Deckenbach, 73 Diamond street, Pittsburgh, Pa.

The Centrifugal Machine.

In our article on the balancing of machinery, page 9, No. 1, current volume, we inadvertently neglected, in comparing the amount of power required to drive the old and new styles of centrifugal machines, to notice the constant friction of the engine and shafting, which absorbed 16.04 H. P. This being deducted from 32.27, the power required to drive the seven old style machines, would leave 16.23 total, or 2.32 H. P. for each machine; and deducting from 22.48, the amount required for the new style, would leave 6.44 total, or .92 H. P. for each self-balancing machine.

BLACK VARNISH.—An aniline black varnish, of recent Parisian production, is the following: In a liter of alcohol, twelve grammes of aniline blue, three grammes of fuchsine, and eight grammes of naphthaline yellow, are dissolved. The whole is dissolved by agitation in less than twelve hours. One application renders an object ebony black; the varnish can be filtered, and will never deposit afterwards.

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

For the American News Company, Agents, 121 Nassau street, New York.
For the New York News Company, Agents, 118 Spruce street.
Messrs. Sampson, Low, Son & Marston, Booksellers, Crown Building,
155 Fleet street, London, are the Agents to receive European subscriptions or
advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be
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VOL. XIX., No. 3....[NEW SERIES.]... Twenty-third Year.

NEW YORK, WEDNESDAY, JULY 15, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

*Improvement in Portable Forges.....	38
*Sawing and Grooving Machines.....	39
A Useful Official.....	39
Speed of the Senses.....	39
Public Rights as Affected by Opera- tions of Railroad Monopolists.....	34
Gunpowder—its Manufacture and Uses.....	34
Explosive Gases in Steam Boilers.....	34
Mechanical Distribution of Elec- tricity.....	35
Loss of Gas—Wet Meters.....	35
Inventions Needed.....	35
Use of Raw and Cooked Food.....	35
Glyphography.....	35
Another Invention Wanted.....	35
Paper—its material and Uses.....	35
*Silk and its Culture.....	36
How to Ascertain the Amount of Impurities in Water.....	36
*The Best Way of Yoking Oxen.....	37
*Richardson's Patent Method of Forging Hoes.....	37
An English Economist on Railroad Reform.....	37
Hydrophobia Cured by Salivation.....	38
The Loss of Power by the Crank.....	38
Manufacturing, Mining, and Rail- road Items.....	38
Editorial Summary.....	38
Recent American and Foreign Patents.....	38
Answers to Correspondents.....	39
Inventions Patented in England by Americans.....	39
*Warren's Automatic Muzzle Bar- rel.....	40
Philosophy of the Use of Blueing in the Starching of Linen.....	40
Military Telegraphs.....	40
Cheap Fire-proof Covering for Steam Boilers.....	40
A Scottish "Crane-Song".....	40
*The Patent Metallic Wheel Hub.....	40
The Centrifugal Machine.....	40
The Cause of Steam Boiler Ex- plosions—The Bowers Accident.....	41
Viscera and Vitality vs. Steel, Cord, and Whalebone.....	41
Small Philosophers.....	41
The Havre Exhibition.....	41
Chemical Nomenclature and Sym- bols.....	41
The West Side Elevated Railway.....	42
Experiments with Dynamite.....	42
Patent Claims.....	42, 43, 44, 45, 46
Extension Notices.....	46
New Publications.....	46

THE CAUSE OF STEAM BOILER EXPLOSIONS—THE BOW- ERY ACCIDENT.

One thing can be said of the verdict of the coronor's jury on the bodies of those killed by the recent explosion of a steam fire engine in this city, which cannot be said of all similar investigations. Much common sense was exercised by the jurors, and some intelligence. As usual in so-called investigations there were froth, foam, ignorance, brought before them, with a modicum of reason and educated intellect. The facts, aided by the statements of engineers, seem, in this case to have had some weight with the jury. We only wish their verdict could have more completely covered the ground.

Just here we wish to notice some of the nonsense which our journals published in relation to these occurrences; evidently written by anybody but a practical engineer. In this case one published statement was that the "steam gage was corroded;" another that the "tubes leaked;" another that only "sixty pounds pressure was on the boiler at the time of the explosion," and still another that the machine was a "perfect powder magazine." All such talk is not only sheer nonsense viewed from a professional standpoint, but it is really wicked, misleading old engineers and puzzling young mechanics. Not less to be deplored is the conflicting statements of men who should know whereof they affirm—not their opinions, but the results of their investigations. While one states that the rupture was caused or aided by a crack in the sheet, another says the sheet was perfectly sound. While one declares that the soot was burned off more than one half the fire-box, another knows there was no over heating of the iron. All this is nonsense, and there is more of the same sort shown in the reports of the testimony given before the jury.

The corrosion of a steam gage will strike our engineers as a new thing; that the leakage of tubes could produce an explosion will also interest them; that a boiler of the build of that which blew up could be even ruptured by a pressure of sixty pounds will amuse them, and that one of the Amoskeag fire engines is a perfect powder magazine under any circumstances would be believed only by those who have no knowledge of the excellence of material and perfection of work used and turned out by that concern.

In reviewing the testimony we cannot forbear a tribute to the straightforward and manly evidence produced by Messrs. Coffee and Powers. The former is well known as a competent engineer of large experience; the latter appears to be a thorough mechanic. No attempt has been made to impeach the testimony of either of these gentlemen. Both agree that the disaster was caused by an over pressure of steam, which a personal examination of the exploded boiler enables us to confirm.

The testimony of Mr. Bean, the superintendent of the Amoskeag works, Manchester, N. H., is somewhat of a curiosity if correctly reported in the daily papers. He says the boiler was braced from five to seven inches apart. Now if seven inches—area of forty-nine square inches—were sufficient, why put braces five inches apart leaving an area of twenty-five inches? But on an examination of the boiler we found a place on each side of the fire box that had nothing but "blind" stays in a space of eleven by eight inches, exposing a large space of three sixteenths iron without a support. In one of these places the rupture occurred. We cannot but think he is mistaken in saying that both the shells were of the same thickness. On our examination we thought the inner skin of the water leg was three sixteenths, and the shell one-quarter, large. If Mr. Bean is correct then there may be some reason in Mr. Norman Wiard's statement that the shell was the weaker part of the boiler, a statement we take, however, *cum grano salis*.

To return to Mr. Bean; he says: "from the general appearance of the boiler I think the top part of the fire box and flues must have been nearly red hot." What reason has he for this statement? The morning after the explosion there was no reliable evidence of over heating or burning. The clinches or rivetings of the lower ends of the tubes had not started, the tube sheet bore a coat of soot, and the edges of the ruptured sheet were bright, which they could not have been had they been exposed to 400° of temperature.

Our conclusions are that the sheet that gave way was too thin to be stayed with screw stays; that the space between stays—eighty-eight square inches—was too great, and that the cause assigned by the coronor's jury for the explosion—over pressure of steam—is the correct one.

We cannot but suggest to the builders of these upright tubular boilers the insertion of a less number of tubes, giving more water space. It must be difficult to keep a sufficient quantity of water in a boiler built as this one was; probably but for the jarring and shaking of these machines while working, the flue plate and sheets surrounding the fire box would sometimes be bare.

VISCERA AND VITALITY VS. STEEL, CORD, AND WHALE- BONE.

The devotees of fashion are no less abject in their worship at her shrine, no less willing to throw aside all considerations of reason, and to obey blindly her dictates, than the veriest slaves of heathen superstition are to sacrifice everything to the "gods which their own hands have made." We are struck with horror when we read of people prostrating themselves beneath the wheels of the car of Juggernaut, or of mothers throwing their children into the mouths of crocodiles, but such acts are tender mercies compared to practices in vogue at the present day among those who claim the highest degree of civilization as yet attained in the history of the world. How much better to die suddenly, all sense of pain being instantaneously crushed out of the body by brute force, than to suffer the prolonged misery of slow suffocation in croup, or the agonies of death by consumption.

The votaries of fashion do not scruple to impose these diseases upon themselves and their children, and although they refuse to believe it, and sin through ignorance, it is willful ignorance, and therefore all the more culpable. Parents who permit young children to go with bare necks, and almost bare legs, in the changeable climate of this latitude, are as heartlessly cruel as the heathen mother who immolates her child; and although the result is not so certain in regard to any particular victim, yet we believe that more children are thus annually sacrificed upon the altar of fashion, in proportion to our population, than are destroyed in the superstitious rites of people who are less culpable, because their ignorance is not the result of obstinate refusal to accept truth and obey its precepts. Not content with subjecting their offspring to the risks of exposure in early childhood above alluded to, fashionable mothers have revived the murderous practice of tight lacing. More than this, public journals have opened their columns to its defence, and books are beginning to make their appearance justifying it, and strongly asserting that it is essential to the attainment of both beauty and health.

It is of no use whatever to reassert facts which are patent to every physician, and which, if listened to, would speedily condemn the wearing of corsets to immediate and total extinction. People will not listen, and to use the words of an English cotemporary, "so long as 'society' is ruled by women of fifty, who want to conceal the obesity which refutes their pretensions to thirty-five," there will be no lack of champions to defend, and examples to encourage the young to adopt the pernicious practice.

Neither is it of use to yield to the temptation which any sensible man must feel, no matter how little given he may be to profanity, to substitute a u for the o, and insert an i before the t, in the word corset, whenever he hears the subject mentioned. To reason or to denounce is equally futile. The only way is to let Steel, Cord, and Whalebone "fight it out on this line," until Viscera and Vitality succumb. Let the "poor ghosts" of women now seen so frequently dragging themselves along through the streets, passionless, colorless (unless bedaubed), useless, listless, waistless, less every thing except pain, increase and multiply. Unfit for wives and mothers, they shall at last feel the weight of the disgust their unnatural practices excite; and as the number of old maids and consumptives increase, peradventure common sense may at last resume its sway.

SMALL PHILOSOPHERS.

The world is full of small philosophers, ready at a moment's notice to give you reasons "as plenty as blackberries" for anything whatever. They as a general thing believe that the changes of the moon have an important influence upon the weather, that if the new moon lies horizontally it is a "dry moon," and if it stands vertically it is a "wet moon." They will generally tell you that the moisture which gathers upon the outside of a pitcher of ice water in a warm day, is the "sweating" of the pitcher; and they believe that a wagon draws easier because the hindwheels are much larger than the others. They are men who believe implicitly in all the traditions of their fathers, and who carry with them through life the prejudices which they imbibed in their youth. Anything no matter how absurd it may be, provided it does not conflict with their preconceived opinions may be palmed off for truth; utterly innocent of logic, the form of a syllogism is sufficient to convince them, the truth of premises or the justness of an inference never being called in question so long as it leaves their prejudices undisturbed. They are fond of glittering generalities, and of high sounding asser-

tions; and words, so long as they seem to mean something, are enough for them without sense.

Upon them charlatans thrive; and it is sufficient evidence that the mass of society is made up of just such people as we have described that so many imposters, in medicine and law, and in politics and religion, are enabled to fatten themselves upon it.

The tendency of mechanical study is to sweep away prejudice, to enlarge and liberalize views, and to induce men to subject to rigid and logical analysis, everything which demands belief. The vast interest which is now shown in mechanical science, is producing a set of hardheaded and determined thinkers, who are not likely to be deceived by such arts as have in past times, so to speak, led the world by the nose.

We see hope for the future in the developments of the present, and even in some of the vicious tendencies of the times we see agencies at work which will, we are confident, effect their own cure. Meanwhile let us all not only hope but labor for the speedy coming of the new era.

THE HAVRE EXHIBITION.

Punctually on the date first announced, the International Marine Exhibition, at Havre, France, was formally opened on the 1st ult., in the presence of the largest assemblage ever gathered in that city. So far as the display of goods was concerned, the exhibition, at last accounts, could not with propriety be called a success, the chaotic state which seems inseparable to the early records of all exhibitions, holding full sway. But if the first impressions were thereby rendered unfavorable, the committee seemed determined to make amends in the opening exercises, by rendering them of a character worthy of so important an event. The ceremonies consisted of the usual laudatory addresses, deemed indispensable on similar occasions, an ode on the history of navigation, and instrumental and vocal music, written expressly for the occasion, and given by an orchestra and chorus numbering about five hundred performers.

The exhibition is of no mean size, the buildings and garden occupying a space of twelve and a half acres. The former consist of closed galleries one story in height, having a more pretentious building at each corner of the square, formed by the galleries, for offices, etc. Inside the galleries, opening upon the gardens, is a covered promenade, monopolized by the representatives—either imported or improvised from native talent—of foreign nationalities, Jews, Turks, Arabs, and Hottentots, where they dispose of trinkets or refreshments, the latter being served in the style with which the representatives are supposed to be the most familiar. The garden boasts of a number of buildings of unique style of architecture. The leading attraction is probably the mammoth aquarium, situated in a grotto beneath what is designed to represent the Island of Fingal with its basaltic columns. The island is surrounded by a miniature sea, in which sport a variety of fishes and a small school of seals.

The number of exhibitors is about three thousand. The two groups of navigation and fishery occupy the front gallery of the building, the place of honor. Here are to be found the models and plans of vessels of every conceivable species and description, rigging for the same, fittings, stores, instruments and charts, systems of signals, boats and apparatus for saving life; also, the chief articles of exportation, the latter comprehending river and sea fishing, with all that appertains to both. These two groups include the goods of seventy-five per cent of all the exhibitors, a much larger proportion than was anticipated, so that nearly the whole of the gallery originally set aside for works of art has been taken for industrial purposes.

The United States is but sparsely represented in the exhibition, and the same may be said of Great Britain; but every thing sent is of first class character. As the exhibition develops we shall present further particulars of novelties displayed.

CHEMICAL NOMENCLATURE AND SYMBOLS.

The chemical nomenclature and symbols now in use were founded by the great Swedish chemist, Berzelius. His large work in six volumes is still a standard authority in chemical science, a remarkable fact when we take in consideration that it is nearly forty years old, and that it treats a modern science, not yet one century old, and which in late years has made enormous progress. Immense additions have been made to the total stock of our knowledge, but no change of any importance has been made in the principles laid down by the great Swede in regard to the facts stated by him, as far as inorganic chemistry is concerned. Organic chemistry was in Berzelius' time only in its infancy, and it required, in later time the genius of a Liebig to elevate this branch to the same level.

Berzelius considered it preferable to use for the chemical compounds the Latin names, as they would be the same for all nations. The idea, however, has not been carried out, but the chemical symbols which he founded on those Latin names have universally been adopted, and are now intelligible to all chemists, in all countries, no matter what language they speak, in the same way that numbers written in our Arabic numerals are equally well understood by the English, French, Germans, or others, and named by each in his own language. The reason is simply that the chemical symbols, like the numerals, do not represent the sounds of the names, but the substance, or objects themselves. They are not phonetic, but objective.

The first letter, or two letters of the Latin name which the elementary substances had at first received, have been adopted as the symbol representing not only the substance, but

also a definite amount in weight of that substance; thus, O stands not only for oxygen, which is the most common substance in nature, but it also stands for 8 parts of oxygen; H stands not only for hydrogen (water generator), but also for 1 part of hydrogen; and the formula H_2O , therefore, means 1 part of hydrogen combined with 8 parts of oxygen, the most common compound existing, and known as ice, water, and steam, according to the amount of heat it contains.

When two or more substances have the same initials, another letter of the name is added to the less frequent one; in the same way as we indicate the different States of our American Union, Mo. for Missouri, and Miss. for Mississippi. Osmium, one of the rare noble metals, is indicated by Os, and Mercury, after the Latin name Hydrargyrum, by Hg. Both symbols standing respectively for 100 parts of the substance.

Ag.	stands for	Argentum (silver), 108 parts.
Al.	"	Aluminum (metal of alum), 14 parts.
As.	"	Arsenicum (metal of arsenic), 75 parts.
Au.	"	Aurum (gold), 197 parts.
B.	"	Boron (similar to coal), 11 parts.
Ba.	"	Barium (similar to calcium), 68 parts.
Bi.	"	Bismuth (similar to tin), 208 parts.
Br.	"	Bromine (similar to chlorine), 80 parts.
C.	"	Carbon (coal), 6 parts.
Ca.	"	Calcium (metal of lime), 40 parts.
Cd.	"	Cadmium (similar to zinc), 112 parts.
Cl.	"	Chlorine (found in salt), 35 parts.
Co.	"	Cobalt (a hard, rare metal), 59 parts.
Cr.	"	Chromium (analogous to iron), 52 parts.
F.	"	Fluorine (analogous to oxygen), 19 parts.
Fe.	"	Ferrum (iron), 56 parts.
I.	"	Iodine (analogous to chlorine), 127 parts.
Ir.	"	Iridium (similar to platinum), 223 parts.
K.	"	Kalium (potassium), 39 parts.
Li.	"	Lithium (analogous to potassium), 7 parts.
Mg.	"	Magnesium (metal of magnesia), 24 parts.
Mn.	"	Manganese (very similar to iron), 55 parts.
Mo.	"	Molybdenum (similar to lead), 96 parts.
N.	"	Nitrogen (part of our atmosphere), 14 parts.
Ni.	"	Nickel (metal), 59 parts.
Na.	"	Natrium (sodium, found in salt), 23 parts.
P.	"	Phosphorus (found in bones), 31 parts.
Pb.	"	Plumbum (lead), 207 parts.
Pd.	"	Palladium (similar to platinum), 107 parts.
Pt.	"	Platinum, 195 parts.
S.	"	Sulphur (brimstone), 32 parts.
Se.	"	Selenium (antimony), 78 parts.
Si.	"	Silicon (found in silicic acid, etc.), 28 parts.
Sn.	"	Stannum (tin), 118 parts.
Str.	"	Strontium (similar to calcium), 88 parts.

The above numbers represent the quantities in weight by which the different substances will mutually combine. As, for instance, 27 parts of iron will combine with exactly 16 parts of sulphur, and the symbol Fe_2S_3 , expresses not only the compound of iron with sulphur, but also the above proportion of quantities. These numbers are called atomic weights or chemical equivalents.

Besides these forty elementary substances, there exist some thirty others, which, being very rare, are omitted here. The whole crust of our globe is made up of different combinations of these seventy elementary substances, of which, however, only fourteen or fifteen constitute the chief mass of the mineral and of the organic world. In regard to the last, the different products of the earth's crust, vegetable and animal, they are chiefly made up of only three or four of these substances, with the incidental combination of the remaining ten.

THE WEST SIDE ELEVATED RAILWAY.

On Friday last the members of the city press were invited to inspect the working of the new elevated railway on Greenwich street. As has been before noted in our columns, the section now completed, running between the Battery and Greenwich street, was built as an experiment, to test the practicability of the plan. On Thursday, the Legislative Commissioners and Governor Fenton examined the railway, and expressed their entire approval of its mode of working.

The road is about one half mile in length, is fourteen feet in the clear above street level, and is supported by cast-iron pillars placed from twenty to forty feet apart. An endless wire cable of three quarters inch diameter, carrying with it a series of small trucks every fifty yards, is put in motion by steam power below ground, midway between the extreme stations. Motion is imparted to the car on bringing a projecting lip below the car floor in contact with the swiftly moving trucks, but by means of a series of leafed elliptic springs, having india-rubber buffers between each, there is far less shock at starting than is experienced in ordinary horse-cars, being hardly perceptible. The car can be stopped at any time by releasing the track and applying the brake. The rails are of the ordinary pattern used on steam roads, and their wheels flanged so that no apprehension need be felt of the cars leaving the track. To make assurance doubly sure, each end of the car is provided with an extra axle and guide wheels with safety flanges. The speed attained on Friday was from ten to fifteen miles per hour. The projectors propose making the wire-cable larger, so that the rate can be considerably increased; other minor alterations and improvements, which the trials have suggested, will also be introduced.

Our city sadly needs increased traveling facilities within its limits. No more surface roads can be accommodated in our streets, and such as now exist are open to serious objections from which both the elevated and underground railways are free. Steam power can be safely applied on these, and increased speed be attained, a great consideration for those journeying morning and night from one end of the island to the other; besides, there is little liability on either road of travel being incommoded or stopped by track obstructions. The friends of the underground road are organized, and tunneling operations will soon begin, and with this section of elevated road actually in successful operation, the

prospect surely brightens for a speedy improvement in city traveling accommodations.

Experiments with Dynamite.

Dynamite, the new explosive agent, manufactured by Mr. Alfred Nobel, of Hamburg, consists of porous silica, saturated with nitro glycerin to the extent of about 76 per cent, the compound forming a powder of reddish yellow color. It is, in fact, nitro glycerin, rendered safe to handle, without any diminution of its prodigious explosive force. As shown in the course of recent experiments, it is as safe as gunpowder against explosion by concussion. Nor does it, under ordinary circumstances, explode on the application of fire, but burns away quite quietly, leaving behind a whitish ash. To produce explosion by fire, the powder must be inclosed in a bore or vessel, perfectly airtight. The portion brought in contact with the flame will simply burn, but when the gases produced by such combustion have accumulated to a certain pressure the remainder will explode. In actual practice the explosive pressure is supplied by a sort of percussion cap placed in contact with the powder, and connected with an ordinary gunpowder fuse. The force exerted by exploding dynamite is said to be about three times greater than that of gun cotton, or some twelve times greater than that of gunpowder. Whatever the exact proportion may be, the power of the new agent is unquestionably tremendous. A couple of table-spoonsful laid quite loose on a thick beam proved sufficient, when fired, to break the timber right across, and project one of the fragments to a considerable distance. A charge of six pounds, exploded in a horizontal bore, brought down about 4000 cubic feet of whinstone rock. Four pounds, fired in a tough rock, produced results which, it is averred, could not have been obtained by any possible charge of gunpowder. In another experiment four tenths of a pound of dynamite were placed in a small bore in the center of a mass of malleable iron, measuring twelve inches by ten. The charge was not plugged in; but even without that advantage, the explosion sufficed to shiver the iron into half a dozen pieces. Still more remarkable was the force exerted in a subsequent trial. A block of wrought iron, measuring nine inches by eight, was placed vertically in the ground, and a quantity of dynamite, covered only with loose rubbish, exploded on its upper surface. The result was to convert what had been a convex surface into a concave one, the mass of iron being at the same time split in several places. A five-ounce cartridge laid on the top of a huge block of whinstone, and covered with a little clay, served, by its explosion, to shiver the block into workable pieces. In addition to the blasting experiments, trial was made of the powder as a means of signaling at sea. For this purpose it seemed highly recommendable—a one-lb. cartridge, suspended by a cord, producing a report like that of a 32-pounder cannon.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING JUNE 30, 1888.

Reported Officially for the Scientific American.

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Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying the fee of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

79,293.—MACHINE FOR CLIPPING HORSES' HAIR.—Patrick Adie, of the Strand, England.

I claim the combination of the toothed plate, A and B, screws, I and J, handle, A, H, with handle or lever, L, K, D, H, the whole constructed and operated in the manner and for the purpose above set forth and described.

79,294.—HOT AIR FURNACE.—James Albee (assignor to Moses Pond and Company), Boston, Mass.

I claim the arrangement and combination of the flue, N, with either or both the pipes, M, the fire pot, A, the drum, F, the conduit, F, the escape pipe O, or its branch pipe, H, provided with a damper as described, the case, I, being furnished with a throat or opening for the passage of the evaporating pan, P, to and from the top of the flue, N, as set forth.

Also, the arrangement and combination of the flue, N, with the case, I, the fire pot, A, the drum, F, the series of pipes, G, and their extensions, G', arranged with the drum and the fire pot, as specified.

Also, the combination of the damper, or the partition, having a hole, O, as described, with the two pipes, M, M', and the flue, N, arranged with the fire pot, the drum, and the case, and combined with the conduit, F, and the escape pipe, O, as set forth.

Also, the arrangement of the evaporating pan and its throat with the flue, N, and the fire pot.

79,295.—KEYBOARD FOR PIANOS, ETC.—J. S. Allen and A. P. Wilkins, Allen's Grove, Wis.

We claim a keyboard to a pianoforte or other musical instrument, to which additional keys, whether one or more series, are employed or arranged for operation upon the ordinary keys of the keyboard, substantially as and for the purpose described.

79,296.—TREADLE FOR SEWING MACHINES.—A. Q. Allis, Dayton, Ohio.

I claim the arrangement upon the frame, A, of the spring, F, on shaft B, the race, C, pawl, D, and gear wheels, E, G, I, J, K, L, driving shaft, B, pulley, H, by which, D, friction pulley, H', brake, B, rod, K, spring, M, treadle, N, and rack, P, as herein described, for the purpose specified.

79,297.—SPINNING MACHINERY.—Robert Atherton and Geo. Singleton, Paterson, N. J., Antedated June 19, 1886.

We claim in silk spinning machinery the combination of the stationary plus B, stationary thimble sp. K, and thread guide traveler, W, with the moving member described and for the purpose set forth.

79,298.—MANUFACTURE OF GLASS WARE WITH HANDLES.—J. S. Atterbury and T. B. Atterbury, Pittsburg, Pa.

I claim a glass lamp, or other article in glass, having a molded or cast handle and a blown body, produced substantially as described.

79,299.—WHEEL.—Dexter Avery, Westfield, Mass.

I claim as a new article of manufacture, a wheel having its covering woven with a web and warp, as herein described, for the purpose specified.

79,300.—HARVESTER.—Darius Babcock, Warsaw, Ill.

I claim, 1st, The drum-shaped frame, A', in combination with the dome, A, as shown and described and for the purposes set forth.

2d, The annular frame, P, in combination with the frame, A', and the axle, M, substantially as shown and described, and for the purposes set forth.

3d, The combination of the axle, M, gear wheel D, pinion, C, shaft, B,

crown wheel, A, pinion, E, and shaft, H, with the frame, P, all constructed arranged, and operating substantially as and for the purposes set forth.

4th, The frame, F, in combination with the lever, L, and chute, and arm, I, substantially as shown and described and for the purposes set forth.

5th, The hook, G, in combination with the arm, I, and any B-stable bar, R, substantially as shown and described and for the purposes set forth.

79,301.—BROADCAST SOWER.—Alfred B. Beaumont, Grand Rapids, Mich.

I claim, 1st, The adjustable disk, K, K', for regulating the discharge of the grain, substantially as and for the purpose shown and described.

2d, The screw, S, in combination with the disk, K, K', substantially as and for the purpose shown and described.

3d, Arm, M, substantially as and for the purposes shown and described.

4th, Arm, M, substantially as and for the purposes shown and described.

5th, The slot, V, on the arm, M, substantially as and for the purposes shown and described.

6th, The spring, V', on the arm, M, substantially as and for the purposes shown and described.

7th, Operating the disk, K, by means of a rod, M, spring, S', lever, P, and hook, T, or other equivalent devices, substantially as and for the purposes shown and described.

8th, The sowing cone, K, substantially as and for the purposes hereinbefore shown and described.

9th, The arms, M and N, of the cone and hopper, substantially as and for the purposes shown and described.

10th, Constructing a scattering wheel, I, with a central opening, K, and channel, O, whereby the grain can pass into a portion of its said channels, substantially as and for the purposes specified and shown.

11th, The cylindrical slides, P, of the disk, K, for the purpose of retaining the latter in the throat of the hopper, whereby the said disk is permitted to partially rotate, substantially as and for the purposes hereinbefore described.

12th, The bevel wheel, F, on the axle, X, and connected with an independent ratchet disk, F, substantially as and for the purposes hereinbefore shown and described.

13th, The hollow pulley, H, with its bevel wheel, G, within it, in combination with a grain sowing machine, substantially as and for the purposes shown and described.

14th, The coupling devices, I, I', in combination with a grain-growing machine, substantially as and for the objects shown and described.

15th, The disk, K', attached to the cone, K, and provided with openings for dropping the grain or plaster, substantially as and for the purposes shown and described.

79,302.—BED SPRING.—Henry Beyrodt, Louisville, Ky.

I claim the combination and arrangement of the outer cylinder, No. 3, the spiral spring and its covering, No. 4, and the presser, No. 5, constructed and operated in the manner as shown and described and for the purposes set forth.

79,303.—GILDING AND ORNAMENTS GLASS SIGN.—J. B. Blair, Philadelphia, Pa.

I claim the production of duplicates in plain or ornamental gilding or painting, substantially as and for the purposes set forth.

79,304.—CULTIVATOR.—A. R. Blood, A. Hathaway, and V. R. Beach, Independence, Iowa.

We claim, The levers, J, J', strips, A, a bar, L, and pivoted frame, I, when all are arranged and operating substantially in the manner and for the purpose set forth.

2d, The set screw, H, seed slide, B', levers, J, J', strips, A, a bar, L, H, pivoted frame, I, all combined and arranged as and for the purpose described.

79,305.—CRUTCH.—A. E. Bowen, Baltimore, Md.

I claim, 1st, An adjustable crutch, constructed in the manner and for the purpose as herein set forth.

2d, The combination of the legs, A, A' and B, B', the thumb-screws, T, the elastic top or arm-rest, and the elastic bottom of the crutch.

79,306.—WRENCH.—Wm. Bradshaw and Charles Lyon, Delph, Ind.

We claim the open-backed jaw, E, in combination with the links, b, and shafts, G, substantially as described for the purpose specified.

79,307.—NAIL EXTRACTOR.—J. D. Breathitt, Cooper county, Mo.

I claim the fulcrum, B, of the nail extractor, A, when pointed at its lower end, and adapted to be adjusted longitudinally of the extractor, A, to increase or decrease the leverage of the latter, as herein described for the purpose specified.

79,308.—DOOR BELL.—Asa T. Brooks, New Britain, Conn.

I claim, 1st, An oscillating arm, K', and vibratory cam, A, secured and oscillating both upon the same stud pin, D, in combination with the arms, A, K, substantially as described.

2d, In combination with the above, the angle lever, V, oscillating upon the pin, D, all arranged and operating substantially as and for the purpose described.

79,309.—RAILROAD RAIL.—R. M. Brooks, Griffin, Ga.

I claim the combination of the railroad rails, A and B, provided with corrugated flanges, a and b, and fitted together, substantially as and for the purpose set forth.

79,310.—WASH BOILER.—Stephen Buynitzky, St. Petersburg, Russia.

I claim a loose plate, C, provided with the guides, E, or their equivalents, substantially as described, to be placed on the top of the clothes in the wash boiler, for the purposes set forth.

79,311.—WAGON BODY.—Matthew M. Carr (assignor to himself and Thomas S. Carr), Hingwood, Ill.

I claim the combination of the angled sections of the bottom, C, D, E, the bars, F, pivoted as described at H, the springs, J, latch, S, I, lever, K, cords or chains, G, and N, and levers, L and M, all arranged and operating in the manner set forth.

79,312.—STOVE GRATE.—Gardner Chilson, Boston, Mass.

I claim the square or rectangular grate, as a whole or curved both longitudinally and laterally, and having its side bars, b, secured or made deeper at their middle than at their ends, as represented.

Also, the combination and arrangement of the elbow of the grate arm, with such arm and the grate, constructed and disposed relatively to each other, substantially as specified.

79,313.—APPARATUS AND PROCESS FOR MAKING STEEL.—T. J. Chubb, Williamsburg, N. Y., Antedated Dec. 30, 1887.

I claim, 1st, The construction of a series of decarburizing and carbonizing retorts or chambers, A, A', arranged so as to prevent the gases from the heat-producing fuel from coming in contact with the ore or the materials in the retort, in combination with a melting chamber for the purposes set forth.

2d, The arrangement of the melting chamber, B, B', with openings and doors at both ends, in such a manner as to facilitate the manipulation of the ore or metal, under treatment from both ends, substantially as described.

3d, Making provision for feeding loose ore and metallic and other substances in at one end of the melting chamber or furnace, B', and tapping the molten metal at the other end, substantially as described.

4th, Making provision for conducting heated air and gases over the ore or molten metal, said air and gases entering at one side or end of the said melting chamber or furnace, and passing out at the sides or other end thereof, for the purpose of reducing said ore, metal, or metallic substances therein into a liquid or molten mass, substantially as described.

5th, Making provision for shielding the ore, metal, and other substances from the direct action of the gases of the fuel, by means of the molten metal in a melting chamber from the direct action of the air, flame, and gases of the fuel, floating shields, or an equivalent refractory substance or substances floating on the top of the metal, as described.

6th, Making provision for skimming off the surface of molten metal by floating scrapers, or their equivalents, substantially as described.

7th, Making a separation of the dross or upper layer of substances floating on molten metal by the means herein specified and described.

8th, The construction of a vessel or melting chamber of a furnace, so arranged that it may be heated solely from above, by which means the metal therein becomes fully melted into a liquid state previous to skimming, tapping, and drawing off the same, substantially as herein described.

9th, Making provision for and effecting the melting of metals by heat applied through an air-heating and gas-heating or reheating furnace, chamber, or apparatus, in separate currents.

10th, Providing for keeping the under side of the melting chamber, or chambers in which the melting chamber or vessel is placed, cool, or from melting or leaking, by the arrangement of a cold air chamber or space below the same, C.

11th, The employment of slats or arch pieces, T, T', for the purposes set forth.

12th, The employment of scrapers or skimmers, S, S', or their equivalent, for the purpose set forth.

13th, The employment of floating fire shields and heat conductors, S, S', or their equivalent, for the purpose set forth.

14th, Constructing slats, arches, and shields with an uneven or irregular surface on one or both sides thereof, for the purpose set forth.

15th, The method or process of refining metals and separating the dross and other extraneous matter from the surface of molten metal by mechanical power and appliances, or of inserting of refractory or infusible colder substances than the dross and scum, cooling and congealing them so that they may be skimmed or removed from the surface of the molten metal, substantially as set forth.

16th, Making provisions in the construction of a melting chamber of a furnace for reducing iron into such a liquid state by igneous fusion that it highly carbonized iron ore, or pig iron, cast or wrought iron, or other iron or steel, may fuse and mix with each other, and the impurities and surplus carbon, silicon, and other matter that is not essential to the production of good cast steel, may be floated and removed from the surface of the molten steel, refining and running the same into vessels or molds, substantially as described.

17th, Obtaining cast steel, or products of any degree of malleability or ductility, by melting together in a vessel or chamber in a furnace, combinations of pig iron and wrought iron, or of nature or partly natured iron and cast iron, and using, mixing, refining, and running the same into molds, substantially as described.

18th, The production of cast steel by mixing together, in a fixed or stationary melting vessel, chamber, or furnace, cast iron and iron ore, when such iron has been previously reduced, or natured, or partly natured, or carbonized in a separate vessel, retort, or furnace, and when mixed with manganese or titanium, or the ores or compounds thereof, and fusing, mixing, and running the same into molds.

19th, The production of cast steel by first melting the iron or metal containing the most carbon in a stationary vessel, and adding the metal or ore containing the less carbon to the molten metal, and when the whole is reduced to the proper consistency of cast steel, running the same into molds.

20th, Effecting a continuous process of making cast steel from iron ore by submerging it into a bath of molten cast iron or highly carbonized iron, whereby the whole will be liquified and brought to the consistency of cast steel and refined and run into molds.

79,314.—MAKING STEEL DIRECT FROM THE ORE.—Thomas J. Chubb, Williamsburg, N. Y. Antedated Jan. 15, 1868.

I claim, 1st, The arrangement and employment of fuel supporters, a, a, and d, a, for the purpose set forth.

2d, The arrangement and employment of stirrers and conveyers, b, b, b, for the purpose set forth.

3d, The process of decomposing mineral substances by currents of heated gas or gases passing through and among finely divided particles of the same, substantially as described and herein shown and for the purpose set forth.

4th, The carbonization of iron or iron sponge, or the metallic particles therein by a current or currents of heated gas or gases, as herein described, passing through and among finely divided particles of the same, substantially as described.

5th, The steel melting chamber, C, in combination with a heat-reclaiming apparatus, or a gas-regenerative, or a gas and heat-reclaiming apparatus or furnace.

6th, The process of making cast steel, in combination with a heat-reclaiming and regenerative apparatus or furnace.

7th, The employment of aluminum substances, such as fire clay crucibles, as a substrate for plumbago crucibles, for making or melting steel therein, in combination with a gas-generative furnace and a heat-reclaiming apparatus.

8th, The employment of a stationary melting chamber, vessel or furnace, in combination with the apparatuses employed in the process of decomposition or deoxidizing iron ore, and carbonizing the metallic particles thereof.

9th, The employment of a stationary melting chamber, vessel, or furnace, in combination with the process or processes of decomposing or deoxidizing iron ore, and carbonizing the metallic particles thereof.

10th, The process herein described of decomposing or deoxidizing iron ore and carbonizing the metallic particles thereof.

11th, The process herein described of making cast steel direct from the ore.

12th, The employment of coal tar, rosin, petroleum oil, or the gas or gases thereof, for the purpose set forth.

13th, The employment, in the deoxidizing chamber, in combination with carbon, of ammonia, or some ammoniacal compound, or of fusible compounds of cyanogen, or the gas or gases therefrom, to facilitate the conversion of iron ore or iron or steel sponges, into molten or cast steel, substantially as described.

14th, The employment of the chamber, A, in the manner described, and the apparatuses and process employed therewith, for the purpose set forth.

15th, Deoxidizing and carbonizing iron ore in a chamber separate from and previous to melting the same in a cupola or a blast furnace, substantially as described.

16th, The combination of the process or processes of deoxidizing and carbonizing iron ore with the process of reducing and melting the metallic particles thereof, in a cupola or a blast furnace.

17th, The arrangement of a melting or refining and refining chamber, as described, in combination with a cupola or a blast furnace, (figs. 3 and 4).

18th, The combination of the process of reducing iron ore, and melting the metallic particles thereof in a cupola or a blast furnace, with the process of melting or refining and refining, substantially as herein described.

19th, Producing refined iron or steel by the process of deoxidizing and carbonizing the ore in a separate chamber, and melting the metallic particles thereof in a cupola or a blast furnace, substantially as described and shown, (figs. 4 and 6).

20th, Producing refined iron or steel by the process of reducing the ore, and melting the metallic particles thereof in a cupola or a blast furnace, and reheating and refining the same in a melting or refining and refining chamber, substantially as herein described.

21st, The arrangement or employment of an air heating and gas heating or reheating apparatus, in combination with a cupola or blast furnace, for the purpose set forth.

22d, The arrangement or employment of an air heating and gas heating or reheating apparatus, in the process or processes of deoxidizing and carbonizing iron ore, substantially as herein described.

23d, The employment of the chamber, C, in the manner described, and the apparatuses and process employed therewith, for the purpose set forth.

79,315.—CAR STANDARD.—Robert Clarke, Mount Vernon, Ohio.

I claim the box, A, provided with the side supports, G, G, and confined to the car by means of the stirrup, B, and the pin, E, when used in combination with the standard, D, which is provided with a slot, a, through which the pin E, passes, as and for the purpose set forth.

79,316.—IMPLEMENT FOR SHARPENING THE CALKS OF HORSE SHOES.—Henry M. Close, Charlton, Iowa.

I claim, 1st, The jaw, D, with the block, E, and the upright, F, substantially as specified.

2d, The combination of the cutter, H, block or rest, E, and set screw, G, substantially as and for the purpose described.

79,317.—COW MILKING MACHINE.—L. O. Colvin, New York City.

I claim, 1st, A pump cylinder, for actuating a cow milking apparatus, having a variable oscillating movement imparted to it, substantially as and for the purpose described.

