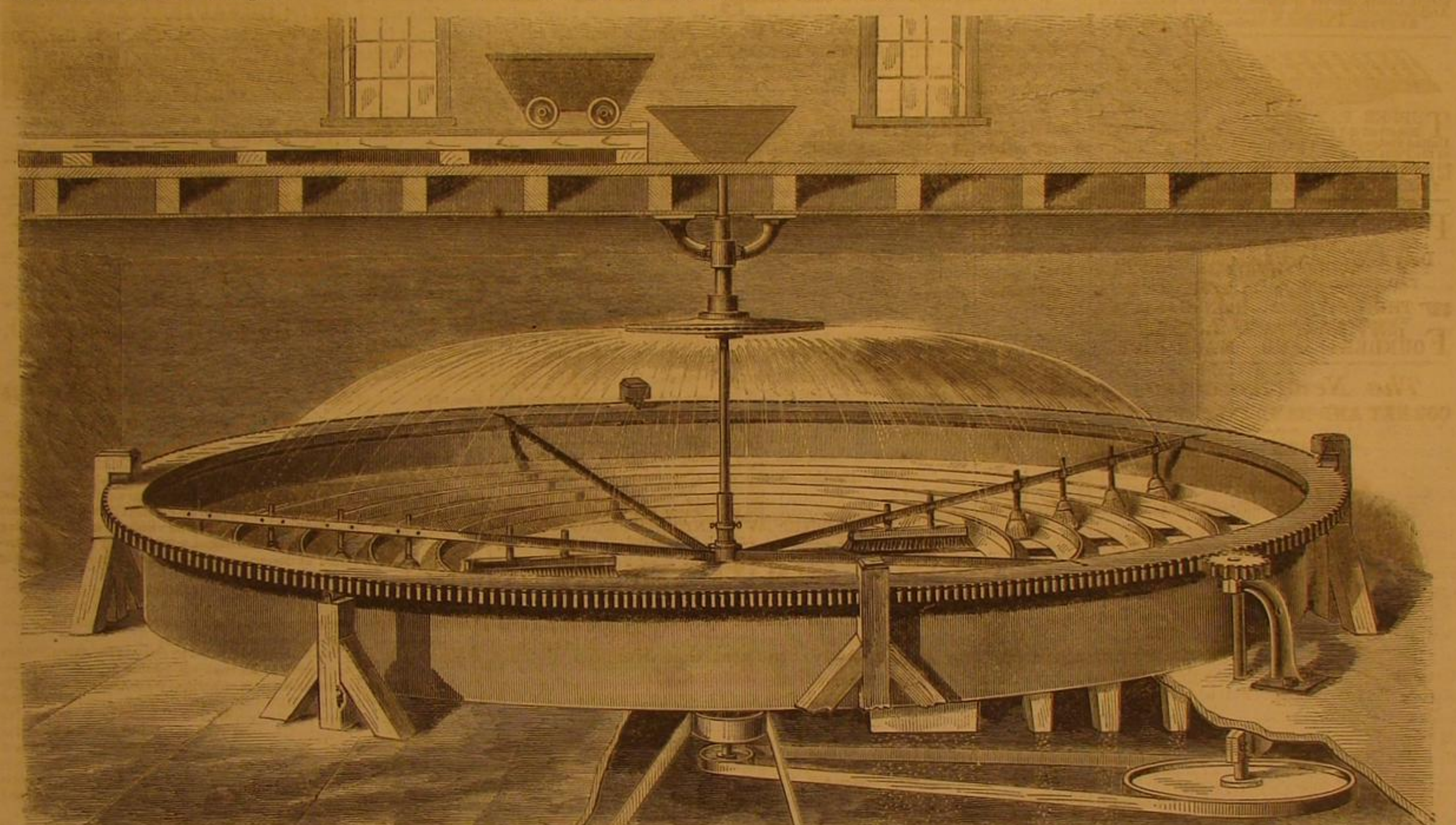
SCIENTIFIC AMERICAN

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

Vol. XX.---No. 9. [NEW SERIES.] | NEW YORK, FEBRUARY 27, 1869 | $3 per Annum. [IN ADVANCE.]

Improvement in Separating and Concentrating Ores, Grains, etc.

The concentration of metallic ores, or their separation from waste and worthless rock, is a process through which all metals used in daily life must pass before they reach the smelter and through him the consumer. It is a fact which may surprise the general reader, but which is well known to those interested, that of all the ores raised from the mine not more than three-fourths, in many cases not over half, goes to the smelter. The residue is either washed away in "water dressing," or else left still mechanically combined with the rock which is thrown aside as "tailings."



PEARCE'S CENTRIFUGAL ORE CONCENTRATOR.

The difficulties which stand in the way of a complete separation of the metals from the rock are mainly these two: Unless the ore is crushed fine (in some cases exceedingly fine), the metallic portions are not entirely detached, and therefore cannot be mechanically separated from the rock. On the other hand, the finer the ore is crushed the greater is the difficulty of washing out the earthy matter without washing away the metal with it. Hence, fine crushing for ordinary ores is, for the most part, eschewed; yet from the friable nature of most of them it is impossible, in any mode of crushing, but that a large proportion of fine dust must be made. Moreover, if fine ores could be separated with as little loss of metal as coarse, fine crushing or more perfect disintegration would be the rule. Therefore a means of concentrating finely crushed ore must obviously be of the first importance.

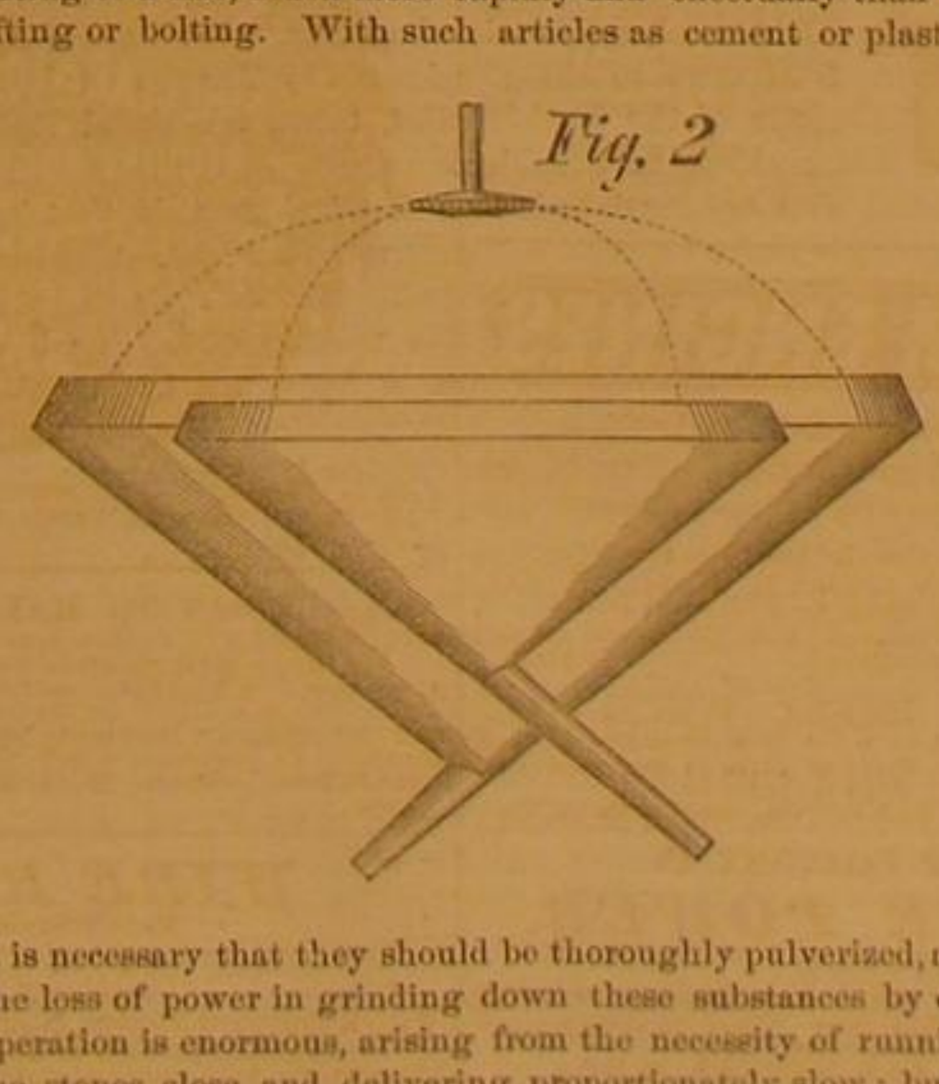
This object is attained, it is believed, in the highest degree practicable, by the invention represented in the accompanying engraving.

Instead of the employment of currents either of air or water—which in whatever way they are applied must necessarily carry off some valuable matter—the crushed ore is thrown out of a revolving distributor, by the very simple mechanism shown, and by the operation of centrifugal force, alone, is carried into concentric annular receivers, the heaviest particles falling further from and the lighter nearer to the center.

Revolving brushes or scrapers, as shown, keep the machine clear, and cause each quality to be discharged, as it falls, through separate pipes. These scrapers are slowly revolved by means of the outer geared rim, driven by an upright shaft having a pulley on the lower end and a pinion meshing with the teeth of the revolving rim at its upper end. The brushes are attached to radial arms extending from a collar on the central shaft to the rim. The heavier metallic portions in the outer circles, and the waste in the inner one, will run where desired, and the middle portions which may require further crushing or further separation, may fall into an elevator and be carried up either to the crusher or separator, to be run through at a different speed, or with fresh ore.