2d, The combination, with a pump having a variable oscillating movement, substantially as and for the purpose described, of the tubes, E and E', for supporting the milkers, and communicating the various motions to the same, as herein described and for the purpose set forth.

3d, The combination of the tubes, E and E', of the caps, d and d', bracket, a', set screw, d', and pin nut, when constructed and arranged substantially as and for the purpose described.

4th, The combination, with a pump piston rod, of the bent arm, c, pivoted to the end of a bent hand lever, D, and oscillating joint, a, substantially as and for the purpose described.

5th, The stall, constructed as described, in combination with the cow milking device, as herein set forth and for the purpose specified.

6th, The combination with the oscillating cylinder, A, of the pipe, E, when joined to the same in the manner described, as and for the purpose described.

7th, A pump cylinder for the cow milking apparatus, to which the same is connected, as described, provided with a swivel joint, d, whereby the cylinder may be susceptible of oscillation on its axis, substantially as and for the purpose described.

79,318.—WATER CLOSET AUTOMATIC SUPPLY REGULATOR.—George Connon, New York City.

I claim the combination and arrangement, with relation to the bowl, A, and discharge bowl, B, L, of the chambers, E, C, H, valve, G, float, D, lever, a, rod, b, c, valve, d, and box, I, having the shoulder, j, and opening, e, f, adapted to communicate with the supply pipes, J, K, substantially as herein shown and described, for the purpose specified.

79,319.—HORSE SHOE CALK SHARPENER.—Richard Crocker, Marshalltown, Iowa.

I claim the combination of the lever, B, provided with the cutting edge, a, the lever, D, provided with the abutment, c, and face, b, said lever, B, with cutting edge, a, lever, D, with abutment, c, and face, b, being combined, operating as described, and for the purpose set forth.

79,320.—SAD IRON HANDLE.—S. H. Cummings, Norway, Me.

I claim, as a new article of manufacture, the handle, B, formed of a single piece of wire, which is bent and coiled to form vertical columns, the horizontal central portion being left plain, for the application of the part, C, a, id handle, being also provided with the shield, D, all as herein shown and described for the purpose set forth.

79,321.—METALLIC REED FOR MUSICAL INSTRUMENTS.—C. N. Cutter (assignor to Davis, Hill & Co.), Worcester, Mass.

I claim a metallic reed for musical instruments, in which the tongue of the reed and frame, or part to which the same is attached, are combined with an interposed rubber or other elastic packing, substantially as and for the purpose shown and set forth.

79,322.—METALLIC REED FOR MUSICAL INSTRUMENTS.—C. N. Cutter (assignor to Davis, Hill & Co.), Worcester, Mass.

I claim, 1st, The combination with the base, a, of the tongue, B, and the main or frame part, A, of a holding staple, clasp, or loop, substantially as and for the purposes set forth.

2d, The combination with the tongue, B, and frame or base, A, of the clasp C, having projections, b, b, and shoulders, d, d, substantially as and for the purposes set forth.

79,323.—COMPOUND LENSES FOR PHOTOGRAPHIC USE.—John Henry Davenport, Middlesex county, England. Patented in England, September 23d, 1867.

I claim the double combination lens, composed of two positive achromatic or astigmatic combinations, each having the higher refracting denser material at the exterior.

2d, Also, the construction of the double combination lens, with the denser higher refracting material at the exterior, and with the posterior achromatic combination of smaller diameter than the anterior combination.

79,324.—LETTER POUCH.—P. Davis, Newport News, Va.

I claim a letter pouch, having its exterior lined or ruled off, with addresses printed or written thereon, substantially as shown and described.

79,325.—CAR REPLACER.—Rees Davis, Utica, N. Y.

I claim a railroad car replacer, constructed of wood and iron, with the frogs of different lengths, arranged and adapted to the rails, substantially as described, and for the uses and purposes mentioned.

79,326.—LUBRICATOR FOR NAIL MACHINES.—Lucius A. Dodge, Keeseville, N. Y.

I claim the stock, A, provided with the chamber, C, the wick-chambers, C', and C', passages, d, d, and the set screws, a, a, substantially as and for the purpose described.

79,327.—HAY LOADER.—N. B. Douglas, Cornwall, Vt.

I claim, 1st, The removable frame, G, attached to a frame, F, hung on the rear axle of the wagon, in combination with the toothed belt, o, and the discharger, A, all arranged to operate in the manner substantially as and for the purpose set forth.

2d, The rake head, s, hung to the frame, G, in such a manner that by freeing the springs, u, upon the head, from the scope, w, upon the frame, the rake, J, can be turned up and rendered inoperative, as herein shown and described.

79,328.—HORSE HAY FORK.—James Drinkwater, Adams, Ohio.

I claim the combination of the handle, G, latch, H, spring, I, notch, L, and trigger, K, with the hay fork, as herein described, for operating substantially as set forth.

79,329.—SKATE.—Stafford A. Du Bois, Chicago, Ill.

I claim, 1st, A skate, made in two separate and distinct parts, one to be attached to the heel of the boot, and one to the sole thereof, substantially as herein set forth.

2d, In combination with the plates, H and F, of the skate, the flanges, M and J, and the thumb screws, L, when constructed and operating substantially as described.

79,330.—RELAY MAGNET.—Charles Durant (assignor to Geo. F. Durant), Jersey City, N. J.

I claim, 1st, The application of a spring or springs, a cushion or cushions, or other elastic substance, to the contact arm of a relay machine, substantially as and for the purpose set forth.

2d, The shield or protector, B, for the contact wire, L, substantially as and for the purpose herein shown and described.

79,331.—RELAY MAGNET.—Charles Durant (assignor to Geo. F. Durant), Jersey City, N. J.

I claim, 1st, The jaws or fork in the armature or armature lever, of an electric

tro magnetic relay machine, substantially as and for the purpose herein shown and described.

2d, The jaws or fork in the post, B, substantially as and for the purpose herein shown and described.

3d, The spring, C, applied substantially as and for the purpose herein shown and described.

79,332.—BROADCAST SEEDER AND CULTIVATOR.—George Easterly, Whitewater, Wis.

I claim, 1st, The construction of the cap, F, with an upwardly flaring throat d, with a hollow projection, d', for receiving a packing, I, and also with a discharge passage, f, substantially as described.

2d, The construction of the bearing, G, with discharge openings, h, and f, through its bottom, a-d, with a recess on one side of it, over opening, h, for receiving the circular flange, S, said bearing being applied to the cap, F, and adapted to serve, in conjunction therewith, as a receptacle for the rotary distributor, J, and cylindrical cut-off, J', substantially as described.

3d, The flange, S, with segmental projections, S', in combination with the distributor, J, and cut-off, J', arranged to operate substantially as and for the purpose described.

4th, Applying the distributor, J, and cut-off, J', loosely upon its shaft, K, in combination with the cap, F, and bearing, G, substantially as described and for the purpose set forth.

5th, Constructing conical scatterers, I, for seed discharging tubes, with circular or corrugated surfaces, their surfaces, substantially as described.

6th, The combination of the driving wheel, N, pinion, K, chain, n, n', and lever, P, with the device, K, K', for regulating the discharge of seed, substantially as described.

7th, The construction of the plate, E, with the lateral offset, e, serving as an end bearing for the rod, D, for carrying drag bars, D, substantially as and for the purpose described.

8th, The adjustable clamp stops, pivoted to the standards, D, D', when such stops are so constructed as to resist or binary backward pressure against the hose, and also to allow the standards to slip backward when subjected to an extraordinary pressure, substantially as described.

79,333.—PUMP FOR OIL WELLS.—Mandana D. Fenner, Rochester, N. Y.

I claim an apparatus for washing or producing an agitation in a well, consisting of a tube opening directly into the liquid of the well, and having a solid piston, in combination with an elevated tube having a valve at its top, when the plunger and piston have an inequality of leverage, substantially as described.

79,334.—BRIDLE.—E. R. Ferry, New Haven, Conn.

I claim, 1st, The levers, f, f', fitted loosely on or permanently attached to the bar, o, of the bit, and having a curb strap or chain, j, attached to their upper ends, in connection with the reins D, D', passing through the outer ends of the levers, f, and passing over pulleys, c, at the upper part of the bridle, and down the bit, all arranged to operate in the manner substantially as and for the purpose set forth.

2d, The springs, E, E', and stops, k, applied to the reins, D, D', in connection with the levers, f, f', and pulleys, c, on the bridle, all arranged substantially as and for the purpose specified.

3d, The application of the pulleys, c, with or without the pulleys, b, in connection with the reins, D, D', arranged substantially as and for the purpose set forth.

79,335.—ENAMELED METALLIC ICE PITCHER.—Charles C. Foote (assignor to Meriden Britannia Company), West Meriden, Conn.

I claim coating the inside of metallic ice pitchers with enamel, by applying the enamel in a liquid state to the metallic inner surfaces, substantially as herein shown and described.

79,336.—HORSE PICKER.—Henry Fornecrook, F. J. Shepperd, and Andrew Garton, Watertown, Wis.

I claim, 1st, The manner of adjusting the incline of the bolt, F, by means of the movable strip, a, in combination with the jack, z, suspended to the frame by one screw upon each side, substantially as herein shown and described.

2d, The combination and arrangement of the picker, B, cleaner, D, bolt, F, shaker, H, and feed rollers, O, O, and P, in the manner and for the purpose substantially as herein set forth.

3d, In combination with the above, the elevator, M, arranged substantially as herein specified.

79,337.—COMPOSITION FOR KALSOMINING WALLS, ETC.—N. A. Frank, Chicago, Ill.

I claim a kalsomine composed of the ingredients herein named, and compounded substantially as specified.

79,338.—MACHINE FOR PRESSING HATS.—Wm. E. George, Wrentham, Mass.

I claim the combination and arrangement of the socket piece, m, the head, G, the diaphragm, l, the elastic covering, i, and flanged ring, q, of the die, the said socket piece, m, and flanged ring, v, being connected substantially as described.

And for use with the steam chest, C, when combined with a mold and die, and mechanism for forcing the die into the mold for the purpose of pressing a hat, the combination, substantially as described, for fastening a mold, B, to the mold of the steam chest, the same consisting of the flange, a, the annulus F, the clamp ring, E, the screws, g, the projections, e, of the flange, d, and notches, f, of the said ring, the whole being arranged in manner and to operate substantially as described.

The combination of the presser or elastic die with the head, G, by the tenons, s, their pins and holes the same being so arranged as to enable the said presser or die to be readily removed from the head, G, without disturbing the connection of the diaphragm and the elastic covering of the presser.

79,339.—REGISTER FOR RAILROAD CARS.—P. S. Gerhart, Philadelphia, Pa.

I claim the combination of a turnstile with pending arms, with any car or other vehicle, the whole constructed, arranged, and operating in the manner as and for the purpose above set forth and described.

79,340.—MODE OF REPAIRING BARRELS.—Edmund W. Gillman, Hunt's Point, N. Y.

I claim the hoop, B, slotted to receive the adjustable grips, C, D, and provided with lugs adapted to be drawn together by means of the screw, E, substantially as and for the purpose set forth.

79,341.—LOCOMOTIVE STEAM ENGINE.—Anton Hatupel and John Reinhardt, Philadelphia, Pa. Antedated June 15, 1868.

We claim, 1st, A valve regulating wheel or disk, M, in combination with the shaft, D, having notches, d', movable collars, P, Q, key, S, and bar, F, all arranged and operating substantially as herein set forth.

2d, The combination with the movable collars, P, Q, of the releasing trigger, O, lever, N, and forks, n, o, with their described connections, substantially as herein set forth.

3d, The shaft, L, D, friction rollers, L, L', and vibrating levers, K, K, in combination with the wheel, M, for communicating motion to the valves, substantially as described.

79,342.—APPARATUS FOR HOPPING BEER.—Wm. S. Haight, Watertown, N. Y.

I claim, 1st, Arranging a rotary stirrer, F, f, in a hopping apparatus, between two perforated shelves, D and E, substantially as herein shown and described.

2d, The arrangement in a beer hopping apparatus of the discharge pipe, H, a-d, over flow pipe, L, both arranged substantially in the manner herein shown and described, the overflow pipe entering the discharge beyond the tap, g, in the latter, as set forth.

3d, A beer hopping apparatus consisting of the box, A, air tight cover, B, perforated false bottom, D, and perforated false cover, E, of the stirrer, F, discharge pipe, H, overflow pipe, L, and aroma, conductor, J, all made and operating substantially as herein shown and described.

4th, Making the stirrer shaft, F, removable, by suspending one end upon the pin or arbor, e, of the driving crank or pulley, substantially as herein shown and described.

5th, The application of the plug, L, or its equivalent, through the real and false bottoms of the box, A, for the purpose of facilitating the discharge of the spent hops, as set forth.

79,343.—HOSE COUPLING.—Wm. Hamilton, Chicopee, Mass.

I claim the combination of the two parts of the coupling, each having a lip, R, and rim, A, with the fastening pin, D, with split slot, d, and eccentric face, J, the parts being constructed and arranged together substantially as herein given.

79,344.—CULTIVATOR.—Major E. Hanover and David D. Bailey, Lamelle, Ill.

We claim, 1st, The frame, C, constructed and arranged substantially as herein shown and described, in combination with the axle, B, as and for the purpose set forth.

2d, The combination and arrangement of the pivoted oblique beams, P, connecting bars, U, levers, V, and connecting rods, W, with each other and with the frame, C, and axle, B, substantially as herein shown and described and for the purpose set forth.

3d, The combination and arrangement of the hounds, D, frame, C, lever hoods or catenae, coiled or equivalent spring, F, and operating rod, G, with each other, substantially as herein shown and described and for the purpose set forth.

4th, The combination of the angular or bent brace parts, T, with the pivoted plow beam, P, axle, B, and frame, C, substantially as herein shown and described and for the purpose set forth.

5th, The bent levers, A, A', pivoted at their angle points to the axle, B, in combination with the connecting rod, B', in rear of the axle, B, draft rods, C', horizontal bars, clamping bars, D, and slotted vertical arms, D', all operating as described, for the purpose specified.

79,345.—PAPER SHEARS.—Alfred Hathaway, Charlestown, Mass.

I claim, 1st, The mechanism for securing the cutting action of the blade, E, by means of a series of pins acting in slots, F, and G, shaped as set forth, and located in arms attached to the lever, D, substantially as described.

2d, Shear blades when one or both are denticulated upon the edge, and they are united by self-adjusting fulcras, substantially in the manner and for the purpose set forth.

3d, The combination of the stationary block, B, and lever, D, with adjustable blocks, C, C', and levers, d, d', the latter being connected with the lever D, by intermediate levers and rods, that they may be operated simultaneously with the latter by a single movement, substantially as and for the purpose set forth.

4th, The combination of the lever, D, and denticulated shearing blade, E, substantially as and for the purpose set forth.

79,346.—HAMMER.—Peter C. Havely and Wm. W. Coggeshall, Henselerville, N. Y.

We claim the implement herein described, consisting of the hammer, B, adze, E, nail holder, a, claw, F, movable jaw, G, notched socket, C, granulated handle, A, and removable screw-driver, D, all constructed and arranged to operate in the manner as herein set forth.

79,347.—CLAMP HOOK.—Daniel Hayes, Cambridge, Mass.

I claim the application to iron hooks of a class or bar, slanted to said hook as shown and being attached to the outside of aforesaid hook, in the manner above set forth.

79,348.—COMBINED STOVEPIPE, OVEN, AND WATER HEATER.—Reverend Dixon, Ill.

I claim, 1st, Constructing a heater, C, without an inner wall, so that the oven or boiler forming the inner wall thereof may be exposed to the direct action of the heat in the flue, substantially in the manner and for the purposes herein specified and shown.

2d, In combination with a heater constructed substantially as described, an oven, D, arranged to operate as and for the purpose set forth.

3d, In combination with a heater constructed as described, a boiler, F, constructed so as to form the inner wall of the heater, substantially as and for the purpose specified.

79,349.—CHURN AND ICE CREAM FREEZER.—Charles Higley, Port Byron, N. Y.

I claim the receptacle, F, constructed as described, with double walls and bottom, forming a water or ice chamber, H, having no communication with the interior of the receptacle, and closed at the top by means of the annular flange, I, beneath which, within the receptacle, upon one side, the curved spoon, L, is suspended, as herein described, for the purpose set forth.

79,350.—DRESS PROTECTOR.—Theodore Himes, New Albany, Ind.

I claim the dress protector consisting of the drawers, D, leggings, E, double covering, A, B, attached to the drawers, and skirt, I, all held up and supported by straps from waistbands, f, g, substantially as and for the purpose set forth.

79,351.—SHINGLE MACHINE.—Miller J. Hine, Equality, Ill.

I claim, 1st, The combination of the circular toothed wheel, F, pinion wheel, G, vertical shaft, H, ratchet wheel, P, saw, O, arm, N, rock shaft, M, arm, L, connecting bar, K, and crank wheel, J, with each other and with the carriage, D, and block, A, all constructed and arranged to operate substantially as herein shown and described and for the purpose set forth.

2d, The combination of the sawed screw, B', and sliding bed plate, C', with the carriage, D, and block, A, substantially as herein shown and described and for the purpose set forth.

79,352.—MEDICAL COMPOUND.—A. J. Hobbs, Van Wirt, Ga.

I claim the medicinal compound substantially as above set forth.

79,353.—MATCH SAFE.—Alfred Hoyt, New York City.

I claim a match safe formed of the parts, A, B and C, constructed, arranged and operating substantially as herein shown and described.

79,354.—FLOUR BOLT.—Jos. G. Humes, Gravios Mills, Mo.

I claim the construction and arrangement of the radial arms, n, all set to the bosses, a, the adjustable screw bolts, B, and adjustable eye bolts, c, whereby the bolting cloth is strained radially and longitudinally, as herein described, for the purpose specified.

79,355.—LETTER BOX.—D. P. Jordan, Chicago, Ill.

I claim the letter box, C, in combination with the box, A, when constructed and operating substantially as shown and described, for the purposes set forth.

79,356.—CLEANING AND BORING DEVICE.—John B. Jordan, Aurora, Wis.

I claim, 1st, An apparatus for boring and cleaning wells, consisting of the metallic cylinder, A, shaft, D, with angled lips, F, provided with flanges, F, and valves, c, constructed and arranged to operate substantially as herein described.

2d, In combination with the cylinder, A, shaft, D, with the angled lips, F, provided with flanges, F, and valves, c, the scraper, G, with its adjustable wings or curved arms, e, when constructed and arranged to operate substantially as herein described.

79,357.—BOOT-CRIMP.—F. L. Kathan and E. D. Rummer, Roscoe, Ill.

We claim the combination of the hinged crimp, A, A', block and screw, D, in the gripes, C, C', when arranged, constructed, and operating as herein described, and for the purposes as set forth, as an article of manufacture.

79,358.—MAKING SOAP.—J. L. Klein, New York City.

I claim a new and improved process for making soap, as herein described, using for that purpose the aforesaid ingredients or compositions of matter, or any other substantially the same, and which will produce the intended effect.

79,359.—MACHINE FOR DRESSING MILLSTONES.—Azul Lane, Addison, N. Y.

I claim the combination with the platform, A, provided with a rack bar, B, of the shaft, C', provided with the sliding blocks, C, C', and pinions, F, substantially as and for the purpose set forth.

79,360.—MACHINE FOR ROLLING LEATHER.—Wm. H. Leach (assignor to Bradford Weston) Uxbridge, Mass.

I claim the arrangement of the lever frame, C, provided with the projections, c, and the compound lever, C' D' T, when the parts are constructed and made to operate the roller, B', as and for the purpose set forth.

2d, The flanges, d, d, on the bearings, b, of the lever frame, C, as and for the purpose set forth.

79,361.—PIPE WRENCH.—R. H. Lecky, Allegheny City, Pa. Antedated June 13, 1868.

I claim a pipe wrench and cutter combined in one instrument, constructed and arranged and operating substantially as herein described, and for the purpose set forth.

79,362.—BRICK MACHINE.—W. O. Leslie, Philadelphia, Pa.

I claim,

34. The peculiar arrangement and combination of the principal plate, B, with cam faces, K, and working lever, L, the plate, A, with cam faces, N, the plate, C, the block, D, and the clamp, E, the several parts being constructed and arranged substantially in the manner and for the purpose herein specified.

35. The peculiar arrangement and combination of the frame, K, with block, D, and arms, A and C, the die clamp, E, with arms, F and G, and the clamp lever, H, with slot, I, the several parts being arranged in the manner and for the purpose herein specified.

79,439.—POTATO DIGGER.—John W. Blodgett, Three Rivers, Mich.

I claim, 1st, The endless belt, G, constructed as shown and described.

2d, The sleeve, M, in combination with the disk, A, shown and described, arm, O, elbow lever, P, standard, S, and connecting rods, R and L, all constructed and arranged substantially as specified.

79,440.—ELECTRO MAGNETIC BURGALAR AND FIRE ALARM.—

Edmund Hunt, Jr., Bay Ridge, N. Y.

I claim, 1st, Combining with the armature, F, the springs, G, substantially as and for the purpose specified.

2d, The circuit breakers, J, formed of one or more strips of metal, secured substantially as described.

3d, Combining with the slab, provided with the openings and screw caps, G and T, the armature, H, coils, S, switch, I, and buttons, I, and I, when the same shall be combined and operated substantially as shown, for the purposes indicated.

4th, Combining with the door the spring, J, plate of metal, S, and the regulating screw, A, connected and operating substantially as described.

5th, Combining with the drum, B, the disk, I, when the same shall be combined, constructed, and operated substantially as described.

6th, In combination with the subject-matter of the third claim, the door and alarm, when the same shall be combined and operate substantially as and for the purpose specified.

7th, In combination with the subject-matter of the third claim of claim, the window and alarm, when the same shall be combined and operate substantially as and for the purpose specified.

8th, In combination with the subject-matter of the third claim of claim, the drum, B, and disk, I, when the same shall be combined and operate substantially as described.

79,441.—PAPER FILE.—John W. Boughton, New York city.

I claim a paper file, consisting of one or more pieces of pasteboard or other suitable material, having notches or recesses cut in its edge, for the reception of ordinary elastic bands, with the bands applied thereto, all substantially as described.

79,442.—SPIKE MACHINE.—James Dryson and Alonzo Potter, New Canaan, Pa.

We claim, 1st, The sliding plate, K, when provided with the arms, m and n, or their equivalents, in combination with cutter, F, and guide, O, all arranged and operating in the manner and for the purpose set forth.

2d, A slide or sliding arm, n, arranged on the bed of the machine, as described, in combination with its operative mechanism, for the purpose of moving the rod to position, substantially as described.

79,443.—BELT SHIPPER.—Erastus Buck, Vincennes, Ind.

I claim the combination of the shipper, H, pivoted lever, G, and pulleys, D, when arranged and operating substantially as described.

79,444.—INKSTAND.—C. Thurston Chase, Albany, N. Y.

I claim in combination with an ink well, having a rim, D, and catch, d, the pivoted cover, E, when constructed, attached, and operated substantially in the manner and for the purposes specified.

79,445.—DUMP CAR.—William Chisholm, Cleveland, Ohio.

I claim, 1st, The construction and arrangement of a section of a railroad track by means of trunnions or bearings to support the track, and thereby allow a longitudinal and transverse tilting and vibrating of the same, substantially as and for the purpose set forth.

2d, The segments, J, K, in combination with the section of a track, A, and trunnions or bearings, as described.

3d, The combination of the sectional tilting track, A, with the turn table, L, for the purposes set forth.

4th, The combination of the sectional tilting track, A, turn table, L, with a transfer table, M, in the manner as and for the purpose described.

79,446.—FISH HOOK.—John B. Christian, Mount Carroll, Ill.

I claim the revolving grooved plate, B, the artificial worm, A, the hooks, c, c, and the wire, D, as arranged in relation to each other, substantially as herein described.

79,447.—TUCKING DEVICE FOR SEWING MACHINE.—William H. Cole, Quincy, Mich.

I claim the combination, with foot, A, of plates, C, E and G, the latter provided with stop, F, slotted arm, H, screw, I, indicator, D, and screw, H, all constructed and arranged substantially as shown and described.

79,448.—DRESSING MACHINE.—D. C. Cregier, Chicago, Ill.

I claim, 1st, The guides, d and screws, f, with the shaft, k, and bevel-pinion, E, and their connections, in combination with the vertical framework, B, and its connections, adapted to transmit the power at any elevation, as and for the purposes herein set forth.

2d, The inclined framework, E, mounted on the upright frame, A, as represented and adapted to be adjusted in the several directions, and operating the dressing, B, in an inclined position, while the frame, A, and the lowering motion may be vertical, as and for the purposes herein specified.

3d, The guides, m, formed and arranged as represented on the revolving parts, G, I, G, and adapted to guide the pitch chains, H, and consequently to control very exactly the working paths of the buckets, h, or their equivalents, as and for the purposes herein specified.

79,449.—RAILROAD CAR HEATING AND VENTILATING APPARATUS.—Samuel Darling, Bangor, Me.

I claim, in combination with an end pipe for conveying a heated fluid, a plow, operated substantially as described, to cause a continuous circulation of the fluid in the pipe.

Also, the combination, in a stove or furnace, and beneath the fire chamber, of a water vessel, and an intermediate non-conducting chamber, having a ball valve, or its equivalent, substantially as and for the purpose described.

Also, the combination, with the end pipe, of a conical chamber and ball valve, or its equivalent, substantially as and for the purpose described.

79,450.—CULTIVATOR.—John H. Davey, Rockford, Ill.

I claim the trimes, B and C, the standards, D, D, pins, E, the chains, F, F, the lever, K, the chain, K, all constructed, combined, and operating substantially in the manner and for the purposes set forth.

79,451.—CULTIVATOR TOOTH.—Daniel Dean, Brighton, Mich.

I claim the reversible cultivator tooth, A, when constructed substantially as shown and for the purposes described.

79,452.—HARVESTER.—Charles Denton, Decatur, Ill., assignor to Ames Plow Company, Boston, Mass.

I claim, 1st, Fulcruming the lever which actuates the sickle bar, at or near its centre, by means of a movable lever, and driving it by a link, connected at the rear of the frame with the driving mechanism, which is located out side of the frame.

2d, Pivoting the sickle bar lever to a laterally moveable or vibrating lever, substantially as and for the purpose set forth.

3d, The combination of the floored offset, K, and its side board, I, with the auxiliary belt and the main belt of the sprocket, F, constructed and arranged to operate substantially as and for the purpose described.

4th, In combination with a vapor tight furnace, A, provided with a hopper, J, either of the pump, Q, or H, substantially as and for the purpose specified.

79,454.—BEE HIVE.—William J. Elvin, North Madison, Ind.

I claim the bee hive herein described, when its several parts are constructed, combined, and arranged as set forth.

79,455.—FRUIT PICKER.—Ralph Evans, Brant, N. Y.

I claim the metallic casting B, having a flange on its under side, and slotted so as to form a knife, and provided with an angular stem, as and for the purposes set forth.

79,456.—FIELD ROLLER.—A. L. Chub, Grand Rapids, Mich.

I claim the yokes, B, B, cast with projections for sustaining the weight box or driver's seat, in combination with straps, c, c, all arranged as herein described.

79,457.—CHIMNEY COWL.—Austin E. Clement, Wapakonetta, Ohio.

I claim hanging the wings, C, C, by the bent springs, D, D, in the manner and for the purpose set forth, in combination with the cylinder, B, bolts, E, E, and pipe, A, substantially as described.

79,458.—FUME CONDUCTOR.—William C. Davis and George H. Knight, assignors to W. C. Davis & Co., Cincinnati, Ohio.

We claim, 1st, The arrangement of the perforated receiver, E, and notched or perforated ring, D, for the purpose set forth.

2d, The notched ring, D, or its equivalent, for the use herein designated.

3d, The perforated receiver, E, G, S, having the cover, F, as and for the purpose stated.

79,459.—ROW LOCK.—Charles L. Dayton, North Buffalo N. Y.

I claim the combination of the yoke, A, bed plate, C, pivoted eye, D and pin, E, all employed and operating in the manner described, for the purpose specified.

79,460.—MACHINE FOR APPLYING CLOTH PATCHES TO PAPER COLLARS.—C. H. Denison, (assignor to himself, G. W. Ray, and V. N. Taylor), Springfield, Mass.

I claim, 1st, The combination of the plunger or plate, D, with the bar, F, attached thereto, the stamps, e, and sponge tubes, G, all constructed and operating substantially as herein described and for the purposes set forth.

2d, The combination of the plunger or plate, D, with the bar, F, attached thereto, the stamps, e, the sponge tubes, G, and the water pipe, G, and box, G, when constructed and operating substantially as described and for the purposes specified.

3d, The stamps, e, having the dies, e, counter dies, x, and passage, x, therein, all constructed substantially as herein described and specified.

4th, The combination of the stamps, e, having the dies, e, counter dies, x, and the passage, x, therein, with the platen, x, when constructed and operating substantially as described and in the manner set forth.

5th, The combination of the wheel, A, with the projection, I, thereon, vibrating arm, x, rock shaft, x, rod, x, arm, x, ratchet wheel and pawl, x, x, x, x, for the purpose of moving the strips under the dies, e, substantially as described.

6th, The bar, F, having the slot, F, therein, in combination with the stamps, e, having the projection, I, thereon, all constructed and arranged substantially as herein described and set forth.

7th, The sponge tubes, G, in combination with the water pipe, G, having

outlets, G, therein, all constructed and operating substantially as herein described, and in the manner specified.

8th, The combination of the sponge tubes, G, adjustable rod, G, and valve and valve arm, M, when constructed substantially as described and operating in the manner set forth.

9th, The sponge tubes, G, having the side pass, G, thereon, and the adjusting projection, G, and its nut, G, all constructed and operating substantially as described and in the manner set forth.

10th, Applying cloth patches to paper, or paper collars, as herein described, that is to say, by first dampening the paper or collar at the places where the patches are to be applied, and then pressing said patches thereon by means of a plunger or die, which, in its descent, cuts the patch from cloth which has been previously made adhesive upon one side by a suitable preparation, and then dried, said cloth being fed or moved automatically to or under the dies, all substantially as described.

79,461.—MACHINE FOR MAKING RASPS.—Major H. Fisher, Bridgeport, Conn.

I claim, 1st, Attaching the cutter, D, to the holder, B, by means of the stirrup, E, and spring, F, when the said stirrup is arranged to hold the cutter, and at the same time allow the point to turn up, substantially in the manner and for the purpose set forth.

2d, In combination with the holder, B, arranged and operated as above, the blank holder, G, and mechanism, substantially as described, for imparting to the said holder a movement relatively to the movement of the cutter across the blank, so that the teeth cut in each row shall be at right angles to the teeth of the row substantially as herein set forth.

79,462.—HOE.—J. L. Fountain, New Milford, Ill.

I claim, 1st, Forming the curved shank, B, on its inner side or curve, V-shaped or sharp edged, as and for the purpose set forth.

2d, The forward projecting curved shank, B, having an acute angle on its inner side, C, in combination with the blade, substantially as and for the purpose specified.

69,493.—THREE HORSE CLEVIS.—Jos. Fowler, Allegan, Mich.

I claim, 1st, The bars, D, and friction wheel, F, or its equivalent, in connection with any suitable clevis, A, when attached and operating substantially as and for the purposes specified.

2d, The bar or lever, E, when attached to the upper end of the clevis, A, and provided with any suitable device, G, to which to attach a team, when constructed and operating substantially as and for the purposes set forth.

3d, The combination and arrangement of the clevis, A, the bars, D, D, the lever, E, the friction roller, F, hook, H, and ring, G, or their equivalent, when constructed and operating substantially as and for the purposes herein specified.

79,464.—MANUFACTURE OF SUGAR.—Horace P. Gale, Washington, Va.

I claim the peculiar construction of the inside of my arch, arrangement of smoke stacks, the application of fines in my pan, and the combination of dampers and stop cocks, to produce the advantages herein set forth.

79,465.—MEAT CHOPPER.—C. L. Gilpatrick, Boston, Mass.

I claim the arrangement of the cutting or chopping knife, K, in the frame, I, and working in the arms H, H, by means of wheels, G, E and D, and a shaft through a hollow shaft, F, substantially as and for the purposes herein set forth.

79,466.—DOOR KEY.—Francis Green, Troy, Pa.

I claim the guard, C, in combination with the arm, f, for closing the key hole, when constructed and operating substantially as shown and described, and for the purpose specified.

79,467.—GRAIN THRESHER AND SEPARATOR.—George W. Greer, and Frank F. Laidis, Lancaster, Pa.

We claim, 1st, The double chambered fan casing or flues, f, and f, made substantially in the manner and for the purpose specified.

2d, The arrangement of the double shoe, x, x, in combination with the regulating board, R, made substantially in the manner and for the purpose specified.

3d, In combination with the regulating board, R, and inclined board, r, the appendage of the wire rack, r, r, to the same, made substantially in the manner and for the purpose specified.

4th, The racking device when constructed with parallel beams, m, and tooth plates or rakes, u, revolving over each other in the manner and for the purpose specified.

79,468.—MACHINE FOR CUTTING AND TRIMMING BRISTLES.—E. F. Wool, and Charles F. Harlow, Boston, Mass., assignor to himself and Dexter S. King.

I claim, 1st, The combination of the stationary toothed knife, g, and movable toothed knife, g, with the guide, S, and slide, R, when constructed to operate as set forth.

2d, The combination of the sliding table, R, guide, S, slide and cutters, x, x, with the slotted arm, D, and table, A, for the purpose of adjusting the cutters, g, g, at any desired distance from the jaws or bars, X, X, as specified.

3d, The feed shaft, p, adjusted in the slotted bars and held by the spring, q, in combination with the cutters, x, g, arranged upon the sliding table, R, to operate substantially as set forth.

4th, The curved or horizontal bar, X, X, when made adjustable to the posts, C, C, and arranged as and for the purpose specified.

79,469.—COFFEE ROASTER.—Theodore Heerman's, Pleasant Hill, Mo.

I claim the wire cloth or perforated cylinder, E, when arranged eccentrically within the outer cylinder, D, as described and for the purpose set forth.

79,470.—TICKET PUNCH.—Warren Hill, Springfield, Mass.

Ante-dated May 5, 1868.

I claim the construction and arrangement of the spindle, C, projection, e, and spiral spring, f, in combination, with the lever, A, recesses, e', and the slotted lever, B, substantially as described.

79,471.—BEE HIVE.—Jas. S. Hooton, New Carlisle, Ind.

I claim, 1st, The device for entrapping the worms, as specified.

2d, Supporting the racks by the metal staples, S, as shown and specified.

3d, Supporting and holding to their places the racks by means of the metal pins, X, X, as specified.

4th, Supporting the racks solely upon metal bearings, by means of the pins, X, X, and staples, S, as set forth.

5th, The combination of the several parts are constructed, combined, and arranged as set forth.

6th, Board, B, when constructed as specified.

7th, The combination of the metal strip, I', the screw, Z, the aperture, V, openings, P and T, through the board, B, with the wire cloth, as set forth and for the purposes specified.

79,472.—COMPOUND FOR COVERING ROOFS AND OTHER STRUCTURES.—Carleton B. Hutchins, Ann Arbor, Mich.

I claim the compound of ingredients, as herein described, to make a composition for roofing, and for various other purposes, as herein described.

79,473.—POTATO DIGGER.—Moses Johnson, Three Rivers, Mich.

I claim a potato digger having wheel, A, grooved wheel, B, roller, D, arms C, shovel, E, arms, F, belt, G, box, H, lever, K, bar, M, spring, O, and pulley, S, constructed, combined, arranged, and operating substantially as set forth.

79,474.—CLOTHES DRYER.—Wm. Johnston, Appleton, Wis.

I claim, 1st, The movable metallic arms, H, folding into each other and oscillating upon a common fulcrum, operating in the manner described and for the purposes set forth.

2d, The combination and arrangement of the bracket, sides, A, A, and the frame rod, B, C, with the fulcrum rod, F, the metallic movable arms, H, and the bars, E, E, E, with the slot, I, and rivet, J, when operating in the manner specified and for the purposes set forth.

79,475.—BALANCING POLISHING WHEELS.—Horace K. Jones, Kensington, Conn.

I claim, 1st, The use, for the purpose of balancing wheels, of two or more wheels, arranged upon a common axle, and having the periphery, and capable of being fixed at any point upon the side of the wheels, within the limit of their motion, by screw or other suitable means.

2d, The combination of the movable weights, B, B, with the fixed weights, D, for the purpose specified.

79,476.—HORSE POWER.—Isaac Keller, Randolph, Ohio.

I claim, 1st, The solid metallic box, G, with the hole, g, therein, when used to contain the speeding gear, P, E, of a horse power, substantially in the manner and for the purpose set forth.

2d, The iron, N, with lip, n, when used in combination with the box, G, with its gear, P, J, K, and the master wheel, A, B, B, substantially as and for the purpose herein specified.

3d, The peculiar arrangement and combination of the box, G, axes, H and I, with the wheel, N, with lip, n, and the master wheel, A, B, B, substantially as and for the purpose herein specified.

79,477.—WASHING MACHINE.—G. H. Kidney, Cleveland, Ohio.

I claim, 1st, The cups, H, perforated tubes, G, cylinder, C, and boiler, arranged and operating in the manner and for the purpose substantially as described.

2d, A rotary cylinder, C, provided with interior perforated tubes, G, in combination with the cups, substantially as and for the purpose specified.

79,478.—SAW CLAMP.—Wm. N. Kingston, Bowensburg, Ill.

I claim the saw clamp, having clamps, A, jaws, B, scaffold, C, upright bars, D, platform, J, plank, H, and hooks, G, constructed, combined, and arranged substantially as specified.

79,479.—FUME CONDUCTOR.—George H. Knight (assignor to W. C. Davis & Co., Cincinnati, Ohio).

I claim, 1st, The perforated case or receiver, D, E, formed and adapted to operate as set forth.

2d, The receiver, D, E, enclosing a boiler or cooking vessel as to confine and direct the fumes, and conserve the heat thereof, when said vessel is so elevated above the stop as to permit the escape of said fumes in the stove due in the manner set forth.

3d, A perforated cooking vessel, having protruberances, c, adapted and employed to rest either upon the plane of the stove top or within suitable indentations, b, therein, at the will of the operator, for the purpose herein designated.

79,480.—INDICATOR FOR STREET RAILWAY CAR.—James Knight, Philadelphia, Pa.

I claim, 1st, The minute hand, G, and its pin, J, turned by clock work, as described, and moved toward and from the dial plate by a cam wheel, H, in combination with loose indicating hands, b, which are turned by the minute hand, and released at certain determined points on the dial plate, all substantially in the manner and for the purpose specified.

2d, The wheel, J, having adjustable blocks, f, and being operated through the medium of the gearing described by a wire, I, connected with the wheel or axle of the street railway car.

3d, The above in combination with the arms, s', t, and u of a spindle, K, with the arm, w, or a spindle, L, for starting and arresting the motion of the cam wheel, H, as described.

4th, The cam wheel, H, operated by a coiled spring, g, or its equivalent, for imparting a longitudinal sliding motion to the portion, e, of the spindle, F, for the purpose specified.

5th, The manner, substantially as herein described, of securing the indicator hands, b, to the stem, h, so that they may be turned either separately or together upon the said stem.

79,481.—CAR COUPLING.—Ph. Knoblock, Wyandotte, Kas.

I claim a car coupler, having jaws, A and B, slotted frame, K, cross-bar, H, with cord attached as described, lever, G, and hook, M, constructed, combined, and arranged substantially as specified.

79,482.—EYELET MACHINE.—A. Komp, New York city.

I claim, 1st, The friction spring, n, on the guide pin, c, in the punch, D, substantially as and for the purpose described.

2d, The self-acting dog, h, for clamping, k, in combination with the guide pin, c, and punch, D, substantially as and for the purpose set forth.

3d, The yielding rest, J, in combination with the anvil, I, and punch, D, substantially as and for the purpose set forth.

69,483.—SHUTTLE.—Perley Saffin, Warren, Mass.

I claim the combination with the shuttle of a treading and guide piece or lip, constructed as described and for the purpose set forth.

79,484.—HEAD BLOCK FOR SAW MILL.—Dennis Lane, Montpelier, Vt.

I claim, 1st, The rollers or wheels, C, supporting the head block, and mounted on shafts eccentric to them, by which the wheels are forced upon the carriage or released from bearing thereon, constructed and operated as described.

2d, The scrapers, H, hinged to the head block, for the purpose of clearing the face of the carriage side from saw dust, constructed and operated substantially as described.

3d, The chain connection, E, attached to the upright supports, and operated by means of a friction pulley, G, upon a bar, I, through a treadle, M, by which the carriage is engaged or released, the supports will be drawn back on the carriage, constructed and operating substantially as described.

79,485.—VAPOR BURNER.—C. B. Loveless, Syracuse, N. Y.

I claim the pipe, a, retort, m, cap, j, jacket, k, gas pipe, c, burner, g, and chimney, h, constructed and arranged substantially in the manner and for the purposes set forth.

79,486.—PLOW.—Hammond Marshall, Atlanta, assignor to himself and T. W. Chandler, Fulton county, Ga.

I claim the shank, A, constructed as described, with a sharp cutting edge, d, d, at the top, curved at the bottom, and provided with slotted projections, substantially as and for the purpose herein set forth.

2d, The slotted and flanged projections, B, B, on the shank, A, in combination with the lugs, I, I, and grooves, h, h, on the wings, for the purpose of fastening the same together, substantially as and for the purposes herein set forth.

3d, The pin, b, on the point, C, in combination with the hole, c, on the shank, A, for the purpose of fastening the same together, substantially as and for the purposes herein set forth.

79,487.—MEDICINE DROPPER.—Patrick McElroy, Cambridge, Mass.

I claim a tube for dropping medicine, or other liquid, constructed substantially as and for the purpose described.

79,488.—LAMP BURNER.—Rufus S. Merrill (assignor to himself and Wm. Carleton), Boston, Mass.

I claim, 1st, In a burner in which the upper section, consisting of the deflector, air distributing plate, and chimney holder, with its chimney, is removable from the lower section, composed of the base and wick tube, a sleeve united with the air distributing plate, and shaped in the

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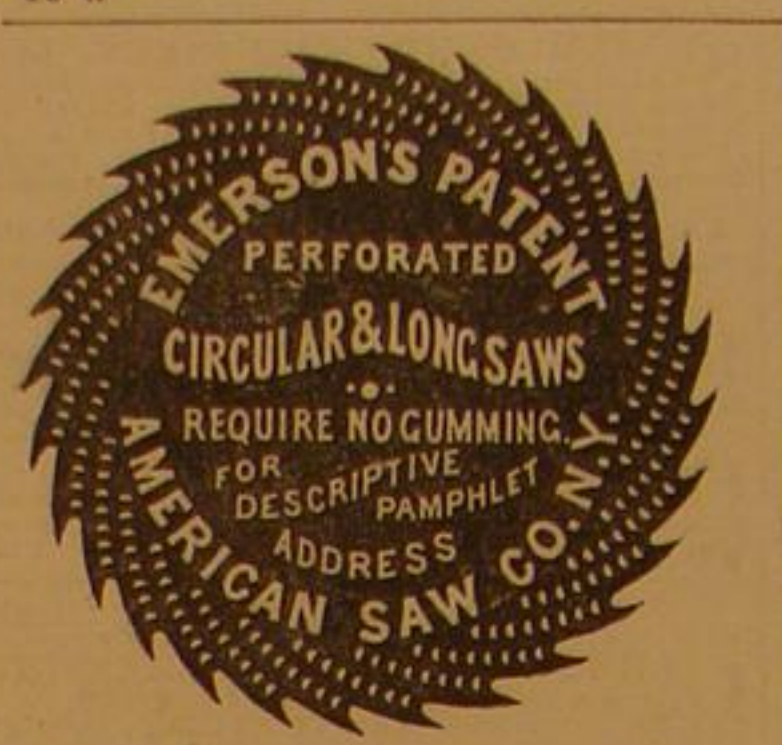
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Vol. XIX.—No. 4.
[NEW SERIES.]

NEW YORK, JULY 22, 1868.

\$3 per Annum.
[IN ADVANCE.]

Improvement in Machinery for Sawing Wheel Fellyes.

The object of the machine shown in the engraving is to afford a ready and rapid means of sawing out the sections forming the rims of wagon and carriage wheels, both edges being sawed at the same time, and the machine being adjustable so that the segments may be sawed on different radii and the feed be adjusted to accommodate the nature of the timber and the design of the operator.

The saws, A, are suspended in the usual manner, the power being applied to the crank shaft through the medium of the pulley, B. From this shaft runs a belt connecting with another which drives the feed. On the inner end of this shaft is a friction wheel that engages with another at right angles to it and secured to a vertical shaft, which forms a pivot for the frame, C. At the inner end of this frame is an upright shaft connecting, by means of belt and pulleys, the two upright shafts. This frame may be swung from one position to another while the belt from the pivot shaft will act as well in one position as another. On the top of the inner upright shaft is a pinion that engages with the segment, D, which is suspended by an adjustable pivot so it may be moved to or from the saw, making the product of a less or greater diameter. This segment is really the table, the material being held to it by the jaws, E, which are also adjustable. A weighted lever, F, is used to throw the frame, C, and its pinions in gear with the segment, D, a catch holding it in position. This catch is disengaged automatically by an arm on the segment, when the saw has passed through the stock, so that the table can be swung around to receive more material.

The rate of feed is governed by means of the friction wheel on the pivot shaft of the frame, C, which may be raised, by means of the handle, G, operating a weighted lever, H, and clutch. As this wheel is raised toward the center of the wheel on the horizontal shaft its momentum is reduced and consequently the rate of feed.

A patent for this is pending through the Scientific American Patent Agency. All communications should be addressed to the inventor, Peter S. Beidler, South Easton, Pa.

Improved Cane-juice Bleaching Machine.

The object of the machine which the annexed engravings illustrate, is to thoroughly and evenly bleach the saccharine juice of the cane, insuring a uniform grade of sugar. It is, to a great extent, automatic in its operation and self-regulating. In the engravings, A is a furnace in which the sulphur is burned, the gas from which is conducted by gas pipes, B, to

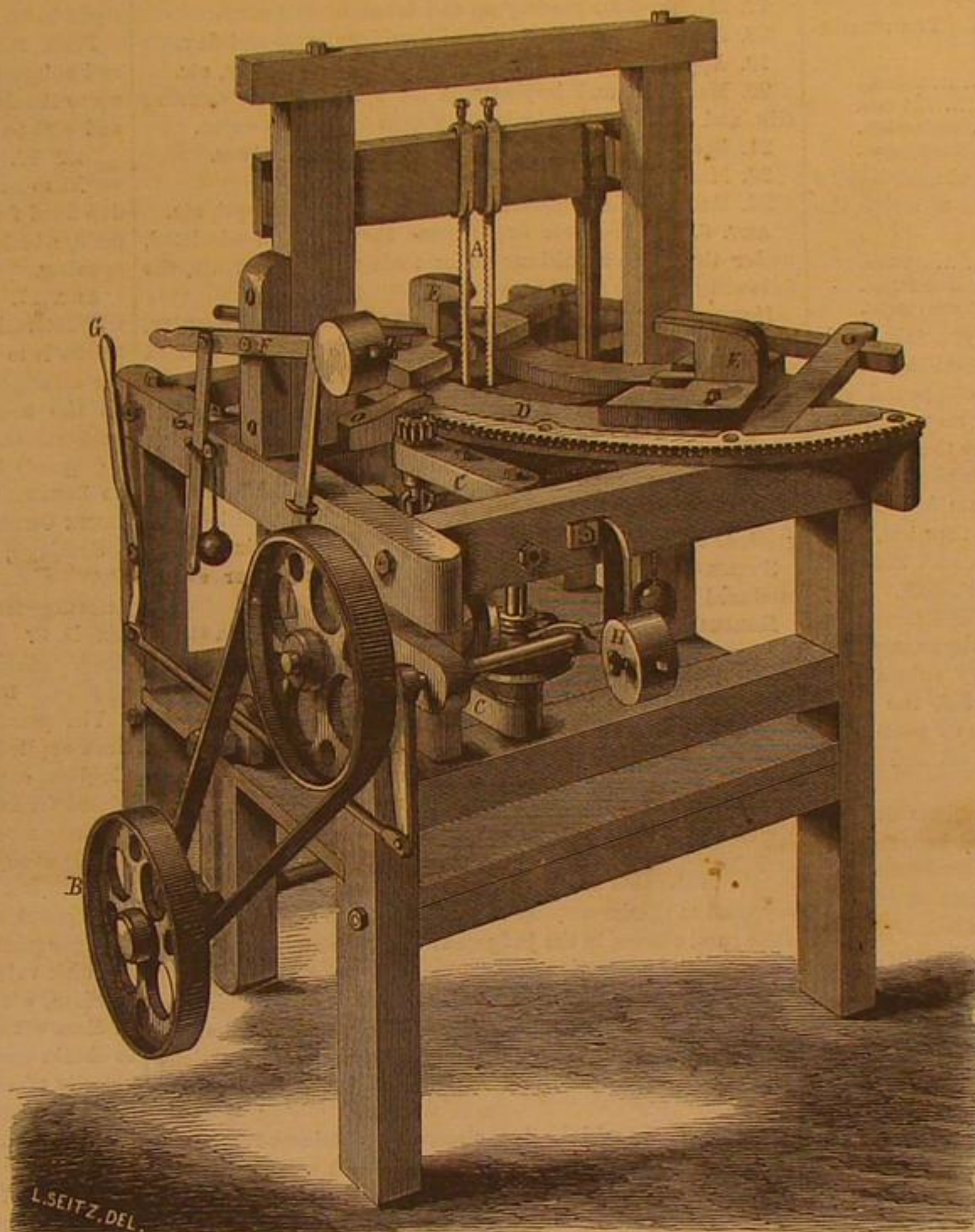
extending transversely across the trough. A wheel, the blades of which are curved and perforated, revolves in the trough, G, about midway between the ends, and on a shaft in line and connected with the hollow shaft on which the wheel, C,

pendant valve, I, operates the register, I, and damper, K, and governs the amount of gas admitted to the juice, and the combustion of the sulphur. The pendant partitions prevent the escape of the gas, as they extend down below the surface of the liquid. A patent for this device is now pending, application having been made through the Scientific American Patent Agency by Evan Skelly, of Plaquemines Parish, La.

The Prospects of the Suez Canal.

Mere speculators, and particularly English speculators, have held aloof from the Suez Canal Company, and it has, therefore, been carried on chiefly by French capitalists. This apparent want of enterprise has been caused by the magnitude of the undertaking and the want of definite answers to such questions as, "Will the canal ever pay?" "How much more capital will be required for its completion?" and "Is there no chance of competition?" A feeling of jealousy toward France also contributed to English distrust. One of the directors of the company writes to the *London Times* to supply this deficiency. He expects that when the canal is opened two thirds of the traffic now passing around the Cape will be diverted. Such traffic he estimates at the lowest as 600,000,000 tons annually, two thirds of which would yield, at \$2 per ton, an income of \$8,000,000 per annum. Seeing that more voyages could be made by the same vessel by the shorter distance, the writer anticipates a larger income than this which, it must be observed, is from merchandise merely, leaving passengers out of the question. The cost for maintenance and the interest on loans is estimated at about \$4,000,000, leaving the same sum for division—a very fair dividend of 10 percent. No more capital will be required after the arrangement of the present loan of \$20,000,000, the total amount subscribed being \$60,000,000. As to whether the canal is safe from future competition by the Euphrates Valley line, no great evil from opposition is apprehended. Lord Clarence Paget inspected the works in 1867, and was of opinion that they would succeed.

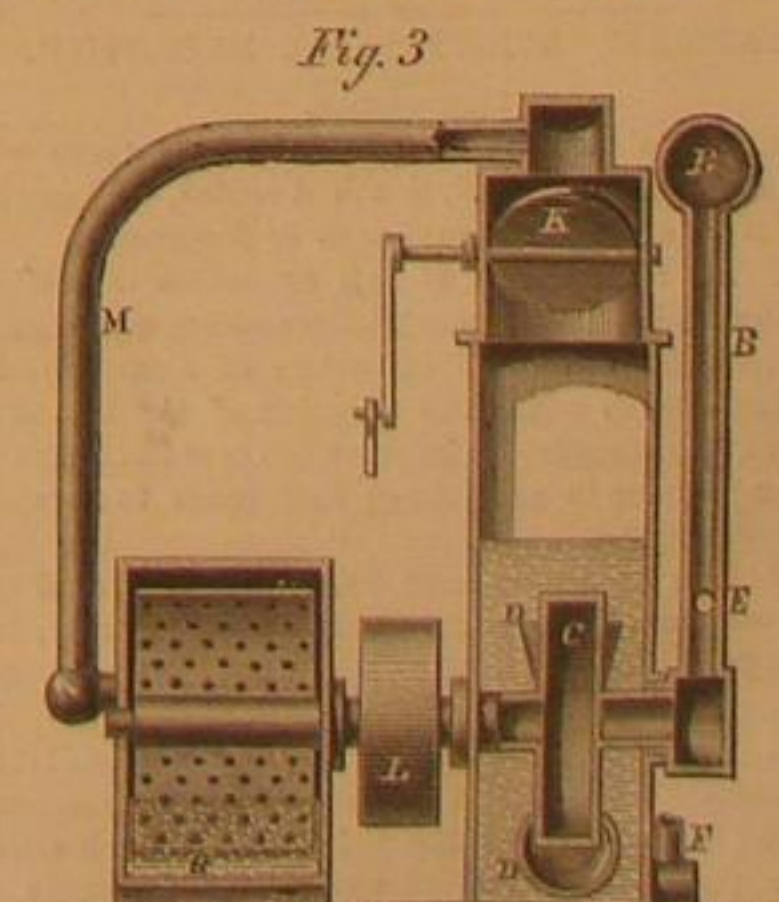
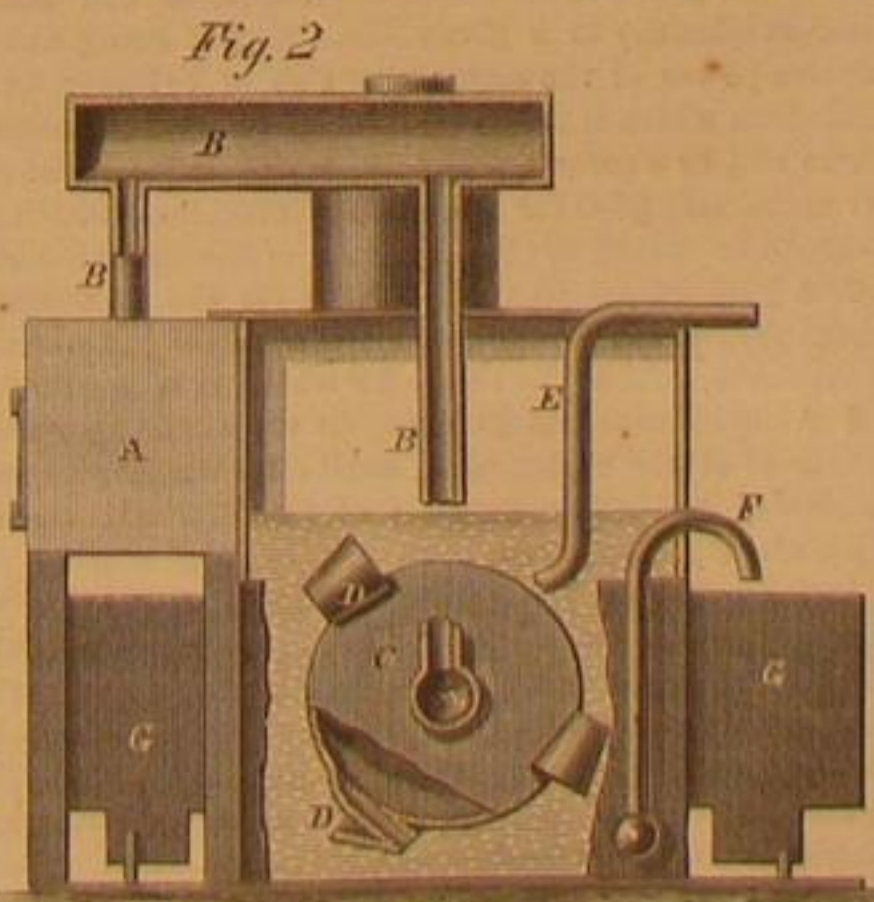
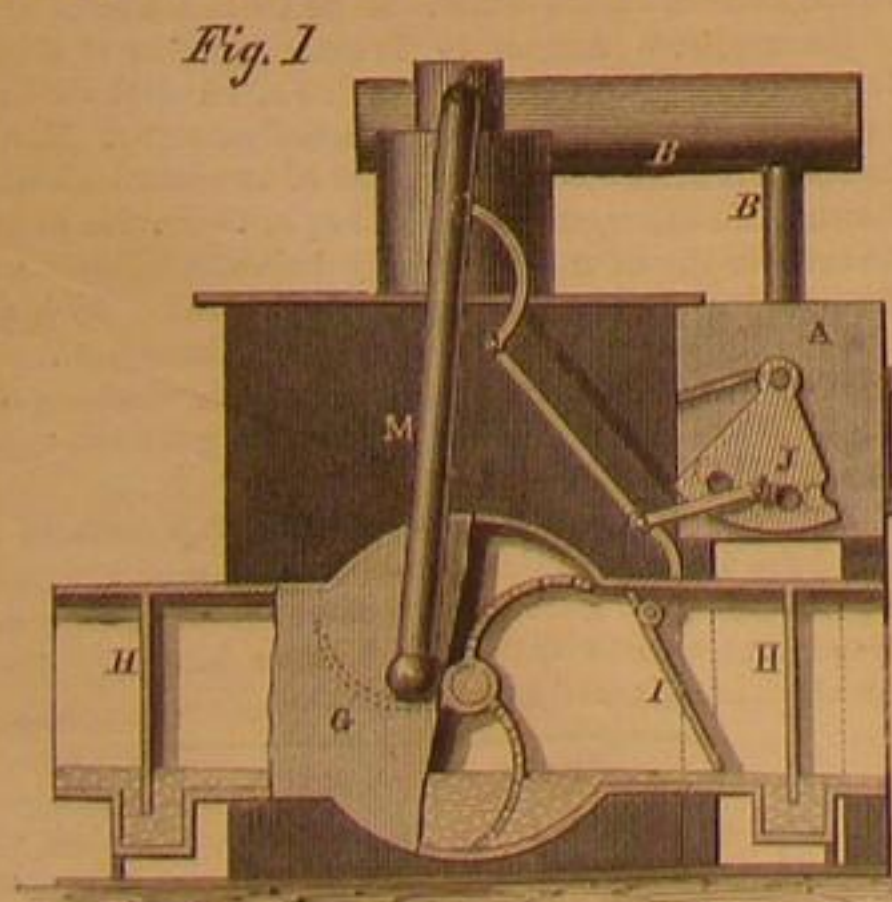
In France the capitalists are rather slow in coming forward with any more money. The result is that the legislative body has taken the matter up, and passed a bill which allows the managers to get up a lottery in aid of the enterprise. The lottery custom was put down in 1836, but it has been again permitted—"just this once." Berryer, Thiers, and a great number of others, abstained from voting, or stayed away, and some of the minority said some dreadful



BEIDLER'S AUTOMATIC FELLY SAWING MACHINE.

is fixed. At the rear of this wheel is a pendant valve, I, Fig. 1, connected by jointed arms with a register on the furnace, A, and with a damper, K, in a chamber over the water tank as seen in Figs. 2 and 3.

The operation of the device can be readily understood from the above references to the parts. The furnace being supplied with sulphur and the latter ignited, the wheel, C, and that in the trough are rotated by a belt on the pulley, L,



SKELLY'S CANE-JUICE BLEACHING MACHINE.

a hollow shaft and wheel, C, furnished with draft nozzles, D, and rotating under water in the chamber. E is a water supply pipe leading from any connecting reservoir, and F a discharge pipe for controlling the level of the water in the chamber.

The juice is received into the trough, G, which is slightly inclined from a level, as seen in Fig. 1, and has two depressions one at either end, to receive the pendant partitions, H,

Fig. 3, from any source of power. Water is fed through the pipe E to the chamber in which the hollow wheel, C, rotates. The rotation of this wheel draws the gas from the furnace through the pipes, B, passing it through the water to the chamber in which the damper, K, is situated. From thence it is led by the pipe, M, Figs. 1 and 3, to the dash wheel in the juice trough, G, where it is incorporated with the saccharine liquid. The action of the dash-wheel against the

things about the immorality of lotteries. And yet they have, in their time, built churches, hospitals, etc.; they helped Queen Elizabeth to beat the Spanish Armada, and they may help M. Lesseps to complete his cosmopolitan canal. In this age, however, a reasonable distrust may well be entertained of the financial management of any enterprise that resorts to such questionable means to obtain money.

CHEMICAL NOMENCLATURE.

(Continued from page 42.)

Of the seventy elementary substances thus far discovered by chemists, there are only fifteen which make up the chief mass of our globe, and of these the following nine are the most abundant and also arranged in the order of their abundance: oxygen, hydrogen, nitrogen, silicon, chlorine, sodium, aluminum, carbon, and iron; after these follow potassium, calcium, magnesium, sulphur, phosphorus, and fluorine.

In regard to the organic products of the earth's crust, they are chiefly made up (see p. 42) of four substances, namely, carbon, oxygen, hydrogen, and, in many cases, also nitrogen; after these follow, also in the order of their frequency, potassium, calcium, phosphorus, silicon, sulphur, sodium, magnesium, chlorine, iron, and fluorine. It will be seen that the order of frequency is quite different in both kingdoms, the inorganic and the organic. For instance, chlorine, which is the fifth in the order of frequency in the mineral kingdom, is only the twelfth in the organic, and aluminum, so very abundant in the first, hardly ever occurs in the last.

Some fifty-six of the elementary substances possess metallic properties, and therefore are called metals. The remaining fourteen are called metalloids; they are

Oxygen, hydrogen, and nitrogen.....	Gaseous.
Carbon, boron, and silicon.....	Solids.
Sulphur, selenium, tellurium, and phosphorus.....	Combustible.
Chlorine, bromine, iodine, and fluorine.....	Salt formers.

The other substances are metals, and are again subdivided into light and heavy metals; the light metals of which the specific gravity is less than five, are

Potassium, sodium, and lithium.....	Alkalies.
Calcium, barium, strontium, and magnesium.....	Alkaline earths.
Aluminum.....	Earthy metal.

The remaining in the list (page 42) are heavy metals; their specific gravity is more than five. When a metalloid is combined with a metal or other metalloid, the compound was named in such a way that the name of the metalloid was added with the appendage of the affix *atum*; so the combinations of potassium with oxygen, sulphur, phosphorus, chlorine were called respectively, kalium oxydatum, kalium sulphuratum, kalium phosphuratum, kalium chloruratum.

The symbols were founded on these names, and the compounds expressed respectively by KO, KS, KP, KCl. They are in use at the present day, and we cannot sufficiently insist on the fact that these symbols, besides the names, also represent definite quantities of the elementary substances; so KO means 39 potassium to 8 of oxygen; KS, the same amount of potassium with 16 of sulphur; KP, 39 potassium and 31 of phosphorus; and KCl, 39 of potassium and 36 of chlorine.

The Latin names corresponding with the symbols did not however come in use, but have been translated into the different languages, and so, for instance, we call these four compounds in English, oxide of potassium, sulphuret of potassium, phosphuret of potassium, chloruret of potassium. More recently, for the sake of abridgment and uniformity, they have been named oxide, sulphide, phosphide, and chloride of potassium, and the termination *ide* has generally been adopted to denominate all primary compounds, (that is to say, compounds containing only two elementary substances); thus,

The compound of any substance with oxygen is called an oxide.	
" " " sulphur " asulphide.	
" " " phosphorus " aphosphide.	
" " " chlorine " a chloride.	
" " " hydrogen " a hydride.	
" " " carbon " a carbide.	
" " " nitrogen " a nitride.	
" " " arsenic " an arsenide.	

As the names in the last column differ so little in orthography as well as in pronunciation from the names sulphite, phosphite, chlorite, etc., which latter names indicate compounds of an entirely different nature (as will be explained hereafter), it has lately been proposed by various authorities to drop the final *e* in the names of these compounds, and to write oxid, sulphid, phosphid, chlorid, etc. This termination has been adopted by some writers of the present day, but most text books still retain the final *e* to the names of the primary compounds.

NATIONAL AGRICULTURAL EXPOSITION.

PROGRAMME.

ARTICLE 1. On the 1st day of April, 1869, there will be opened in Santiago, in Chili, South America, an Agricultural Exposition, at a locality hereafter to be designated.

ART. 2. The chief object of this exposition is to stimulate as well the landed proprietors of the country as national and foreign manufacturers and importers of agricultural tools and implements, to cause the adoption of the best methods introduced in husbandry, to improve the breed of animals, and to give an impetus to everything that tends to cheapen and perfect production.

ART. 3. The exposition will be especially devoted to agricultural tools and implements and breeding animals; but all such things will be admitted as appertain in any way to rural industry.

ART. 4. The exposition will, in consequence be divided into departments as follows: The first for tools and implements; the second for cattle; and the third for all such articles as serve for the advancement of agriculture—as seeds, wines, oil, dried fruits, timber, models of country houses, household articles, articles of rural economy, dried beef, pulse, liquors, exotic and textile plants, etc., etc.

ART. 5. In the department of tools and implements there will be admitted to the exposition, and to the contest for premiums, the following articles:

1. Thrashing machines, operated by animal, mechanical, or steam motive power.
2. Steam motive powers, fixed or movable.

3. Machines for reaping wheat or mowing hay, or for both purposes, worked by oxen or horses.

4. Improved plows of every kind, single and double.

5. Harrows of every kind, both of iron and of wood.

6. Cultivators of whatever form or denomination.

7. Rollers for breaking the soil or pressing the earth.

8. Harrows with movable teeth, drawn by horses.

9. Machines for separating the grain from the ear of corn, sifting hay or straw, or grading pulse; for crushing grain or oleaginous substances, or triturating them for the food of cattle.

10. Machines for cleaning and separating wheat and all kinds of grain.

11. Machines for winnowing wheat thrashed by horses.

12. Portable agricultural mills, single or double, moved by water, steam, or animal force.

13. Implements for the dairy, and for the making of cheese and butter.

14. Apparatus for pressing grapes.

15. Wine presses, fixed and portable.

16. Distilling apparatus for grains and liquids.

17. Machines for rooting up and breaking the earth.

18. Machines for dressing and combing hemp and flax.

19. Apparatus for irrigation, as pumps, iron sluices, etc.

20. Machines and implements for spinning and weaving silk, and ovens for developing the eggs of the silkworm.

21. Bees and all utensils relative to the care of bees.

22. Machines for sawing wood.

23. Machines for dressing hay, straw, wool, charqui, etc.

ART. 6. In the cattle department there will be admitted, under the same conditions as for tools and implements, the following species and types:

HORNED CATTLE.—1. Animals indigenous to the country, of one, two, three, and four years of age; 2. Cattle imported from abroad, or born in the country of pure breed; 3. Cattle produced by a cross with the indigenous race, from the age of one year upwards.

WOOL GIVING ANIMALS.—1. Mixed ewes only of the Pe huenche breed; 2. Mestizo sheep of the first, second, and third crossing; 3. Merino sheep, pure English, Rambouillet, Negretti, or other sheep; 4. Native, foreign, and mestizo goats.

SWINE.—Swine of the pure race of the country, or swine produced by a cross between both.

HORSES.—Horses and mares of indigenous or foreign stock, carriage, riding, or race horses, and horses for the general use of the country in farming operations.

ASSES.—Asses of native or foreign breed.

ART. 7. In the department of general agronomy, there will be admitted seeds, fruits, wines, woods, birds and domestic animals, plants, hides and skins, butter, wool, wax, honey, hemp, flax, oleaginous seeds, models, plans, and all articles whether of artificial or natural production, which do not appertain to the two preceding departments, and which in any way tend to the improvement of agriculture and the welfare of the rural classes, in the judgment of the commission having charge of the exposition.

ART. 8. Each one of these departments will be under the charge of a special commission, which will nominate the proper judges for the examination of the animals and articles entered for exhibition, and will award the respective premiums.

ART. 9. There will be five classes of premiums special for the purposes hereinafter expressed, and which will be awarded by the different commissions combined into one.

1. A grand medal of honor and a premium of eight hundred dollars (gold), which will be awarded to the national or foreign manufacturer or manufacturing company that shall present the greatest number of machines, apparatus, or instruments of agriculture which, combined, shall be deemed to produce the most perfect results, and which, in the judgment of the commission, shall be entitled to the premium. But in this case the articles must be proved to have proceeded, and been sent directly from the manufactory in question.

2. A premium of the first class, which will consist of a gold medal and \$500 (gold), for the thrashing machine that shall deliver the grain in the cleanest condition, and render the greatest quantity in a given time, regard being had for the relative power of the motor, the size of cylinder, and other conditions which it may be proper to take into consideration. There will be a second premium, which will consist of a silver medal and \$300 for this class of machines, which will be awarded according to the discretion of the commission.

3. A gold medal and \$400 (gold), for the best winnowing wheat thrashed by horses, and which, in the judgment of the commission, attains the object for which it is intended.

4. A gold medal and \$5 (gold), to the exhibitor who in the judgment of the commission, shall offer the largest and best number of producing animals of the different classes and types already mentioned.

ART. 10. All the other apparatus or instruments will be classified by the special commissioners to be appointed, in different classes, according to their character and variety, or the quantity of each kind that may appear in the Exposition; and those that deserve premiums in each class will have awarded to them medals of gold and silver, and premiums ranging in value from \$10 to \$200 (gold).

ART. 11. The rewards for the exposition of breeding animals of the different kinds above designated, will consist of medals of the first and second class, those of the first class being of gold, and those of the second of silver, and in pecuniary premiums from \$20 to \$150 (gold), in value according to the kind to which they belong, and such as, in the judgment of the jury, may be entitled to such premiums.

ART. 12. The fruits of the country, which, in the opinion of the proper committee, shall merit some reward, will receive it in medals of silver or gold, or premiums in money

to the value of \$50; but it is proper to notify those interested that such fruits must be produced in sufficient quantity to render them objects of consideration.

ART. 13. In addition to the gold and silver medals and pecuniary rewards, there will be given medals of bronze, whenever the commissioners deem any one of the various exhibitors entitled to this reward.

ART. 14. No object shall be admitted to the exposition which, in the judgment of the commission charged with the management of the exposition, ought to be rejected as not fulfilling the required conditions.

ART. 15. Every person who desires to take part in the exposition should at least two months beforehand, communicate in writing to the committee having charge of the exposition his intention of being one of the exhibitors, designating at the same time the article or articles which he wishes to present and the quantity thereof, in order to have the proper space reserved, and to make the necessary arrangements for the best and most convenient location with a previous knowledge of all the articles destined to figure in the exposition. Those who do not comply with this requirement will have no right to be admitted to the exposition.

From this condition are excepted manufactured articles and animals brought from abroad, which will be admitted up to the day preceding that of the opening of the exposition, and will be entitled to premiums like the former.

ART. 16. All articles intended to appear in the exposition ought to be sent punctually, at least fifteen days before the day fixed for the opening of the exposition, except the animals, which should be entered at least three days before the opening.

ART. 17. A special regulation, hereafter to be published, will determine the days on which the trial of the various machines is to take place, as well as everything else concerning the arrangements of the objects that may be transmitted, and all the necessary preparations for the realization of this programme.

(Signed) FRANCISCO ECHAURREN, SANTIAGO PRADO, DOMINGO BEZANILLA, MANUEL BEAUCHEF, RUPERTO OVALLE, BENJAMIN ORTUZAR, BENJAMIN VICUNA MACKENNA.

Santiago, April 30, 1868.

Any additional information desired can be obtained by addressing Mr. Sanchez Fontecilla, Chilean Minister, Washington, D. C.

Floating Water Wheels for Siam.

The practice of utilizing the power of the tides has just been applied to pumping purposes for the king of Siam by English engineers. The first of a series of wheels is completed for supplying water to the king's palace at Bangkok. It recently received a preliminary trial on the river Thames. It was fixed on a wrought iron punt sixteen feet long, five broad, and two feet six inches deep. The wheel is five feet diameter, with paddles two feet broad, and working treble two-inch plunger pumps of nine inch stroke, and fitted with India-rubber disk valves. The engineers were consulted by the king of Siam, with reference to supplying the four grand palaces at Siam with water, and not finding sufficient fall from which to obtain motive power adopted the plan of tidal wheels. The velocity of the stream ranges from two and one half to four miles an hour—about the same flow as on the Thames—and the apparatus will have to force water a considerable distance to a height of over a hundred feet. This in a recent trial on the Thames it proved itself quite capable of doing, working equally well on each change of the tide.

A New Pleasure Vehicle.

Hitherto the velocipede has been considered a mere toy for the amusement of children, but at the present moment this vehicle has produced a fashionable mania in Paris among both sexes, and it is very likely to come over to us. Why should we not adopt the velocipede as a pleasure carriage? It appears that a "veloce club" of sixty members has been organized in Paris, at the head of which is Monsieur de Vesin who has made a considerable wager that he can out-run the swiftest horse of Prince Murat. M. de Vesin has recently made the journey from Angers to Tours a distance of sixty-four miles, where his velocipede broke down. A first class race is soon promised to come off at the Bois de Boulogne. The Paris velocipede is sometimes constructed of two large wheels, one following the other, and connected so as to provide a comfortable seat for the rider who adroitly balances himself and at the same time guides and propels the machine by his feet. Generally however three large nicely balanced wheels are used, and with a powerful crank and easily working levers, the machine is propelled along with the greatest apparent ease and at high speed.

Velocipedes are very common upon the streets of Paris which have smooth pavements, and can be used anywhere in our parks and upon good country roads, therefore we expect very soon to witness their introduction into this country. The exercise is graceful and healthful.

Cheap Ice Pitcher.

We republish, it being reasonable, the following simple method of keeping ice water for a long time in a common pitcher or jug. Place between two sheets of paper (newspaper will answer, thick brown is better,) a layer of cotton batting about half an inch in thickness, fasten the ends of paper and batting together, forming a circle, then sew or paste a crown over one end, making a box the shape of a stove-pipe hat minus the rim. Place this over an ordinary pitcher filled with ice water, making it deep enough to rest on the table, so as to exclude the air, and the reader will be astonished at the length of time his ice will keep and the water remain cold after the ice is melted.

CARBOLIC ACID.

A lecture delivered by Dr. Crace Calvert, before the Society for the Encouragement of Industry in France, contains most important details of the manufacture of carbolic acid, and its application in the arts. We shall endeavor, as briefly as possible, to give an abstract of the facts embodied in his lecture concerning this substance, which is attracting increased attention as its applications become more numerous and important.

When coal is heated to a dull red in a retort, gaseous products, water containing ammonia and salts of ammonia, and coal tar are distilled over, coke remaining in the retort. Carbolic or phenic acid is extracted from coal tar. Laurent was the first to discover an easy method of separating carbolic acid from the substances with which it was mixed and combined. His method was to submit the light oils obtained from the distillation of coal tar to fractional distillation, and then to treat those which distilled off between 160° and 200° C. with a strong solution of potash. This process was improved upon by Mansfield and Bobeuf, who treated with caustic soda the whole of the light oils, instead of a portion as Laurent had done.

The acid thus obtained was very impure, but it was found to be of great use in the production of picric acid, in preventing the transformation of tannic acid into gallic acid, in the process of tanning, and in the preservation of subjects in the dissecting room. M. Bobeuf also applied it to the preservation of other organic substances from putrefaction.

In 1859, Dr. Calvert discovered that a better way to obtain carbolic acid was to treat the impure benzol or naphthalene of commerce with weak alkaline solutions. By this means he obtained a semi-fluid blackish product, of a density of 1.06 which contained 50 per cent of carbolic acid. Still further experiment resulted in the production of the crystallized acid of considerable purity, but the tarry and sulphurous smells which remained were serious obstacles to its use in medicine. In 1864, the firm with whom Dr. Calvert was connected succeeded in removing the sulphurous smell. The acknowledged therapeutic value of carbolic acid had already attracted the attention of medical men, and from this time its use in medicine and surgery became largely increased. Since that time, however, the Messrs. Calvert have also succeeded in producing an acid entirely freed from disagreeable odors and tarry flavor, and as pure as that obtained by the processes of Wurz and Kékulé, or that which is obtained from salicylic or nitrobenzoic acid.

This acid differs from Laurent's in its solubility, its fusibility, and the temperature at which it boils. It requires 20 parts of water for its solution, fuses at 41° C., and boils at 182° C. Laurent's requires 33 parts of water for its solution, fuses at 34° C., and boils at 186° C.

From the fact that Laurent's acid had a constant boiling and crystallization point, it was formerly supposed to be a pure and definite substance. The production of this new acid shows it to be only a mixture of carbolic acid and a liquid homologue; for when a certain proportion of water is added to Laurent's acid, and the mixture is allowed to stand at a temperature of 4° C. it deposits a crystalline substance in large octahedrons. This substance is a hydrate of carbolic or phenic alcohol, that is, carbolic acid combined with an equivalent of water of crystallization—the only example known of an alcoholic hydrate in a crystalline form. By removing the water from this hydrate, carbolic acid is obtained in its purest state.

The applications of this substance for sanitary purposes in medicine, agriculture, and manufactures are already extensive, and are likely to be rendered of much greater importance than at present. As a disinfectant and antiseptic it is exceedingly efficacious. It acts directly upon the microscopic vegetation and animalcules, to the presence of which fermentation and putrefaction have been attributed, destroying them and thus neutralizing the effect of their diffusion, through the atmosphere. It is superior for this purpose to chlorine, permanganate of potash, or Condy's fluid. The latter substances act indiscriminately upon all organic substances with which they come in contact. Carbolic acid, on the contrary, only acts directly upon the causes of putrefaction. A very small quantity of it is required to prevent decomposition, it is therefore economical. Being volatile, it meets with and destroys the germs and spores which vitiate the atmosphere,—a property possessed by none of the above mentioned disinfectants except chlorine. It was therefore used with great success in England, Belgium, and Holland, during the prevalence of the cattle plague and the cholera. Dr. Calvert stated that .001 or even .0002 would prevent the decomposition, fermentation, or putrefaction of urine, blood, glue solution, flour paste, feces, etc., for months. Its vapor alone will preserve meat in confined spaces for weeks, and protect it from flies. Sewage may be kept free from fermentation by the use of .0001 part. The British government have decided to use it exclusively in the navy and other government departments.