The machine being of a fixed size, it can be regulated to the various grades of ore with great nicety, by varying the rate of the speed or the hight of the distributor, the tube being made movable for that purpose. The whole operation of dressing ore by centrifugal force is rendered entirely mechanical, and in that respect analogous to the working of an ordinary flouring mill, where there is no loss of the substance treated, nor manual labor employed in it, except for packing and attention to the machinery. While the machine will concentrate perfectly ores which are so fine as to float on water, it is equally applicable to the coarser grades, and beside the metallic ores all other mineral or granular substances can be treated by this process. It also affords a means of grading the particles of homogeneous substances which may require sorting to a size, much more rapidly and effectually than by sifting or bolting. With such articles as cement or plaster,

Fig. 2



it is necessary that they should be thoroughly pulverized, and the loss of power in grinding down these substances by one operation is enormous, arising from the necessity of running the stones close, and delivering proportionately slow; but if the stones could be run free and the coarse matter thrown out from the fine and returned, it is manifest that an immense gain in the power and capacity of existing mills would be effected. A form of receiver adapted to such fine substances, where only two grades are required, is shown in Fig. 2. It consists of two funnels suspended one within the other. A pipe from each would carry off the matter which fell into them by means of its gravity alone without any machinery.

Another application of this principle of centrifugal force contemplated by the patentee is the cleansing and sorting of all kinds of seeds, and grains, especially such as may be intended for seeding. It is taken for granted that the heaviest grains or seeds possess the greatest germinating power, and produce the finest plants. By passing any sample of grain or seed through the separator, the heavier or plumper seeds would fall in the outer receiver, and the whole be cleared and classified, almost without cost.

An important feature in the working of this machine is the rapidity of its action. Through a working model now on exhibition at 32 Dey street, in this city, iron ore has been passed with effect at the rate of ten tuns per hour, and it would be perfectly practicable to increase its capacity tenfold, with even greater perfection in the result. The "tailings" from water-dressing now accumulated at working and worked-out mines, contain metal worth many millions of dollars. The value of the invention for working over and recovering this mineral will be at once apparent.

An objection with some who have tried dry ore-dressing, arises from the flying dust which usually accompanies the operation and which is prejudicial both to the health of the workmen and the durability of the machinery. With the centrifugal machine this objection does not arise. The apparatus, as shown in the engraving, is placed in a closed chamber, which need never be entered by workmen while the machine is in operation. The pipe through which the ore is admitted, is fitted with an air-tight stuffing box, which prevents all currents of air from entering, and the air within the chamber will gradually acquire a rotary motion, with the running of the machine, which will not disturb the separation even of the finest dust; each particle of which will obey the laws of centrifugal motion and fall into its proper place. Having witnessed its operation, we think that, from the variety of interests involved in the possible application of the machine, it is well worthy the attention of seedsmen, plaster manufacturers, grain dealers, and others, beside those interested in the extraction of metals from ores.

Patented August 4, 1868, by S. T. Pearce, who may be addressed at 32 Dey st., New York city, where one of the machines having a diameter of twenty feet can be seen in operation.

THERE are twenty-five tobacco factories in Chicago, with an aggregate capital of three millions dollars, the annual product of which is about ten millions dollars.

"MODERN ENGINEERING."—BY THE HON. WM. J. MCALPINE.

A large audience assembled in Steinway Hall, 17th February, to hear the last lecture of the course before the American Institute. The lecturer, after a few introductory remarks, said: Engineering is peculiarly the exponent of modern development. Its definition is "the acquisition of that species of knowledge whereby the great sources of power in nature are converted, adapted, and applied for the use and convenience of man," which covers the civil and military engineer, the architect and mechanician, the closet theorist, and the practical workman. The subject covers the locomotive and its railway; the steam engine and its application; the metals and their manipulation; the workshops and their great tools; modern ordnance and armor; naval construction, telegraphy, bridges, canals, water supplies, harbors, etc.; and has been characterized by the various applications of steam, the product and manipulation of metals and telegraphy. Among the most important of the discoveries and appliances on modern engineering is the locomotive. It was invented at the beginning of this century, but was not successfully used until 1829, since which time it has increased from four to forty tuns in weight, and from fourteen to sixty miles per hour in speed. Then grades of fifty feet per mile were the maximum, now those of 440 feet at Mont Cenis and 528 on the Baltimore and Ohio, have been used. Forty years ago Horatio Allen had to mount the foot-board of the first locomotive himself, now 15,000 are daily whirling over 40,000 miles of railways in this country alone. To-day locomotives are passing over the summits of the Rocky Mountains and Sierra Nevada, and before the year closes will go from ocean to ocean. From the days of Noah until those of the locomotive, civilized population was confined to the water lines. This one engine has spread an avalanche of peoples upon our fertile interior, who now form more than one half of our population and sources of prosperity. The Erie Canal, originally built for vessels of 60 tuns, has just been enlarged for those of 250 tuns, and its increasing traffic already demands an enlargement for vessels of 1,000 tuns. Of the traffic of the great West it now carries more than all of the great trunk lines of railway between the St. Lawrence and the Potomac. One canal boat carries more tunnage than a freight train, and the Erie Canal brings daily to tide water more than five times as much tunnage as the New York Central. Its tunnage exceeds that of all the foreign commerce of this city. The materials used in its construction exceed in quantity those required for the 2,000 miles of the Pacific Railway. The Croton Aqueduct exceeds in engineering merit any work of its kind in the world. The American examples of bridges embrace those of every material and form, and many of huge dimensions. The Niagara and Cincinnati wire suspension, by Roebling; the Havre de Grace of wood, by Parker; the Schuylkill bridge of cast iron arches, by Kneass; and the Victoria iron girder by Stephenson, are among the most noted. In submarine works are the piers of the Potomac and Croton Aqueducts, of the Havre de Grace and Harlem Bridges, and the founding of the United States Graving Dock, at Brooklyn. The Aqueducts and Graving Dock were founded by means of coffer dams, the Havre de Grace Bridge by means of iron caissons, and the piers of the Harlem Bridge are composed of large cast-iron columns or hollow piles, driven by the new-discovered pneumatic process. A mass of metal of a tun weight was unknown before the Christian era. Now those in cast iron up to 150 tuns, in wrought iron to forty tuns, and in steel or bronze to twenty-five tuns, are cast in any desired form, and turned or bored with the most perfect accuracy. Two years ago I saw the largest lathe in England, which swings twenty-two feet, and will take in a shaft forty-five feet long. Six months ago I saw one in this country which swings thirty feet, and will take in a shaft of fifty feet. There are planers which will plane iron fifty feet in length; others of eighteen feet in width; others fourteen feet in hight, taking off metal shavings of two and a half inches in width and a quarter thick. Not long since I witnessed the penetration of a wrought-iron shield of fifteen inches thickness by an elongated cannon shot of twelve inches diameter. The largest European gun is of steel, by Krupp, fourteen inches bore, and will throw a ball of 1,000 pounds, but has never been fired. The next largest European gun, is an Armstrong rifle, which throws a shell of 610 pounds. The 12-inch American Rodman rifle throws an elongated shot of 630 pounds, and the 20-inch smooth-bore, a spherical shot of 1,072 pounds. The "Swamp Angel" is a Parrott rifle, eight inches bore, and threw shot of 150 pounds a distance of five and a half miles into Charleston. Its ancient rival, "Mons. Meg," is twenty inches bore, and threw stone balls of eighteen and a half inches in diameter, but notwithstanding its quaint legend, its range did not exceed a mile and a half.

It is said that telegraphy may be read by each of the five senses, namely, sight, sound, feeling, taste, and even smelling. The method of signaling through the Atlantic Cable is exactly the reverse of that upon the land lines, and is done by alternate currents of positive or negative electricity, but ten per cent of which is allowed to cross the ocean; and, therefore, an almost microscopic receiving instrument is used. Last autumn General Reynolds sent a message ninety-two miles across Lake Superior by means of the heliotrope (or mirror) without the aid of either wire or cable. The works of the ancients are often referred to as excelling, in magnitude, accuracy of workmanship, and beauty of design those of modern times. This view is in part at least quite erroneous. Their works were generally for useless purposes, although there are many exceptions, such as their canals, water works, military roads and bridges, which show that they were occasionally called upon for works of utility. The stones in the temple of Baalbec are the largest save one of any building in the world. They range from 1,200 to 1,275 tuns. The one at St. Petersburg is one-fifth larger. The monoliths of Egypt are from 200 to 300 tuns, and a few of 700 tuns. The obelisk of Luxor, now in Paris, weighs 250 tuns. The "goodly stones" of the temple at Jerusalem weighed 350 tuns each. The speaker then described, from the most trustworthy sources, the probable method of constructing the great Pyramid of Gizeh, including the method of quarrying, transporting, and laying the stone, and stated that, instead of scaffolding, a mound of earth and an inclined causeway were used, and when the structure was completed the earth was removed. This pyramid contained 6,500,000 tuns of stone, and the embankments required 50,000,000 tuns of earth. All of the masonry of the Erie Canal amounts to but one-third of this, and all of the earth moved for the Pacific Railway amounts to but that used instead of scaffolding for this pyramid. It required the labor of 500,000 men for thirty years, and cost $5,000,000,000. A modern engineer would construct such a work for $100,000,000, and use a tithe of the men. The Coliseum of Rome was of but one-third of the size of the London Exhibition building, and but one-sixth of the Paris building. The tunnage of the Ark was 12,000; of the show ships built by Ptolemy somewhat less, and of the Great Eastern, 22,500 tuns. Some of the modern men-of-war have nearly 9,000 tuns displacement, and our passenger ships 3,000 to 5,000 tuns. The largest steam engines in the world were those used in draining the Haerlem Mere, with steam cylinders of twelve feet diameter and fifteen feet stroke, driving eight pumps of sixty-three and seventy-three inches diameter, and ten feet stroke. These three engines were capable of delivering a volume of water six times as great as that of the Croton. The next largest pumps are those of the Graving Dock at Brooklyn, of one-third of the capacity of those at Haerlem Mere. The steam engines next in size are those of the Bristol and Providence steamers, with cylinders of nine feet two inches diameter and twelve feet stroke. The speaker then described the Bessemer steel process, and spoke of the changes which it is destined to produce in engineering structures Seven of the most noted modern engineering works, to contrast with the seven wonders of the ancient world, are the Thames Tunnel, the Great Eastern steamship, the Atlantic Cable, the Britannia and Niagara Bridges, the Erie Canal, modern ordnance, and the Pacific Railway. Among the great projects of the age are those for building canals, railways, tunnels, bridges, and steamers. In canals, we have the project of one around the Falls of Niagara; a re-enlargement of the Erie for vessels of 1,000 tuns; the Suez, nearly completed; one cross the Alleghanies in Virginia; one through the Nicaragua Lake or Panama, and one from Huron to Ontario. In railways, we have the Pacific on the eve of completion; the Mont Cenis in rapid progress; one across the continent from Rio Janeiro begun, and many others of magnitude. Of bridges, we have those in progress across our great Western rivers; one proposed across the East River at New York of 1,600 feet clear span; two over the Hudson, above and below West Point; another across the Straits of Messina, covering the "Scilla and Charybdis with clear spans of 1,000 meters (two-thirds of a mile) each," and with piers of 700 feet high, half in and half out of the sea, and finally the modern "Pons Asinorum," a bridge project across the Straits of Dover, sixteen miles long, in clear spans of two miles each, with piers of 1,000 feet depth in the water. This project is said to be favored by Napoleon. In tunnels we have that of Mont Cenis, eight miles, and of the Hoosic, five miles in length, both in rapid progress; one of wrought iron tubes at London, and another at Chicago, almost completed; tunnels proposed under the East and North Rivers at New York, under the Ganges at Calcutta, and under the Straits of Dover.

IS HYDROGEN GAS A METAL?

It has long been suspected that hydrogen would ultimately prove to be a metal. Our readers will also recollect the announcement that during some recent experiments, a substance had been discovered, supposed to be the metallic base of hydrogen. Still more recent experiments by Thomas Graham, F.R.S., Master of the British Mint, throw additional light upon this most important subject.

It has often been maintained on chemical grounds that hydrogen gas is the vapor of a highly volatile metal. The idea forces itself upon the mind that palladium with its occluded hydrogen is simply an alloy of this volatile metal in which the volatility of the one element is restrained by its union with the other, and which owes its metallic aspect equally to both constituents. How far such a view is borne out by the properties of the compound substance in question will appear by the following examination of the properties of what, assuming its metallic character, would fairly be named hydrogenium

The density of palladium, when charged with 800 or 900 times its volume of hydrogen gas, is perceptibly lowered, but the change cannot be measured accurately by the ordinary method of immersion in water, owing to a continuous evolution of minute hydrogen bubbles which appear to be determined by contact with the liquid. However, the linear dimensions of the charged palladium are altered so considerably that the difference admits of easy measurement, and furnishes the required density by calculation. Palladium, in the form of wire, is readily charged with hydrogen by evolving that gas upon the surface of the metal in a galvanometer containing dilute sulphuric acid, as usual. The length of the wire before and after a charge is found by stretching it on both occasions by the same moderate weight, such as will not produce permanent distention, over the surface of a flat graduated measure. The measure was graduated to hundredths of an inch, and by means of a vernier, the divisions could be read to thousandths. The distance between two fine cross lines marked upon the surface of the wire near each of its extremities was observed.

The wire had been drawn from welded palladium, and was hard and elastic. The diameter of the wire was 0·462 millimeter; its specific gravity was 12·38, as determined with care. The wire was twisted into a loop at each end, and the mark made near each loop. The loops were varnished so as to limit absorption of gas by the wire to the measured length between the two marks. To straighten the wire, the loop was fixed, and the other connected with a string passing over a pulley and loaded with 1·5 kilogrammes, a weight sufficient to straighten the wire without occasioning any undue strain. The wire was charged with hydrogen by making it the negative electrode of a small Bunsen's battery, consisting of two cells, each of half a liter in capacity. The positive electrode was a thick platinum wire placed side by side with the palladium wire, and extending the whole length of the latter, within a tall jar filled with dilute sulphuric acid. The palladium wire had, in consequence, hydrogen carried to its surface for a period of one and a half hours. A longer exposure was found not to add sensibly to the charge of hydrogen acquired by the wire. The wire was again measured and the increase in length noted. Finally, the wire being dried with a cloth, was divided at the marks, and the charged portion heated in a long narrow glass tube kept vacuous by a Sprengel aspirator. The whole occluded hydrogen was thus collected and measured; its volume is reduced by calculation to Bar. 760 m.m., and Therm. 0° C.

The original length of the palladium wire exposed was 609·144 m. m. (23·982 inches), and its weight 1·6832 grm. The wire received a charge of hydrogen amounting to 936 times its volume, measuring 128 c.c., and therefore weighing 0·01147 grm. When the gas was ultimately expelled, the loss as ascertained by direct weighing was 0·01164 grm. The charged wire measured 618·923 m.m., showing an increase in length of 9·779 m.m. (0·385 inch). The increase in linear dimensions is from 100 to 101·605; and in cubic capacity, assuming the expansion to be equal in all directions, from 100 to 104·908. Supposing the two metals united without any change of volume, the alloy may therefore be said to be composed of—

		By volume.
Palladium	100	or 95·32
Hydrogenium	4·908	or 4·68
	104·908	100

The expansion which the palladium undergoes appears enormous if viewed as a change of bulk in the metal only, due to any conceivable physical force, amounting as it does to sixteen times the dilatation of palladium when heated from 0° to 100° C. The density of the charged wire is reduced by calculation from 12·3 to 11·79. Again, as 100 is to 4·91, so the volume of the palladium, 0·1358 c.c is to the volume of the hydrogenium 0·006714 c.c. Finally, dividing the weight of the hydrogenium, 0·01147 grm. by its volume in the alloy, 0·006714 c. c. we find

Density of hydrogenium..........1·708

The density of hydrogenium, then, appears to approach that of magnesium, 1·743, by this first experiment.

Further, the expulsion of hydrogen from the wire, however caused, is attended with an extraordinary contraction of the latter. On expelling the hydrogen by a moderate heat, the wire not only receded to its original length, but fell as much below that zero as it had previously ridden above it. The palladium wire first measuring 609·144 m.m., and which increased 9·77 m.m., was ultimately reduced to 599·444 m.m., and contracted 9·7 m.m. The wire is permanently shortened. The density of the palladium did not increase, but fell slightly at the same time, namely, from 12·38 to 12·12; proving that this contraction of the wire is in length only. The result is the converse of extension by wire-drawing. The retraction of the wire is possibly due to an effect of wire-drawing in leaving the particles of metal in a state of unequal tension, a tension which is excessive in the direction of the length of the wire. The metallic particles would seem to become mobile, and to right themselves in proportion as the hydrogen escapes; and the wire contracts in length, expanding, as appears by its final density, in other directions at the same time.

A wire so charged with hydrogen, if rubbed with the powder of magnesia (to make the flame luminous), burns like a waxed thread when ignited in the flame of a lamp.

Numerous other experiments were also performed, with remarkable unanimity of result; the specific density of hydrogenium being found by calculation from several successive experiments to be, respectively, 1·708, 1·898, 1·977, 1·917, 1·927, 1·930, 2·055, the variations resulting from different volumes being used in the alloy, the highest densities being obtained when small quantities were used.

In these experiments the hydrogen was expelled by exposing the palladium placed within a glass tube to a moderate heat short of redness, and exhausting by means of a Sprengel tube; but the gas was also withdrawn in another way, namely, by making the wire the positive electrode, and thereby evolving oxygen upon its surface. In such circumstances, a slight film of oxide of palladium is formed on the wire, but it appears not to interfere with the extraction and oxidation of the hydrogen. The wire measured—

		Difference.
Before charge	443·25 m.m.	
With hydrogen	449·90 "	+ 6·65 m.m.
After discharge	437·31 "	— 5·94 "

The retraction of the wire, therefore, does not require the concurrence of a high temperature. This experiment further proved that a large charge of hydrogen may be removed in a complete manner by exposure to the positive pole—for four hours in this case; for the wire in its ultimate state gave no hydrogen on being heated *in vacuo*.

Experiments were also made to determine the conducting power of the palladium and hydrogenium wire, and its magnetic properties, the details of which may be hereafter referred to. The record of these experiments, as communicated to the Royal Society, January 14, by Mr. Graham, forms one of the most important contributions to science that has been recently made, and will immediately arrest the attention of the entire scientific world.

VELOCIPEDE NOTES.

Many have expressed doubts as to the real utility of velocipedes and the permanency of their use. Most of these croakers have based their opinions upon the disuse into which the rude machines of former times have fallen and the want of adaptability to the roughly paved roadways of our cities. The first of these objections is answered by the fact that the seemingly slight differences in the construction of modern velocipedes from the primitive ones, have entirely changed the character of the vehicle. They are no longer draft vehicles, they are locomotives, and are as much superior to the original straddle bar on wheels, as the improved steam locomotive is to the old time stage coach. As to the second point, what will objectors say when it is announced on good authority that the spirited Common Council of Brooklyn propose to bridge the gutters for the accommodation of velocipedestrians. *The Brooklyn Union* says of this project: "Whole streets will no doubt in due time be modified to meet the requirements of the coming vehicle. We are informed that our beneficent Prospect Park Commissioners are already proposing to give the velocipede the benefit of a special course. In view of the existing demand, as well as of the plain prospects of this institution, we take the liberty of suggesting that the gutters of the city be bridged. Whether it be effected with iron or with flagging, it can be done with perfect ease and tolerable economy, and would be viewed by every one as a great convenience. It is a little job which we commend to the paternal mercies of the City Fathers." It adds that if this is long delayed "The whole city will rise in its might to demand little iron bridges over the gutters."

We believe in the *utility* of the velocipede, as well as in its capacity for affording amusement, and shall not be disappointed to see Henry Ward Beecher's prediction fulfilled, and devout worshippers propelling themselves with all due gravity and decorum to church on Sunday.

Velocipede livery stables are the offspring of scant supply and large demand. "Velocipedes To Let" greets our eyes every day on the way to our office. Velocipedes rent at 60 cents an hour in Boston. The same city has adopted the soubriquet of "*velocipedagogue*" for those who teach the art of riding them.

A New Orleans paper says that the Crescent City proposes to purchase twenty-five velocipedes for each fire company in the city.

Detroit has caught the complaint, got it badly, so a friend informs us who has just come from that enterprising city.

An expert suggests through the columns of the *Evening Post*, a few improvements much needed in the present style of the two-wheeled velocipede, as well as some cautions to be observed by those who intend to purchase.