In medicine, besides its properties as a disinfectant, its caustic properties are found beneficial. It is used with benefit in cases of carbuncle, quinsy, and diphtheria; hemorrhoids, internal and external fistula, and other similar complaints. In surgery it is applied with great success to purulent sores, preventing the disagreeable smell which issues from them, and keeping them in a healthy and cleanly condition. It has also been found of great service in cases of syphilis and phthisis.

In agriculture it has been found of the greatest use in the treatment of diseases common to sheep. Scab is cured by dipping the sheep in water containing a small portion of the acid, and allowing it to remain about one minute. For this purpose the pure concentrated acid is too expensive, and an emulsion of the crude acid in soap and water is to be used

instead. A bath containing .017 of it is sufficient to effect a cure. For foot-rot an ointment should be made of the crude acid and grease, placed in a shallow stone tray, and the sheep driven through it. If cattle or horses are annoyed with flies or other insects, a weak solution of carbolic acid rubbed through the hair will be found an effectual protection.

In manufactures, this substance has been successfully applied to the preservation of wood, hides, and bones designed for shipping to great distances, in the preservation of guts at the gutworks, the preparation of anatomical subjects, and the preservation of all animal matter. It is also used to prevent the decomposition of gelatin and albumen, used in spinning, dyeing, and calico printing.

It is used in the manufacture of certain beautiful colors, very much resembling the famous aniline dyes, and in the manufacture of picric and picramic acids. We have not space for the enumeration of all the uses of carbolic acid, as given by Dr. Calvert, who, in closing, expressed his regrets at being unable to give in a single lecture, all the important applications of this valuable agent, which, after having rendered important services to most of the world's industries, still offers to chemists and to manufacturers a wide field for new applications.

Matters at Quarantine.—The West Bank Hospital Buildings.

Ever since the memorable "Sepoy" riots of 1858, in which the old Quarantine establishment at Staten Island was destroyed by a mob, many of them, by the way, gentlemen of property and standing, the important business of quarantine has been carried on in temporary and floating accommodations. In 1865 Dr. Swinburne, the present efficient Health Officer, was appointed by Governor Seymour, and in the following year, mainly through his energetic efforts the Legislature despairing of obtaining from the State of New Jersey the coveted site of Sandy Hook, authorized the erection of Quarantine buildings on the West Bank, a well known shoal in the lower bay, at a point some fifteen miles from this city. The work was not commenced, however, until March, 1867, when the board, vested by the act with power in the premises, viz., Messrs. Curtiss, Cobb, and Anderson, with the Mayors of New York and Brooklyn *ex officio*, contracted with Mr. Frank Swift for the structure, which has since been vigorously proceeded with.

The shoal at West Bank is even at low tide from seven to nine feet below water, and being composed of soft and shifting sand, grave doubts were felt whether the erection of a permanent structure on such a site was a practicable feat of engineering, and the progress of the work has been watched with much interest. The experiment bids fair to be entirely successful.

The first step in the undertaking was the construction of cribs of the heaviest timber. These were floated to positions designed to form the exterior line of the structure, and then sunk by being filled with stones. Other cribs were in like manner sunk upon them, and in this way a solid wall has been formed, 25 feet in height, 30 feet in width at the bottom, and 20 feet on the top. The cribs thus sunk form a six sided wall 1,300 feet in length, in its exterior line; and 240 feet in its greatest width, and enclose an area of about two acres. The space thus enclosed is then filled with sand dredged out from the neighboring shoal, and heavy stones are then thrown into the sea around the exterior of the crib, forming what is termed a "rip-rap" wall, which is designed to be carried up to a level with the summit of the structure, which, it is claimed, will thus be rendered permanent and indestructible. Some 53,000 cubic yards of sand, and 23,000 yards of stone will be required to complete the work, which is now more than half done. The work is to cost, by contract, \$310,000. On the plateau thus constructed, which will be about 13 feet above high water mark, six ranges of one story hospital buildings, capable of accommodating about 1,000 patients, are to be erected, and a landing pier some 400 feet long constructed to the ship channel. Another similar structure will be built at a point about three quarters of a mile to the north, which will be used to accommodate the healthy passengers taken from infected vessels. It is much to be desired that the experiment should prove successful, as it will in that case solve at once the tangled quarantine question and sundry weighty problems in engineering. Depots for infected cargoes will probably be erected at a point in the upper bay.

The hospital steamships Falcon or Nightingale and Illinois are now moored at a point near the West Bank, ready for the reception of yellow fever patients, who are expected shortly to arrive in considerable numbers. They can conjointly accommodate some three hundred patients. They are models of neatness, and in their cool and breezy anchorage furnish at this season a really delightful accommodation for the sick.

Dr. Swinburne is entirely confident that with the new structures completed all infectious and contagious diseases can absolutely be held at bay at the entrance of the harbor.—*Sun*.

At a recent foreign meeting of the Society of Friends, many of the most influential members expressed their wish that the denomination might more actively and generally cooperate with the efforts of the Peace Society; and in lamenting the increase of military armaments of late years, one of the speakers dwelt particularly upon the condition of the France, where nearly eight hundred thousand men are compelled to lead the demoralizing life of soldiers, being withdrawn from useful civil industry and taught only to slaughter and destroy their race. Another member, from Maine, stated that \$1,250,000,000 are annually expended upon military armaments by Christian nations, while hundreds of thousands of their citizens are suffering from misery, ignorance, poverty and starvation.

Editorial Summary.

DURING the present warm weather attention should be specially directed to whatever may have a tendency to produce disease. The basements of houses situated in the very best localities often contain dust bins, drain pipes, and other matters in so neglected a condition that they may at this season prove very prolific sources of fever and diarrhea. Particular care should be taken to prevent the admixture of vegetable and animal matter with the cinder ash. A means of obviating this, and of counteracting the lazy, extravagant habits of domestics, who rarely sift the cinders, is to provide the dust bin with an iron grating made to fit the top like a lid and having a padlock to prevent removal save at the time when the dust is to be taken away by the carts. This will be found by householders to promote both health and economy. The grating being small, or sufficiently fine to permit only the dust to pass through, the cinders will remain on the top, and can there be collected and replaced in the coal scuttle. Cisterns should be examined and all sediment and deposit at once removed, for at no other time of the year is pure water so essential to health, or impure water so certain to cause illness. As a disinfectant, we cannot mention a more effective agent than carbolic acid, the nature and properties of which have been noticed before in our columns, and are very fully treated in another place in our present issue.

WHAT MODERN CHEMISTRY CAN PERFORM.—The chemist takes a quantity of Sombrea guano, mixes it with sulphuric acid, and the result is an excellent manure. If instead of converting this substance into material for the practical agriculturist, he extracts phosphoric acid therefrom, this acid can be made to give the igniting property to lucifer matches. So the same article that will aid in producing wholesome, strength-giving food for man and beast, will also afford a light for the cigar of the fop; it can build up the hay rick and corn stack, or form a principal component of the instrument with which the incendiary burns them down. The farmer rejoicing in his plentiful harvest and fat cattle, the street Arab who sells matches at ten cents a box, and the housewife as she kindles the kitchen fire and prepares the daily food, may thus be dependent for the success of their labors upon a sea bird inhabiting a lone rock in the ocean.

A RUBBER CARRIAGE.—A carriage has been made in Bridgeport, Conn., which is an open buggy and weighs but 125 pounds. The body is one piece of hard rubber, one eighth of an inch in thickness. It is without the usual carriage bolts and screws, and presents a perfectly smooth surface, which is not soiled or tarnished by rubbing or by handling. The rubber is tougher than wood, and very much more elastic. The running gear is of wood, but the next carriage made will be entirely of rubber. The material is unaffected by wet, hot or cold weather, and was prepared at a temperature of 300 degrees, the body having been first got into a plastic mass, like dough. A company has been formed, called the "Hard Rubber Wood Company," with a capital of \$250,000, and consisting of fifteen stockholders, for the purpose of carrying on the business in Bridgeport.

ORNAMENTAL METALLIC TUBES.—Ornamental metallic tubes are now manufactured in the following manner: A tube or foundation of wrought iron of the required strength, is placed in a tube of thin brass, and by a drawing process, conducted in the ordinary manner, the iron tube is coated with brass. Ornamental figures are then impressed upon the surfaces by passing them through engraved rollers, after inserting a steel mandril into their bores to prevent compression. On being removed from the mandril the ornamental tube resembles a solid brass tube.

WHETHER the "grip" of the horizontal brake wheels of the Mont Cenis Railway will be seriously affected in winter by the hard frosts remains to be proved, but at this season Mr. Fell's railway transports one in a far pleasanter manner over Mont Cenis than the diligence. Six hours and twenty francs a head are saved by it, to say nothing of the greater comfort and less fatigue, and as soon as the communication has been established throughout Italy, any one may leave London at 7:30 A. M. on Monday and dine at Rome on Wednesday, to say nothing of breakfasting at Naples on Thursday morning, if such rapid motion should suit him.

AGRICULTURAL EXHIBITION IN CHINA.—We call attention to the programme published on another page of the particulars concerning the above exhibition. Some of the circulars before issued announced that it would open on the 15th December next. The time has been changed to April 1, 1869, which will enable our agricultural implement makers to send on their productions.

HENRY LEWIS, an American artist residing at Dusseldorf, Prussia, has been appointed U. S. Vice Consul for that city. Mr. Lewis has been a faithful friend of our countrymen visiting that place, and is in a position to execute any art commission that may be entrusted to his care.

THE Prussian government has authorized the Krupp firm at Essen to execute a considerable order of cast steel guns for the Russian military administration. Russia intends to transform all her artillery into the Prussian pattern.

ENGLISH AND AMERICAN REAPING MACHINES.—By the cable we learn that at a trial which took place in Germany, July 11th, the English reapers bore off the international prize.

THE USE OF EXPLOSIVE PROJECTILES.

Communicated.

The Russian government has issued a circular calling upon foreign powers to adopt unanimously a new regulation, calculated, it is supposed, to mitigate the horrors of war. Hollow projectiles have been devised suitable for small fire-arms. These balls are filled with fulminating material, and in bursting are said to produce effects much more terrible than those of ordinary bullets. Experiments, rather extensively conducted, have proved that these shells can be fired from muskets with the same facility as those of a larger size can be discharged from cannon. As yet these projectiles have been directed chiefly against wild beasts, and basing its statements, let us trust, upon this use of the new shells, the Russian document says, "An explosive bullet of this description splits into ten or more fragments, and in case of the explosion occurring in a man's body the wound is most painful and mortal. Moreover the fulminating matter seriously affects the organism of the human frame and needlessly increases the suffering." The disabling of an enemy, it argues, not the infliction of agony, is all that is desired in actual fight, and the use of these bullets is therefore unnecessary and barbarous.

Whatever may tend to the mitigation of suffering in war is certainly most desirable; but, while we are inclined to give all due credit to the humanity of sovereigns and rulers in general, and of the Czar in particular, we very much doubt that this appeal to the heart will have any weight in deciding the acceptance or rejection of the proposal. So long as evil passions exist among individuals in private life, and these passions, acting on a larger scale, tend to produce distrust, antipathy, and war between nations, a wider and more comprehensive view must be taken of the case. At present the ability to undertake and sustain a war is considered the surest guarantee of a nation's peace. In war it is a received axiom that offence is the best means of defence. If, then, it could be proved that a body of men provided with this kind of ammunition could send more certain and rapid destruction into the ranks of enemies than they would be able to do if furnished with the usual kind, feelings of humanity for the after sufferings of the fallen would not ultimately call forth any prohibition of its use. We think there are certain objections, however, which stand in the way of these shells being extensively employed in warfare. Their use involves more caution and difficulty than that of the common projectile. Numerous unavoidable situations will readily occur to the mind where they would be more dangerous to friend than foe. Again, considering the nature of their structure and composition, it is not easy to see how they can be well employed with the needle gun. Taking these practical disadvantages into consideration, it will readily be perceived how the benevolent sentiments of those who wage war at the expense of their fellow men can remain undisturbed in deciding upon the rejection of these missiles; and no doubt the sagacity of the Emperor of the French led him at once to perfectly comprehend the matter in all its bearings, when with his accustomed policy he so promptly forwarded his assent to the proposal of Russia.

Over and above what at first meets the eye in this proposal, taken in connection with the general acquiescence which will be probably given to the proposition, it seems to us to have an important significance. On sea and land the art of war has arrived at a high degree of perfection. Ships, guns, and war material as a whole have been so altered and improved under the labors of the engineer, the chemist, and the machinist that war is no longer so much a matter of chance as to amount to an exciting national diversion. Death now reaps too enormous a harvest with awful certainty and speed, for nations to sacrifice in war their youth and strength and intelligence on any other ground save the preservation of life, liberty, and national existence. Aggressive wars tend now to something else than the mere gratification of pride and ambition. Princes and potentates are beginning to have these facts forced upon their attention, and, to put it in rather homely but expressive terms, are learning to calculate the "cost of the candle" before venturing on the game of war. Let inventors go on perfecting implements of destruction and devising new ones, for humanly speaking, we know of no other means which can so powerfully operate in showing the folly of armies meeting for slaughter, and forestall in some degree the time when men shall learn the art of war no more.

Artificial Granite.

A method of manufacturing artificial granite has recently been patented in England. The materials of this artificial granite are disintegrated natural granite mixed with clay, together with pounded glass, lava, and iron slags. The disintegrated granite is obtained by submitting fragments of natural granite to a strong heat, about 700 deg. or 800 deg. C. in an oven, by which after a sufficient time, it becomes dissolved into a granitic sand, the constituent parts of which, quartz, or feldspar, possess great powers of adhesion. One part of this granitic sand is then mixed with an equal quantity of pounded glass, or the constituents of glass, or lava, or iron slag, to which is added from twenty to thirty parts of refractory clay, or from thirty to fifty parts of ordinary clay. This mixture is thoroughly kneaded together with a sufficient quantity of water to make it of a pasty consistency. It is then molded to any form required, and submitted to a degree of heat sufficient to vitrify the mass for about thirty-six hours, which converts it into a durable substance resembling granite. The artificial granite thus produced may be molded into any forms required to render it suitable for various kinds of buildings, fortifications, docks, and other engineering structures, and particularly for all kinds of pavements, for which its great hardness renders it particularly suitable. When very

large blocks are required, it is preferable to make them hollow, and, after they have been baked or burnt, they may be filled with concrete, rubble, &c., to make them solid. Any kind of furnace in which the requisite heat can be generated will answer for dissolving the granite and baking or vitrifying the blocks or bricks; but Mr. Parsons finds Hoffman's annular furnaces performs this operation satisfactorily.

Correspondence.

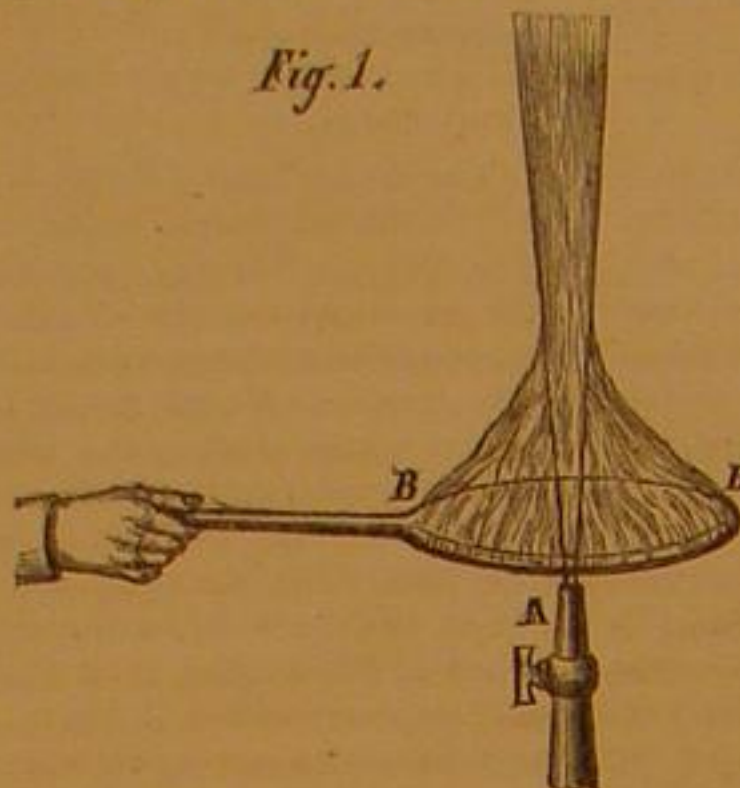
The Editors are not responsible for the opinions expressed by their correspondents.

Faraday on the Ball and Jet.

MESSRS. EDITORS:—The following is an extract from an English work:

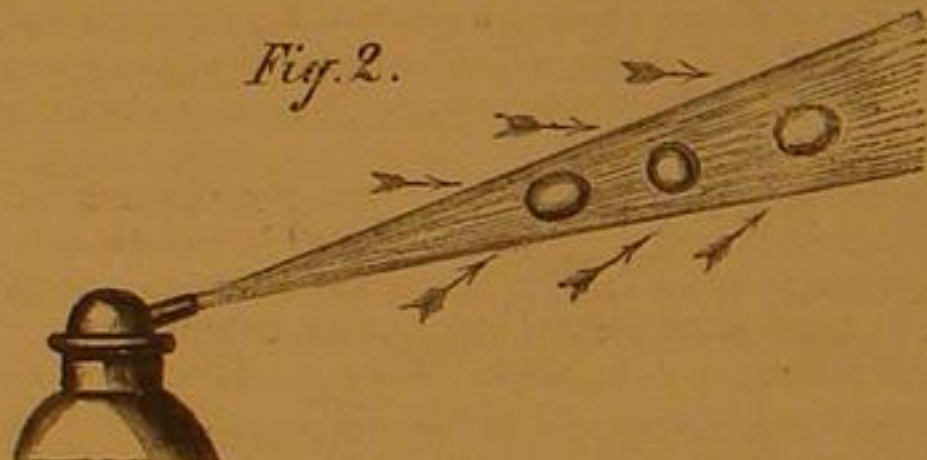
Faraday found that "if steam, at a pressure of about sixty pounds per inch, is allowed to escape from a proper jet, and a large lighted circular torch, composed of tow dipped in turpentine, held over it, the course of the external air is shown by the direction of the flames, which are forcibly pulled and blown into the jet of steam with a roaring noise, indicating

Fig. 1.



the rapidity of the blast of air moving to the steam jet." A, in the sketch, (Fig. 1,) is a steam jet, B B, the lighted torch, held around the escaping steam—the flames all rushing into the steam. Egg shells, empty flasks, India-rubber, or light copper and brass balls are suspended in the most singular manner inside an escaping jet of high pressure steam. Sin-

Fig. 2.



gular is the fact that the jet of steam might be inclined at any angle between the horizontal and perpendicular, and still hold the ball, egg shell, or other spherical figure, firmly in its vapory grasp, as shown in Fig. 2, C being a ball and socket to incline the jet.

Syracuse, N. Y.

X. X.

The Influence of Color on Vegetation.

MESSRS. EDITORS:—It is a well-known fact, that if growing plants are excluded from light, though not from air and moisture, they will become nearly or quite colorless, or of a pale yellow hue; and on the other hand, it is equally true that the foliage of nearly all healthy plants and trees, growing in the sun-light, are of one universal color, viz., green, with its various shades. Now as there are in white light but three primitive colors (red, yellow, and blue), and two of them (yellow and blue) are reflected from the surface of the leaf, forming green, it would seem that the color which is essentially a benefit to plants is that which they absorb; or red. Red and green, as well as orange and blue, yellow and violet, form white. This, I think, is a subject on which some interesting experiments might be made by any who has the necessary time and facilities. Make, say, seven small square sashes in the sides of which panes of glass may be inserted, each of one of the following colors, red, orange, yellow, green, blue, violet, and one of common glass; these with covers of the same (but no bottoms) may be placed over beds of plants, forming miniature hot-houses, and the result of the experiment watched. Perhaps young peas would be best to experiment on.

Theoretically, red would be nearest to, purple or orange next, and green farthest in effect from the natural growth. One other substance—blood—is always of the same color. It seems that vegetable life needs red, and animal life green light, in the same manner that the former needs carbon, and the latter oxygen; in both cases, each giving of that which the other requires. The natural abode of man and other land animals, the forests, and even the sea, is of a greenish hue. As plants through the night are said to reverse the process of giving off oxygen and absorbing carbon, it may be that the red light of day prepares the surface of the leaf for the reception of carbon or the generation of oxygen, thus becoming an active agent in the production of vegetable growth. I should be pleased to have the opinion of the SCIENTIFIC AMERICAN on this, which I think is a subject deserving of more attention than it has received.

Havana, N. Y.

SPECTRUM.

[We can hardly agree with our correspondent that red is the color essentially beneficial to plants. Timbs, in his

"Curiosities of Science," says that experiments on hyacinths grown under the influence of various lights, proved that the yellow ray diminishes the growth of the rootlets and the absorption of water, and the red ray hinders the proper development of the plant. The blue rays retard germination at first, but accelerate the growth of the plant afterward; the act of germination being attended with absorption of oxygen, but the process of development, on the contrary, being attended with the extrication of this gas.

The experiments recommended by our correspondent are inexpensive, and easily made.—EDS.

Imperium in Imperio.

MESSRS. EDITORS:—"A house divided against itself cannot stand." If this is true it seems that our industrial fabric is liable to overthrow. We see that, in spite of the basis of our government, as shadowed in the Declaration of Independence, in which it is stated that all men have an innate right to the pursuit of happiness, we are prevented from that pursuit by the interference of the members of combinations, who seem to suppose that the pursuit should be undertaken in only the paths they themselves have marked out. I believe I have a perfect right, in this country, to pursue happiness, i. e., to do my own business, in my own way, without interference from any man, or set of men, if I do not infringe upon the rights of others. Believing thus, I have so acted. Conducting a business which necessitates the employment of workmen, I have employed men and kept them in work at fair wages, without caring to inquire whether they belonged to some trades union or not.

But a "change came o'er the spirit of my dream." My men, who had perfectly satisfied my demands, and always done their work well, one by one left me without any satisfactory reason. I found great difficulty in filling their places, and at length my eyes were opened by the receipt of several threatening anonymous letters, containing the information, that if I wanted workmen I must take members of the trades union at a fixed price per day, without regard to the qualifications of the workmen, or it would be "the worse for me." Paying no regard to these threats, and determined to do my business in my own way, without permitting outside and unwarrantable interference, I again attempted to employ hands to work at my business. I found my steps dogged and my efforts hindered and forestalled by members or agents of this trades union, even my personal safety being threatened in the streets.

Now, if we have a government in a government, an authority beyond the general law which shall compel men to obey its behests rather than depend upon the protection believed to be afforded to all good and peaceable citizens by the law, it is time it should be known, and a remedy applied. I hold and acknowledge no allegiance to any government but that of the state and nation in which I reside, and repudiate all attempts of bogus authorities, in the shape of trades unions, to regulate my business or the terms I make with my workmen. I want merely the common liberty of doing my business in my own way, and paying out my money as best for my interest and for the good of my workmen, both of which, I think, I can manage for myself and them, better than any association can manage for me. My business concerns myself and those who work for me—nobody else—and I shall not submit, in this land of personal freedom, to any dictation from unauthorized outsiders as to the method of managing my business.

I think it is time that something should be said by influential papers, as the SCIENTIFIC AMERICAN, in regard to this subject. This assumption of power and interference with private, personal rights by irresponsible and self-constituted arbiters of questions between employer and employed, has assumed such proportions in its interference and dictation between employing capital and employed labor, that it has become a question whether an individual has a right to the employment of skill, or even the use of his own hands without the consent of combinations whose practices are unquestionably illegal.

These unions and associations assume too much when they insist on dictating, not only the amount of wages to the employed, but the person to whom the employer may give work. The employer is not only the best judge of the qualifications of his workmen, but he is also the best judge of the amount each earns, and also of the advantages of one workman over another. As to his ability to know his own business—that is, his profit and loss—I presume, on this point, there can be no question.

New York city.

CRISPINUS.

Modern Naval Warfare.

MESSRS. EDITORS:—Mr. Holley, of Harrisburgh, Pa., might have given one more important invention to the credit of one of the Stevens family, namely, the Armstrong time and percussion fuze; the fuze being ignited by the liberation of a plunger held in position by a wire or its equivalent on the shock of concussion by explosion of discharge, when the plunger acted on a fulminate attached to the time fuze. This invention forms the basis of the Armstrong fuze and of all the time and percussion fuzes used during the late war, except a few used on the "Springard" principle. Nearly two years ago I discovered at Fort Monroe, among the papers of Mr. Couch, master carpenter, a detailed drawing in sections of this fuze and which bore the names of two witnesses and date 1831. A copy of the original is in my possession. I afterward found in the Washington Navy-yard Museum, a perfect brass fuze of the same make, and the officer informed me that it was left there many years ago by one of the Stevens family. I called the attention of the army ordnance department to the fact when I made the discovery. No records of

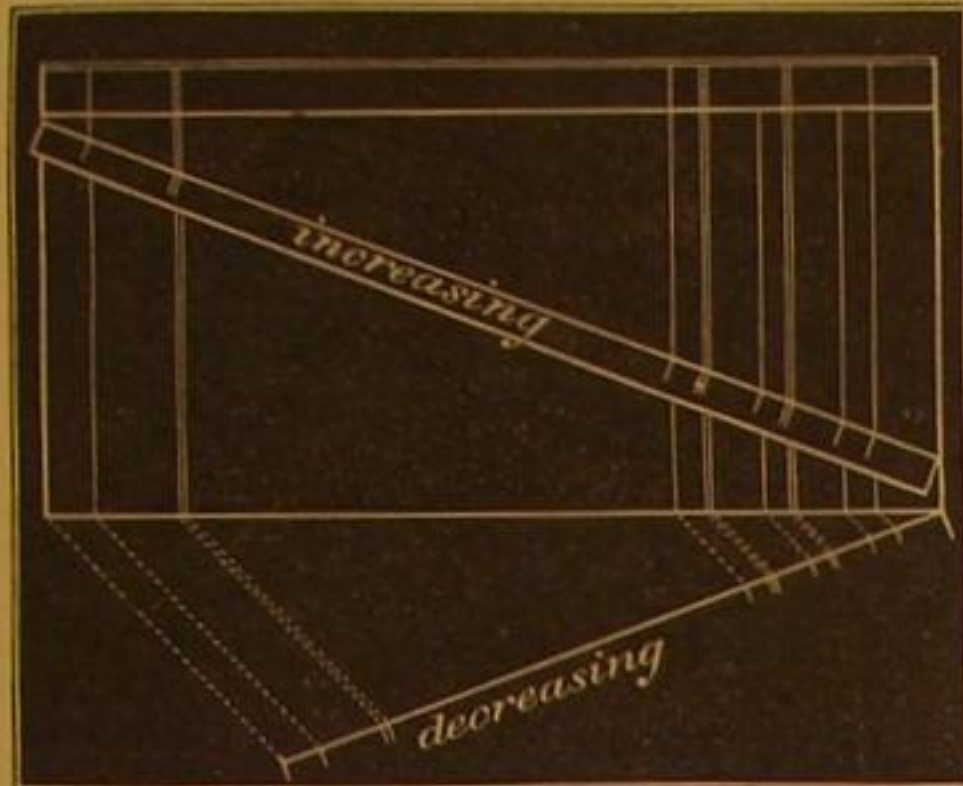
the experiments with it could be found, but Mr. Couch was present when the experiments were made. It is strange that the navy department should so far neglect the interests of American inventors. The Armstrong fuze is, doubtless, more perfect in construction, but the principle is the same in both. Sir William Armstrong was handsomely paid by the British government for this invention.

THOMAS TAYLOR.

New York, June 29, 1868.

Reducing and Expanding Lines.

MESSENGERS EDITORS:—I send herewith a simple mode of changing the scale of any pattern of ruling. You will see that it provides both for increasing and decreasing the scale while preserving the proportions. I cannot think that a



thing so simple could have escaped the notice of professional men, yet I have never met one person who knew it. Perhaps if given in your excellent paper it may interest some of your readers.

J. S. B.

Springfield, Ill.

[This method of reducing or enlarging lines we had supposed was too well known to require a published example, but we find frequently that many items of useful knowledge, long in use, are new to our correspondents, and at the risk of being considered behind the age we reproduce them as a means of instruction.]

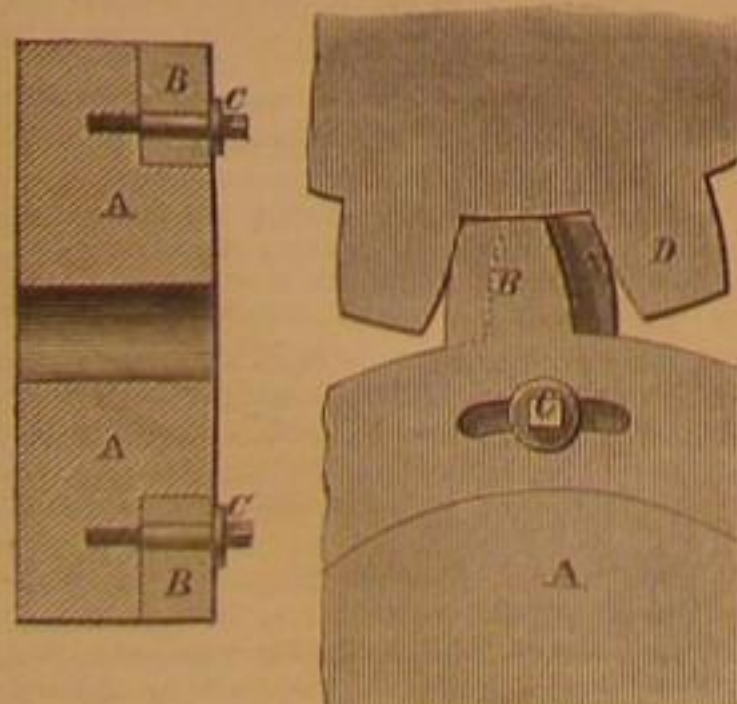
In the diagram the parallelogram may be considered a sheet of paper ruled. If it is desired to rule another but wider sheet, preserving the same relative proportions, it may be done by placing a slip diagonally across the sheet and marking on it the points where its edge intersects the ruled lines, then placing it squarely across the wider sheet, and ruling from the points as marked. For instance, if the original sheet is six inches across and the proposed sheet nine inches across, cut a strip nine inches long and place it on the six-inch sheet at such an angle that its ends shall agree with the edges of the sheet, then make the marks and transfer to the nine inch sheet. The contraction is done in reverse order, as shown by the diagram. It is evident that this plan is applicable to many uses. Draftsmen and others who use pen and pencil know its value.—EDS.

Adjustable Gears—Gears Without "Backlash."

MESSENGERS EDITORS:—In Vol. XVIII, No. 15, page 228, there is a call for the invention of a gear which shall have no "backlash." I have been experimenting since that time, and think I have overcome this objection. It is evident that whatever be the form of the tooth, there will be "backlash" after the gears have become worn. I have resorted to a double arrangement to accomplish my purpose. Fig. 1 represents a section of this gear; A represents the gear proper and B a ring fitted to A and secured to it by the bolts, C, which pass through slotted holes. The proportionate width of the face of the gear and the face of the ring may vary with the amount of work to be done by each. Fig. 2 is a side view of a section of the gears. The letters are applied to the

Fig. 1

Fig. 2



same parts as in Fig. 1. The ring, B, with teeth on it the same as the teeth on A, being adjustable, can be moved about the center of A, sufficiently to make the teeth on A touch one side of the space between two teeth on a gear with which it meshes, while the teeth on B touch the opposite side of the same space. Only half the gears of a train need be of this kind. D is an ordinary gear, the teeth of which mesh with those of A.

J. M. M.

[Objections will be raised to this method of overcoming the play or backlash of gearing because of its cost and its difficulty of adjustment. We give, however, a diagram of our correspondent's plan, as in some circumstances the device may be found available and perhaps efficient. We have

lately seen a gear which we consider superior on account of its cheapness, and fully as efficient. It is simply a double or treble gear, the teeth of which interpose with the spaces, so that when one relaxes its hold the others engage and keep up a thorough and intimate connection. The wear, alluded to by our correspondent, being divided among two or three sets of teeth, is very little in the aggregate, and the action of the teeth is very smooth and even.—EDS.

Eyeless Axes.

MESSENGERS EDITORS: Reading an article, in your paper of the 1st, on the manufacture of edged tools in the United States, reminded me of a story which may interest some of your readers. My authority for its truth is a member of the Chicago Board of Trade, who stated that he had seen several of the "tools" which were the heroes of his tale, that runs as follows:—

"When the great Eastern Rail Road from Michigan to Detroit was being built, the manager of the work, having a just sense of the superiority of the design of American axes over the English, caused a wooden model of one of Collins, best to be sent to Birmingham with an order for several thousand to be made for the use of the workmen who had to 'blaze the way' through the immense forests of Upper Canada. Unfortunately he neglected to put on eye in his model, and in due time, received an exact duplicate of the same in the shape of a car load or so of highly finished and well tempered axes with no hole for a handle.

My informant stated that he had seen a quantity of eyeless axes lying in a warehouse opposite Detroit.

C. B.

Nerves Uniting.

MESSENGERS EDITORS:—In looking over some back numbers of your valuable paper I find, page 323, Vol. XVIII, that Mr. Eades (a dentist in Ohio who mentions a few interesting cases of teeth being extracted and afterward replaced) makes the following remark: "What is singular about it is that the nerve, after having been broken, should again unite. I do not see how this could be possible."

Permit me to remark that the *vis medicatrix nature* acts on nerves and brain matter as well as on muscle, bone, and skin, and that it is a well known fact in surgery that a nerve divided, either intentionally or by accident, will reunite as well as any other structure. The operation of dividing the facial nerve for the cure of neuralgia or tic douloureux has often failed to accomplish the cure intended, for this very reason; and some surgeons have even removed a piece of the nerve of about an inch in length, in order to prevent its reuniting, and the consequent return of the pain. Dr. Willard Parker, of this city, even testifies to a case where the nerve reunited in spite of the removal of a portion of it, and even of that part of the jaw bone through which the channel of the nerve passed.

P. H. VANDER WEYDE, M. D.

New York city.

BLASTING WITH NITRO GLYCERIN.—COMPARISON OF THIS SUBSTANCE WITH GUN COTTON AND GUNPOWDER.

From a paper read a short time ago by Edward P. North, C. E., before the American Society of Civil Engineers, of New York city, we make the following extracts on the properties and uses of nitro glycerin. It appears from a statement in another column, that Mr. Nobel, the inventor of the substance, has not been able to control it within safe limits, as his own works were recently blown up:

I have been led to introduce to your notice the subject of this paper (nitro glycerin, or Nobel's blasting oil), because its application to blasting is comparatively new, and, consequently not generally known. As over three-fourths of a ton has been used on the New Canaan Railroad, of which I am now in charge, I may, perhaps, be able to convey some ideas of information and interest. I have, however, to regret that no accurate accounts of the comparative cost of quarrying with powder and nitro glycerin have been kept on this road, and that I can only give impressions as to the cost. It may be as well here to give a little sketch of nitro glycerin, and to compare it with powder and gun cotton.

Gunpowder is composed of a variable quantity of nitrate of potassa, sulphur, and carbon (charcoal), the nitrate of potassa being replaced in cheap powder by nitrate of soda.

Gun-cotton was discovered by Prof. Schonbein, about 1846, and its manufacture was almost immediately commenced, but never with financial success until lately.

Nitro glycerin was discovered in 1846, by Sobrero, but nothing was done with it until 1863, when Alfred Nobel patented its application to blasting. Gun cotton and nitro glycerin are made, the one from cotton and the other from glycerin, treated with nitric and sulphuric acid, the action of the sulphuric acid being, in each case, to intensify the action of the nitric. In the case of gun cotton, cotton which has a formula of $C_{12}H_{10}O_{10}$, is dipped into a mixture of three parts of sulphuric acid and one of nitric acid, by weight. Some of the oxygen in nitric acid goes to the hydrogen, forming water, and the formula stands $C_{12}H_7, 3(NO_2), O_{10}+6HO$, three parts of the hydrogen in the cotton being replaced by three parts of nitrous acid. On its explosion, it is all resolved into gases, namely:

	By volume.	By weight.
Carbonic oxide.....	CO.....28.95	29.97
" acid.....	CO ²20.82	33.86
Light carbureted hydrogen.....	C ² H ⁴7.24	4.28
Hydrogen.....	H.....3.16	0.24
Nitrogen.....	N.....12.67	13.16
Carbon.....	C.....1.82	1.62
Steam.....	HO.....35.34	16.87
	100.00	100.00

Leaving no residue. According to Von Lenk, in blasting,

one pound of gun cotton is equal to 6,274 pounds of powder. According to a commission appointed by the French government, the explosive power of gun cotton depends, in a measure, on the degree of compression, and, in the mean, is about three times that of gunpowder. When uncompressed, it will burn more freely than gunpowder, but by compression its rate of burning can be brought below that of gunpowder. Gun cotton, according to Prof. Abel, when well made, can be kept for a long time without undergoing change, and can be transported as safely as powder; but when impure and acid, a gradual decomposition takes place, the result of which is an explosion.

Nitro glycerin is made by treating glycerin, which has the formula $C_3H_8O_3$, with nitric and sulphuric acids, as in the case of cotton, and the chemical reactions are nearly the same, it being in both a case of the substitution of nitrous acid for a part of the hydrogen. By explosion, according to an article in the *London Mechanics' Magazine*, September, 1865, one volume of oil is converted into 429 volumes of carbonic acid, 554 volumes of steam, 39 volumes of oxygen, and 236 volumes of nitrogen—1,298 volumes in all, for one volume of liquid oil, being thus theoretically, five times more effective than its bulk in gunpowder; but by the greater amount of heat generated by the explosion, and the consequent higher tension of the gases, it is really thirteen times more effective by bulk, and eight times by weight, than the same. The United States blasting oil company, in a pamphlet published by them, assert that nitro glycerin has thirteen times the strength of powder by volume, and ten times by weight. It is a lightish, yellow, oily liquid, with a specific gravity of 1.6, nearly insoluble in water, not volatile, taking fire at 360° Fah., and freezing at from 40° to 36° Fah. When impure and acid, it decomposes spontaneously, with an escape of gas and the formation of oxalic, C_2O_4 , 2HO, and glyceric, $C_3H_5O_6$, acids. Under these circumstances it is liable to explode.

My attention was first called to the use of nitro glycerin by the fact that our contractor, Lawrence W. Myers, was losing money, on account of the extreme hardness of the rock in one cut, and its wetness in another. As I advised the use of nitro glycerin, I, of course, took a great deal of interest in its success, loading and firing a great many of the holes myself. I will give a sketch of the circumstances and results as they appeared. In one cut, which in its deepest part was about 12 feet, the rock was mostly feldspar and mica, in large crystals; but it was very wet, springs forcing themselves up through the bore holes, so that they could not be puddled. Here the fact that nitro glycerin was entirely unaffected by water rendered it particularly valuable. The mode of procedure was this: A single hole was put down to grade about the center of the cut, a foot or two further back from the face than the depth of the cutting, so as to have the line of least resistance a vertical one; from five to eight pounds of nitro glycerin were poured in. A tin cartridge about four inches long, and three fourths in diameter, filled with powder, into which a waterproof fuse was introduced, was put into the nitro glycerin, and the hole filled with water. These charges were very effective, in some instances loosening over 100 cubic yards, so that it could be readily barred out, while that immediately around the charge was burned to a soft white powder. The quarrymen said it had turned to lime. About 50 per cent. of the rock was usually so fine as to be readily thrown into carts without sledging or block holing, while that furthest from the charge was in masses of two or three cubic yards.