Up to the present time the velocipede in this country has been used almost entirely in cities, and but very few have given them a trial on our country roads, though there is no longer any doubt of their utility *in rure*. As yet no machine is provided with protectors to keep the mud and dust from off the back; and this is one of the most important improvements that can be made. For from actual experience it has been found that one's back very soon gets a coating of dust over it, which is thrown up by the hind wheel; while for the front wheel there should also be a protector (fastened to the support of the wheel, to turn with it), to prevent that wheel from rubbing upon the pantaloons, a serious annoyance. The saddle should be as far down between the wheels as possible without coming in contact with them, and the support for the front wheel, to which the handles are attached, should incline backwards, so that the center of the cross bar at the top shall be at least nine inches from a perpendicular drawn through the center of the front wheel. For it is obvious, and experience has proved it to be so, that more force can be exerted and a greater speed more easily attained if the body is thrown well back and the whole frame kept nearly straight, than if the legs are forced up and down in the position that one assumes while sitting in a chair. In this latter position he may press hard enough to raise himself from the seat, but in the former the machine itself must give before he can be moved by pushing. The ingenious arrangement for supporting lanterns on some machines are a waste of time and expense; better some sort of clamps to secure a light umbrella in front when the sun shines hot, or it rains, as well as clamps, or the like, for fastening a traveling bag on the rear, for we must look forward to next summer, when so many excursions and trips into the country will be made on these machines.

Before purchasing any machine, but particularly the cheaper ones, examine them closely yourself, or if not a judge of good mechanical workmanship, ask a friend to do it for you. Many defects are concealed by the coatings of paint, particularly in the castings and forgings; and a machine that is weak in any point is a dangerous one to use in fast riding. Be sure that every bolt is properly secured by nuts that cannot be shaken off; they should be riveted on to the bolt, for they will soon work loose if not so fastened. The crank should never be keyed on to the shaft, but fastened on to a square head.

The manufacturers at present are pocketing immense receipts at the expense of the excited and incautious public. A good machine can be made to order under the direction of almost any good mechanic for a sum much less than is charged for any now in the market.

That the career of the "velocipedestrian" is not one of unalloyed happiness is gently suggested by the following inquiries, propounded by a novice in a Western journal:

"If a fellow goes with his velocipede to call upon a lady, whose house has no front yard, and no back yard, and there is a lot of boys in front of it ready to pounce upon his machine, and the lady is smiling through the window, what is he to do with it?

"If a fellow, riding his velocipede, meets a lady on a particularly rough bit of road, where it requires both hands to steer, is he positively required to let go with one hand to lift his hat; and, if so, what will he do with his machine?

"If a fellow, riding his velocipede, overtakes a lady carrying two bundles and a parcel, what should he do with it?

"If a fellow, riding his machine, meets three ladies walking abreast, opposite a particularly tall curb stone, what ought he to do with it?

"If a lady meets a fellow riding his machine, and asks him to go shopping with her, what can he do with it?

"If the hind wheel of a fellow's machine flings mud just above the saddle, ought he to call on people who do not keep a duplex mirror and a clothes brush in the front hall?

"If a fellow, riding his velocipede, encounters his expected father-in-law, bothering painfully over a bit of slippery sidewalk, what shall he do with it?

"If people, coming suddenly round corners, will run against a fellow's machine, is he bound to stop and apologize, or are they?

"If a fellow is invited to join a funeral procession, ought he to ride his machine?

"And is it proper to ride a velocipede to church; and, if so, what will he do with it when he gets there?"

There should be a "mixed commission" of ladies to decide these questions.

Prof. Sweet, of Providence, R. I., a well-known pedestrian and rope walker, is to commence, on the first day of June next, the unparalleled feat of propelling a velocipede of his own manufacture, a distance of three thousand miles in thirty days, averaging one hundred miles per day, for a wager of $5,000. During the trip, he is to ride the velocipede one hundred and fifty miles in twenty-four hours, and one trial only will be allowed.

A correspondent from Yonkers writes us about the velocipede of 1818. He was at that time a possessor and a rider of one and remembers it with affection, recalling with indignation the prohibition of their use by the action of the New York City Fathers of that date.

The Canton (Ohio) *Republican* proposes to make a velocipede with rimmed wheels, so that it can be run at the rate of a hundred miles an hour on a single rail of a railroad. In case of meeting a lightning train, wouldn't it be very bad for the bicycle?

The New Steel.

The Philadelphia *Ledger* says it is suggested that as other substances beside carbon, tungsten, manganese, chromium, silicon, etc., may enter into composition with iron to form varieties of steel, boron will also enter into composition; and that the new steel recently described in our columns, of which tools were made possessing extraordinary hardness and cutting power are composed of boron steel. This will do for a conjecture, but its real constitution cannot long remain hidden.

Editorial Summary.

A BEAUTIFUL SWORD.—The recent war greatly stimulated the production of military goods in this country, and many improvements in arms and equipments were made the subject of letters patent. Not only were there many more engaged in the business than ever had been previous to 1861, but better workmen were employed, and more artistical designs were executed. The impetus thus given to this department of manufacture and trade, it still continues to feel, although, of course, the close of the war has largely diminished the demand. We were shown, the past week, a beautiful sword, manufactured by Mr. Virgil Price, 144 Greene st., New York city, which does great credit to the manufacturers. It is a Knight Templar's sword, with richly ornamented silver hilt and scabbard, and in style and finish would be hard to beat. Mr. Price is an enterprising inventor, who has long been a valued client of ours, and it gives us pleasure to thus testify to the meritorious character of his workmanship.

SURGICAL OPERATION ON A MULE.—The *New Jersey Enterprise* says: "Dr. Cattell, vetinary surgeon, of Bridgeton, N. J. last week performed a surgical operation on a mule, which had a large lump upon its shoulder blade. Upon opening the excrescence, to the astonishment of all present, a silver ten-cent piece was discovered in the wound. How it got there is a mystery." The mule might have been brought from the South or Southwest in some parts of which it is the practice to insert a small silver coin underneath the skin of a horse or mule, so that in case the animal is stolen, the owner has proof positive of his ownership at hand should he chance to find the animal again. The marked coin is placed in various positions, so that it is difficult to find, except by the one who inserted it.

IT is known to the readers of the SCIENTIFIC AMERICAN that Fell's over-mountain railroad across Mt. Cenis was opened for traffic in June last. Considering that the tunnel under the mountain lacked but two miles of being completed, it required a great deal of boldness to carry forward an enterprise which, according to reports has cost its projectors upwards of $2,500,000, or equal to about $50,000 per mile. The total receipts up to this time have been, in round numbers, about $100,000 which is far from a satisfactory exhibit. *Engineering* estimates that the tunnel will be through in 1871, and that unless the traffic largely increases before that time arrives, the shareholders will have hopelessly lost at least five-sixths of their principal.

A PHYSIOLOGICAL EXPERIMENT.—A most extraordinary experiment was recently made by Professor Dickson, a distinguished physiologist. A few grains of barley were placed before a hungry pigeon, which at once began pecking. During this operation the brain of the pigeon was frozen by means of a spray of ether, and the bird being thus suddenly deprived of consciousness, ceased pecking, and remained for awhile as if deprived of life. At this moment the grains of barley were all cleared away, and the ether spray having ceased, the brain was allowed to thaw; the bird returned in a short time, as it were, to life, and the first thing it did was to continue pecking for awhile, though no grains were present.—*Exchange.*

THE IMPROVED FIRE-ARMS.—An article on the new fire-arms, published by the *Journal Official*, of Paris, says:—"The results of a comparative trial in the School of Musketry at Spandau, in Prussia, among the breech-loaders adopted by the different armies, were, according to the official report, the following: The Prussian needle gun can fire 12 shots a minute; the Chassepot, 11; the Snider, 10; the Remington (Denmark), 14; the Peabody (Switzerland), 13; the Wœnzl (Austria), 10; the Werndi (same state), 12; and the Winchester repeating rifle (United States), 19."

THE Berliner *Vossische Zeitung* states that the Prussian Government has proposed to the legislature of the North German Confederation that, in future, no patents shall be granted for new inventions in that country. If such a law should be sanctioned, inventors would be robbed of the earnings of many years' work; and the consequence would be that most inventions would not be brought to such perfection as under the the existence of a good patent law, where the inventor has a chance of getting repaid in the end.

CARBOLIC ACID FOR WOUNDS UPON HORSES.—If a wound will heal by the first intention, the less done to it the better. If, on the other hand, suppuration is inevitable, the most beneficial effects follow the use of carbolic acid combined with glycerin or linseed oil, in the proportion of 1 to 20; it may be applied, night and morning, with a feather. Of course, as with all other dressings, the wound must be kept clean,and in the case of backs and shoulders,all pressure removed by small pads of curled horse-hair, sown on to the harness, above and below the sore.

ZINC may be given a fine black color, according to Knaffl, by cleaning its surface with sand and sulphuric acid, and immersing for an instant in a solution composed of four parts of sulphate of nickel and ammonia in forty of water, acidulated with one part of sulphuric acid, washing, and drying it. The black coating adheres firmly, and takes a bronze color under the burnisher. Brass may be stained black with a liquid containing two parts arsenious acid, four hydrochloric acid, and one of sulphuric acid in eighty parts of water.

FOURTEEN WEEKS WITHOUT SLEEP.—Dr. Newcomer, of Cleveland, Ohio, in noticing the paragraph, recently published in the SCIENTIFIC AMERICAN, about the experiments made by parties in Berlin who undertook to find out which could longest hold out against sleep, informs us that he had a case in his own practice when the patient had no sleep for fourteen weeks. This is certainly a queer case, and very hard to believe.

TASTE OF TURNIPS IN BUTTER OR MILK.—The flavor of turnips cannot be removed entirely from milk or butter when the cows are fed on them, but much may be done to mitigate it. It is said that a tablespoonful (per gallon of milk) of niter dissolved in as much water as it will take, and put in the pail before milking the cow, and giving no turnips to the cow for two or three hours before milking, will lessen the flavor, as will, also, giving only the center part of the turnip, having the top and bottom cut off.

THE English War Department has thrown aside the Armstrong gun altogether, after expending millions upon it and knighting the inventor. The thing is a failure. The British War Office has issued an order, intimating its purpose to withdraw all the breech-loading rifled guns, and substitute muzzle loaders.

A FOREIGN journal, *Le Strade Ferrati d' Italia*, speaks in high terms of an electrical brake, recently invented, to be applied to a train of cars. The announcement is couched in the ambiguous, pseudo-scientific verbiage, so fashionable nowadays, both at home and abroad, and no definite idea can be obtained from it of the nature or value of the discovery.

QUALITY OF UNGUENTS.—The elevation of temperature produced by the friction of a journal is sometimes used as an experimental test of the quality of unguents. When the velocity of rubbing is about four or five feet per second, the elevation of temperature is said to have been found by some recent experiments to be, with good fatty and soapy unguents, 40° to 50° Fahr.; with good mineral unguents, about 30°.

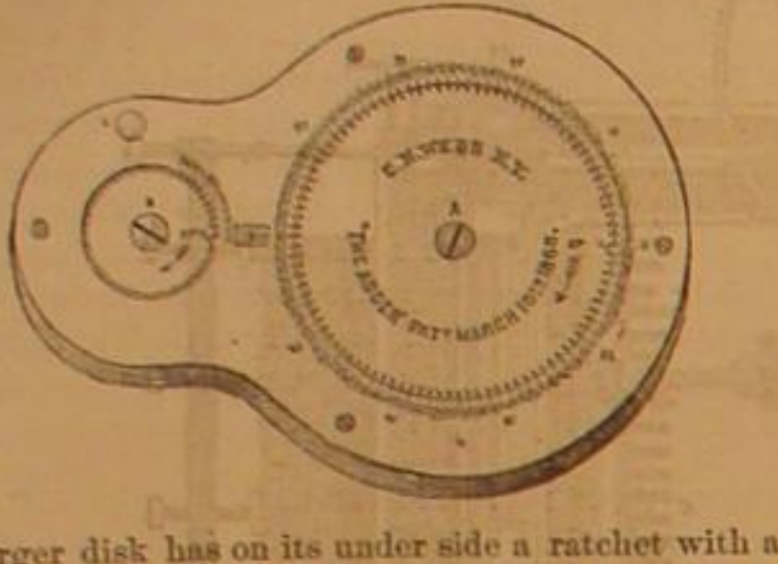
THE Exhibition of machinery and of agricultural products, which is to commence at Santiago, (Chili) on the 1st of April next, will remain open until the 1st of July following, so that opportunity will be afforded for the display of all articles that may be offered for the purpose before the 1st of June.

WE notice street venders of dentrifices that will instantaneously remove tartar and discoloration. Their wares should be shunned—they contain chemicals destructive to the teeth.

A SPACIOUS room has been fitted up by the Collins Company, at Collinsville, Conn., as a library for their employés.

WEBB'S PATENT ADDER AND TALLY BOARD.

We have an innate and hereditary hatred of all of the order *ophidian*, and we much doubted the expediency of receiving Mr. Webb's reptile into our office, but having seen the animal and found it was no "snaik" whose head was to be crushed, but an industrious little device calculated to save head-wear, we welcomed it cordially. Its appearance is similar to the accompanying engraving, the implement, however, being larger, measuring about six and three-quarter inches long by about five inches across the widest place. The form is seen in the engraving. A large disk, A, and a small one, B, both revolving, and both graduated around the circumference and marked with figures in two concentric circles, are seated in a case and and partially covered with a metallic plate, leaving only the inner circle of figures exposed, except at a small opening between the two disks, where one set of figures, on the outer circle of each, is seen through the slot in the plate. The plate around the larger disk is marked from 0 to 99 to correspond with similar numbers on the disk's concentric circles. The smaller disk has 50 numbers, from 0 to 50, with a corresponding segment of numbers (units) from 0 to 9 ranging from the pening in the plate or cover back around a portion of the smaller circle.



The larger disk has on its under side a ratchet with a single tooth and the smaller one a ratchet of fifty teeth. A connection is made between the two by a spring pawl so that one entire revolution of the large disk will move the small one one-fiftieth of its circumference. The operation may be comprehended by the above description of the parts.

The inventor believes that it is a great aid to accountants, substituting a merely mechanical process for mental or brain labor. Certainly if his manipulation of the device, and the opinions of those who have given it a trial are to be considered, the implement should be estimated as a valuable adjunct to the means of summing up wearisome columns of figures. It may be let in flush with the surface of a desk so that the accountant, or clerk, may always have it at his elbow, working it with one hand while keeping his place in the columns of figures with the others. It is neat, handy, and presentable, but although it will add numbers rapidly, it is is doubtful if it will add to a man's fortune or to his family. With this drawback we can indorse the adder.

Orders for the implement or for explanatory circulars should be addressed to the patentee, C. H. Webb, 571 Broadway, New York city.

Geological Survey of Ohio.

The Cleveland *Herald* says:—"A number of years since a partial geological survey of the State was made. A mistaken economy on the part of the State terminated the work when but a small part had been completed, but that which had been done has proved an incalculable benefit in revealing a portion of the mineral wealth of the State, and enabling mining operations to be carried on intelligently.

"Every year has shown the folly of the legislature in stopping the appropriations before the survey was completed; and the feeling in favor of the resumption of the work has been yearly growing stronger. The increasing demand for coal, the tendency to seek out new sources of supply, and the reports from time to time of mineral discoveries in various parts of the State, combine to render desirable a complete survey that shall map out the geological structure of the State and enable projectors of mining enterprise to work intelligently and not sink pits at hap-hazard, or with no better guide than a 'divining rod,' or the revelations of a spiritualistic medium.

"Mr. Lee, of Delaware county, will introduce into the House of Representatives a bill to provide for a thorough geological survey of the State.

"The former survey was made by Colonel Charles Whittlesy, Colonel J. W. Foster, Professor J. P. Kirtland, Dr. C. Briggs, Professor W. W. Mather, Professor John Locke, and Dr. S. P. Hildreth. The last three named of the above are dead."

Harbor Defenses.

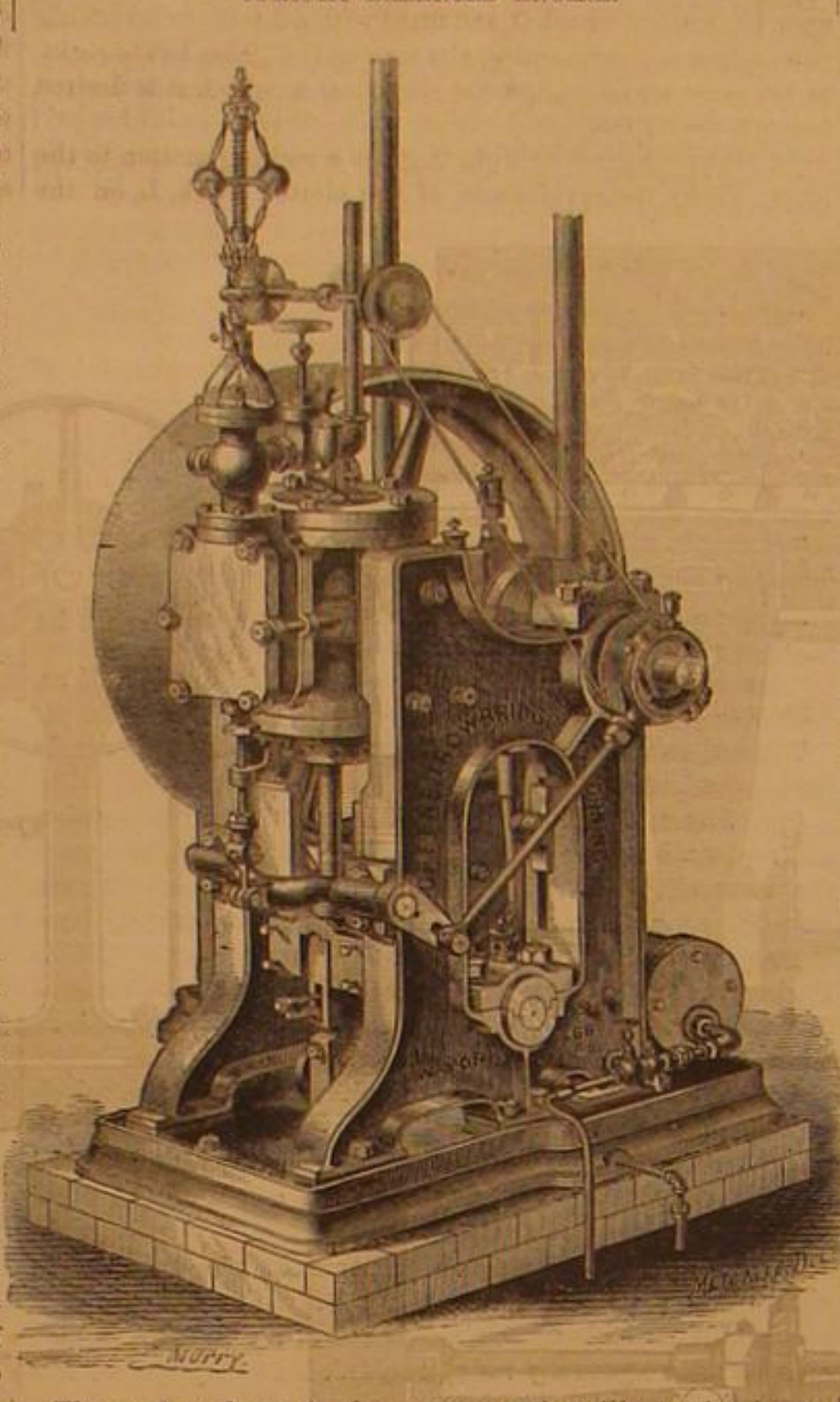
We learn that the joint resolution which passed the Senate last July has been passed in the House, authorizing the General of the Army, and the Admiral or Vice Admiral of the Navy, to inquire into the utility and practicability of the Ryan-Hitchcock mode of marine fortifications, directing them to report the result of their investigations at the next session of Congress. The method of marine defense here referred to, is known as Ryan's revolving iron turret fort, to be used for monitors and for harbor defense. It was illustrated and described in No. 26, Vol. XIX SCIENTIFIC AMERICAN. A board, to be composed partly of army and partly of navy officers, will soon be appointed, with instructions to proceed to some suitable point where the value of the invention can be fairly and thoroughly tested.