In the other cut, which for about 50 feet was 21 feet deep, and contained about 8,000 cubic yards, the rock was very hard feldspar and quartz, so that sometimes drills were used up faster than one to an inch. In this cut it was found better to have the line of least resistance a horizontal one. There was no grain to this rock, it not splitting or breaking more readily in one direction than another. This cut was worked from both ends, one foreman using small holes, and, of course, more of them, while the other sank his holes in the center, nearly to grade, and tried to throw out the cut at one shot. Though the plan of single holes was not always successful, still, on the side on which it was tried, there was an economy of about 10 per cent. in labor per yard moved, and a slight loss in the quantity of rock per month, which latter item I think due to the fact that too much was put before the single holes, as the rock in the face of the cut was sometimes in masses of 5 or 6 cubic yards, requiring block holing.

The effect of nitro glycerin differs from that of powder in consequence, I suppose, of its greater force and quickness of explosion, in that, that powder, when fired, when the line of least resistance is a vertical one (the bore also being vertical, and the rock homogeneous), will form a tolerably uniform crater, with the sides sloping according to the hardness of the rock. When the line of least resistance is a horizontal one, and not too long, the rock being solid, the blast will throw out what is before it, leaving the back uncracked, and no sign of action below the bottom of the hole.

Nitro glycerin, on the contrary, in the first case, will form a well, and if the rock is not too hard, the bottom diameter will be greater than the top. Nor, as far as I have seen, will the action ever be concentrated on the line of least resistance, but will extend back from the hole and downward to a greater or less distance, according to the hardness of the rock. I think that this action of nitro glycerin, in connection with the fact that its explosive force is uninfluenced by the presence of water, will tend to its being the only explosive agent used in all subaqueous operations; for with any depth of water, it will be unnecessary to drill holes, only to sink a flask of nitro glycerin on the rock and fire it.

In regard to the relative safety of gunpowder, gun cotton, and nitro glycerin, I think the last named is the safest

agent. I do not wish to be understood to underrate the disastrous effects that would, probably, and have occurred from an accidental explosion; only to say that I think, with properly made, unfrozen nitro glycerin, the cans packed in plaster of Paris, as the law requires, it is safer than powder. I speak of its being unfrozen, because during the use of it on this road, from last September until the middle of January, the only instance in which any glycerine was exploded without the aid of powder, was a small frozen piece that was crushed between two stones. Nitro glycerin was placed in the hands of six different foremen, and by them in the hands of the men; was carried unprotected in sixty pound cans up and down the line, frozen and unfrozen, in dump carts; and was generally treated with the recklessness with which Irishmen treat powder. And as blasting material is usually used on roads, it must be the safest of the three; for, as there is no necessity of any tamping but water tamping, if a charge miss fire, there is no solid tamping to cut out—at the danger of the driller's life—as with powder. For if water has been used, another cartridge can be dropped in in a minute; or if sand has been used, a portion of it can be scraped out, and a small charge of glycerin poured in and fired on top of the old charge. Besides which, gun cotton will ignite and explode not only from a light spark, but from a flame, thus making it the most dangerous of the three; while powder, though it cannot be ignited without the aid of a spark, or something red hot, can be ignited by any spark, such as one flying from drills or from rocks falling; and nitro glycerin cannot be exploded, even if ignited, unless confined, and in that case a spark could hardly reach it.

In regard to the accidents that have occurred: the one in New York almost surely occurred from the nitro glycerin having leaked into the sawdust in which it was packed, and oxidation and combustion followed, as surely as if oil had been put on the same sawdust, and it put in a warm place, only the combustion was rather more rapid. I have been informed that the accident at the express office in San Francisco occurred from the same cause. As there is now a law against transporting nitro glycerin in glass, or in any mode except in tin cans, packed with plaster of Paris in wooden boxes, we will probably have no more such accidents.

At Aspinwall, a case of nitro glycerin was dropped into the hold of the steamship; few of us would have cared to have been on the deck when a barrel of gunpowder was treated in the same way. At Bergen, red hot iron was brought in contact with tin and solder that melts at from 360° to 475° F., and nitro glycerin would be of little use as a blasting material if it had not proved disastrous. At the risk of reiteration, I will sum up the advantages possessed by nitro glycerin over gunpowder and gun cotton.

1st, That, being of greater strength, there is a great saving in drillers' wages, as fewer holes have to be made, and the charge of glycerin can be put into the rock much more compactly. For instance, if, to break up a certain rock, 1 foot of depth in the bore hole was required with glycerin, 13 feet would be required with powder, which would necessitate 6 feet of additional drilling if but 1 hole was used; but 13 feet of powder could not be exploded in a 2 inch or 2½ inch hole so that it would be effective, on account of the slowness with which it burns, so that additional holes would have to be drilled, with in each an allowance of at least ½ of the depth for tamping. With gun cotton there would not be so much difference.

2d, That nitro glycerin is not injured, either permanently or temporarily, by water or moisture, which enables us to use water tamping, a great saving of time and risk of life, impossible with either of the others; and it can be stored in damp cellars, or under water, without the necessity of drying it before using, as in the case of gun cotton, or having it ruined, as with gunpowder.

And lastly, the difficulty of exploding it renders it the least dangerous to human life.

EFFECT OF ARSENIC UPON APPLES.

Some years since a man was indicted by the Grand Jury of a western county for an attempt to kill by poisoning with arsenic. He was convicted, and sentenced to be imprisoned, at hard labor, in the State Prison at Auburn, for the term of twenty years, and was subsequently pardoned, his innocence having been satisfactorily established.

It was charged in this case that the arsenic was administered by inserting it into cuts made in the sides of apples, four in number. It was proved that the cuts were made on the 22d of September, and that the apples were laid away in a drawer until the 11th of October in the same year, during which time the accused was absent, and, of course, had no access to the fruit. Nothing remarkable was discovered in the taste of the fruit or its appearance. Two of the apples examined by a professional Toxicologist, had slits in their sides which contained crystals of white arsenic amounting to at least one grain on the cut surface of a single apple. The eating of the fruit was followed by all the symptoms of arsenical poisoning, but, fortunately, by timely measures, death was prevented.

Some doubts having arisen upon the sufficiency of the evidence, investigations were commenced to ascertain the effect of arsenic upon apples and other pulpy fruits. The results of these investigations were as follows:

First, when apples have smooth slits made in them with a sharp instrument, the changes which take place in them are very slight, during an interval of two or three weeks, especially so if they are (as was proved in the case cited) in good keeping condition when the slits are made; Secondly, when arsenic—in the form of arsenous acid—is inserted into the slits, the cuts begin to open in the course of from two to five

days; the edges are separated from one eighth to one fourth of an inch, or even more, showing very plainly the white arsenic within. At the same time the skin adjacent to the cut begins to be discolored, and, together with the pulp beneath, turns dark brown, both in appearance and consistency resembling the ordinary slow decay of the apple. This change begins to show itself on the second or third day, and then makes steady and regular progress, extending itself on each side of the cut so rapidly that by the eighth day it attains a width of from five eighths to seven eighths of an inch; by the sixteenth day, one and a half to two inches, and by the twenty-first day, one half or more of the apple will be affected with decay.

The experiments were conducted with great care, upon a great number and variety of apples, and the results were singularly uniform. Experiments upon apples baked with arsenic placed in a slit upon their sides, show that the arsenic, in such cases, is discolored. In the case cited it was proved that one of the apples which was baked had white arsenic in it. It therefore must have been inserted after it was baked.

In this case, it will be remembered that the apples were placed in a drawer on the 22d of September, remaining there nineteen days, and as the accused was absent during the whole of that time, the charge could only be sustained upon the theory that he had inserted the arsenic on the 22d of September. If that had been the case the apples would have been unfit to eat upon the 11th day of October, the time when the apples were eaten.

This action of arsenic upon the pulp of fruits contrasts singularly with its action upon animal tissues, which, it is well known, are preserved by its action.

Iodine and Carbolic Acid.

A communication to the *American Journal of Pharmacy* contains a description of a new solution containing iodine, carbolic acid, and glycerin, which is claimed to possess superior therapeutic virtues. The solution is thus prepared: Take of the compound tincture of iodine, forty-five minims; crystallized carbolic acid, fused, six minims; glycerin, eight drachms; distilled water, five ounces.

The iodine color gradually disappears, and the solution eventually becomes colorless. The time necessary to complete this change depends on the temperature—at 60° Fah., eight to ten days are required; if the cork of the bottle is secured, and the mixture exposed in a water bath to a temperature of from 90° to 100° Fah., the change will be effected in eight or ten hours. The change takes place as quickly in diffused light as in direct sunshine, provided the temperatures are equal. The solution, exposed to sunshine, becomes somewhat turbid, and deposits a muddy precipitate.

The change is due entirely to the carbolic acid, glycerin alone, under similar conditions, effecting no change in the iodine solution, while carbolic acid acts equally well with or without the presence of glycerin.

The character of the change is probably the transformation of the iodine into iodide of formyle (iodoform) at the expense of the carbon atoms of the carbolic acid.

The solution possesses antiseptic and stimulant properties in a marked degree, and has met with favor as an application in the form of injections, gargles, and lotions "in cases of sore throat, ozæna, abscesses in the ear, and foul or indolent ulcers."

It has also been recommended as an injection in cases of internal hemorrhoids, and by inhalation for throat and bronchial affections. When used for inhalation the glycerin can be omitted.

DESTRUCTIVE FIRE FROM FIREWORKS.—The Lawrence Academy, at Groton, Mass., was entirely consumed by fire on the afternoon of the 4th inst. The library, apparatus, etc., were mostly saved. The fire was supposed to have caught from Chinese crackers thrown upon the piazza by a boy. The loss on the building is estimated at \$4,000, entirely covered by insurance. A rocket also exploded in the steeple of St. John's Episcopal Church, in Buffalo, on the 4th. The structure was soon afterward wrapped in flames, which destroyed it with all its valuable contents. We trust the severe lessons which are thus annually received will result in the gradual substitution of more sensible methods of celebrating the birthday of American Independence. In marked contrast to the above we notice that on the 4th of July Mr George W. Childs, of the *Philadelphia Ledger*, gave a "Continental Hotel" dinner to about 150 newsboys in the press room of the *Ledger* building.

It is said that letter envelopes were made about forty years ago, by Brewer, a bookseller in Brighton, England. He employed a pattern made of metal plates for cutting out the sizes, and the demand for the envelopes became so great that he was obliged to employ a London firm to manufacture them.

NEW PUBLICATIONS.

COLLEGE COURANT. Yale. We are in receipt of the *College Courant*, published weekly at New Haven, Conn. It appears in a new elegant dress and enlarged form, and its prospectus and able list of contributors give sufficient promise of a brilliant future. It has our best wishes.

THE WORKSHOP. No. 5, published by E. Steiger, No. 17 North William street, contains an article upon bookbinding and fancy leather goods, also several ornamental designs for various purposes.

THE ZOETROPE, OR WHEEL OF LIFE.—We have already noticed this unique optical instrument, which has afforded so much amusement to old and young, and although an American invention, its sale has already become quite extensive in Europe. Sets of figures are furnished with each wheel, and the changes which its rotation effects are both amusing and instructive. The Zoetrope is manufactured by Milton Bradley & Co., Springfield, Mass.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

GREASING WAGONS.—But few people are aware that they do wagons and carriages more injury by greasing too plentifully than in any other way. A well made wheel will endure common wear from ten to twenty five years, if care is taken to use the right kind and proper amount of grease; but if this matter is not attended to, they will be used up in five or six years. Lard should never be used on a wagon, for it will penetrate the hub and work its way out around the tenons of the spokes, and spoil the wheel. Tallow is the best lubricator for wood axle-trees, and castor oil for iron. Just grease enough should be applied to the spindle of a wagon to give it a light coating; this is better than more, for the surplus put on will work out at the ends, and be forced by the shoulder-bands and nut-washers into the hub around the outside of the boxes. To oil an iron axle-tree, first wipe the spindle clean with a wet cloth with spirits of turpentine, and then apply a few drops of castor oil near the shoulder and end. One teaspoonful is sufficient for the whole.

TO REMOVE THE TASTE OF NEW WOOD.—A new keg, churn, bucket, or other wooden vessel, will generally communicate a disagreeable taste to anything that is put into it. To prevent this inconvenience, first scald the vessel well with boiling water, letting the water remain in it until cold; then dissolve some pearlash or soda in lukewarm water, adding a lime to it, and wash the inside of the vessel well with this solution. Afterward scald it well with plain hot water, and rinse it with cold water before you use it. The reason for this is the ready combination of resinous matters with alkalies to form compounds soluble in water. The resinous substances of wood, while new, cause a disagreeable taste and odor in substances kept in wooden vessels.

RAILROAD ENTERPRISE.—It is less than half a century since the first railroad in the United States was commenced—the Baltimore and Ohio, in 1828—and now there are forty thousand miles of railway within the limits of the country. The Mohawk and Hudson Railroad, in New York, was the second road built, and the South Carolina Railroad was the third. The road from Boston to Albany was commenced in 1841, and a continuous line of railway between Boston and New York was formed in 1849, by the completion of the New York and New Haven road. The Erie and the Hudson River lines were completed in 1851, the Michigan Southern and Michigan Central the following year, and in 1853 an unbroken line of one thousand miles of railroad between Boston and New York and Chicago was formed. Between 1849 and 1857, there were 15,843 miles of road constructed, and the railroad enterprise gained such an impetus from the success of those eight years that no obstacle has since been able to offer anything more than a temporary check. At the close of the year 1857 there were 1,998 miles of railroad in the United States, and at the close of 1857, there 34,344 miles. This gives an average increase of 1,156 miles per year for thirty-three years. The largest number of miles opened in one year was 3,643, in 1856, and the least number was 159, in 1843.

GOLD IN ALASKA.—Reports continue to reach us which tend to confirm the previous statements of important gold discoveries in Alaska. Much excitement is said to prevail in Oregon, Washington Territory, and British Columbia, in consequence of these reports. Specimens of anthracite have been brought to Sitka by the Indians, who report large deposits in the interior. These statements are probably exaggerated, but there is some reason to believe Alaska contains considerable mineral wealth. It ought to contain some mineral wealth as it will take considerable to purchase this territory.

PROTECTION OF EYES.—In a recent investigation by an oculist of Breslau, embracing six manufacturing establishments, employing in the aggregate 1,233 workmen in the different departments of boiler-making, blacksmithing, turning, fitting, &c., it was found that 90 per cent. had often been injured in the eye by minute pieces of metal, and that 40 per cent. had been under medical treatment for serious accidents to their eyes. The whole time lost by the workmen from this cause amounted to 4,736 working days. Ordinary glass spectacles were objected to on account of their liability to be broken. Mica spectacles were tried, and found to fulfill all requirements. The mica used is of the purest kind, very thin, and is curved somewhat like a watch-glass. It is held in a frame which fits closely enough to the eye to prevent the passage of metallic fragments. Mica lenses are a pale gray tint to objects, but does not imp in the eye. The price of a pair of these spectacles, at Breslau, is about 15 cents. If, from want of proper protection, a fragment of metal, wood, or other substance, should get in the eye, it can often be easily removed as follows: Take a horse hair and double it, leaving a loop. If the mote can be seen lay the loop over it, close the eye, and the mote will come out as the hair is withdrawn. If the irritating object can not be seen raise the lid of the eye as high as possible and place the loop as far in as you can, close the eye and roll the ball around a few times, draw out the hair; the substance which caused so much pain will be sure to come with it.

The ground has been broken on the Pacific and Atlantic railroad at Springfield, Mo. A large number of men are employed, and the work will be pushed with a view of connecting St. Louis and San Francisco by the 35th parallel.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

MAKING CORES FOR CASTINGS.—Benjamin S. Benson, Baltimore, Md.—This invention consists in an improved device for holding and cleaning the metallic cores used in casting oven pipes, by which such cores can be evenly and thoroughly scraped and cleaned.

VENTILATOR.—J. W. Foard, San Francisco, Cal.—The object of this invention is to furnish an improved ventilator for ships, buildings, cars, etc., which while affording a thorough ventilation to the ship or building upon which it is used, entirely prevents the rain from entering through the ventilator.

FIREMAN'S EXTENSION LADDER.—Robert H. Jones, San Francisco, Cal.—This invention is an apparatus by which, in cases of fires in lofty buildings, the hose can be carried to the top of the building, and there operated conveniently and safely from the ladder. A device is connected by which persons and valuable property can, at the same time, be removed from the upper stories of the building.

HOR POLE.—Luman B. Clark, Bambridge, N. Y.—This invention consists in providing a tapered post of scantling which may be driven into the ground, and which may form a base to which the poles may be attached or rendered detachable.

MILL STONE.—Peter Zimmerman, Delaware Water Gap, Pa.—This invention consists in the arrangement of a ball or suspending apparatus for the stone so as to possess the quality of a universal joint, whereby, although the faces of the stones may not be perpendicular with the spindle, the jarring and pounding action of the parts usually occurring when rigidly connected together will be avoided.

STOVE OR HEATER.—F. S. Zumstein, Evansville, Ind.—This invention has for its object to furnish an improved stove for railroad cars, steamboats, hotels, houses, etc., which shall be simple in construction, will keep the fire in full operation from six to twenty-four hours without its being necessary to attend to the fire, and which may be used with perfect safety on railroad cars, as the stove is so constructed as not to be liable to be broken and to scatter the fire should an accident happen to the car.

PRUNING AND HARVESTING HOOK.—John Stark, Thomsville, Ga.—This invention relates to an improvement in hooks for harvesting and cutting up corn and also for pruning trees, and it consists in making the hook or cutting edges in two or more parts united together.

SELF-DETACHING PULLEY.—Jesse E. Gustin, Elmira, N. Y.—This invention relates to an improvement in pulleys used for raising heavy weights whereby the same are made self-acting or so arranged that the position of the pulley can be changed and the load dumped automatically.

STEAM PRESSURE ALARM.—David McFarland, New York City.—Two patents have been granted on this invention which relates to a new and simple device to be connected with a steam boiler for sounding an alarm when the steam within the boiler exceeds a certain pressure, and also for sounding an alarm when the water descends to a certain level.

PAPER MACHINE.—Isaac Jennings, Fairfield, Conn.—This invention has for its object to so improve the construction of ordinary paper machines that the paper may be removed from the rollers in the form of tubes either straight or tapering for the formation of the bodies of buckets, barrels, etc., or to form pipes or tubing.

HAY FORK.—E. J. Fenn, Medina, Ohio.—This invention has for its object to furnish a simple, convenient and effective fork for handling hay with horse or other power, and which shall at the same time be easily operated to load and unload it.

HORSE POWER HAY FORK.—William Hannab, Middlefield Center, N. Y.—This invention relates to a new and improved method of constructing hay forks for the unloading of hay by the power of a horse, whereby the same is more rapidly and economically done.

STOVE.—S. W. Gibbs, Albany, N. Y.—The object of this invention is to produce a self-feeding, base burning stove for heating purposes of such formation as will allow a free escape for the gasses generated, and which shall allow a free supply of fresh air to the fuel at the base of the feeder.

REFRIGERATOR.—Anthony B. Sweetland, Fitchburg, Mass.—This invention relates to an improved refrigerator for household or other use and it consists in the method in which the ice is supported therein and the provision made for properly distributing the ice water.

MILK CAN.—David W. Shaw, Baltimore, Md.—This invention relates to a method of constructing cans for transporting and keeping milk and other articles and it consists in forming the neck of the can so that the milk may be secured air-tight and the cover locked in its position, thus protecting the milk from the action of the atmosphere as well as from being stolen, and preventing the churning of the milk during transportation.

HORSE HAY FORK.—E. I. White, Locke, N. Y.—This invention has for its object to furnish a neat, simple, convenient, and effective hay fork, and which shall at the same time be strong, not liable to get out of order, and easily operated.

HOP VINE SUPPORT.—Peter J. Fuller, Clarksville, N. Y.—This invention relates to an apparatus for training hops, and consists of a short pole secured in the ground, and of a series of arms pivoted to the upper part of the same. The arms can be brought to an upright position, and are then clamped by means of hooks or other equivalent devices, so as to form rigid supports for the growing hops. Four, more or less, such arms being arranged on each pole. An equal number of vines can be framed on each pole. The arms are, by means of the aforesaid hooks, so firmly held that they need no further fastening or support. When the hops are to be removed, the arms are swung down, and the vines can then very easily be stripped off.

MEAT CHOPPING MACHINE.—Henry Obrecht, Mahoney City, Pa.—This invention relates to a new machine for chopping meat or other articles, and consists in imparting to the cutter or cutters, beside an up and down reciprocating, a slow rotary motion. The cutters are fastened to the lower end of a vertical shaft, which is swiveled in, and suspended from an up and down reciprocating block or other device, said shaft also passing through the center of the wheel, to which slow rotary motion is imparted, the shaft or wheel having a feather so that the shaft is turned by the wheel, and may still move up and down through the same.

WOODEN PAVEMENT.—Duncan McKenzie, Brooklyn, N. Y.—This invention relates to a new and useful improvement in wooden pavements of that class which are constructed of blocks laid with the grain in a vertical position and placed in parallel rows with a space or recess allowed between the rows, to receive sand and to serve as a foothold for horses. The invention consists in connecting the rows of wooden blocks by means of dovetail wooden strips attached to the sides of the blocks and arranged in such a manner that when the pavement is laid it will be retained in proper position or at the proper level, the several blocks sustaining each other throughout the entire length of the pavement.

Coupling Railroad Cars.—James M. Everhart, Pittston, Pa.—This invention relates to a new and useful improvement in coupling railroad cars, and has for its object the avoidance of all slackness or play between the coupled cars and the consequent jamming, jerking, etc., attending the said slackness or play.

APPARATUS FOR DRAWING WATER.—W. P. Walling, Swartz Creek, Mich.—This invention relates to a new and improved apparatus for drawing and conveying water from a spring or brook to any convenient distance, and is designed to avoid the labor of carrying water by hand from brooks or springs which are at some distance from a house or any place where the water is to be used.

GRAIN SEPARATOR FOR THRASHING MACHINES.—Daniel S. Yeakle, Dillingersville, Pa.—This invention relates to a new and improved separator for separating the grain from straw as said substance is discharged from the thrashing cylinder of a thrashing machine, whereby the work above mentioned is performed in a perfect manner.

LOCKING NUTS.—Samuel Garber, Beaver, Pa.—This invention has for its object to furnish a simple and effective means for keeping nuts upon bolts that are subject to a frequent or continuous jarring, designed especially for securing the nuts upon the bolts that hold the fish plates to the sides of the rails of railroad tracks, but which are equally applicable to nuts upon bolts in other situations.

PIPE TONGS.—James M. Everts, New Haven, Conn.—This invention consists in providing a long slot in one of the jaws when the joint is to be formed with the other jaw, for sliding the pivot, which is fixed to the other jaw, back and forth, which slot, for about half the distance through the jaw, is perpendicular to the face of the jaw, and for the other half inclined thereto in such direction as to present a section of a V form, or the section of a triangle of which the base is the longest side. The focus of these said inclined walls of the slot are serrated and a stud fitted to the axial pin and provided with corresponding angular serrated sides, and also with a rectangular portion to fit into the rectangular portion of the slot is interposed in the said slot between the jaws and constitutes the means of securing the jaws at any position with reference to each other within the angle allowed by the said slot.

HOG TROUGH.—Caroline M. Rolfe, Laconia, N. H.—This invention relates to a new and improved hog trough of that class which are provided with pivoted covers so hung and arranged that by adjusting the latter in one position the trough will be exposed at the outside of the pen or sty and rendered accessible for the pouring of food into the trough, while the latter is shut off from or rendered inaccessible to the hogs in the sty, and when the cover is adjusted in the other position the trough is rendered accessible to the hogs. The invention consists in a peculiar construction and arrangement of the cover, whereby a very economical and durable trough of the kind specified is obtained.

VELOCIPEDE.—George, William, Alfred, Edward, and Frederick Hanlon, New York city.—The object of this invention is to so construct a two-wheeled velocipede that it can be used by various sized persons, and that it may be balanced by the addition of a third wheel, for persons learning to use it.

STEEL SHANKS FOR BOOTS AND SHOES.—Henry Briner and Emil Briner, Manhattanville, N. Y.—This invention relates to an improvement in the strips of spring steel or other spring metal called "steel shanks," for stiffening the bottoms of boots and shoes under the hollow of the foot, or for supporting and keeping in place that portion of the leather bottoms of boots and shoes.

WINDOW MUSKETO BAR.—C. T. Warren, Linden, N. J. Patented June 30, 1868.—This invention relates to the manner in which musketo bar, gauze, or netting is operated, so as to prevent the entrance of those pests into a room through the windows, and it consists in operating the bar (either rolling up or unrolling it) by the act of raising or lowering the sashes, by means of fixed cords and rollers.

LADDER AND SCAFFOLD FOR PAINTING AND OTHER PURPOSES.—Robert Rowan, Parisburg, Pa. Patented June 30, 1868.—This invention relates to an apparatus for facilitating the operation of painting buildings, and which is adapted to other uses where work is to be performed on buildings in elevated situations.

DEVICE FOR REPAIRING BARRELS.—E. W. Gillman, Hunter's Point, N. Y. Patented June 30, 1868.—This invention consists in binding the barrel with

adjustable metallic bands and thereby holding such barrel or vessel together, when the hoops are removed therefrom, so tightly that leakage is prevented, and so that the broken or decayed stave or staves may be removed and other sound staves be inserted in place thereof.

MATCH SAFE.—Alfred Hoyt, New York city. Patented June 30, 1868.—The object of this invention is to so form a receptacle or box for keeping matches, and conveniences for lighting the same, that the matches shall be kept dry and not exposed to moisture from the atmosphere, and so that facilities shall always be at hand for lighting the match.

LETTER BOX.—D. P. Jordan, Chicago, Ill. Patented June 30, 1868.—This invention relates to an improvement in the method of receiving a securing letters, papers, etc., and it consists in a novel combination of a letter and newspaper box.

INK.—D. C. McNeil, Osceola, Mo. Patented June 30, 1868.—This invention relates to a new and improved ink, whereby the ink when used on paper is invisible, no writing or marks appearing until the paper is exposed to the fire.

BUTTONHOLE SEWING MACHINE.—Henry E. Reynolds, Bristol, R. I. Patented June 30, 1868.—The object of this invention is to furnish a machine by which buttonholes in clothing may be worked and completed with the same facility with which any other kind of sewing is done on the same garments.

GRAIN DRYER.—Wm. Standing, Cairo, Ill.—The object of this invention is to accomplish the drying of grain in an expeditious and effective manner, and is designed for use in steam grist mills where the waste steam from the engines may be utilized in drying the grain, but is equally applicable in other situations where steam can be obtained.

It consists in general terms of a steam chamber containing grain cylinders through which the grain is passed, and around which cylinders is a steam space.

It is provided with valves for adjusting the rapidity of the passage of the grain through the said cylinders, and perforated wire cloth tubes located within the grain cylinders through which an upward current of air passes to assist in drying the grain, and to bear away the moisture expelled from the same.

It is further provided with a receiving chamber at the base of the apparatus which is formed with lateral openings to admit the air to the lower ends of the said perforated tubes, together with other devices perfecting the whole.

BRICK AND MORTAR ELEVATOR.—Herman Spiro, Knoxville, Tenn.—The object of this invention is to accomplish the raising of brick and mortar for building purposes, and to present the same in a position conveniently accessible to the builders upon the scaffolding.

HOPPER SHOE FOR GRIST MILLS.—W. P. Wyche and Young P. Dickson, Brookville, N. C.—This invention relates to an attachment for grinding mills, and is designed to sift or separate the trash and other foreign matter from grain before it enters the hopper. It consists of a vibrating sieve hung above an inclined apron, and both actuated by some suitable mechanism forming part of the mill machinery.

CATHARTIC LOZENGE.—William M. Du Bois, Poughkeepsie, N. Y.—This invention consists in the preparation of a medicinal bark, having cathartic properties, in the convenient and palatable form of a lozenge, pill, or bolus, by which it is more easily and conveniently carried and administered.

COAL SCUTTLE.—Thomas Scantlin and James M. Scantlin, Evansville, Ind.—This invention consists in forming the bottom of a coal scuttle of cast iron, formed with diagonal ridges, which form a central leg at their intersection, and also serve to strengthen the bottom. The manner of uniting the sheet metal sides to the cast bottom is also improved.

PANEL FENCE.—C. W. Spruill, Rome, Ga.—This invention consists, essentially, in the method of attaching fence panels, which is accomplished in a very simple and effective manner.

WEATHER STRIP.—Benjamin F. Averill, Dunkirk, N. Y.—This invention relates to weather strips for shutting out the drafts of cold air under the bottom of doors. It consists of a moveable plate, provided with certain mechanism, by which the plate is made to shut downward and close the crack between the door and the sill, and to rise again when the door is swung open.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at \$1.00 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

J. A. P., of Wis.—Your explanation of the swing is too complex and is partially erroneous; the whole question can be disposed of in a few lines, by considering the shifting of the center of gravity by the person in the swing.

J. A. H., of Ark.—Paper boxes may be made waterproof in a very easy manner by applying a thick coat of turpentine, benzine, or alcohol varnish.

A. T. Y., of Pa.—A novel substitute for plastering is a paste of the fiber of prairie grass or pampo, it is similar to paper pulp, but much cheaper; it may be mixed with some adhesive substance soluble in water. When required to be fireproof mix it with waterglass.

J. H. B., of Ohio.—It is very doubtful if our courts of law would sustain a patent granted under such circumstances. A good deal of consideration is due to the claim of an original inventor, but there is no good excuse for so many years' delay in asserting his rights to a patent.

F. N., of Ohio.—The loss of temper in a scythe from exposure to the rays of the sun in this latitude would we think be scarcely appreciable. We know of no manual that treats of brickmaking. It is an art that must be learned by practice.

S. W. B., of S. C.—Siphons may be used for transferring water over any height less than 34 feet theoretically, practically about 32 feet may be relied upon. No doubt they might be substituted for the floodgates and trunks of which you speak, but we doubt whether it would be profitable to do so.

J. E. V., of Ohio.—We prefer a solution of gum tragacanth in water, with a little alcohol to prevent souring, to any other ready made mucilage. It is not, however, a fluid, but a paste.

J., of La. asks, "can ice be produced in a vacuum, or in other words, will water freeze if the air is taken from it?" No; the presence or absence of air does not produce congelation. Rapid evaporation of moisture tends to refrigeration, but the total absence of air does not necessarily produce congelation.

O. T. P., of Tenn. says, "I am running an engine the boiler of which is fed with water from the coal bank, the water evidently containing iron and sulphur in solution, which seems to have a bad effect on my boiler. What can I do to neutralize this effect?" No neutralization of the iron is required; it is perfectly harmless. As for the sulphur, perhaps nothing is better than common washing soda to neutralize its effects. But the use of this alkali is troublesome and expensive. The best remedy in this case would be to procure feed water from a purer source.

Z. Mc M., of Mo. asks the best method of dressing deer skins, as he is unable to obtain a skin that has not been damaged in dressing. The "burning" of leather is not uncommon from the use of strong lime as an alkali. In dressing deer skins and the tender pelts of our smaller game and domestic animals some milder alkali, as washing soda or pearlash is preferable to lime, to be followed by an application of a solution of alum.

C. H., of Pa. tells of a practical sawyer ripping up some blocks of wood with a circular saw, and finding that a high speed of the saw prevented its cutting. He wonders at it, and asks the wherefore. Probably the cause is the clogging of the teeth, the dust not having time to deliver, if, as stated the speed was 6,000 or 7,000 revolutions per minute. In this case as in many others "more haste less speed."

E. A., of Conn.—Bodies float in fluids when their weight is equal to the sustaining fluids bulk for bulk. When their weight is less than the fluids in which they are placed bulk for bulk they will rise to and project from the surface. Therefore if a hollow ball containing air floats upon and projects from the surface of any fluid, it will when the air is removed from its interior, float still higher as the weight is diminished, by weight of the air removed. A hollow bar of iron will not sustain as much weight in any way as a solid bar of the same diameter. A hollow bar will however sustain within certain limits more weight, when its ends are supported, and it sustains more pressure in a horizontal position, than a solid one of the same weight owing to a better distribution of the fibers to meet the strain. Another reason is that the central portions of iron bars are not so strong in proportion to their weight as the surface parts. The pressure upon the inside of a balloon from the contained gas is equal to the resistance offered by the containing silk and network, and the pressure of the external air.

G. M., of Ill. thinks he has a theory original with him in regard to the cause of steam boiler explosions, namely, electricity in the boiler. Assuming electricity to be a cause of boiler explosions he proposes the insertion of pointed copper conductors, of wire, around the safety valve to conduct this dangerous fluid from the interior of the boiler to the external atmosphere. We have published enough about this theory until we have facts which are really valuable.

J. B., of Mass.—Iron, steel, and other metals, polished, may be preserved from rusting while unused by a coating of paraffine, or of lard or tallow (not salted) mixed with powdered resin in the proportions of eight of lard and two of resin, applied while hot.

Business and Personal.

The charge for insertion under this head is one dollar a line.

Marshall's line engraved portrait of Gen. Grant. This portrait is commended in the highest terms by Mrs. Grant, Hon. Schuyler Colfax, Gen. Sickles, the artists, Huntington, Durand, and Elliott, and many others. It is the only authentic and satisfactory portrait of our next President that has been issued. Agents for its sale are wanted everywhere. Address Ticknor & Fields, Publishers, Boston, and 63 Bleeker st., New York.

S. S., Wis.—M. M. Leahy, Milwaukee, is agent for Broughton's lubricators, oil cups, gage cocks, and others. Undoubtedly they are the best.

Millstone-dressing diamond machine, simple, effective, and durable. Also, Glazier's diamonds, diamond drills, tools for mining, and other purposes. Send stamp for circular. J. Dickinson, 64 Nassau st., N. Y.

Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Conn.

Universal filter well.—Drives and works successfully everywhere. Patented in Dec., 1867, by Oscar C. Fox, Georgetown, D. C.

The patent sweet fern and chemical lacing, as made by J. H. & N. A. Williams, Utica, N. Y., is far superior to the ordinary kinds of belt lacings made under the same patent.

Artificial stone—cheap and new invention—for sale. T. Hodgson, 7 Beach Place, Brooklyn, N. Y.

Patented articles a specialty.—All description of sheet and cast metal small wares made to order and introduced to the trade. Dies and tools for sheet metal, castings, etc., etc. J. H. White, Newark, N. J.

Olmstead's oilers are the best. Sold everywhere.

Want to buy—State right for brick machine. Address box 125, Toledo, Ohio.

Portable India-rubber bathing tub.—Can be carried in trunk. Also, formula for electro chemical bath for all diseases. United States for sale. Price \$300. Address box 100, Clarksburg, West Va.

All buyers of tools and hardware should have Wilkinson & Co.'s illustrated catalogue. The illustrations are very full. Sent on the receipt of 50c. 2 Washington st., Boston.

Brick Machine.—Lafar's New Iron Clad has more advantages than any other ever invented. For descriptive circular address J. A. Lafar & Co., Albion, Orleans county, N. Y.

For services of experienced detectives to obtain evidence against infringers of patents, address Box 581, Newark, N. J.

Adams' improved air cylinder graining machine, in operation daily and specimens of work at 44 Murray st. Send stamp for circular full particulars, prices, etc. Address Heath, Smith & Co., as above.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

Livingston & Co., Iron Founders, Pittsburgh, Pa., make to order fine, smooth castings, of all kinds, from A No. 1, soft and strong iron. Give them a trial.

EXTENSION NOTICES.

Ann Winter, of Rondout, N. Y., administratrix, and William Winter, of said Rondout, administrators of the estate of Archibald Winter, deceased, having petitioned for the extension of a patent granted to the said Archibald Winter the 19th day of September, 1854, for an improvement in machines for sawing fire wood, etc., for seven years from the expiration of said patent, which takes place on the 19th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 15th day of September next.

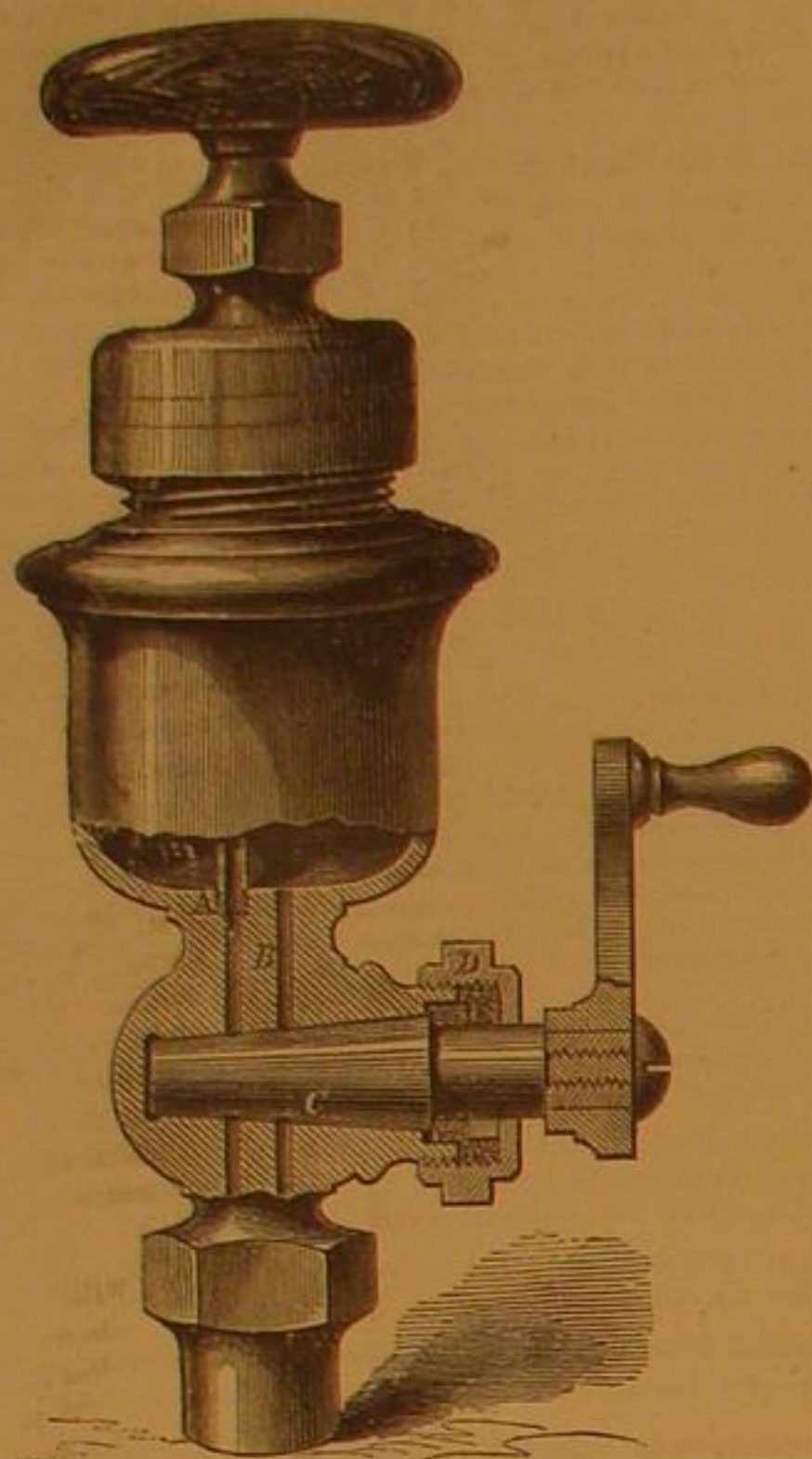
Julius Debaunais, of New York city, executor of the estate of Victor Beaumont, deceased, having petitioned for the extension of a patent granted to the said Victor Beaumont the 24 day of October, 1854, for an improvement in steam gages, for seven years from the expiration of said patent, which takes place on the 24 day of October, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 14th day of September next.

Gardner S. Blodgett and Paul T. Sweet, of Burlington, Vt., having petitioned for the extension of a patent granted to them the 5th day of December, 1854, for an improvement in ovens for baking, for seven years from the expiration of said patent, which takes place on the 5th day of December, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 16th day of November next.

Rebecca A. Marcher, of New York city, executrix of Robert I. Marcher, deceased, having petitioned for the extension of a patent granted to the said Robert I. Marcher the 23d day of May, 1855, for an improvement in tools for grooving moldings, for seven years from the expiration of said patent, which takes place on the 22d day of May, 1869, it is ordered that the said petition be heard at the Patent Office on Monday, the 21st day of December next.

HARLIN'S PLAN FOR IMPROVING OIL CUPS.

The great difficulty with the oilers generally in use on the chests of engine cylinders is the wear of the plug and the trouble of grinding and resetting it. It is in use but a little while before it leaks and becomes a source of continual annoyance. After being several times re-ground the transverse holes through it become out of line with those in the cup and stem, which should correspond. The object of this improvement—for which a patent is now pending through the Scientific American Patent Agency—is to provide a means of making these leaky or discarded oil cups useful and even better than before. It consists simply in packing the plug so that no leakage is possible and that the portion which is seated in the stem is not compelled to perform two offices.



A brief reference to the parts of the engraving will readily explain the action of the oiler. A is the pipe for the admission of the steam to the surface of the oil in the cup, and B, the oil hole leading from the cup to the interior of the chest. C is the plug and D the stuffing box, inside of which is the packing and the ring, E. From these references any engineer or machinist will see how readily one of the common oilers may be improved to render them perfectly effective, durable, and convenient.

Further information may be obtained by addressing McNab & Harlin, 86 John Street, New York city.

GILDING ON WOOD.

A correspondent inquires why picture and mirror frames which are gilded receive a coat of some white composition before being gilded, while the letters and ornamentations on signs, made also of wood, do not.

It will be noticed that picture frames when gilded have a luster—are burnished—while the letters on signs are “dead.” The composition referred to is necessary to this burnishing, as the wood would “give” too much and the leaf be broken and destroyed. To prepare the frame for the gold leaf a mixture of hot size and whiting, quite thin, is applied evenly, and followed by successive coats, each thicker than the other, care being taken that the ornaments or carvings are not clogged and filled by the mixture. The coating when completed is about one-sixteenth of an inch thick, and is smoothed with pumice stone. Upon this bed is laid a composition of clay, red chalk, plumbago, suet, and bullock's blood. The leaf is then applied precisely as in ordinary gilding, which will be presently described, and burnished with agate or bloodstone set in convenient handles.

In ordinary gilding, as for the lettering on signs, no preparation is necessary, except to apply a mixture of boiled linseed oil and ochre, called gold size, which should stand over night or for a few hours until, to the practiced touch, it is of the proper viscosity to receive the leaf. The application of the leaf appears to be perfectly simple, but it requires much experience, dexterity, and the exercise of discretion and good judgment. The gold leaf comes in “books,” each leaf of which is coated with red chalk, an argillaceous oxide of iron, to prevent the adhesion of the gold to the paper. The gilder, holding in his left hand a cushion covered with soft leather and in his right the foot of a rabbit or hare, removes one of the gold leaves from the book by simply touching it with the hare's foot or lifting it with a thin steel blade, and conveys it to the cushion, on which he spreads it by gently blowing upon it, by which he smooths out all the wrinkles. With his blunt edged knife, similar to a painter's palette knife, he cuts the leaf into pieces adapted in size to the spot to be gilded, and with the hare's foot lifts the piece and dexterously conveys it to its place, finishing the process by touching the uneven portions with a soft camel's hair pencil. No

draft of air can be allowed in the room where this work is done, as the particles of gold leaf are so light that they fly at the slightest breath. Sometimes it is necessary to press portions of the leaf into depressions of the work, if for instance it is a carved frame, by a wad of soft cotton, but this cannot be used in a damp atmosphere.

THE NICOLSON PAVEMENT—IMPORTANT PATENT EXTENSION.

The Commissioner of Patents has extended the patent granted to Samuel Nicolson, August 1854, as renewed Aug. 1867, for a wood pavement. This pavement is intended to combine the good points of all other pavements.

A sufficient foundation is first placed under blocks of wood to preserve them in their wear and to keep them level at the surface. Alternate rows of concrete are also placed with the blocks upon this foundation, so as to prevent their becoming slippery, and the blocks are coated and saturated with bituminous substances, to retard decay. By these means a pavement is produced which has no objections to it, and is comparatively cheap and very simple in its construction.

The tests which this pavement has undergone, and the great saving of horses and vehicles, as well as the increased comfort both to travelers and residents along the streets through which it has been laid, its durability and economy, demonstrate the value of the improvement.

It has been computed according to the testimony in the case that in New York and the adjacent cities, there are over 200,000 horses and a corresponding number of vehicles. These horses and vehicles cost from \$100 to \$1,000 each, while many of them cost more. It is also estimated that the lowest possible saving on each horse would, in seven years, be not less than \$75, which on 200,000 horses, makes a saving of \$15,000,000. It is further estimated that the average saving on each vehicle for the same time would be at least \$100 or an aggregate in 200,000 vehicles of \$20,000,000. It costs now on an average \$30 per annum for the shoeing of a horse, one half of which it is thought might be saved by the use of the Nicolson wood pavement. The aggregate saving in shoeing would amount in these cities to \$21,000,000. It would probably save in the same time \$1,500,000 in the destruction of freights, and a like amount in the expense of cleaning the streets. This gives a total of \$59,000,000. To which may be added sundry other gains resulting from the increased capacity of the streets, and increased speed of vehicles, the saving of the lives of thousands of horses, and diminishing the rates of insurance upon them; the saving of goods exposed for sale, from the accumulation of gritty dust; in the prevention of frost in gas and water pipes, the leakages of water into cellars and the improved sanitary condition of these cities. These accumulated savings were estimated to amount to not less than \$7,000,000, which added to the increased value of real estate probably not less than \$10,000,000 would swell the total saving to \$76,000,000.

Last though not least to the humanitarian, will appear the prevention of cruelty to horses. To walk through Broadway, without seeing a horse down is a consummation which the Nicolson pavement would secure. We think this pavement, to be unquestionably superior to any stone pavement that has been or can be devised.

CORROSION OF IRON EXPOSED TO SALT WATER.

It is usually supposed that iron, either cast or wrought, is subject to rapid oxidation by being exposed to the action of sea water; or if alternately exposed to the action of water and the atmosphere. Many facts seem to support this theory, but there are others which would seem to denote that much of this action, instead of being attributed to external influences, is to be attributed, rather, to the nature and structure of the iron. Wrought iron is undoubtedly more subject to the influences of moisture and the atmosphere than cast iron; but the cannon of the *Royal George*, submerged nearly half a century, were so soft, when raised, as to be easily cut with a knife; yet cannon, sunk in the fresh-water lakes of our country in 1812, were found to be but slightly corroded when raised forty years afterward. We have, however, seen shot—cannon balls—sunk at the same time, in the same locality, and recovered at the same time, which appeared to be converted into plumbago, or a species of carburet of iron. We attribute these seemingly contradictory results to the difference in the quality of the metal acted upon.

Cast iron, to resist corrosion, should be as hard as the circumstances of the case will admit, of an even, close grain, containing but little graphite, which is found so abundantly in ordinary soft iron, the filings from which will smut the fingers. Water pipes and gas pipes are too often cast from the refuse of the foundry, slag, scoria, etc., when they should be made of the most compact metal, hard, white iron.

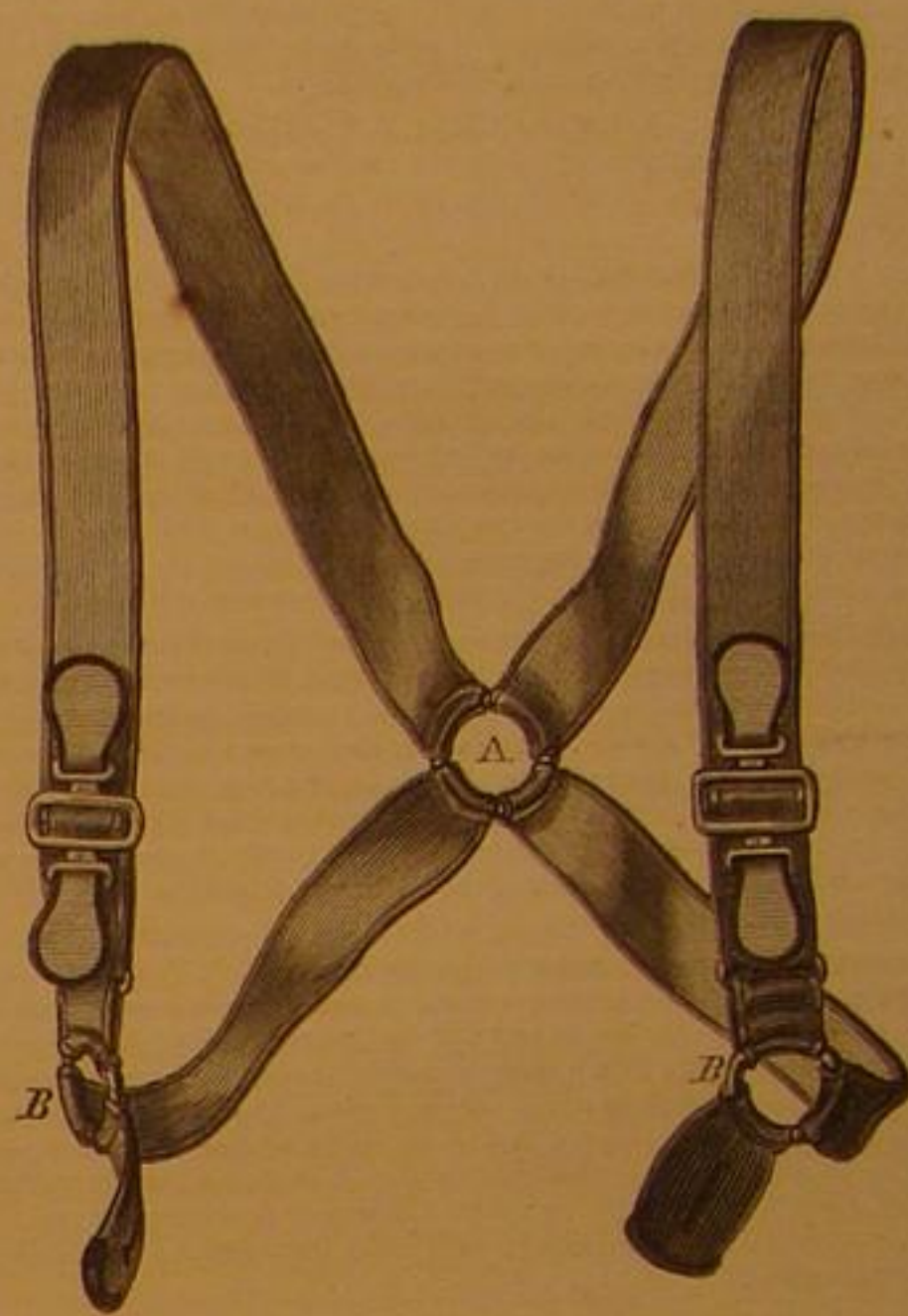
A Scientific Toy.

An amusing, if not a very reliable, hygrometer may be constructed as follows:—Take an ordinary cigar box, and place a vertical upright rock shaft in its center. To this shaft attach a bar of light wood so as to form two equal arms on each side. Insert a staple at one end of the box; attach one end of a piece of small catgut (or a horse hair will do) to it, wind it twice around the vertical shaft and fasten the other end to a small coiled spring fastened to the other end of the box. The absorption of moisture will render the gut longer or shorter as the atmosphere is moist or dry, and the motion produced by the contraction or expansion of the gut and the spring will be communicated to the vertical shaft, and through it to the arms. If to the end of one arm a toy figure of a mower be attached, and to the other a figure holding an umbrella, openings being cut to represent doors in the side of the box, fronting each figure, the figure holding the umbrel-

la will appear when the air is moist, and the haymaker when it is dry. Rain is more likely to occur when the air is moist, than when it is dry, and thus this toy will indicate, to some extent, the probability of rain. This is an amusing modification of the well known hair hygrometer. It may be added that the smaller the vertical shaft is made, the more delicate will be its operation. A box of considerable length in proportion to its other dimensions is best adapted to the purpose.

TOWLES' PATENT ELLIPTIC SUSPENDER.

We recollect an anecdote of a rigid Scotch Presbyterian, who, in advising his son against heretical influences, bid him beware of suspenders to his breeches. What connection the old gentleman could see between suspenders and theology we never could perceive, but that he might oppose pantaloons braces on the score of discomfort seems reasonable. In hot weather they are a nuisance; they bind and sweat the shoulders and prevent free movement of the body. Having pretty thoroughly tested the contrivance illustrated in the ac-



companying engravings, however, we are certain it is free from these objections; we have never before found anything of the sort so comfortable and so well adapted to give ease to the wearer in every position of the body.



The pantaloons are supported and suspended from two points only, these being under the arms and central. By reference to the engravings it will be seen that the strain and weight are equal in whatever position. From a common center or ring, A, on the back, both front and back webs draw equally, those which pass over the shoulder and those which pass under the arm uniting at rings, B, just forward and under each arm, with the buttoning-straps. As the straps across the shoulders are not elastic, chafing, perspiration, and binding are obviated. The larger engraving shows the brace alone, and the smaller its adaptation to the person. The point of bearing being in the center of the back, the webs which pass under the arms and down the front act as shoulder braces, tending to keep the chest expanded and the body erect. This gives a hygienic value to the device.

The patent, obtained through the Scientific American Patent Agency, was issued June 2, 1868. All communications should be addressed to Towles, Bro., & Co., Monumental Silk Works, Baltimore, Md.

Preservation of Oilcloths.

Oilcloths are often damaged by the use of soap containing too much caustic alkali in cleansing their surfaces. All vegetable oils which are adapted for use in painting, absorb oxygen upon exposure to the air, and assume resinous characters. The drying properties of such oils are increased by heating them with litharge, which, by partially oxidizing them, renders their complete oxidation a work of less time than would otherwise be the case. Oils thus treated are called “boiled oils.” In this state they are used as a vehicle for the various pigments used in painting and in the manufacture of oilcloths. Resinous substances resulting from the oxidization of vegetable oils are strongly acted upon by the caustic alkalis. It will be seen, then, that the use of soaps containing an excess of soda or potash would be liable to destroy surfaces of oilcloths. To preserve them properly they should be washed with Castile soap only, and occasionally receive a coat of good copal varnish.

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

For "The American News Company," Agents, 121 Nassau street, New York.
For "The New York News Company," Agents, 121 Spruce street.
Messrs. Sampson, Low, Son & Marston, Booksellers, Crown Building, 188 Fleet street, London, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

VOL. XIX., No. 4....[NEW SERIES.]...Twenty-third Year.

NEW YORK, WEDNESDAY, JULY 22, 1868.

Contents:

(Illustrated articles are marked with an asterisk.)

*Improvement in Machinery for Sawing Wheel Pellets.....	49
*Improved Cane Juice Bleaching Machine.....	49
The Prospects of the Suez Canal.....	49
Chemical Nomenclature.....	50
National Agricultural Exposition.....	50
Floating Water Wheels for Slam.....	50
A New Pressure Vehicle.....	50
Carbolic Acid.....	51
Matters at Quarantine—The West Bank Hospital Buildings.....	51
Editorial Summary.....	51
The Use of Explosive Projectiles.....	52
*Parade on the Ball and Jet.....	52
Influence of Color on Vegetation.....	52
Imperium in Imperio.....	52
Modern Naval Warfare.....	52
*Reducing and Expanding Lines.....	53
*Adjustable Gears—Gears Without "Backlash".....	53
Eyeless Axes.....	53
Nerves Unting.....	53
Blasting with Nitro Glycerin—Comparison with Gun Cotton and Gunpowder.....	53
Effect of Arsenic upon Apples.....	54
Iodine and Carbolic Acid.....	54
New Publications.....	54
Manufacturing, Mining, and Railroad Items.....	54
Recent American and Foreign Patents.....	54
Answers to Correspondents.....	55
*Extension Notices.....	55
*Harris' Plan for Improving Oil Cans.....	55
Guiding on Wood.....	56
The Nicolson Pavement—Import and Patent Extension.....	56
Corrosion of Iron Exposed to Salt Water.....	56
A Scientific Toy.....	56
*Towies' Patent Elliptic Suspender.....	56
Preservation of Oilcloths.....	56
Needless Sacrifice of Life and Property.....	57
The Justice of Trades Unions.....	57
Granite.....	57
Ringing in the Ears.....	57
Mechanics in California.....	57
Lightning.....	57
Differences in Opinion.....	58
\$250,000 for Stamp Eraser.....	58
Patent Claims.....	58, 59, 60, 61, 62

NEEDLESS SACRIFICE OF LIFE AND PROPERTY.

One of the fundamental purposes for which governments are instituted among men, is to protect life and property, and this protection is supposed to increase in proportion to the intelligence of the people. It is therefore reasonable to suppose that, in these respects, our own country should occupy a leading place among the nations of the earth, but it has come to pass that Europeans look upon us as the most reckless people in the world, so far as our care of life and property is concerned. The impression is pretty well founded, and we are compelled to admit a want, to some extent, of those safeguards which are necessary to secure these desirable ends.

We all take a patriotic pride in celebrating the return of our national anniversary, but in so doing we have admitted certain practices, the unrestrained indulgence of which costs the loss of many precious lives and the destruction of much valuable property. The indiscriminate use of firearms in the hands of children and inexperienced persons, presents a yearly catalogue of fearful loss of life, limb, and property—the responsibility for which falls sometimes with crushing force upon our families as well as upon our authorities, who sanction the barbarous custom of celebrating the Fourth of July by the free discharge of mischievous crackers, rockets, pistols, and other missiles.

The authorities of this city, not content to let people purchase and explode their own ammunition, deliberately appropriated \$30,000 of the people's money in the purchase of fireworks, which were burned up in less than thirty minutes. One thousand dollars per minute will strike all reasonable people as a pretty expensive exhibit of patriotism, especially when the thermometer stands at 90°, but there was a "ring job" in it, therefore remonstrance was thrown away upon our patriotic city fathers. The expense, however, of celebrating our national anniversary is nothing compared to the killing, and maiming, and burning, whereof the columns of our journals gave sorrowful witness. Two years ago the beautiful city of Portland was nearly reduced to ashes by the careless use of fireworks; and this year, in other places, a lamentable destruction of property followed from the same causes.

Are we never to learn any wholesome lessons from these heart-rending calamities? Must we still go on with the heathen practice of killing, maiming, and burning? These are serious questions, and should not be lightly treated by our people, who have it in their power to put a stop to the evil. Congress ought to interdict the importation, under heavy penalties, of the Chinese fire-crackers, the use of which has carried mourning into thousands of families. Not only should this nuisance be stopped, but instead of appropriating money to buy and burn fireworks, the manufacture of them ought also to be prohibited. Is it not enough that we are compelled to manufacture powder to kill each other in war, without taking the additional risk of having our lives and our property destroyed by fire-crackers and sky-rockets? It appears to us in sober reason, and, to use an every-day phrase, that it is about time for this dangerous game to "play out" forever. Hereafter let our patriotism be shown forth in safer and more reasonable manifestations.

We have thus indicated but one of the ways in which we show a reckless regard for life and property. Another and even more serious one is the loose management of our railways. We wish to make no invidious comparison in discussing this matter, but having frequent occasion to pass over the New York and New Haven road, we select it as an example, of what we propose to say on this subject. If we mistake not, twenty-five trains are run upon this road every day. They

are usually run "at a high speed so as to accommodate the impatient traveler, who is naturally anxious to reach his rural home. Populous villages and considerable cities are thickly scattered all along this great thoroughfare, and hundreds of streets, and public highways, run across its iron track. Yet, strange to say, the law does not require it, and the company sees fit not to adopt any proper safeguards to prevent people from being run over by the swiftly passing trains, and the consequence is that vehicles are knocked in pieces, and persons whose lives and limbs ought to be considered precious, are killed and maimed every year. Not only is this true in regard to the New Haven road, but it is also true of many others. The street and road crossings are not properly guarded, and the trains are allowed to rush on, pell-mell, with no other notice of their rapid approach, than the screeching of the whistle, which is really of little use, especially when trains are running at high speed, or are concealed from view in deep cuttings. No other people on the face of the earth, blessed with railroad facilities, are so careless in this respect as our own. Citizens whose lives and property are so imminently endangered, have sometimes petitioned to their legislatures for the application of safeguards, but hitherto to little or no purpose, as the companies always succeed in beating them off through wire-pulling and special committees. If these railways were non-paying, then there might be some little excuse for such negligence on the part of the directors, but they cannot plead poverty as an excuse; they therefore should be compelled to establish gates and maintain guards to close up the chief highways and streets during the passage of the trains.

THE INJUSTICE OF TRADES UNIONS.

We give place in this week's issue to a communication from an aggrieved employer who complains of what he considers an unwarrantable interference with his rights on the part of "Trades Unions." It is impossible to deal with the labor question at the present moment without treading upon the feelings and prejudices of two useful classes, viz: the employer and the employed. This should not be so, for the interest of these two classes are like the functions of the human body, so vitally connected that any serious injury to the one, causes a corresponding injury to the other. No writer, journalist, or statesman is worthy of confidence who fails to consider both these interests as entitled to favorable recognition. In the ordering of divine Providence, and according to the laws that govern all human industries, there must of necessity be two classes—the capitalist to supply the money, and the working man to supply the brawn and muscle. When these two classes are properly united, there must be progress, and an increase of the wealth and prosperity of both. No one fact is better understood, or more generally accepted in our country than that the "laborer is worthy of his hire" in other words, that the laboring and producing classes are entitled to a fair compensation for their labor. There are exceptions to this rule in practice, but we can wish prosperity to no man, or combination of men, who are not willing to pay their employés a fair price for their labor. For some years past there have been growing up very serious disturbances in the labor interests of the old country and as a natural consequence its influences have reached our shores. Mechanics have come to distrust employers, and employers have come to distrust mechanics, and the result is, that they have divided into hostile camps; each denouncing the other by resolutions and speeches similar to the hordes of scurvy politicians whose "god is their belly, and whose end is destruction." In the city of New York at this moment, more than two thousand mechanics are out of employment, and large building operations are suspended, simply because the brick-layers and the "boss" masons cannot agree upon terms. This is very unfortunate for brick-maker, brick-layer, "boss" laborer, tax-payer, rent-payer,—indeed all classes of trades people are more or less unfavorably affected by this disagreement.

We believe that outside parties, selfish schemers, have had much to do in bringing about this mischief, for it does not appear to us that the parties whose interests are so closely allied, could ever have reached so unhappy a condition, but for mischievous intermeddling. The sympathies of the SCIENTIFIC AMERICAN are naturally with our mechanics and the working classes, but we can never prostitute our columns to engender hostile feelings between them and their employers. Be it our mission rather to promote the interests of both, as we have hitherto striven to do—therefore we feel constrained to declare that in our judgment, some of the rules governing the Trades Unions are unjust, oppressive and entirely hostile to the spirit of our laws, and the sooner they are abolished the sooner will the rights and true interests of these mechanics be recognized. They have a right to fix the price of their own labor, but it cannot be tolerated in this free country, that a combination of men can band together and declare that a "boss" shall not work on his own job, or that he shall employ but two apprentices. Such a doctrine as this is simply monstrous, anti-republican, a serious violation of private rights, and will work injury to those who undertake to enforce it.

We could never admit for a moment the right of the assistant editors of this journal to say that the chief editor should not write for his own columns. No; such a proposition would not stand the application of either law or gospel. All right-minded mechanics and working men will at once admit the force of our position, therefore we say to them, the sooner they learn that their true interests, as well as their manhood, are seriously compromised by these "Trades Unions" the better it will be for them.

The "bosses" and the workmen should stop denouncing each other, and come together like reasonable men, and adjust their grievances. That is the true way.

GRANITE.

Granite is probably the most durable stone used for building purposes. It exists in greater or less abundance in the mountains of Scotland and Germany; the Alps, the Carpathian, the Uralian, and the Altalan mountains; the Andes, and the United States. By long continued friction with sand and emery a high polish may be given to its surface. The largest block of granite which has been quarried and transported in modern times, is the pedestal of the equestrian statue of Peter the Great, at St. Petersburg. It is computed to weigh three million lbs., and was transported nine leagues. The method adopted for moving this immense mass was rolling it upon cannon balls. Those of iron being crushed, balls of bronze were substituted. The columns in the Pantheon, at Rome, are also of granite. They are thirty-six feet eight inches in height. There are sixty granite columns at St. Petersburg, composed each of a single stone twenty feet high. One of the most beautiful kinds of granite is called graphic granite. It is composed principally of feldspar and quartz. The feldspar may be considered the basis of this variety, in which the quartz, in various forms, lies embedded. When broken in a direction which is perpendicular to that in which the feldspar is traversed by the quartz, the fracture appears to have letters traced upon it in parallel lines. Its name was given to it on account of this fact. A most beautiful effect is produced by the seeming lines of gray letters upon a white or flesh-colored ground, when the stone is polished. A handsome white granite is found in various places in the eastern sections of the United States. It is the material used for the New Market House, the United States Bank, and the Tremont House, in Boston. We do not recollect seeing it elsewhere. It is doubtless the finest building stone quarried in this country.

RINGING IN THE EARS.

Whenever sounds are heard which cannot be referred to external causes, the phenomenon may be attributed to a deprivation of the sense of hearing, usually traceable to the auditory apparatus. *Tinnitus aurium* is the name given to this complaint. A great variety of sounds are heard, like the hissing of steam, the roaring of water, the discharge of cannon, musical tones, human voices, etc.

Numerous causes may be assigned for this disagreeable complaint. The most common, however, is hyperemia, or a rush of blood to the head. The hyperemia may be acute or chronic, inflammatory, or due to such transient causes as a dependent position of the head, violent exercise or emotion, a full meal, or a glass of wine. Its agency may be shown by compression of the carotid artery, which will often relieve the tinnitus. Quinine in excessive doses induces this symptom. One case is reported in which a physician was afflicted with tinnitus for twenty years. He heard every variety of sound, even long conversations. Deaf mutes are stated to be frequently troubled with tinnitus. Chronic cases, dependent upon chronic inflammation of the middle ear seem to resist all treatment. The subject has latterly attracted considerable attention from suspicion that the continued administration of quinine endangers the sense of hearing. Tinnitus often depends upon the presence of cerumen or ear-wax. Relief can be obtained in such cases by syringing with warm water.

MECHANICS IN CALIFORNIA.

Several weeks ago we published the statement, drawn as we believed from reliable sources, to the effect that there was "a dearth of mechanics in California." This statement has attracted the notice of the *Daily Evening Bulletin*, a very influential paper published in San Francisco, which says "there has been a good demand for mechanics, especially for carpenters, this year, and, we believe, all competent workmen of this class have found ready employment." The *Bulletin* doubts, however, if there is any gap which requires any considerable accession of mechanics. We have also a letter from an intelligent engineer residing in San Francisco, who states that at present there is no want of mechanics in any department which would justify immigration. If mechanics go to California intending to become residents, their chances would be the same as other resident mechanics, some of whom, our correspondent says, are now compelled to accept employment as ordinary laborers.

It is a wise old saying that "a rolling stone gathers no moss." Mechanics and the working classes generally are best off when they stick to their steady employment, and avoid tramping, and all excesses or expensive habits.

LIGHTNING.

Those manifestations of atmospheric electricity which are called lightning are among the most interesting as well as the most grand and impressive of the phenomena of nature. In earlier ages very erroneous impressions prevailed as to the cause of lightning and thunder, and although at the present time, those who have given attention to the subject, have generally correct views, there still remains enough of popular error to justify further attention to it.

There are three varieties of lightning, viz., zigzag, or chain lightning as it is popularly called, sheet lightning, or that which is exhibited in sheets of light which illuminate a whole cloud, and globular lightning or that which takes the form of fire-balls. Chain and sheet lightning are so familiar to all that no description of their appearance is necessary. Globular lightning on the contrary, is very rarely seen, and is therefore a subject of great interest whenever it is observed.

It generally is seen to move slowly, and at times it remains stationary. It has never been known to move with the rapidity of chain lightning. The cause of this peculiar form

of lightning is yet unaccounted for, and its extreme rarity renders it practically of small importance.

The ancient idea that the destructive effects of lightning were produced by the projection of a solid body from the clouds which was called a thunder bolt, is still entertained by many; and it is claimed that these bolts have been found imbedded in the sand at the point indicated by the course of discharge. The supposed thunder-bolts are hollow tubes coated on the interior with brilliant glass, and are formed of sand vitrified by the intense heat. They are winding in their form, often throwing out lateral spurs, or branches, and contracted in size toward the lowest extremity. They generally terminate at a spring of water or other good conductor of electricity. The diameters of the main tubes vary from four hundredths of an inch to three inches and a half; and they are often many yards in length. One is on record which was fiftieth of an inch to nearly an inch. These formations have received the name of fulgurites, and are of quite frequent occurrence upon the sandy plains of Silesia where they were first discovered.

There is a prevalent doubt in the popular mind as to the utility of lightning rods. Some grounds for distrust have been created by their improper construction and by the failure to attend to requisite repairs in season. The main cause of doubt is, however, to be attributed to want of knowledge in regard to the principles upon which they are constructed.

The action of a lightning rod depends upon the principles of electric induction, and the power which pointed conductors possess, of conducting away electricity silently and without explosive effects. The tension of electricity upon the surface of a sphere is everywhere uniform. On an ellipsoid the greatest tension is found at the extremities. Pointed rods may be regarded as modifications of the latter form, and when electrified the tension at their points becomes so great in proportion to their entire surface, that discharges take place in rapid succession and in so small quantity as to be harmless in their effects. Induction is the production of an opposite state of electricity in any body, by the proximity of another body positively or negatively electrified. Thus a cloud positively electrified would induce negative electricity in the earth below it, or, positive electricity if negatively electrified. A good conductor having one end in contact with the earth, and the other raised to a considerable height and terminating with points, restores the equilibrium between the two bodies, or so to speak, effects the recombination of the positive and negative electricities which renders them inert. This would not be done with a sudden and violent discharge, but by a series of minute discharges, which might be considered as practically a continuous flow. These discharges may take place from the cloud to the earth, or vice versa. It having been shown, however, that positive electricity passes through the air with greater facility than negative, it is probable that the discharge takes place in a direction from the positive to the negative, as the case may be. The discharges are most frequently from the clouds to the earth. In either case the discharge will follow—all other things being equal—the nearest conductor. If, then, the lightning rod is higher than any other part of a building within a certain distance, and is constructed of materials and of a size which render it a better conductor than the structure which it is designed to protect, it becomes a reliable safe-guard from the destructive effects of lightning.

It will be seen from these facts that the opinion that lightning-rods attract discharges of electricity, and thus endanger the safety of buildings has no foundation whatever. The conditions for a discharge must be established before it can take place through a lightning-rod or otherwise, and the employment of the rod is simply the substitution of a good and safe conductor for an imperfect and dangerous one.

DIFFERENCES IN OPINION.

Among the numerous causes of differences in opinion there is none more common than misconception. The peculiarity of the differences in opinion that arise from misconception is that they are rather apparent than real. It is often the case that parties engaged in hot dispute are surprised to find, that when they come to comprehend, fully, each others meaning, they agree perfectly.

Such disagreements are very apt to arise in the discussion of theories and hypotheses which can not be brought to the test of experiment, or subjected to rigid mathematical demonstration. In such discussions it is exceedingly difficult to express a proposition so clearly, or to give so complete definitions that the meaning intended shall be fully understood, and nothing more; and greater differences of opinion will be found in speculative philosophy than in the entire range of the positive sciences.

Volumes have been written to defend diverse doctrines which are based upon different conceptions of the meaning of the word space. The same may be said of each of the words time, cause, effect, distance, force, existence, and many others. The meaning of the word poison has never been fully agreed upon. Of course we refer, not to the popular sense in which it is used, but to its scientific signification.

Nothing is so difficult as to define. This difficulty, and the great effort to avoid misconception, which speculative writers feel to be a necessity, is apt to give the reader the impression of heaviness and want of conciseness in the works of such authors. Such subjects can not be discussed hastily, or be understood by desultory and careless perusal. Each thought is labored, and its clear expression demands the severest and most critical use of language. The same critical analysis is required in its perusal, in order to properly conceive the author's meaning.

It seems to be one of the inevitable tendencies of language to saddle words with different significations. In ordinary conversation and communication, this does not occasion so much inconvenience as in scientific and philosophical discussion, yet even in our most common intercourse we often misunderstand each other from this cause.

It is necessary then, in order to avoid misconception in writing and talking upon scientific matters, to first state distinctly the meanings of the terms employed, and secondly, to so express all propositions that, if properly considered, there shall be little or no possibility of being misunderstood. It is also necessary in the conduct of a dispute upon such topics, to accept the significations given, and not to allow ourselves to substitute a signification of our own for that given by an opponent. If a definition of terms cannot be agreed upon, there is an end to profitable argument.

Such diversities of opinion, would more readily be harmonized were it not for the peculiar tendency of the mind to antagonistic action, rather than passive reciprocity, in listening to the arguments of others. It is difficult to fix attention upon, and give due weight to the opinions and arguments of another, because it is hard to resist mentally framing arguments against them; and while the mind is thus engaged it is impossible to obtain the full force of the ideas advanced. Candid listeners are even more rare than candid talkers, and cool, dispassionate, and able thinkers, are rarer than either. It is well to consider these things when we find ourselves inclined to impatience with the views of others, and be perfectly sure that our differences are not such as arise from mutual misunderstanding.

\$250,000 FOR STAMP ERASER.

It is announced that Marcus P. Norton, of Troy, N. Y. has been awarded the sum of \$250,000 for the past use of his patent for canceling stamps, illustrated upon page 104, vol. IX, SCIENTIFIC AMERICAN. The report is that the Court of Claims certified their decision to Congress, and asked that a bill might pass, covering this amount in favor of Mr. Norton, which recommendation was promptly acted upon by Congress and the President's ten days for signing the bill expired a few days since. We have not seen the official report of these proceedings, but if true, we cannot but regard the transaction as extremely questionable.

The invention has been in use about five years, and the award is equal to \$50,000 a year, or at the rate of \$850,000 for the full term of the patent.

We are always pleased to record the success of inventors, but we should take no pleasure in allowing the people to be taxed after this fashion, and for an invention involving so little ingenuity. We do not believe the story.

SHOES.—It is said that a coat of gum copal varnish applied to the soles of boots and shoes, and repeated as it dries, until the pores are filled and the surface shines like polished mahogany, will make the soles waterproof, and also cause them to last three times as long as ordinary soles. We are inclined to think however that the sole would by this operation be rendered so inelastic as to endanger the integrity of the uppers, and also to render the boot uncomfortable to the foot. On boots however made of very stout leather and with very heavy soles this might not prove an objection.

ALFRED NOBEL'S nitroglycerin manufactory at Stockholm, Sweden, was recently blown up. Fifteen persons were killed and several seriously injured. The destruction of property in the neighborhood was also extensive. This occurrence, if any further evidence was required in addition to what was lately given by successive violent and fatal explosions, shows the extremely dangerous nature of nitroglycerin, and will do much to ward weakening the statements lately made by Mr. Nobel, in leading European papers, with regard to the comparative safety of this compound.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING JULY 7, 1866.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each application for a Patent, except for a design.....	\$10
On filing each original Patent.....	\$15
On appeal to Commissioner of Patents.....	\$20
On application for Extension of Patent.....	\$20
On application for Extension of Patent.....	\$20
On granting the Extension.....	\$20
On filing a Disclaimer.....	\$10
On filing application for Design (three and a half years).....	\$10
On filing application for Design (seven years).....	\$15
On filing application for Design (fourteen years).....	\$20

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying the model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

79,535.—MANUFACTURE OF VULCANIZED INDIA RUBBER.—Henry A. Alden, Mattawan, N. Y., assignor to The New York Rubber Company, New York city.

I claim, 1. The method of forming the valve for the admission and discharge of air into and from rubber balls, or other hollow articles requiring to be distended by inflation, substantially in the manner herein shown and described. 2. A vulcanized India-rubber ball, or other like hollow article, the aperture provided with a valve for the passage of air, the valve being an elastic valve piece, the ball, substantially as herein set forth. 3. The employment, in connection with the chamber or opening formed in the ball, and the elastic valve piece, for closing said chamber, of a shot, or the equivalent, inserted in said chamber, so as to close the valve tightly, and prevent the entrance of dirt, as set forth.

79,534.—BOTTLE STOPPER.—Joseph Bell Alexander, Washington, D.C.

I claim, 1. The combination of the shaft A and disk D with the rubber body F, when united by the process of vulcanization, substantially as described. 2. In combination with the above, the device composed of the button, G, and the string, H, for attaching the stopper to the neck of the bottle, substantially as described, and for the purpose set forth.

79,537.—MILL-SPINDLE SPRING.—Thomas Alsop, Elkhart, Ind.

I claim the spindle C and pinion D, in combination with the spring C', when the same is connected with the spindle and pinion by means of a pin, and the whole is constructed and arranged substantially as and for the purpose specified.

79,538.—FOG ALARM.—John R. Anderson, Brooklyn, N. Y. I claim the arrangement of the trumpet or horn, B, and hollow plunger, C, relatively to each other, and with the cylinder A substantially as herein described for the purpose set forth.

79,539.—HARVESTER RAKE.—Charles J. Arlington, Auburn, N. Y., assignor to C. Wheeler, Jr.

I claim, in a combined "reel rake," the arms of which are hinged to a head, moving around an axis nearly perpendicular to the platform, the rake-heads being hinged to their arms, and connected with springs, so that their teeth shall be retained in a position nearly parallel to the platform in reeling in combination with mechanism under the control of the operator, so that he can bring their teeth to a vertical position at pleasure, for the purpose of raking, substantially as described.

Also, the combination, substantially as described, of a continuous fixed cam-way, for guiding the rake and reel arms, and a second moveable cam, which, when raised by the attendant, forms a guideway outside the first track, for controlling the rakes.