THE germination of seeds can be watched, at every stage of its progress, by laying the seeds between moist towels, and laying them between plates. The towels can be lifted without damage to the tender sprouts.

GREENE'S PORTABLE ENGINE, UNION CHECK VALVE, AND LUBRICATOR.

Compactness in an engine is a very desirable quality, whether for facility in removal from one locality to another, diminution of weight—and consequent friction—or absorption of room. Short pipe connections are also to be considered advantageous.

UPRIGHT BALANCED ENGINE.

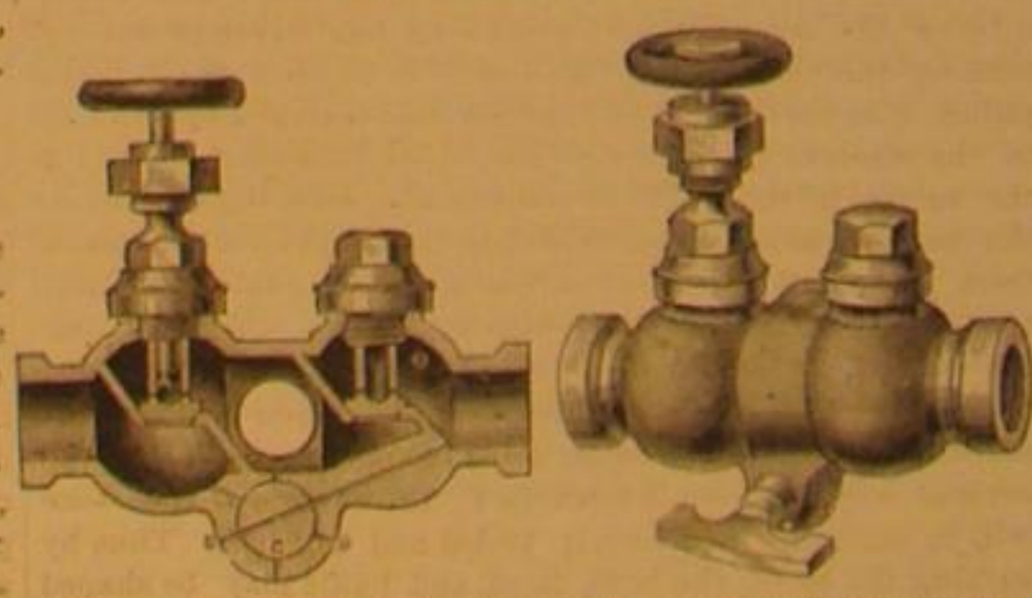


The engine shown in the accompanying illustration is one that better fulfills these requirements than any other of its power with which we are acquainted. Having seen it in operation in a wood sawing and splitting establishment where its capacity and performance were severely taxed, we feel free to say that it is a machine we can honestly commend as very superior. When running at 170 revolutions per minute it made no perceptible jar and worked almost noiselessly. Although occupying but a small space for its power, the parts are so arranged that the engineer experiences no annoyance in reaching every part.

As seen, it is an upright engine, the cylinder and steam chest near the top of the frame, the piston rod connecting with a crosshead, that itself is connected to a walking beam at the bottom of the frame, the other end of the beam connecting with the crank and driving the pump which is inside the frame. The parts are balanced so that the resistance is equal on each end of the beam, and there is no shaking or jar under any circumstances. A double eccentric with link motion can be easily attached to act as a cut-off or for reversing the motion, adapting the machine to hoisting and other purposes. The piston rod, valve, valve stem, and all the connection pins, are of steel; the pump has Greene's Union Check Valve, which we shall presently describe; the heater is in close contiguity with the engine; and the base plate has a rim for receiving all the drippings and the condensation from the steam, thus keeping the engine room neat and clean.

The engine can be built per horse horse power much cheaper than engines of ordinary patterns, and can be transported entire or easily taken to pieces and packed on mules or horses, and as easily put together, making it especially adapted to the mining regions of the country.

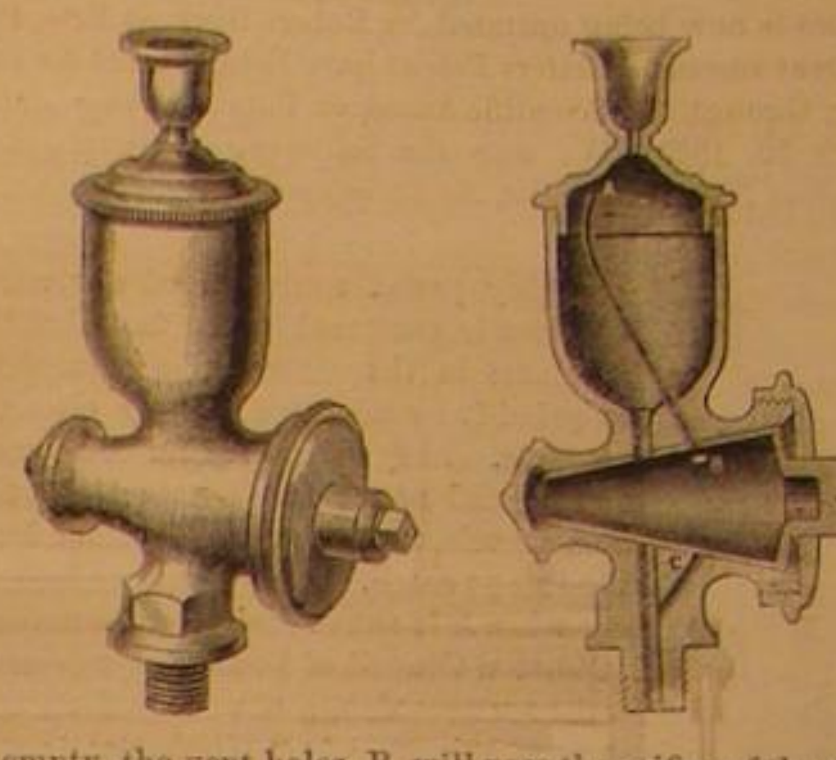
UNION CHECK VALVE.



The union check valve herewith represented in perspective and section is used on this engine. It is a check valve, stop cock, and air cock, or tester, combined. A is the stop cock valve operated in the usual way by the hand wheel; the ordinary check valve is seen by its side. The air cock has one opening, B, through its center transversely, connecting with openings to the top and bottom of each valve and with the openings, C and D. Thus freezing and bursting may be prevented, and the condition and action of pump and valves may be, at all times, determined.

THE UNION LUBRICATOR.

The lubricator seen in the two last engravings—perspective and sectional—is of the simplest imaginable form. It is intended for the valves and pistons of engines. The plug is hollow with an opening at the bottom of the cup, or receiver and three vent holes, one shown, marked B, at the bottom of the tube, A. When the cup is filled the plug is in the position shown in the sectional engraving and its interior is filled at the same time with the reservoir. In turning the plug



to empty, the vent holes, B, will pass the orifice of the vent, C—which is a branch of the main delivery—before the large hole in the plug, directly under the cup or reservoir, meets the main delivery, thus allowing steam from the engine to pass into the plug and assist in the discharge of the oil When the plug is turned back to refill, the vents, B, pass the orifice of the tube, A, through which the steam goes without disturbing the oil in the cup. The three vent holes are for allowing the plug to be turned in either direction, the center one being on a line with the main hole, and always when filling or discharging, aiding the operation by means of the steam. The parts may be easily removed for cleaning.

Orders for this engine and appurtenances should be addressed to Greene, Trowbridge, & Corning, 326 and 328 Delancey street, New York City

Annals of Iowa--The Great Pipestone Quarry.

The first number of the "Annals of Iowa," published quarterly by the State Historical Society at Iowa City, has made its appearance. It is edited by Sanford W. Huff, Corresponding Secretary of the Society, and contains much instructive and entertaining matter. Like the earlier annals of any section of the United States, it also contains many amusing incidents.

As a taste of the flavor of this publication we have condensed from its pages an account of the great pipestone quarry, around which so many legends cluster, and which has been celebrated by Longfellow in the "Song of Hiawatha:"

> On the mountains of the prairie,
> On the great Red Pipestone Quarry,
> Gitche Manito, the mighty,
> He the Master of Life descending
> On the red crags of the quarry
> Stood erect, and called the nations,
> Called the tribes of men together
>
> From the red stone of the quarry
> With his hand he broke a fragment,
> Molded it into a pipe head
> Shaped and fashioned it with figures.

A narrow ledge of rocks in the broad shallow valley of a little prairie creek, lying entirely below the general prairie level, constitutes all there is of the Great Pipestone Quarry. As far as the eye can reach in every direction, no "mountain of the prairie," no grove, no tree, no habitation, no living thing except a few birds, is in sight. The spot is within the State of Minnesota, about thirty miles in a direct line from its south-western corner, and three or four miles from its western boundary. Approaching it, the exposure of rocks appears much greater than it does in the distance when it looks like a mere line of broken rocks in the open prairie, for our view then takes in the whole region for many miles around it.