Also, the spring, L, in combination with the arms, I, for the purpose of keeping the wings, M, in proper working position, substantially as described. Also, the spring, P, as combined with the rake, N, and wing, M, for the purpose of keeping the rake out of the way of the grain in the process of reeling, substantially as described.

79,540.—GARDEN IMPLEMENT.—James Armstrong, Bucyrus, Ohio.

I claim the sliding of the handle, A, through the eye of the frame, B, so as to lock the lower roller, C, by coming in contact with the teeth of said lower roller, in combination with all the other devices aforesaid, as herein described for the purposes set forth.

79,541.—RAILROAD CAR VENTILATOR.—G. W. R. Bayley and John McCluskey, Algiers, La.

We claim the arrangement of the connecting rods, D and D', with the connecting rods, F and F', forming a series of operating-in-chains for opening and closing the windows, in the manner and for the purposes described.

79,542.—CHURN.—S. Besser, Dorchester, Ill., assignor to himself and James Draper, St. Louis, Mo.

I claim the dasher rod, C, when provided with a spiral groove, d, and combined with the wheel, A, and connecting rod, B, and engaged by the pin c2, so as to produce a combined motion, as set forth.

79,543.—VEGETABLE SERVER.—Theodore F. Bigelow, Boston, Mass.

I claim the apparatus above described, consisting of the base, A, the top B, the rollers, C, and a journal, arranged and operating substantially as described, d, when the same is made portable so as to be used on any ordinary table.

79,544.—STEAM GENERATOR.—William Branagan, Burlington, Iowa.

I claim, 1st. The fire-chamber, A, terminating in a gas-chamber, A', and with a curved top-plate, in combination with the horizontal flues, a, a, and with the bent or angular water-pipes, D, and with the outer case or water-jacket, C, the said pipes D being inserted into the jacket by horizontal shafts at points below the gas-chamber and below the first horizontal flue, a, and the several parts being constructed and arranged together, substantially as described. 2d. The angular water pipe, D, arranged directly in a line with the flues, a, a, and inserted into the outer case or jacket, C, and applied in the space G, all around the case D and below the crown-heel A' of the fire box or chamber, substantially in the manner and for the purposes described.

3d. A double-wall air-heating jacket, E, applied to a steam-boiler, substantially as and for the purpose described.

79,545.—GAS BURNER.—J. S. Bridgman and Edwin G. Wellman, Brockport, N. Y.

We claim the branched burner, A, provided with the vertical nipples, a, a, and horizontal nipples, a', a', arranged as described, and operating in the manner and for the purpose specified.

79,546.—CHEESE SAFE, GAGE, AND CUTTER.—Edwin G. Bulgin, Vienna, N. J.

I claim, 1st. The sliding doors, G and H, as arranged and combined with a rotary bottom and a cutting apparatus, for the purposes set forth. 2d. The arrangement and combination of the cutting knife, K, hand lever, L, regulating-screw, I, with a cheese safe, as described, for the purposes herein set forth.

3d. The graduated scale or index plate, L, the sliding plate, M, with its index finger, e, and the marker, I, as connected with a cheese-safe, for the purpose set forth.

79,547.—PLOW.—William D. Burgess and George W. Zeigler, Muncie, Ohio.

We claim, 1st. The standard, C, constructed with a draught eye, c, parallel flanges, c', iugs, a, g, and a point C', adapted for receiving and having secured to it the shov-el plate, J, and laterally-projecting hilling wings, G, G, substantially as described. 2d. The elev. E, constructed with an eye, e, upon its front end, and also with a flanged slotted segmental portion, I, upon its rear end, substantially as described.

3d. The stand, K, constructed with a slotted foot piece, and a segmental elevation, the latter having recessed flanges formed upon it, substantially as described. 4th. Securing the handle support, K, to the beam, A, by means of the screw or bolt, o, which is used for securing the standard to said beam, substantially as described.

79,548.—MACHINE FOR MAKING TIN-LINED LEAD PIPE.—S. E. Chubbuck, (assignor to J. H. Chadwick), Boston, Mass.

I claim 1st. The combination of the annular fixed partition, D, with the cylinder, ram, and die, when all are arranged in relation one to another, as and so as to operate in the manner described. 2d. The construction and adaptation, one to the other, and to the mandrel, of the ram and an annular partition, D, as shown and described.

79,549.—MACHINE FOR MAKING TIN-LINED LEAD PIPE.—S. E. Chubbuck and J. H. Chadwick, (assignors to J. H. Chadwick), Boston, Mass.

We claim the combination of the annular reciprocating eaving, d, with the ram, cylinder, and die, when all are arranged, relative one to the other, as and so as to operate in the manner described.

79,550.—GUARD FASTENER FOR DOORS.—E. C. Cochrane, Buffalo, N. Y., assignor to himself and J. B. White, same place.

I claim, 1st. The combination of a hinged bar attached to the jamb, and an arm attached to the door, for engagement with each other, substantially as and for the purpose set forth. 2d. The slot, c, of the hinged bar, enlarged at its inner end, to permit the disengagement of the arm from the rod only when the door is closed.

79,551.—HARVESTER.—J. F. Coddington, Bound Brook, N.J.

I claim, 1st. The arrangement of shaft c', carrying the b-val pinion, c'', and spar wheel, d, and the shaft, f, furnished with the spar pinion, d', and crank, f', at that part of the main frame in front of axle, and between the wheels, B', and operating in connection with the bevel-wheel, c, on the axle, and the pitman, f'', of the sickle, substantially as and for the purpose specified. 2d. The elbow-lever, m, connected with a spring or yielding arm, m', for opening the sliding-clutch wheel, d, substantially as set forth.

3d. The arrangement of the elbow-lever, m, circumferentially grooved hub, l, of the bevel-wheel, c, lever, r, and standard, a, substantially as and for the purpose specified. 4th. The transverse sliding piece, z, arranged at the inner end of the finger bar, c', and in relation with the sickle, U, substantially as and for the purpose specified.

79,552.—QUILTING FRAME.—Mrs. Lois A. Collard, Plainfield, N. J.

I claim the combination of the binged sides, A, A, and their legs with the four hinged legs, B, B, having two staples on each, through which passes a pin, as and for the purposes set forth.

79,553.—VELOCIPED.—B. P. Crandall, New York city.

I claim, 1st. In velocipedes, the combination, with the operating lever, J, of the tubular support, K, constructed of a hollow tube, K, having flanges, J, and the hub-pieces, L, as applied to the seat, I, in the manner and for the purpose specified. 2d. As an improvement in the mode of operating the steering apparatus of velocipedes, the parallel rods, E, having one end pivoted to the axle of the forward wheels, D, and the other end to the yoke, F, whereby the said yoke and axle always move parallel to each other, substantially as described.

79,554.—PRESERVING WOOD.—Charles M. Cresson, Philadelphia, Pa.

I claim the employment of heated air or other heated fixed gas, for the purpose of volatilizing or setting in the way of volatilization of coal tar, resin, or other oleaginous or volatile substances, or of carrying or transferring the vapors of coal tar, resin, or other oleaginous or volatile substances, when thus or otherwise induced, to a chamber or receptacle, in order to be used therein in expelling the moisture from the timber or wood, or seasoning the same, or in saturating the same with vapors as a preservative against decay or rot, substantially in the manner and for the purposes above set forth.

Also, the seasoning or or paratory treatment of wood or timber by the method above described, in which the temperature of the vapors is elevated to a point above the temperature of the chamber containing the wood or timber, and the temperature of the wood or timber is, in cooling, allowed to fall more rapidly than that of the vapors, substantially in the manner and for the purposes hereinbefore mentioned.

Also, the treatment of rail road ties, poles, and other timbers, by vapors, as above mentioned, in combination with the subsequent application of a bath of carbolic acid, or of paraffine oil, or of paraffine or other protecting substance, or as a preservative treatment for the application of metallic or earthy solutions, substantially in the manner above described.

Also, the arrangement and combination of the coil, distilling vessel, and wood-chamber above mentioned, the whole being constructed and operating substantially in the manner and for the purposes aforesaid.

79,555.—CAR-AXLE.—Rowland Cromwell, Washington, D.C.

I claim the construction of the axles A, A' when made hollow, and with inner shoulders and nuts, a, a', and enclosing the bolt D with its spring E, all as arranged, and combined with the outer clamps as and for the purpose set forth.

79,556.—SHUTTLE.—Alexander H. Damon and James Whitaker, Lowell, Mass., assignors to Eaton & Ayer, Nashua, N. H.

We claim, 1st. The forked stud constructed substantially as described, and combined with a plate, A, and spooled to the slotted-ryed shuttle, for the purpose set forth. 2. The slotted curved plate, A, in combination with the screw, B, the fork stud, and brushing, v, and the shuttle, for the purpose and substantially as described.

79,557.—SHUTTLE FOR LOOMS.—Alexander M. Damon and James Whitaker, Lowell, Mass., assignors to Eaton & Ayer, Nashua, N. H.

We claim, 1st. In combination with the guide pins at the sides of the eye of the shuttle, the concentric plate, supporting said, B, and plate, a, which covers the slot, c, in the side of the shuttle, and in manner and for the purpose described. 2. The shuttle, in combination with the guide pins at the sides of the eye of the shuttle, the concentric plate, supporting said, B, and plate, a, which covers the slot, c, in the side of the shuttle, and in manner and for the purpose described.

2d. The plate, a, and eccentric supporting stud, b, when arranged and combined with the slotted eye and shaft for the purpose and substantially as described.

3d. The combination, with the slotted eye and shaft, of the plate, a, the plate being arranged over and serving as a cover for the slot.

79,558.—MACHINE FOR FILTERING AND REFINING SUGAR.—

Albert Ludwig George Dehne, Halle on Saale, Prussia.

I claim, 1st, The combination, with filtering chambers or spaces formed by and between the frames C, C', of the inlet-pipe, a, arranged by or in connection with the pockets b and canal r, formed by apertures, a, in the sides of the pockets and holes in the frames, to introduce the juice or fluid at or to the lower parts of the chambers, m, substantially as described.

2d. The swinging or movable pockets, b, having apertures a, through their sides, in combination with the frames, C, C', having holes therein to form a continuous channel, r, essentially as shown and described.

3d. The canal, r, in the lower part of the frame of a filtering apparatus, formed by the pockets and holes in the frames as described, in combination with the cocks f, to the spaces c of the frames, cock, g, water-cock, h, canal, i, with its branches, k, substantially as and for the purpose or purposes herein set forth.

4th. The combination, to form a filtering cloth between the frames of the press, or of adjacent sheets or layers of cotton and linen treils, as herein set forth.

79,559.—WATER METER.—William B. Durant, Cambridge, Mass.

I claim the combination of the receiving-chamber, B, provided with a series of discharging tubes, b, as described, the pan C, the chamber F, the discharging tube, b, the receiver, E, provided with a pipe to discharge into the chamber F, and one or more tilting-vessels, H, placed underneath or below the tube, and to operate as described.

Also, the combination of the above, and mechanism, substantially as described, for effecting the intermittent rotary motion of the receiver, E, as and for the purpose described, a, ch mechanism being the projections, p, q, the shaft, i, escape wheel, m, escapement, n, and arm, r, the whole being substantially as specified.

Also, the combination and arrangement of the box, I, provided with an orifice, s, with tilting vessels, H and K, combined and to operate with the chamber, B, its tube, b, the pan, C, the chamber, F, and the receiver, E, in manner substantially as described.

Also, the combination and arrangement of the auxiliary tilting-vessel, G, and its induction-tube, z, with the vessel, H, the pan, C, the space or chamber, B, and its pipe or tubes, a, for admitting air or steam thereto, as described, the vessels, G and H being fastened together so as to move simultaneously and in the same manner, as and for the purpose explained.

79,560.—TEMPORARY BINDER.—George W. Emerson, Chicago, Ill.

I claim the steel-tempered hoop-spring wire, c, or other suitable material, in combination with the fastenings, D, one or more, or equivalent, the needles, F, and the cords, E, one or more, substantially as and for the purpose set forth.

79,561.—DYNAMOMETER.—James Emerson, Lowell, Mass.

I claim, 1st, Connecting the rim of the pulley, C, to the automatic indicating arm, h, when constructed substantially as described for the purpose named.

2d. The arrangement of the stop, o, in connection with the forked ends of the spider, E, so that the pulley, C, will be clutched to the spider, when the arm, h, is raised as described, for the purpose of taking the end pressure from the shaft, and to operate as described.

3d. Making the collar, d, oval in form, to prevent its resting on the neck of the collar, f, also chambering it as shown, to hold packing for the purpose of constantly lubricating the neck of the collar, f.

4th. The arrangement of the screws, j, and x, with nuts, each side of the eyebolt, k, and the holders, t, that the connecting chains may be properly adjusted in length, b.

5th. The spring, v, for the purpose named.

6th. Pivoting the eyebolt, k, in the arm, j, in the manner and for the purpose substantially as described.

79,562.—DYNAMOMETER.—James Emerson, Lowell, Mass.

I claim, 1st, connecting the rim of the driving pulley, C, placed loosely upon the shaft, E, to the weighing scale, in the manner and for the purpose as set forth.

2d. Supporting the driving pulley C, upon the shaft by means of the screws d, c, as and for the purpose set forth.

3d. The connecting links, i, supported upon the knife edges, i, as and for the purpose set forth.

4th. The spring, t, connecting the fulcrum bar with the driving pulley, when used as and for the purpose described.

5th. In combination with the driving pulley, C, fulcrum bar, D, and weighing scale, when connected and operating as and for the purpose described.

79,563.—HYDROCARBON BURNER.—H. Everett, New York City.

Ante-dated Feb. 8, 1868.

I claim, 1st, A liquid-fuel burner, constructed substantially as described, and as and for the purposes specified.

2d. The combustion chamber, B, in the form of an elongated semi-circle, constructed of the fire-proof material, and supplied with the rarefying chamber, b, and its pipe or tubes, c, for admitting air or steam thereto, the whole forming the upper portion of a liquid-fuel burner, in combination with the corrugated and slotted burner plate, A, forming the base thereof, the whole arranged substantially as and for the purpose specified.

3d. The refractor, e, for dividing and distributing the jets of steam or current of air, arranged substantially as and for the purpose set forth.

4th. The mode of connecting the burner plate, A, with the rarefying chamber, b, and its pipe or tubes, c, upon the burner plate, A, together with super-heated air or steam, admitted through the rarefying chamber, b, for the purpose of facilitating the combustion of said fuel, the whole arranged substantially as described.

79,564.—CONSTRUCTION OF SHEET METAL COAL HODS.—M. G. Fagan, Troy, N. Y.

I claim a coal hod, or scuttle, made in the manner and for the purpose set forth in this specification.

79,565.—CARPENTERS' VISE.—Orlando V. Flora, Madison, Ind.

I claim the combination of the saddle piece, G, with the short ratchet on the end of the brace, H, having the vertically slotted opening in the said ratchet brace, thus rendering the disengagement of the ratchets, c and d, automatic when the article clamped is released, substantially as specified.

79,566.—VISE.—O. V. Flora, Madison, Ind.

I claim, 1st, The combination of the jaw, B, vibrating washer, E, and screw, D, all constructed and arranged substantially as described.

2d. The jaw, B, with lugs, G, on the lower end of its shaft, in combination with the supports, F, and gib, n, all constructed and arranged substantially as described.

79,567.—GALVANIC BATTERY.—Alfred C. Garratt, Boston, Mass.

I claim the said battery, as constructed with the bars so arranged that there shall be a narrow open space, d, on each side of every bar, and with the bars of each pair of dissimilar metals insulated by means as described and the several pairs connected by metallic connections at their ends, the whole being substantially as hereinbefore explained.

Also, the formation of one of the bars of each pair with projections or abutments extending from it at or near its ends, such being substantially as and for the purpose described.

Also, the combination of the batteries by hinges and a chain, or its equivalent, as described, the whole being as and for the purpose specified.

79,568.—TEAT CUP FOR MILKING.—Benjamin F. Graves, Groton, Mass.

I claim a teat cup, to be used in milking cows, constructed and operating substantially as above described.

79,569.—LANTERN.—E. J. Hale, Foxcroft, Me.

I claim the combination of the glass chimney and air deflector, or either, with the door, so as to be capable of being moved with it, and by it, with respect to the lamp, in manner as described, when such lamp is in the case.

Also, the lamp as made quadrantal in form, and hinged at its radial center to the lantern case, as set forth.

And with the lamp and its chimney, applied to separate doors of the lantern case, the arrangement of either door so as, when closed, to lap on and keep the other closed, as specified.

79,570.—SULKY CULTIVATOR.—William Harvey, Volga City, Iowa.

I claim, 1st, The combined arrangement of the shovels, F, F', supporting chains, I, I', perforated straps, J, J', and wooden pins, K, K', K', K', elevating chains, L, L', and treadle, M, M', and the dodging chains, O, O', and treadles, N, N', all as represented and described for the purpose set forth.

2d. The hook, P, P', employed, in combination with the inner shovels, F, F', to adjust said shovels relatively to the row, substantially as and for the purpose specified.

79,571.—FURNITURE CASTER.—J. W. Hewitt and G. R. Lynch, Allegheny City, Pa.

We claim the combination of the eccentric arms, G, and connecting links, I, with the supports, D, g, h, e, which, in combination with the frame legs, S, when arranged and operating as and for the purpose set forth.

79,572.—TREADLE FOR MACHINERY.—Alonzo Hitchcock, New York City.

I claim, 1st, The use of two connection rods for driving sewing machines, or analogous machines, when the two connection rods form the two legs of a triangle, the crank pin being the apex of said triangle, and when the two other ends of the connection rods that form the legs of the triangle unite with two separate treadles or levers to operate the treadle or crank shaft or wheel, when the two treadles are connected to the same crank pin by two connection rods, substantially as herein set forth.

79,573.—OIL-TANK CAR.—G. W. Hgenfritz and M. Schall, York, Pa.

We claim, 1, A metallic tank, B, for railroad oil cars, formed by bolting a cylindrical tube midway between its ends and on its lower side, and forming this tube with heads, a small flange, c, passage or passages, a safety dome and discharge passage, which latter is at the convergent point of the bolting or lowest portion of the tank, all substantially as described and for the purpose set forth.

2d. The construction of the car bed or platform, so as to receive the tank or reservoir, b, between its sills, G, and upon chairs, e, g, which are located below the top of said bed or platform, substantially as described.

3d. A railroad oil tank car, as described, having a depress tank, B, upon it, and inclined brace and stay pieces, C, C', applied to its ends, substantially as described.

frame, movable perpendicularly up and down on the main axleplate, and a hinged tongue and lever for tilting the platform and cutting apparatus.

4th. The employment of a double cam way or track provided with a movable switch, adapted to be moved by the revolving rake and reel arm, for engaging the path of said arm.

5th. The eccentric lever, x, or its equivalent, for operating the movable cam way, substantially as described.

79,574.—CORN PLANTER.—Harris Keeney, Danville, and C. H. Scoe, New Florence, Mo.

We claim, 1st, The combination and arrangement of the devices, D, D', d, d', d', for dropping the seeds, substantially in the manner herein shown and described.

2d. The castor wheel, B, the lever, F, and rack, f, when arranged with reference to each other, and to the frame, A, as herein described, for the purpose of turning and elevating the front end of the machine.

79,575.—ANIMAL TRAP.—Joseph Kohler, Cincinnati, Ohio.

I claim the arrangement of the base or foot A, and shaft, B, with the sliding cage, E, slotted sleeve, D, bearing, pin, G, bait hook, H, and pivot, I, or their equivalents, substantially as herein described and for the purpose set forth.

79,576.—SPRING.—Wm. Kroeger, Allegheny City, Pa. Ante-dated June 24, 1868.

I claim a spring, constructed and operating substantially as herein described and for the purpose set forth.

79,577.—SEWING MACHINE.—H. P. Lamson, Lowell, Mass.

I claim the guide piece, p, formed with a spring thread guide to yield against the pressure of the needle, and then to carry the thread athwart its path, and also with another guide piece, serving to govern the path of the thread as well as to close the needle bar.

Also, the spring guide, p, in combination with the cloth table of a sewing machine, and with a flexible barbed needle, operating substantially as and for the purpose set forth.

79,580.—CLOAK AND COAT SUSPENDER.—J. D. Leach, Penobscot, and E. S. Wardwell, Bucksport, Me.

We claim the coat and cloak suspender, E, when constructed of iron or other suitable material, and formed with its upper convexity of line, its backward horizontal curve from the ends to the center, its vertical curve, and the hook or loop, e, formed relative to the body of the suspender, so that the center of gravity of the suspender, and the garment hung thereon, shall coincide, all substantially as described and shown.

79,581.—QUARTZ MILL.—Alpheus Lewis, Virginia City, Montana.

I claim the train of gear wheels, E, E, E, in combination with the series of stamps, D, D, D, whose stems, C, C, C, pass up through the eyes of the gear wheels, E, and derive a constant rotation therefrom, substantially as and for the purpose set forth.

79,582.—LEVEL.—H. G. Loomis, Hartford, Conn.

I claim a carpenter's or mason's level, having a folding leaf, A, furnished with a sight, m, at one end of the frame, and at the other a graduated slide, B, furnished with a sight, n, sliding vertically in grooves, to adjust it to different elevations, substantially as herein described.

79,583.—SCALE.—C. C. Lyman, Edinboro, Pa.

I claim, 1st, The short platform, B, when so arranged in relation to the weighing apparatus and car that the scale will be at rest and free when the wheels are not upon the platform, and so operating that each end of a car will be weighed and registered automatically while in motion over the platform, substantially as and for the purpose set forth.

2d. The series of counter weights, I, and lifting shaft, J, in combination with the beam, D, substantially as and for the purpose set forth.

3d. The lifting shaft, J, slide and block, N, in combination with the loops, a, a, and b, arranged and operating substantially as and for the purpose set forth.

4th. The index wheels, H, G, and lug wheel, I, in combination with the cheek or lock, A', arranged in relation to each other, and operating substantially as and for the purpose set forth.

5th. The loops, a, b, in combination with the index wheels, H, G, slide block N, and lifting shaft, J, substantially as and for the purpose set forth.

79,584.—WAGON POLE.—J. R. Madison and M. Thomas, Oneida, Ill. Ante-dated June 30, 1868.

We claim the combination of the neck-yoke, E, to the ferrule by means of the bolt, H, and the ball, G, substantially as and for the purpose set forth.

2d. The combination of the ferrule, B, with its hook, C, yoke, E, ball, G, and nut, H, substantially as and for the purpose set forth.

79,585.—WATER WHEEL.—S. W. Marsh, Rochester, N. Y.

I claim the partitions, C, attached to the case, B, and the portions, D, of the gates, C, forming the vertical sides of the chutes, k, when both are flexible, and free to yield at their inner ends, to allow the escape of obstructions, substantially as set forth.

79,586.—HAY AND MANURE FORK.—A. J. Martin, Catskill, N. Y.

I claim the combination of the handle, A, ferrule, B, adjustable lines, C, C, screw, o, and nut, substantially as and for the purpose set forth.

79,587.—SPIKE DRAWER.—I. W. Mead (assignor to himself and E. W. Hartford), Bridgeport, Conn.

I claim the lever, A, with the lifter, B, the pair of levers, C, and the spring, b, constructed to operate substantially as herein described and set forth.

79,588.—CORN PLANTER.—H. Mitchell, Osborn, Ohio.

I claim, 1st, The construction of the belt H, elevators, G, G, rollers, J, and Q, and valve, K, when arranged, combined, and operating as herein described and for the purpose set forth.

2d. The lateral construction of the corn box, A, with its chamber, B, in front, and discharge pipe, C, at the bottom of the chamber, substantially as set forth.

3d. The rollers, P, U, and S, belt, R, shifting lever, T, rollers Q and J, when arranged and operating as herein described and for the purpose set forth.

4th. The arrangement of the hopper, Y, with the adjustable lever, W, brace chain, X, and roller, Z, when regulated and operated on the under side of the machine, as herein described and for the purpose set forth.

79,589.—SIEVE.—Geo. Mohler, Yates City, Ill.

I claim the combination of the swinging and adjustable sieve, H, and the conical shaped feeder, P, whose apex extends up into the slotted bottom of the hopper, J, and operates with the box, H', in the manner set forth.

79,590.—STOVE GRATE.—E. Monuse and L. Duparquet, New York City.

We claim the lever, h, and catch, i, applied substantially as specified, for sustaining the swinging grate.

79,591.—PIANOFORTE.—G. W. Neill, Boston, Mass.

I claim the combination of the wood-a-back frame, B, the sounding board, C, and the frame plate, D, with a separate metallic frame, A, arranged between the back frame and sounding board, and made with flanges, to support the latter, and having no metallic bars or auxiliary frame to extend between the strings, the whole being substantially as described.

79,592.—DEVICE FOR CONNECTING DISSIMILAR ROSE COUPLINGS.—W. H. Paige (assignor to himself and L. O. Hanson), Springfield, Mass.

I claim a connection for hose couplings, said connection consisting of a tubular fitting at its ends, each end being provided with an adapted for attaching dissimilar hose couplings or connecting devices, substantially as described.

79,593.—CLOTHESLINE HOLDER.—O. S. Perkins and John R. Richards, Mount Joy, Pa., assignors to themselves and Joseph H. Ferguson.

We claim, 1st, A pulley wheel with hooks formed of its outer rim, or equivalent, in the manner shown, and for the purpose specified.

2d. A hook and pulley wheel, when combined and arranged in the manner shown and specified, and for the purpose set forth.

79,594.—BASE-BURNING STOVE.—J. S. Perry (assignor to J. S. Perry, trustee and executor, and N. B. Perry), Albany, N. Y.

I claim, 1st, In a base burning stove, wherein the products of combustion are carried directly upward from the fire pot, the fire chamber, N, extending partly around and beyond the body of the casing, I, substantially as described.

2d. A projecting fire chamber, N, constructed with side divisions, p, p', bottom division, p, and deflecting plates, s, and applied to a stove which is constructed upon the principle herein described.

3d. An elevated oven, S, applied on top of the coal magazine, H, in combination with a fire chamber, N, which projects beyond the body of the casing I, substantially as described.

4th. Providing an oven, S, with a register, I, and opening, r, when employed in combination with an extended fire chamber, N, arranged as described.

79,595.—BRICK KILN.—F. Power, St. Louis, Mo.

I claim, 1st, The kiln, A, and drying chambers, A1 A2 A3, when combined and arranged as herein shown and described.

2d. The turn tables, F, F1 F2, when combined with the drying chambers and kiln, as described and set forth.

79,596.—COMBINED CARD AND BRUSH.—W. H. Prouty, Hanover, Mass.

I claim the combination of the card and comb and brush, in one instrument, to be used together at the same time, for the purposes specified.

79,597.—ATTACHING DOOR KNOBS TO THEIR SPINDLES.—Silas S. Putnam, Dorchester, Mass.

I claim the regulating screw, b, in combination with the knob, A, and spindle, B, substantially as described for the purpose set forth.

79,602.—WAGON AND CARRIAGE WHEEL.—Theodore Sallergren, St. Louis, Mo., assignor to Jacob Woodburn.

I claim the feely, perforated traversely at one or both sides of each spoke mortise, and the screw protecting wires inserted in these perforations, when constructed as herein described and for the purpose set forth.

79,603.—CALLIPER.—Sydney Sawyer, Fitchburg, Mass.

I claim constructing the joints which connect the legs with the stock, so as to yield in the direction toward and from each other, in combination with the gear or sectors, the worm or rack, and the clamping rod, spring, or other suitable means for clamping the parts together, substantially as described.

79,604.—RIGID ATTACHMENT TO HARROWS.—Austin D. Shaver, Belleville, N. Y.

I claim a rigid attachment for harrows, made with adjustable seat, H, and pole, B, C, rvd downward at the forward end, and secured to harrow by swivel bar, a, and to frame by bolt and thumbscrew, d, and ropes, E, friction rollers, i, i', with con ter roll rs beneath, as combined, arranged, and attached, for the use and purpose as specified and herein set forth.

79,605.—GEARING.—Alden Sibley, Pawtucket, R. I.

I claim the pinion, B, and its gear, A, as made with tapering teeth, as described, in combination with the pinion and its cylinder shaft, and means by which the pinion may be moved and adjusted lengthwise of the said shaft, and with respect to the fellow gear, A, as and for the purpose of preventing "backlash," as specified.

Also, the arrangement and combination of the endless screw, f, and the worm gear, e, with the pinion, B, and its shaft.

Also, the combination of the sleeve, D, with the pinion, B, and the adjusting screw or screws, m, n, and nut, k, i, thereof, for moving said pinion longitudinally of the sleeve, as set forth.

Also, the combination and arrangement of the pinion, B, the shaft, C, the sleeve, D, the adjustable screws, m, n, and nut, k, i, and the worm, f, and its gear, e, the whole being substantially as described.

79,606.—RAILROAD TRACK CLEARER.—Robert A. Smith, Philadelphia, Pa.

I claim, 1st, The combination of an adjustable main plow, composed of parts P and P', and the mechanism for operating the same so that the snow, dirt, or ice can be thrown to the right or to the left, by one operation, or thrown entirely to the right or to the left, as occasion may require.

2d. The king bolt K, B, and cone, C, arranged substantially in the manner and for the purpose specified.

3d. Arranging on the foot and back of the parts, P and P', constructed and operated as described, a series of "rooms," M, M', with a forward inclination of the beard, for the purpose specified.

4th. In combination with the brooms, M, M', arranged as set forth, the application of the springs, S, for the purpose of keeping the broom beard constantly in position.

5th. The arrangement of the standard Z, and the guides, G, D, substantially in the manner and for the purpose set forth.

6th. The mode of fastening the broom beard to the stay board, S, B of the broom cylinder, by means of a continuous hollow strap, S, I, as described.

7th. The side guards, S, G and S' G' with their rods, r, r', r', and r', for the purpose described and represented.

8th. The within a railroad track cleaner, composed of the above described parts, all combined, constructed, and operating in the manner and for the purpose specified.

79,607.—OVEN IN BASE BURNING STOVE.—Ambrose Spitzmiller, Buffalo, N. Y., assignor to John S. Perry, trustee and executor, and Nathan B. Perry.

I claim, 1st, In a base burning stove, having an oven arranged over the coal magazine, providing for exposing a portion of the bottom of such oven to the action of a circulating current of heat, substantially as described.

2d. An oven, S, in combination with ascending flue, F, and a coal magazine having its upper end contracted, substantially as described.

3d. An oven, S, in combination with the flue, F, when used as a drum or deal chamber, and a coal magazine having its upper end contracted, substantially as described.

4th. Providing the elevated oven, S, of a base burning stove with openings through its side wall, one of which openings is applied to a damper, b', substantially as described.

79,608.—MACHINE FOR SAWING STONE.—Sidney Stanton, Syracuse, N. Y.

I claim the frame, A, hollow standard, B, b, k, gears, E, e, C, shaft, F, f, g, water box, L, and chute, n, all constructed, arranged, and operating in the manner shown, and for the purpose specified.

79,609.—TRACK CLEARER FOR HARVESTER.—Nathan Stonecipher, Cambridge City, Ind.

I claim the combination of the revolving cone, D, and socket, C, when used as a track clearer, in combination with a grain or grass cutter, the whole being constructed, arranged, and operated substantially as above described.

79,610.—MACHINE FOR POLISHING SPHERICAL SHOT AND SNELL.—John Blake Tarr, Fair Haven, Mass.

I claim, 1st, The within described machine, which is adapted for polishing spherical shot and snells, substantially in the manner described.

2d. The cupped polishing and centering devices, G, G', constructed, arranged and operating substantially as described.

79,611.—CAST IRON CAR WHEEL.—John Blake Tarr, Fair Haven, Mass.

I claim, 1st, As a new article of manufacture, a car wheel, made of cast iron, condensed by pressure while in a molten state within a mold, substantially as and for the purpose specified.

79,612.—APPARATUS FOR HARDENING STONE.—E. P. Taylor, St. Louis, Mo.

I claim the force pump, D, with a weighted piston, d', in combination with cylinder, A, air pump, B, and tank, C, the whole being operated in the manner described.

79,613.—MILK COOLER.—J. C. Thayer, Dunton, Ill.

I claim, 1st, The combination of the tanks, A, B, C, the latter tank being removable, and having a pipe, F, for the steam of the valve, G, to operate in, substantially as and for the purpose set forth.

2d. The combination of the valve, G, pipes, F, and P, lever, H, and float, K, L, substantially as herein set forth and shown.

3d. The combination of the tanks, A, B, C, pipes, F, P, valves, G, lever, H, and float, K, L, constructed and arranged to operate as and for the purpose set forth.

79,614.—WOOD-SAW HORSE.—William Tripp, Epsom, N. H.

I claim the adjustable clamp arm, I, as applied to the bar, h, by means of the notches, i, fitting on the pin, m, and as secured by the wedge, n, substantially in the manner described.

Also, the combination of the treadle, g, rock shaft, k, bar, h, and arm, i, constructed to operate as and for the purpose set forth.

79,615.—BAKE OVEN.—Joseph Vale, Beloit, Wis.

I claim the rotating disk or hearth, H, secured to and turning upon the shaft, H, and the mode herein described of rotating the same, whereby co-current air and pinton are disposed with.

Also, the crown plate or disk, E, in combination with the fire grates, C, covers, d, d, flues, b, b, regulating damper, g, flue or chimney, a, a, and ash boxes, D, D, when the whole are constructed and arranged substantially as herein set forth and described, to operate

uprights, B, links, d, drums, A, and belt of boxes, all as and for the purpose set forth.

79,698.—PANEL FENCE.—Charles W. Spruill, Rome, Ga.

I claim the combination of the projecting ends, b, of fence-panel, the regulating uprights, a, and feet, h, all substantially as shown and described, and for the purpose shown and described.

79,699.—GRAIN DRYER.—William Standing, Cairo, Ill.

I claim, 1st, A grain dryer composed of a series of cylinders for the passage of the grain, each surrounding a central perforated air-tube, and all enclosed by a metallic case, forming a close steam-chamber, substantially as herein described for the purpose set forth.

2d, The grain-dryer, constructed as described, of the annular chamber, B, enclosed between the heads, a, b, and each containing a central perforated tube, c, supported by radial arms, d, and extended in imperforate pipes, l, above the head, d, for conducting the moisture to the chamber, G E, the cylinders, B, being surrounded by the case, A, to form the steam chamber, all constructed and arranged as described, and supported upon the perforated conical base, X, as herein set forth for the purpose specified.

3d, The arrangement of the valves, h, supported upon the ring, K, and adjusted by means of the bifurcated plate, l, pivoted lever, L, screw-rod, S, and burr, K, as herein described for the purpose specified.

4th, The arrangement of the close steam chamber, the grain-cylinders, B, and the perforated air-tubes, c, having extended imperforate ends, l, where-by the grain is heated by steam around the cylinders, B, and the moisture discharged through the center of said cylinders by the tubes, C, as herein described, for the purpose set forth.

79,700.—PRUNING-HOOK.—John Stark, Thomasville, Ga.

I claim, 1st, A harvesting or pruning-hook formed of two or more cutting edges, when the same are united and arranged substantially as described for the purpose set forth.

2d, Attaching the hook, D, and blade A, together, as described, whereby they are rendered detachable for sharpening, as herein shown and described.

79,701.—TREATING ORES, METALS, AND MINERALS.—Chase A. Stevens, New York city.

I claim the process of treating auriferous and argentiferous, and other ores, clays, earths, and metallic iron, by the application of the residuum obtained from cryolite, substantially in the manner and for the purpose set forth.

79,702.—CHURN.—G. R. Stevens, Chicago, Ill.

I claim the cone, E, in combination with the rod, D, and winged dasher, B C, the latter having holes, d, made diagonally through it, substantially as and for the purpose herein set forth.

79,703.—CORN-HUSKER.—George E. Stewart, East Saginaw, Mich.

I claim the protecting device consisting of the pivoted metallic plates, A, B, secured to the inner finger and thumb of the wearer by means of the curved strips, D G I, and strips, E F, all constructed and operating as herein described for the purpose specified.

79,704.—REFRIGERATOR.—Anthony B. Sweetland, Fitchburg, Mass., assignor to himself and James Daley, same place.

I claim, 1st, The ice shelf, B, carrying by the central pivot, d, the pendent metallic disk, C, and supported by the curved strips, f, from the lugs, e, upon the interior of the upper removable part, A, all arranged above the inclined flange, G, which forms the channel, h, and supports the vertical tube, l, as herein described for the purpose specified.

2d, The construction of the ice shelf, B, supporting strips, f, pendent disk, C, and inclined flange, G, forming the channel, h, and supporting the pipe, l, all arranged as described in the upper case, A, and adapted to be removed with said part from the lower case, A, bearing the revolving frame, J, as herein described for the purpose specified.

3d, The combination of the ice shelf, B, pendent disk, C, supporting strips, f, inclined flange, G, pipe, l, with the cases, A, and revolving frame, J, all constructed, arranged and operating as herein described for the purpose specified.

79,705.—SPRING BED BOTTOM.—Salmon E. Tyler (assignor to himself, and William S. Stephens), Beloit, Wis.

I claim the clamps B and corrugated eccentrics, b, as and for the purpose herein set forth and described.

79,706.—COTTON-FLOW.—Theophilus A. Wainwright, (assignor to himself and Albert Farmer), Wilson, N. C.

I claim the construction of the frame, A, B C, it being cast from one pattern complete, and the manner of securing thereto all of the necessary parts, as above described, by a single bolt or key each, substantially as and for the purpose set forth.

79,707.—WATER ELEVATOR.—W. P. Walling, Swartz Creek, Mich.

I claim, 1st, The projection Cx, in combination with the ring C', rope, P, pulley, b, and ear, C, as herein described, for the purpose specified.

2d, The bucket, K, provided with the discharge-spout at its bottom, and containing the valve-lever, e, the valve e of which is held closed by the spiral spring, and opened to discharge the water by means of the projection N upon post, A, fitting beneath the arm a' of said lever, as herein shown and described.

3d, The angular pivoted valve lever, in combination with the coiled spring, bucket, K, ear, C, and projection, N, as herein described for the purpose specified.

4th, The grooved vibrating link, l, in combination with the slotted car, C, curved bar, H, curved arms, b', and bucket, K, as herein described for the purpose specified.

79,708.—LOW WATER INDICATOR.—Charles S. Watson, Philadelphia, Pa.

I claim, 1st, The combination of the oscillating vessel, C, constructed substantially as described, with the rod, A, lever, D, and valve, E, substantially in the manner above set forth, and for the purpose specified.

2d, The construction of the part 2 of the oscillating vessel C with the valve, F, to provide for the escape of air from the same, so that water may ascend into and fill it, as above described.

3d, The combination and arrangement of the valve G with the part 1 of the vessel C and the bell, l, substantially as and for the purposes set forth.

79,709.—SURFACE-FILE HANDLE.—Joseph Wear, Fitchburg, Mass.

I claim, 1st, A surface file-handle, composed of the bent or curved handle, A F I, in combination with a clamping device for grasping the file-shank in the manner described, so that the bent part 1 of the handle shall rest or bear upon the file in front of the point at which the handle is attached to the file, as and for the purposes set forth.

2d, The combination of the handle, F, of the curved handle, and the clamp and its adjusting or tightening screw and nut held in said base, and covered by the horn or projection, C, the said parts being constructed and arranged to operate as herein shown and specified.