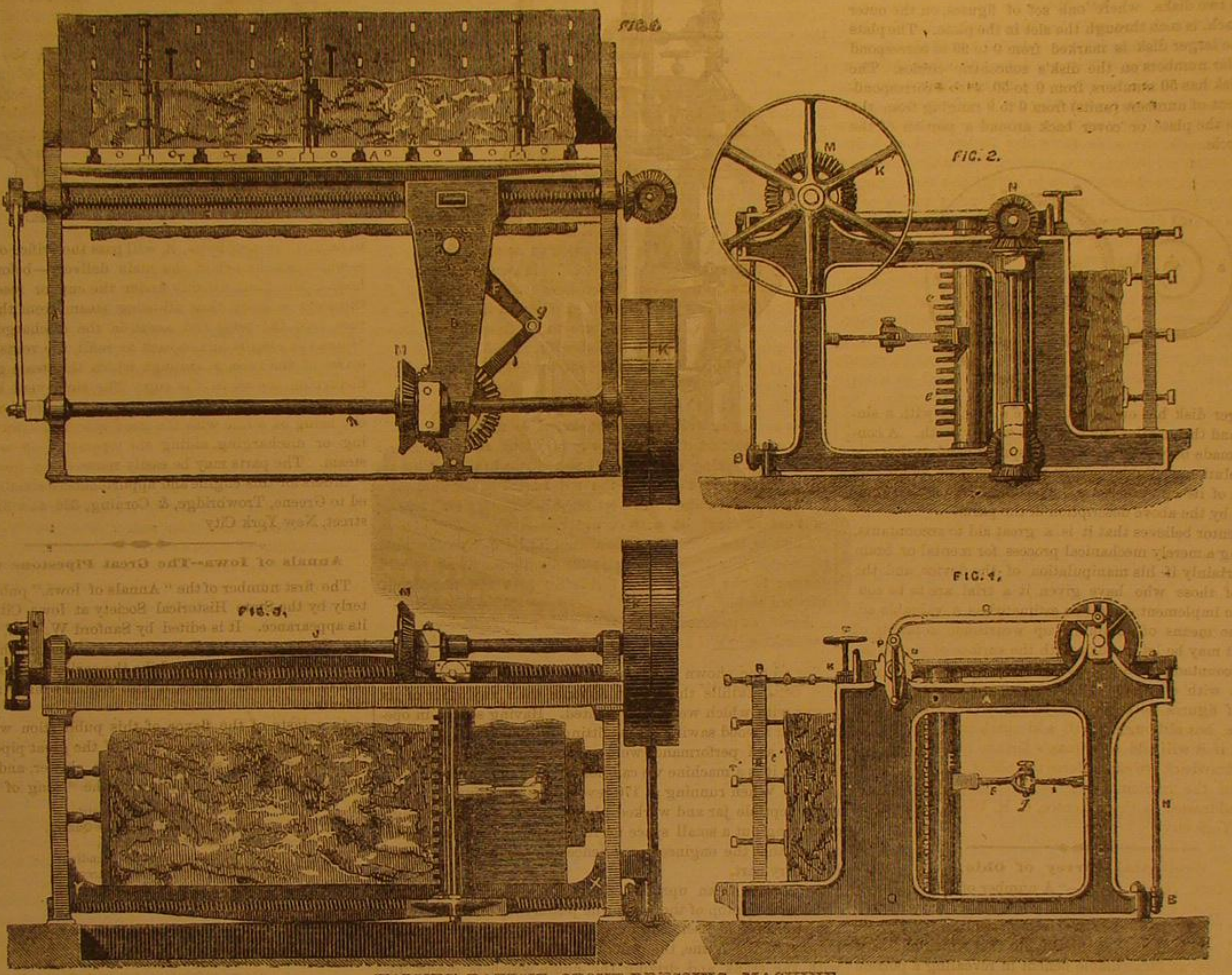
The principal exposure of rocks is about a mile in length from north to south, in both of which directions it becomes gradually lost from view beneath the surface of the prairie, it faces the west and reaches its greatest perpendicular hight about twenty feet, where "Gitche Manito the mighty," is supposed to have stood when he took his wonderful smoke, and where the brook falls over it into the plain below. The pipestone is in somewhat thin and usually shaly layers, and only from eight to twelve inches in aggregate thickness, and is the lowest layer found here. The red quartzite rests immediately upon it, and is four or five feet thick at the ditch, and must be removed to get the pipestone.

This pipestone is chemically a clay—silicate of alumina—colored brick-red with peroxide of iron. It is too heavy for pipes for white men, and is valued by them almost entirely for its legendary interest. It is heavier, harder, and in every respect inferior to meerschaum—silicate of magnesia—yet the finer specimens may be worked without much difficulty with a common saw, file, or knife, and readily takes and retains a considerable polish. Geologically it is a metamorphic clay, as the quartzite is metamorphic sandstone. It was originally a layer of clay intercalated between layers of sandstone and the same metamorphic action that changed the latter to a quartzite, also converted the clay into pipestone.

AN old Spanish silver coin of the year 1017 has been found by a gentleman in Bangor, Me. It shows how rude the art of coinage was at that date, being "hammered out."

Dressing Stone by Machinery.

In the machine represented a vertical cutter-head is arranged to slide horizontally along on the side of a platform, on which the stone to be worked is clamped, and to oscillate on its vertical axis to actuate the chisels secured in it. The cutter-head may be adjusted to cut from right to left and *vice versa*, and the platform on which the block of stone is secured can be fixed an any angle required, so as to cut the stone at any slant required. It is in use in England, and one of the machines is now being operated by Robert Gray, at Erie, Pa., with great success. Letters Patent have been secured for this country through the Scientific American Patent Agency, dated January 19, 1869. We copy the following engraving and description from the London *Engineering :*



HOLMES' PATENT STONE-DRESSING MACHINE.

"We illustrate, above, an ingenious yet simple arrangement of stone-dressing machine, designed and patented by Mr. Joseph Ellicot Holmes, of Chester, which appears likely to take a very high position amongst machinery of its class. In designing this machine it has been Mr. Holmes' endeavor to imitate as closely as possible the effect produced by the mallet and chisel in the hands of skilled masons, and the work turned out by the machines already constructed on this plan shows that this end has been well attained. We shall first describe the machine in detail, and then give some account of its performance. Our illustrations comprise a front elevation, two end elevations, and a plan of the machine; and referring to these views, A A is the main framing which comprises the bed-plate, A′, on which the block of stone to be cut is fixed. B B are traveling arms, in which the cutter stock or cross-head (fitted with chisels, picks, and tools) is mounted, and which arms and cutters are made to traverse the main frame, A A, from end to end alternately, or, from left to right, and *vice versa*, by the screws, *c c*. *d d* are eccentric bearings, or plummer-blocks, in which the ends or journals of the cutter-stock or cross-head are centered. These bearings may be turned by a lever or levers, not shown in the engravings, and may be fixed in position by stop-bolts; *e* is the cutter-stock or cross-head, in which the picks, chisels, and tools are fixed. The picks or chisels are shown at *e e*.

"A lever, F, is fixed to the stock or cross-head for giving right and left hand cutting motions to the chisels or tools, as the case may be, this lever being coupled by the connecting rod, I, to the crank of a cranked shaft, G, centered in the heads of the traveling arms, B B, and turned by the miter wheel, H. By taking out the pin, *g*, the connecting rod, I, can be readily uncoupled, and the lever, F, turned so that it inclines in the opposite direction, for the purpose which we shall explain presently.

"J is the main shaft having a driving pulley, K, keyed on it at one end, and a slotted crank, L, also keyed at the other end. M is a second miter wheel mounted upon a short hollow shaft, *m*, which turns in a bearing provided on the head of one of the traveling arms, B. The main shaft, J, has a long groove cut in it to receive a tongue or feather in the hollow of the shaft, *m*, which is thus turned by, and traverses on, the main shaft from end to end, as the arms, B B, are moved backwards and forwards by the screws, C C. The heads of the arms, B B, are connected by the tie, or parallel bar, *h*. Bevel wheels, N, are keyed on to the ends of the screws, C C, and are connected by a shaft carrying other bevel wheels, as shown. O is a ratchet wheel, fixed on the upper screw shaft at the opposite end to the bevel wheel, N; whilst P, a level centered upon the ratchet wheel, O, and fitted with a double or reversiing pawl, adjustable for turning the screws, C C, from left to right, or *vice versa*, according to the direction to which it is desired to work the cutter.

"A connecting rod or link, Q, gives a rocking motion to the lever, P, by the revolutions of the slotted crank, L, on the end of the main shaft. The crank pin of this crank works in a hollow screw clamp; and by varying the position of the crank pin, the lever, P, can be made to turn the screws, C, C, more or less at each revolution of the main shaft, J, and thus regulate the feed. R, S, and T are the clamps, screws, and cross bars by which the stone is secured in position while being dressed.

"When operating this machine the stone (unshapen) is placed upon the table or bed-plate, A′, with the side to be dressed towards the cutters, and it is then fixed in position by the clamps, R, S, and the clamping screws, T and T′, aided when necessary by shuts and wedges abutting against the end frames. The cutters having been previously moved to the end, X or Y, as the case may be, and the cutter head or stock with the pointed or narrow chisels, *e*, set to the required angle by attaching the lever, F, to the connecting rod, I, the cutters, *e*, being also adjusted for a greater or less depth of cut by turning the eccentric, O, the power is applied through the pulley, *k*, to the shaft, J, and the required motion will be given to the whole of the moving parts of the machine. Now, if the surface of the block is tolerably quarry-faced, one cut of the narrow chisels, *e*, as the cutter arms traverse the frame from *y* to *x*, will suffice to reduce the surface operated upon to a true and even plane, or nearly so, when by taking out the draw pin, *g*, and reversing the position of the cutter stock, thus bringing the broad chisels or tools to their working position, and causing the cutter arms to traverse the frame the reverse way, or from X towards Y, the surface of the stone will be regularly and evenly tooled and finished. Thus by turning the block, the beds, faces, and joints may be shaped with truth and rapidity.

"In the machine which is shown in the engraving, the bed-plate, A[1], and the cutter stock, E, are at right angles to each other, and it will, therefore, produce perfectly rectangular surfaces. It will be obvious, however, that by inclining the bed-plate or table more or less, any required angle may be given to the surfaces. Hence, when the machine is once set the work produced by it upon any number of blocks will be perfectly uniform, causing their beds and faces, or the angle of their surfaces to each other, to be perfectly true one with another. Thus, the use of square bevels and templates, etc., may be dispensed with, and the time required for setting out and working marginal drafts, as when dressed by hand labor, saved altogether.