79,710.—HYDRAULIC CRANE.—Samuel K. Wellman, Nashua, N. H.

I claim, 1st, The combination, with the revolving post, e, of the projection b and the cylinder, c, substantially as shown and described.

2d, The combination, with the crane post, and its hulk case or shell, of the piston, H, and cylinder, c, substantially as and for the purposes set forth.

3d, The combination, with the tube, B, attached to the lower end of the crane post, of the nuts, 14, knee, a, and leather packing, 5, said parts being arranged in relation to each other, substantially as described, and as shown in fig. 4, of the accompanying drawing, and for the purposes set forth.

4th, The combination with the part, 11, of the carriage, n, and windlass, S, of the cushion, O', as shown and described.

79,711.—HORSE HAY FORK.—E. I. White, Locke, N. Y.

I claim the construction of the shank, A, consisting of the cross bar, a, whose reduced ends are fitted rigidly in the tines, D, and turn freely in the tines, E, and whose ear, a2, is provided with a slotted extension, a3, carrying the holding and tripping pulleys, B C, all arranged as described for the purpose specified.

79,712.—MANUFACTURE OF FLOOR CLOTH.—John H. Williams, Essex, Conn., assignor to himself, Thomas N. Dickinson, and William E. Beames.

I claim, 1st, The spring plates, C C, or their equivalents, for distributing the paint evenly over the surface of the cloth, and also remove the extra amount of the same, substantially in the manner and for the purpose specified.

2d, The spring plates, D D, or their equivalents, as a smoothing device for the purpose of finishing the cloth, substantially as herein described.

3d, The peculiar curve of the plates herein described, when in operation, constructed of springs, or their equivalents, to give the smooth and polished surface to the cloth as it passes through the machine, in the manner described and for the purpose specified.

79,713.—APPARATUS FOR PRINTING UPON GLASS.—Dexter B. Wingate, Natick, assignor to Nathan C. Millett, Salem Mass.

I claim forming a type block of an elastic yielding material, and its use in combination with the adjustable ways, H, adjustable gage, E, and lever, L, operating in connection with the movable support, C, for the purpose substantially as described and set forth.

79,714.—MACHINE FOR THREADING BOLTS.—Aurin Wood, Worcester, Mass.

I claim, 1st, The arrangement, with the spindle, B, head, B', and case, F, of the cam ring, G, arms, G', locking pieces, I, and dies, H, the parts being constructed and operating in connection with each other, substantially as and for the purposes set forth.

2d, The notched stop or flanged collar, d, e, in combination with cam ring, D, and arms, I and G, the said parts being constructed and arranged in the manner set forth, to open and close threading dies, substantially as described.

3d, The combination of the rod, o, with the weighted lever, t, arm, 5, cam, 29, and lever, P, provided with arms, x and 30, said parts being arranged for operation to stop and release the notched or flanged collar, d, e, substantially as and for the purposes specified.

4th, The cam, 23, on the wheel, 24, and the rod, 22, working in the sleeve, 21, in combination with the spring stop, said parts being arranged to throw back the blank carriage after the threading dies are opened, substantially as described.

5th, The rod, o, weighted lever, t, arms, 5, cam, 29, and lever, P, with its arms, x and 30, in combination with the connection, P', sleeve, P'', and notches or flanged collar, d, e, substantially in the manner and for the purpose set forth.

6th, The combination of the spring, 27, lever, R H', wheel, N, with rack, pinion, and the blank carriage, said parts being constructed and arranged substantially as and for the purposes set forth.

79,715.—GRAIN SEPARATOR.—Daniel S. Yeakel, (assignor to Henry Deer and Solomon Deer, Dillingersville, Pa.)

I claim the swinging screen, G, hung or suspended as shown, in combination with the springs, D E, all arranged and applied in the manner substantially as and for the purpose set forth.

79,716.—STOVE GRATE.—John H. Yocum, Ashland, Pa.

I claim, 1st, The provisions, in a flat or horizontal grate, or in a grate bottom of one or more apertures, e, as and for the purpose set forth.

79,717.—DEVICE FOR HANGING MILLSTONES.—Peter Zimmerman, Delaware Water Gap, Pa.

I claim the improved adjustable millstone hanging device, substantially as herein shown and described, and for the purpose set forth.

79,718.—HEATING STOVE.—F. S. Zumbstein, Evansville, Ind.

I claim an improved stove or heater, formed by the combination of the outer case, A, having a close fitting cover, B, upon its upper end, and an ingress draught opening in its bottom, air pipes, E, interior furnace, F, having a close fitting cover, H, with an ingress draught opening in its upper end, and ingress draught openings at its lower end, the ingress draught pipes, M, L, or their equivalent, and the water receiver, O, with each other, said parts being constructed and operating substantially as herein described, and for the purpose set forth.

79,719.—INDIA RUBBER BASE BALL.—Henry A. Alden, Mattawan, N. Y., assignor to the New York Rubber Company, New York city.

I claim, 1st, A base-ball or other like ball having a centre or core consisting of one piece, or of several pieces of cork, cemented together, said core being surrounded by the compound substantially as described in Letters Patent of the United States, No. 73,355, and the whole being united and vulcanized as set forth, the said ball being either provided or not with a cover of suitable material.

2d, In a base ball formed of a vulcanized compound such as herein specified, the use of a wire bound or twine or cord wrapped cork core, substantially as and for the purpose set forth.

3d, The combination with a cork and rubber compound base-ball, of a rubber covering or coating, united and vulcanized with the body of the ball, substantially as herein set forth.

79,720.—GRAIN RAKE.—William Baldwin, Plymouth, assignor to himself, Joel Blakeslee, Plymouth, and E. Blakeslee, New Haven, Conn.

I claim the combination of several teeth, C, and prongs, G, arranged so as to rake the grain, or other material, extending above said teeth, the whole constructed and arranged so as to operate substantially as specified.

79,721.—LATHE FOR SCREW CUTTING.—T. D. Bassett, Charlestown, Mass.

I claim, 1st, The combination of the jointed shaft, h, burr cutter, e, and its sliding frame, f.

2d, The combination of the elements last above mentioned with the weighted and sliding tool rest.

3d, A revolving dead centre in the edge of the tall stock in the manner and for the purpose specified.

79,722.—INKING APPARATUS FOR PRINTING PRESSES.—Thomas L. Baylis, Richmond, Ind., assignor to The American Patent Chromatic Printing Press Company.

I claim in combination with the oscillating slotted arms, F, rollers, B C D, springs, e, and tripping collars, I, the rollers, B' D', upright bars, N, projections, u, and spring, e', arranged in relation to one another, so as to operate substantially in the manner and for the purpose set forth.

79,723.—OIL CAN TUBE.—Edgar B. Beach, West Meriden, Conn.

I claim the herein described tube, as an article of manufacture, consisting of the tube, A, spout, B, valve, C, with the head, E, the said valve arranged in the tube, A, in such relative position to the spout, B, as to open and close the spout, and all constructed and arranged in the manner set forth.

79,724.—PIPE TONGS.—James R. Brown, (assignor to E. H. Ashcroft), Boston, Mass.

I claim the arrangement and combination of the hook jaw lever, A, and the tooth jaw lever, B, when constructed as shown and described, and the latter is controlled by its shoulders, d, the pin, f, and screw, C.

79,725.—HARNESSE KING.—George H. Buckius, (assignor to C. Aultman, A. C. Tonner, and P. H. Sowers), Canton, Ohio.

I claim a ring, A, having one or more arms, B arranged on its periphery, substantially as and for the purpose specified.

79,726.—HANDLE FOR TEA AND COFFEE POT.—Henry Bulard, Middletown, Conn.

I claim handles for tea and coffee pots, formed from hard rubber or similar material, and so as to be attached to the tips, B and C, substantially in the manner herein set forth, as a new article of manufacture.

79,727.—LADDER.—William L. Burlingame, Leslie, Mich.

I claim, 1st, The ladders, B C, so arranged in relation to each other as to be able to be formed into one continuous ladder, by means of the rounds, 2 and hooks, 3, in the manner and for the purpose herein set forth.

2d, In combination with the above, the removable platform, A, when provided with hooked projection, E, slots, 4, and locking button, D, all arranged and operating substantially as set forth.

79,728.—WATER CLOSET.—William S. Carr, New York city.

I claim, 1st, The hopper or container, a, contracted at its upper end and adapted to receive the flange of the basin, in combination with the movable ring, that forms a sufficiently wide bearing for the said basin flange and allows for the introduction or removal of the swinging pan of the closet, substantially as set forth.

2d, The ring, f, and hopper, a, in combination with the swinging pan, d, and lug, 7 upon said hopper, a, and below the ring, f, as specified, so that the connection of the pan d, in closing will be taken on said lug, 7, and the ring, f, relieved, as and for the purpose specified.

79,729.—TOOL FOR TURNING SHAFTING, ETC.—Judson A. Cleveland, La Fayette, Ind.

I claim, 1st, The combination of the rest, D, stock, B, and jaw, C, the cutters, G, and the rod, L, and lugs, I, by which the cutters may be independently regulated in relation to one another, while the rest is adjustable, so as to move all the cutters simultaneously substantially as described.

2d, The stock, B, when constructed as described, in combination with the rest, D, adjusting screw, E, and a series of cutters, G G, substantially as and for the purpose set forth.

79,730.—STEAM FIRE ENGINE.—Edward R. Cole and Henry S. Cole, Pawtucket, R. I.

I claim the compound cylinder, A, constructed substantially as described, forming the chambers, A1, and A2, by the interposition of plunger, B.

2d, The elevated induction pipe, D D, and eduction pipe, C, connected substantially as described, for the purposes specified.

3d, The arrangement of the above-described induction pipe, D D, in relation to the air chamber, C C, water way, D D, and operative parts, A B, and A2, and B2, substantially as shown and described.

79,731.—WATER WHEEL.—J. M. Cook, Lake Village, N. H.

I claim the water wheel, B, having independent buckets, L L, secured to the upper plate by inclined flanges, p p, and formed with inwardly curved discharge edges, 11, downwardly curved discharge edges, m, and curved connecting edges, substantially as and for the purpose herein specified.

79,732.—WATER AND FIRE PROOF ROOFING COMPOUND.—Franklin A. Curtis, East Saginaw, Mich.

I claim a compound composed of coal tar, wheat or rye flour, water lime, and sand, mixed in a cold state, as herein described.

79,733.—SIDING BOOTS AND SHOES.—Henry T. Daggett, South Braintree, Mass.

I claim the combination of the gage, t, with the mechanism for changing its position, substantially as and for the purpose set forth.

79,734.—BEE HIVE.—Owen Davis, Newton, Ohio.

I claim, 1st, The combination of the boxes, A and D, boxes, I I, and comb frames, K, when the several parts are constructed and used as herein specified.

2d, A comb frame whose sides are provided with vertical grooves within which are inserted small frames, L, that are provided with comb guides, e, and braces, c, substantially as shown and described.

79,735.—SWAGING MACHINE.—F. S. De Witt, Rochester, N. Y.

I claim the bevelling sections, D and E, of the swaging rollers, C, of tinners' tools, in connection with a gage, H, arranged and operating substantially in the manner and for the purposes herein shown and described.

79,736.—PROCESS OF TREATING GLUE.—Andrew Dietz, New York city.

I claim, 1st, Treating glue with rosin or other proper resinous substance and petroleum or hydrocarbon or fixed oils, substantially as and for the purpose set forth.

2d, Combining with glue, so treated and prepared, carbolic or wood acid, substantially as and for the purposes set forth.

79,737.—GLASSWARE MOLD.—Hiram Dillaway, Sandwich, Mass.

I claim a sectional glassware mold body, when constructed with a hollow hinge pin, so that water may flow from one section to another through said pin, substantially as described.

Also, in combination with the bottom and side sections of a mold body, the hooks, I, arranged to operate substantially as described.

79,738.—COOLING GLASSWARE MOLDS.—Hiram Dillaway, Sandwich, Mass.

I claim the combination, with a glassware mold body, of a water reservoir, in such a manner that the reservoir forms a part of the mold body, and moves therewith, without making and breaking the connection between the reservoir and the mold body at each impression obtained from the mold, substantially as described.

Also, the combination, with a glass mold body, of a close reservoir, made with the coiled air tube, substantially as described, passages, e d o, connected by the trough-like passage, c, substantially as described.

79,739.—CHURN.—George H. Dow, Freeport, Ill.

I claim the beaters, D, as arranged, in combination with the shaft, B, saucer, J, and case, in the manner as and for the purpose set forth.

79,740.—HARVESTER.—Joseph J. Duchesne, Lacon, Ill.

I claim, 1st, The screw, a', in combination with the ferrule, a, and the slotted bar, b, as and for the purpose set forth.

2d, The chain, c, in combination with the bar, b, and tongue, A, as and for the purpose set forth.

the formation of air ducts, f, therethrough, having communication with the main ducts, b, for the more thorough cooling and equalizing of the expansion of such portions, and decreasing the air heating surfaces, substantially as shown and described.

79,741.—APPARATUS FOR DISSOLVING QUARTZ AND FOR EXTRACTING METALS.—A. L. Fleury, New York city.

I claim, 1st, The above-described apparatus for dissolving quartz or silicates consisting of the furnace, A, liquefier, K, electric apparatus, Z, tanks, I, and absorber, V, arranged and operating as described.

2d, The furnace, A, with its fireplace, B, furnace, F, and trap, D, when used for the purposes specified.

3d, The liquefier, K, as above specified.

4th, The combination of the electric machine, Z, and the liquefier, K, in the manner and for the purpose set forth.

79,745.—SINGLE HARNESS.—Orlando V. Flora (assignor to himself, J. E. Witmer, and J. S. Boyle), Madison, Ind. Antedated June 22, 1868.

I claim, 1st, So arranging the circular opening in the draught plate, E, with a notch, extending forward at an angle of about forty-five degrees, that the draft bolt, C, may be passed through by rotating the plate vertically, and, when passed through, will form a fastening, for the purpose and in the manner as set forth.

2d, Placing the draught plate, E, at or near the point where the hold back strap is usually fastened, so as to allow an elastic bearing at that point on the shaft, while the other bearing of the shaft is arranged in the usual manner, for the purposes as described.

79,746.—FASTENING FOR GLOVES.—M. B. Foote, Northampton, Mass.

I claim, 1st, The combination of the button, B, spring, C, and screw, D, arranged and operating substantially as and for the purposes herein set forth.

2d, The combination of the buttons, B B, metal chain E, and lever F, when the several parts are constructed, arranged, and used substantially as and for the purposes specified.

79,747.—ENAMELLED METAL COMB.—Caleb Foster, Wappinger's Falls, N. Y.

I claim a comb of any other sheet metal than steel, and enameled all over so as to represent or imitate a material of which it is made, but of which combs generally are made, as herein described and represented.

79,748.—CHERRY STONER.—George Geer, Galesburg, Ill.

I claim, 1st, The rotating octagon carrier or receiver, D, made and arranged, and operating substantially as and for the purposes above set forth.

2d, The stripper, L, arranged with the cross piece, M, and operating substantially as and for the purposes above set forth.

3d, The arrangement of the spring, G, receiver, D, and stone carrier, F, with the fork, E, when constructed and operating as specified.

4th, The arrangement of the cross piece, M, fork, E, and latch, H, when constructed and operating as set forth.

79,749.—NUT MACHINE.—A. B. Glover, Birmingham, Conn.

I claim, 1st, In combination with the hollow punch, f, punch, h, and die, the crown, g, and the transfer finger, e, all arranged and operating in the manner described.

2d, In combination with the above, two or more rolls, m and n, with the following, l, and guide pin, i, arranged with the transfer finger, i, so as to operate in the manner described.

3d, In combination with the above, the crown, g', arranged with the transfer finger, r, so as to operate substantially as described.

4th, In combination with the transfer fingers, e i r, the holding fingers, i 23, when constructed and arranged so as to transfer and hold the blanks, substantially as herein set forth.

79,750.—CHANNEL BUOY.—W. W. Goff, Eagle Harbor, Mich.

I claim the reflectors, B, when attached and operating substantially as and for the purposes herein described and shown.

79,751.—PRINTING PRESS.—H. M. Hall and George W. Espey, Moore's Hill, Ind.

We claim, 1st, The movable paper clamp, G, when arranged as described, so as to receive the necessary movement from the raising and lowering of the platen.

2d, The combination of the clamp, G, and fingers, H, when arranged as described, for the purpose of holding the paper.

3d, The combination of the cam shaft, F, and hooks, E', for giving the impression to the paper, as set forth.

4th, The combination of the clamp, G, rod, h', and standard, L, with the slotted hinged platen, B, when arranged and operating substantially as and for the purpose described.

79,752.—LUBRICATING PULLEY.—David Harrington, Worcester, assignor to himself and S. A. Woods, Boston, Mass.

I claim, 1st, In combination with the hub of a loose pulley, an annular chamber, extending continuously around the hub, and opening all around into the bearing surface thereof, this chamber being bored out in casting, and being narrow at the bearing surface, and enlarging back therefrom, substantially as shown and described.

Also, in combination with the oil chamber, c, the lateral ducts, made shallow at the outer ends, and deepening and widening towards and into the main chamber, c, substantially as described.

Also, in combination with the main annular chamber, c, and the lateral duct or ducts, an end groove, h, connecting with the lateral duct or ducts, substantially as shown and described.

79,753.—ELEVATED RAILROAD.—Charles T. Harvey, Tarrytown, N. Y.

I claim, 1st, The construction and arrangement and adjustment of a supporting column of two or more independent cylinders or tubes, substantially as described.

2d, The combination of the several cylinders or tubes of the combined column, the frame, J, in which the track rests, and the bolts or keys that connect said tubes and frame together, substantially as described.

3d, The method of connection of the cylinders or tubes of the combined column to the base plate, by means of bolts or keys, substantially as described.

4th, The construction and arrangement of the ends of the frame, J, upwards or over the flanges of the track, to serve as a guard to confine the latter in place, with or without the wooden keys, M, substantially as described.

79,754.—ELEVATED RAILROAD.—Charles T. Harvey, Tarrytown, N. Y.

I claim the combination of a supporting

70,762—QUARTZ MILL.—W. W. Hubbell, Philadelphia, Pa.
I claim the cup-shaped aperture, g, and the revolving arm, h, operating in the lower part of the pot, e, and the cup, c, d, and the plates, k, in combination with the two sets of rollers, a, b, and the opposite inclined and arranged shafts, p, q, r, s, v, w, x, y, z, all constructed and arranged as and for the purposes herein described.

70,763—FIREMAN'S EXTENSION LADDER.—Robert H. Jones, New York, N. Y.
I claim, 1st, the combination, in a fireman's extension ladder, of the sliding frames, A, A', with the sliding telescopic tube, I, I', substantially as above described.
2d, in combination with the extension tube, I, I', the reservoir, L, provided with several supply pipes, M, M', substantially as and for the purposes specified.

70,764—APPARATUS FOR ATOMIZING LIQUIDS.—Henry Kraut, St. Louis, Mo.
I claim the arrangement of the tubes, B and C, inside of the vessel, D, so as to be protected from all external influences.
70,765—PREPARING COTTON SEED FOR PLANTING.—Robert M. Lathrop, assignor to himself, J. E. Proutman, and J. P. Proutman, Three Rivers, Mich.
I claim the method of cleaning and preparing cotton seed for planting, substantially as hereinbefore described.

70,766—EYE PROTECTOR FOR CHIEF ARRESTER FOR LATHES.—Charles T. Lamphere, Greenfield, Mass.
I claim an apparatus, constructed and arranged for use, substantially as described, for protecting the eyes from chips or metal shavings and similar substances.

70,767—SCREW CUTTING LATHE.—J. P. Theodore Lang, Washington, D. C., assignor to himself, E. H. Ashcroft, Boston, Mass., and S. F. Ashcroft, Washington, D. C.
I claim the lever, L, governor plate, H, and worm wheel, G, in combination with the feed screw, W, K, and for the purposes herein set forth.

70,768—DRAW BRIDGE.—C. K. Marshall, New Orleans, La.
I claim the construction and arrangement of the traveling trucks, a, a', with suspended platforms, E, E', when the same is supported, braced and guided, as herein described, and combined with the tubular bridges, A, A', the whole supported on piers, in the manner and for the purposes herein described.

70,769—TOBACCO COMPRESS.—John H. McGowan, Cincinnati, Ohio.
I claim the cars, D, D', provided with the slots, e, e', in combination with the swing bolt, E, and key, I, for swing bolt, F, and collar, H, connected, arranged, and operating substantially as described.

70,770—PAVEMENT.—B. F. Miller, New York city.
I claim the pavement, laid as specified, and receiving the block superstructure, substantially as set forth.

70,771—CIDER MILL.—W. S. Oborn, Marion, Ohio.
I claim the press beam, D, plunger rods, b', screw posts, E, screws, F, and swivel nuts, b'', all arranged and operated substantially as herein set forth.

70,772—WATER ELEVATOR.—Wm. M. Palmer, Middlebury, N. J.
I claim the combination of the cylinders, D and D', the shaft, G, and clutch, H, with the cylinders, E and E', and shaft, L, and clutch, K, and ropes, F and F', for alternately raising and lowering the buckets, B, through a distance that may be adjusted as required, by the continuous revolution of the shaft in one direction, substantially as set forth.

70,773—CHURN.—Philip Penington, Union City, Ind.
I claim the combination of the dashers, E, F, on the movable arms, D, D', having recesses, c, c', and slides, e, e', for securing to the journals, a, d, in the churn, A, to operate as set forth.

70,774—FASTENING THE LINING TO THE SOLES OF BOOTS AND SHOES.—D. H. Fries and B. S. Woodcock, Boston, Mass.
We claim, 1st, the automatic facing or rim, c, operated by the springs, d, e and f, or their equivalents, in combination with the last, b, for the purpose of protecting the lining, substantially in the manner specified.

70,775—CORN HARVESTER.—E. W. Quincy, Lacon, Ill.
I claim, 1st, the frame board, k, applied to a corn harvesting machine, substantially as and for the purposes herein described.
2d, the elevating and gathering apparatus, constructed as described, when applied in combination with the frame board, k, to a corn harvesting machine, substantially as and for the purposes herein described.

70,776—WHIP HOLDER.—A. C. Rand, Westfield, Mass.
I claim the combination of the base with the springs bent in the form of bows, as described and secured thereto, all constructed and operating substantially as described and for the purposes herein set.

70,777—BOOT CRIMPER.—J. M. Reed, Boston, Mass.
I claim as my invention a boot crimper composed of the jawed clasp, the screw, and the pyramidal block, with the retaining teeth formed upon the latter, essentially as herein shown and described.

70,778—ADJUSTABLE SPRING.—A. Roff, Southport, Conn.
I claim the adjustable spring, A, provided with a ratchet and dog for increasing or diminishing its tension, substantially in the manner and for the purposes set forth.

70,779—HARNESS BUCKLE.—I. Roraback, South Bend, Ind.
I claim the sides, D, provided with inclined slots, E, cross plate, F, and dilator, C, as arranged, in combination with the tongue, G, and roller, H, in the manner as and for the purposes specified, as a new article of manufacture.

70,780—UMBRELLA.—Lewis Roth, Newark, N. J. Antedated July 23, 1868.
I claim the arrangement of the brace, B, extending from the thumb, E, to the arm, A, above the regular brace, L, in the manner and for the purposes named.

70,781—ROTARY FLUID ELEVATOR.—S. P. Ruggles, Boston, Mass.
I claim the combination, in one case or box, of two flow wheels that move, one before the other, and then both together, for the purpose of passing air, gas, or water through the case in one direction only, and prevent it from flowing back, substantially in the manner and for the purposes set forth.

70,782—TOY HOUSE.—Emily S. Russell, Plymouth, Mass.
I claim a toy house, made of two thin sheets of material secured together, the outer sheet having swinging doors and windows, concealing or disclosing the interior of the apartment, so that the inner sheet, and the space between the sheets being adapted to movement of the doll, b, substantially as described.

70,783—MIXING MACHINE.—J. M. Seymour, assignor to himself and Daniel Wheeler, Newark, N. J.
I claim, 1st, the adjustable foot, b, stem, H, double clamp, G, and the arms, F, F', when combined with a miter machine in the manner and for the purposes specified.

70,784—MACHINE FOR POLISHING SLATE, ETC.—E. Snyder, Stratford, Pa.
I claim, 1st, the smoothing machine, herein described, having two or more pairs of polishing wheels, revolved in opposite directions, and mounted one above the other, so that the slates may pass through the series by gravity, all substantially as and for the purposes herein set forth.

70,785—SLEIGH BRAKE.—G. B. Stevens, Pluckemin, N. J.
I claim, 1st, the combination with the turning rod, D, of the open bearings, constructed and applied to the cross brace, B, as and for the purposes set forth.

70,786—GLASS PRESSING MACHINE.—Michael Sweeney, assignor to Sweeney, Bell & Co., Wheeling, West Va.
I claim, 1st, the combination of a machine for pressing glass and a pressure blast, the tubes leading from which are so arranged that cold air currents, generated by the blast, may be directed against the surfaces of the pressing mechanism, substantially as and for the purposes herein set forth.

70,787—SHARPENING SAW.—Otis A. Telf, Plattsburg, assignor to Joseph Frazier, Clinton county, N. Y.
I claim the shaft, M, provided with crank, G, and spiral spring, N, in combination with the bar, P, frames, B and G, all connected and arranged to operate as described and for the purposes set forth.

70,788—SHOE HOOK.—E. L. Tevis, Philadelphia, Pa.
I claim a shoe hook constructed and operated for the purpose and in the manner above described and set forth.

70,789—KNITTING MACHINE.—Orison Twombly, Holder, N. H., and Wm. Noyes, Jr., Newburyport, Mass.
We claim, 1st, the needle cylinder, D, provided with a screw thread, D', in combination with the cam, C, screw, S, and bed plate, A, constructed and operated substantially as and for the purposes specified.

70,790—MANUFACTURE OF DESICCATED COCOA NUT.—Geo. W. Wall, Philadelphia, Pa.
I claim the improvements in the mode of desiccating and preparing the meat of the cocoa nut, substantially as described and for the purposes set forth.

70,791—SMUT MILL.—R. Ward, Edinburgh, Ind.
I claim the smut mill with drum, L, constructed as described, with cham-

ber, M, suction pipes, N and O, and the fan in the drum, R, with their various parts all constructed, arranged, and operating substantially as and for the purposes specified.

70,792—DEVICE FOR OPERATING SHUTTERS.—Thos. Watson, Brooklyn, N. Y.
I claim, 1st, the combination of the sliding lever, d, the turning socket, e, the locking pin, f, and the vibrating lever, c, with the curb, b, on the shutter and window sash, all arranged and operating substantially as shown and described and for the purposes specified.

70,793—SPIN.—Samuel Wherly, San Francisco, Cal.
I claim the graduated holes, b, b', or their equivalents, in the sides of the band, A, and the pin, c, near the end of the spring, k, for adjusting the spin to the heel, substantially as described.

70,794—COMPOSITION FOR FORMING MOLDED AND COATED ARTICLES.—Samuel Whitmarsh, Northampton, Mass. Antedated June 21, 1868.
I claim, 1st, the combination of blood with asbestos, for the production of a composition applicable either to a liquid or solid form, substantially as described.

70,795—MOP WRINGER.—H. B. Willoughby, Ottawa, Ill.
I claim the combination of the levers, J, K, E, braces H, G, supports, F, F', frame, D, frame, A, hoop, B, with rollers, L, L', the latter being arranged to open and close over the top of a wash vessel, as and for the purposes herein shown.

70,796—FASTENING FOR NECK TIES.—Elias Woodward, Brooklyn, N. Y.
I claim the detachable fastening for a bow or scarf, formed with penetrating points, o, elastic connection, d, and hook, c, combined and arranged as described.

70,797—HARNESS RING.—William Yates (assignor to C. Autman, A. C. Towner, P. B. Sowers, and G. H. Buckins), Canton, Ohio.
I claim a ring, A, having a base, B, arranged in its interior by means of one or more arms, C, substantially as and for the purposes herein specified.

70,798—CASTER FOR TRUNKS.—W. H. Young and L. Young, Boston, Mass.
We claim the revolving shaft, c, with its head, d, the shoulder, e, and the roller, f, combined and arranged with socket, b, the screw, g, and the strip, h, substantially in the manner and for the purposes above set forth.

70,799—AIR ESCAPE FUNNEL.—J. I. Beaumont, St. Paul, Minn.
I claim the combination of the inner funnel, B, having therein the wire rods, b, with the outer funnel, A, containing the apertures, c, and d, the whole being constructed and arranged in the manner and for the purposes substantially as herein described and set forth.

REISSUES.

49,203—REFITTING STOP VALVE.—Dated August 1, 1865; reissue 3,020.—Charles S. Hall and Charles F. Hall, Brooklyn, N. Y., by Messrs. assignments of S. Hall & Co., either provided with or not an internal sliding centre, c, and arranged in suitable bearings, a, in combination with the adjustable centre, c, constructed and operating substantially as and for the purposes set forth.

74,582—DEVICE TO PREVENT HOGS FROM ROOTING.—Dated February 13, 1866; reissue 3,021.—George O. Nixon and William L. Nixon, Sandyville, Ohio.
We claim the within-described device, consisting of the plate, A, arms, C, C', with holes, D, D', and wire, B, the several parts being arranged and used substantially in the manner and for the purposes herein specified.

49,647—APPARATUS FOR BUILDING WALLS AND EXTRACTING STUMPS.—Dated August 29, 1865; reissue 3,022.—George W. Packer, Jr., Middle River, Conn.
I claim, 1st, the within-described combination and arrangement of the pyramidal frame, M, M', and curved reaches, E, E', with the four wheels and their accessories, substantially as and for the purposes set forth.

34,945—FEMALE REPORTER.—Dated April 1, 1862; reissue 3,023.—Alexander D. Reves, Portland, Me.
I claim the back, h, made as a d for the purposes herein set forth, and supported by the belt and braces, arranged as herein described.

72,484—SAFETY TRUCK.—Dated April 28, 1868; reissue 3,024.—S. Y. Bradstreet, Monticello, Iowa.
I claim, 1st, the combination of the inclined grooved wheels, C, C', with the horizontal bracing wheels, F, F', substantially as and for the purposes set forth.

44,387—PUMP.—Dated September 20, 1864; reissue 3,025.—Eli Perry, Baldwinville, N. Y.
I claim, 1st, the combination, with the wings, E, of the eccentric arms or levers, I, I', of the pump, between the discharge space, B, and the interior of the case, except through passages, i, in the manner and for the purposes specified.

41,583—MACHINE FOR SPLITTING AND STRIPPING LEATHER.—Dated February 9, 1864; reissue 3,026.—Caleb S. Stearns and Thomas Corey, assignors of Cal. S. Stearns, Marlboro, Mass.
I claim, 1st, a carrying cylinder, B, provided with an automatic grasping mechanism, substantially as set forth.

34,945—FEMALE REPORTER.—Dated April 1, 1862; reissue 3,023.—Alexander D. Reves, Portland, Me.
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the rear end of a rooking stove, and between the rear end of the oven and the rear vertical end plate of the stove, in the manner and for the purposes substantially as herein described and set forth.

70,790—MOP WRINGER.—H. B. Willoughby, Ottawa, Ill.
I claim the combination of the levers, J, K, E, braces H, G, supports, F, F', frame, D, frame, A, hoop, B, with rollers, L, L', the latter being arranged to open and close over the top of a wash vessel, as and for the purposes herein shown.

70,791—FASTENING FOR NECK TIES.—Elias Woodward, Brooklyn, N. Y.
I claim the detachable fastening for a bow or scarf, formed with penetrating points, o, elastic connection, d, and hook, c, combined and arranged as described.

70,792—DEVICE FOR OPERATING SHUTTERS.—Thos. Watson, Brooklyn, N. Y.
I claim, 1st, the combination of the sliding lever, d, the turning socket, e, the locking pin, f, and the vibrating lever, c, with the curb, b, on the shutter and window sash, all arranged and operating substantially as shown and described and for the purposes specified.

70,793—SPIN.—Samuel Wherly, San Francisco, Cal.
I claim the graduated holes, b, b', or their equivalents, in the sides of the band, A, and the pin, c, near the end of the spring, k, for adjusting the spin to the heel, substantially as described.

70,794—COMPOSITION FOR FORMING MOLDED AND COATED ARTICLES.—Samuel Whitmarsh, Northampton, Mass. Antedated June 21, 1868.
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70,797—HARNESS RING.—William Yates (assignor to C. Autman, A. C. Towner, P. B. Sowers, and G. H. Buckins), Canton, Ohio.
I claim a ring, A, having a base, B, arranged in its interior by means of one or more arms, C, substantially as and for the purposes herein specified.

70,798—CASTER FOR TRUNKS.—W. H. Young and L. Young, Boston, Mass.
We claim the revolving shaft, c, with its head, d, the shoulder, e, and the roller, f, combined and arranged with socket, b, the screw, g, and the strip, h, substantially in the manner and for the purposes above set forth.

70,799—AIR ESCAPE FUNNEL.—J. I. Beaumont, St. Paul, Minn.
I claim the combination of the inner funnel, B, having therein the wire rods, b, with the outer funnel, A, containing the apertures, c, and d, the whole being constructed and arranged in the manner and for the purposes substantially as herein described and set forth.

EXTENSIONS.

CONVERTING RAILROAD CAR SEATS INTO BEDS OR LOUNGES.—Henry B. Myer, of Cleveland, Ohio.—Letters Patent No. 11,609, dated September 19, 1864; reissue No. 711, dated May 3, 1869; again reissued, No. 136, dated October 8, 1861.

I claim, 1st, the forming of berths in railroad cars by means of the backs of the transverse seats, substantially as described.

2d, the forming of berths in railroad cars by means of the transverse seats, in combination with the corresponding supplementary cushioned or upholstered frames, or their equivalents, to fill up the spaces between the transverse seats, substantially as described.

STEAM GENERATOR.—Finley Latta, of Cincinnati, Ohio, administrator of A. B. Latta, deceased.—Letters Patent No. 11,023, dated June 6, 1864.

I claim the dividing of the coil or coils, commencing with one, then dividing into two, and then subdividing into four, or any other number, as shown or described, or any equivalent device.

SOFA BEDSTEAD.—Charles F. Martine, of Boston, Mass.—Letters Patent No. 11,036, dated June 6, 1864; reissue No. 335, dated December 25, 1865; reissue No. 2,757, dated April 13, 1867.

I claim, 1st, the single spring mattress, so constructed and arranged with a sofa having a hinged back as to form, when the back is dropped from an upright to a horizontal position for forming a bed, as even surface, without joint or centre depression, substantially as and for the purposes specified.

2d, the constructing and arranging the single spring mattress, with sofa having a hinged back, that when the back is raised from a horizontal to an upright position for forming a sofa, said mattress shall be drawn in or depressed longitudinally at or near its centre by means of cords or their equivalents, and will have the appearance and effect of two separate cushions, one for the seat and the other for the back of the sofa, substantially as specified.

3d, the constructing and arranging the single spring mattress, with sofa having a hinged back, that when the back is raised from a horizontal to an upright position for forming a sofa, said mattress shall be drawn in or depressed longitudinally at or near its centre by means of cords or their equivalents, and will have the appearance and effect of two separate cushions, one for the seat and the other for the back of the sofa, substantially as specified.

DEVICE FOR HOLDING PIECES IN SPOKE MACHINES.—Marinda Starks, Genoa, N. Y., administratrix of Isaac Starks, deceased, and of Lyman Ferrigno, Groton, N. Y.—Letters Patent No. 11,394, dated June 13, 1864.

I claim the manner of holding and operating the spoke in the carriage, so that upon slackening the tail screws at the one end, the spoke is forced backward and made capable of being turned without disturbing it from its centre, and is restrained from turning when set, by means of the sliding and turning socket bar in the headstock, provided with a clamp head fitting in a V or bore suitably shaped recess in the headstock, and the socket bar with its clamp head forced backward by a spring or its equivalent, substantially as specified, whereby great expedition and truth is insured in turning and setting the spoke.

METHOD OF GOVERNING THE ACTION OF VALVE COCKS.—Frederick H. Bartholomew, New York city.—Letters Patent No. 11,113, dated June 30, 1864; reissue No. 1,971, dated November 12, 1869.

I claim, 1st, the combination of these three elements or devices, viz., first, a variable chamber, provided with proper apertures for admission and discharge of fluid.

2d, two valves acting to open and close a passage through which water may flow, the one being in its seat, or closing the passage when the variable chamber is of large capacity, and the other being in a like position, or performing the same office when the capacity of the chamber is small; and

3d, a proper connection between the valves and the variable chamber, so applied that the motions of the former shall be controlled by the latter, the whole three being constructed and acting in combination, substantially in the manner and for the purposes hereinbefore described, when operated upon by competent force.

4th, the combination of two valves, a variable chamber, and a connection between them all, substantially such as is hereinbefore last enumerated, with a seat or platform, substantially such as is hereinbefore described, by means of which the valves and the variable chamber all act in unison, substantially as set forth.

5th

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Injure Fine Clothes.

YOU can make it at home in your own kitchen, and it will only cost you two cents per pound. No more trouble to make than a cup of tea. One pound of G. F. GANTZ & CO.'S PURE WHITE ROCK POTASH will make from twelve to fifteen pounds best White Hard Soap. Directions free with every Can. 12* Office 126 and 128 Cedar Street, New York.

BUSINESS OPPORTUNITY.—The Subscriber has a Manufacturing Establishment, Steam Power, and other machinery in good order, situated 20 miles from the city railway and water navigation—that he offers for sale, or will engage with capitalists in some good manufacturing business, that is a sale and large profit. Inquire of JOHN SMALLEY, Bound Brook, N. J. 4 2*

RIVERVIEW MILITARY ACADEMY. ROUGHKEEPSIE, N. Y. Location healthy; scenery unequalled; Buildings convenient; Teachers highly educated, earnest, working men; System of Order unsurpassed. A wide-awake, thorough-going School for boys wishing to be trained for Business, for College, or for West Point, or the Naval Academy. For circulars address OTIS BISBEE, A.M., Principal and Proprietor. 4 8

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PATENT SHINGLE, SLAVE, AND barrel Machine. Comprising Shingle Mill, Head, Mill, Slave, Cutters, Slave Jointers, Shingle and Heading Jointers, Heading Rounders and Planers, Equalizing and Cut-off Saws. Send for Illustrated List. FULLER & FORD, 282 and 284 Madison Street, Chicago, Ill. 3 4

TALLOW LUBRICATORS, and a General assortment of Brass Work, of superior quality at low prices, at Cincinnati Brass Works. 1 12* F. LUNKENHEIMER, Prop.

WOODWORTH PLANERS A SPECIALTY.—From new patterns of the most approved style and workmanship. Wood-working Machinery generally. Nos. 24 and 25 Central, corner Union Street, Worcester, Mass. Withersby RUGG & RICHARDSON. 16 13*

R. A. VERVALEN'S Power Press Brick Machine, making 9-10 lbs of all the Brick used in the city of New York, Brooklyn, Jersey City, Hoboken, and the surrounding sections. Made by R. A. VERVALEN & CO., Haverstraw, Rockland county, N. Y. 22 10*

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OF ALL SIZES, for purposes where a blast is required. For particulars and circulars, address B. F. STURTEVANT, No. 72 Sudbury St., Boston, Mass. 3 11

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