"The machine can be fitted with changing stocks for working concave or convex surfaces, and, by giving a rising and falling motion to the bedplate, spiral as well as plain and curved surfaces can be wrought by it. In cases where, from the inequalities of the quarry face, or the nature of the finished work required, it is necessary to give a second or third cut with the chisels before the broad tools are brought to their work, the cutter stocks can be reversed in the bearings, D; so that the chisels will then give a back as well as a forward cut, or, when the stocks are not reversible, the lever, F, can be lowered to clear the chisels, and the arms be run back to their normal position, and thus give a second or third cut from one and the same end of the frame.

"The dimensions of the machines will vary according to the nature of the work for which they are intended. For ordinary purposes Mr. Holmes proposes to make the cutter stock give a cut three feet wide, with a traverse motion of eight feet, or, so as to dress the surfaces of a block of any size up to seven feet in length by three feet in width. For convenience of locomotion, the main frame may be provided with wheels, and, when necessary, a swing or traveling crane may be added to facilitate the operations of moving and turning the blocks of stone to and from, and also upon, the bedplate or table. It will be seen from what we have said that the oscillating movement imparted to the lever, F, will give to the cutters a reciprocating rotary motion of an extent sufficient to enable them at each stroke to remove chips from the stone in a very similar manner to that in which an ordinary mason's chisel acts. To ensure a correct action, the chisels are set at a certain angle in the cutter stock, which Mr. Holmes has found to be the best for the purpose. The tools used are, as we have said, of two kinds, namely, the narrow chisels or picks by which the surface of the stone is first acted upon, and the broader tools employed for the finishing cut.

"Three machines of the kind we have described have been finished and set to work; and it has been found that such machines are capable of dressing the hardest sandstones or millstone grits with an average forward cut of eighteen inches per minute. With stones fairly quarried or scabbled, not more than two cuts are required for the beds and joints, a third cut being taken for finished face work. With stones three feet deep, a rate of advance of eighteen inches per minute gives four and a half square feet dressed per minute, apart from the time occupied in turning and fixing the stones. With stones of fair size, and skilled and efficient handling, Mr. Holmes states that from two hundred to three hundred superficial feet can be wrought per day by one of these machines.

"The work turned out is of excellent quality, and a leading feature in the machine is that it is capable of tougueing and grooving the entire surface of the beds and joints of the stones without additional cost. This is a matter of great importance under many circumstances, as, for instance, in the case of high retaining walls. The grooving also assists the adhesion of the mortar, and prevents the passage of water.

"The machines, we should state, are being made by Mr. Bryan Johnson, of Chester, and Messrs. Ormerod, Grierson, & Co., of the St. George's Iron Works, Manchester, these firms constructing them either in small sizes for working window caps, and sills, etc., in which case they may be worked by hand, or in large sizes for shaping the massive blocks such as are used in the construction of docks and other heavy works." For rights or machines for United States, address Robert Gray, Erie, Pa.

Fifty Pounds of Nitro-glycerin Exploded in an Oil Well.

On the Mason farm a well has been sunk to the depth of over 800 feet, which has hitherto yielded but little oil, with an abundance of gas. The proprietor, Jonathan Watson, determined to try the effect of a heavy charge of nitro-glycerin, and fifty pounds were exploded by Mr. Mowbray and his assistants. Two cartridges were prepared, the one twenty-five inches in length, the other thirty-five inches, and each five inches in diameter. These were connected by a single copper wire, thirty feet in length, so as to adjust the two charges immediately opposite two several mud veins which were known to be that distance apart, the heaviest charge of thirty pounds nitro-glycerin being at the lower vein, 783 feet deep, the lighter charge at the upper vein. Twelve exploders were inserted in the largest cartridge and eight in the other, forming a train of twenty exploders, which, by means of insulated wire, were connected about 250 feet from the well with an electric battery. Everything being arranged the order was given to fire. In an instant the discharge took place, and a report like a cannon fired from a distance, accompanied by a very perceptible vibration of the earth around, was noticed by those present. The operator and an assistant immediately pulled on the wire, thereby endeavoring to prevent entanglement; when about fifty feet of the wire had been drawn out a reaction ensued, dragging the parties who were pulling at the wire towards the well for a distance of ten feet, to their surprise and great wonderment (this arose from the column of water lifted by the explosion, and its return fall); but most certainly the parties thought for an instant Old Scran was hauling them down below, to answer for blasting his oil factory. The result of the explosion on the well cannot be ascertained until the well has been tubed and the water (a column of 720 feet) has been pumped off. The indications are that so heavy an explosion (the bale of the cartridge which was recovered proved the terrible force exerted) must have penetrated the mud veins for a considerable distance.

The operation was entirely satisfactory to all parties, and the ability to safely fire these heavy charges with as much care as fire crackers has been demonstrated.—*Titusville* (Pa.) *Herald.*

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Generous Inventors.

Messrs. Editors:—Generosity is a noble virtue, and a supply of the "milk of human kindness is a good thing to have in the house." Your correspondent, A. B. C., seems to have been gushing and running over with both these when he so magnanimously gives to the world a valuable discovery because he is unable to patent it, and advises other poor and unfortunate inventors to go and do likewise. The feeling is certainly commendable, and if the world, which he proposes so generously to benefit, was possessed of an equal amount of the same feeling, the plan would no doubt work admirably. No one having any right to interfere with his self-immolation upon the altar of philanthrophy, if he is so moved—but after he has done his best for this needy and deserving world, and has himself, perhaps, fallen into direful distress, let him appeal to the world to aid him to retrieve a position, and see how the world will respond to him.

I have five or six patentable things which I am unable to patent. Many of them have cost me years to mature, and nearly all of them, I believe (what inventor don't believe this of his bantlings?) to be valuable; but if the dear, deserving, and neglected world wants the benefit of them, it must pay for them, because it is vastly richer and more able to make sacrifices than I am.

Inventors have plenty of examples of the bad policy of giving their ideas to the world, and among the most conspicuous is that of Archer, the discoverer of the "collodion process" in photography, which was one of the most valuable discoveries of the century. This he generously and nobly surrendered to the public—died poor—and an appeal made to the civilized world in behalf of his family, who were in need, procured for them (in all the world) perhaps two thousand dollars (I believe much less than that), certainly in the United States not one thousand, and, I think, only about one-third that sum!

Magnificent and splendid generosity of this same unfortunate and very needy world, for one of the most splendid sacrifices ever made by mortal man. *Sic eunt fata hominum!*

V. M. G.

Peekskill, N. Y.

[Our correspondent is entirely right. An inventor who generously bequeaths his invention to the public is liable, for all the public cares, to die in poverty and neglect, while those who hold on, and succeed in making the public pay, are honored and respected.—Eds.

Lightning Rods.

Messrs. Editors:—In a late No. of the Scientific American there is a communication on the above subject from Mr. John Wise, of Lancaster? In the spirit of Mr. Wise, I propose to answer some of his questions and propositions, and in so doing, shall state nothing new, but something useful to the owners of those splendid barns in Lancaster county.

1. Lightning rods are conductors in proportion to thickness, "sectional area," and shortness or "inversely in proportion to their length," and to be effective must be connected in the ground to a metallic plate, and this metallic plate must be imbedded in the moist earth. This is the outlet of the bolt of electricity that first reaches the rod, and to be effective must have the capacity to conduct off the rod itself. Not exactly must the plate have the capacity to conduct off the rod, but it must go further; it must spread to dimensions of damp earth until the earth in contact with the plate has the capacity to conduct off the rod itself. Now, how great must this plate be? We will suppose the plate went into a body of water, a large cistern. Pure water conducts in the proportion to iron as 6 to *6,754,000,000. It is safe to say that this metallic plate, if immersed in water, should have a surface equal at least to the surface upon which the barn stands or covers. Again, as the earth conducts in proportion to the moisture contained, we will say the earth has five parts earth to one of moisture, where the plate is buried. Then the plate should be six times as large as if it were immersed in water, and until this rod is so fixed and secured it is insulated; not absolutely insulated, but insulated in proportion as its outlet has not the capacity to conduct off the rod itself. It is not necessary that the plate should be of the dimensions stated to protect the building from every bolt of electricity, but it is liable to be struck by a bolt of sufficient force to fly from the rod unless these conditions are first complied with, and if complied with, it would be physically impossible to fly from the rod and produce injury.

In the country the rod should go the ground and from that to the spring or well, and be connected to as much metallic surface in contact with water or moist earth as possible. If there was a spring convenient, I would run to the spring and have five hundred feet of the rod buried in the channel of the spring, the rod could be lessened in diameter for economy as it enters the moist earth or water.

In cities, the lightning rods should lead direct to the water pipes—the iron pipes in the streets—then there is no possible danger to the building, as lightning rods are usually constructed and applied.

Again, as to covering the rods with paint, and having the projections bright and pointed. Atmospheric electricity is the same as produced by zinc and copper plate in water, but a different degree of tension. Two cells have twice the tension of one, and a thousand—a thousand times the tension of one, and as the tension is increased, so is its nature to jump and crack, until we reach the effect produced by the Holtz machine and Ruhmkorff coil; lightning being the most extreme case of tension with which we are acquainted. Glass, wood, nor any substance is much of a barrier in the way of the discharge of electricity of high tension, no substance—nothing being an absolute non-conductor except a perfect vacuum, and any of these things as insulators about a lightning rod are of no earthly use—a metallic roof, connected to earth by an ordinary rod in the manner stated is as secure protection to a building as is possible to make, and perfectly secure.

Philadelphia.

[The above communication is from a gentleman whose practical experience as an electrician is probably not surpassed by any other individual.—Eds.

How to Clean Files.

Messrs. Editors:—I have just tried a very effective way of cleaning files filled with work. Simply holding them in a jet of steam under forty pounds pressure. In one minute the files come out "as good as new." This may accommodate some of your numerous readers.

Mt. Lebanon, N. Y. Jas. F. Smith.

Finishing Taps and Reamers.

Messrs Editors.—In the Scientific American, page 99, current volume, I find a plan for tempering taps, etc. I think it may answer in some cases, but I will give one which I have used for a number of years with great success. The forgings are got out in the usual way, left to anneal, then centered and turned just sufficient to remove the scale. Then anneal again and turn down to within a thirty-second of an inch, or less, of finishing size. Anneal once more and finish in the lathe. If not sprung in turning, the tap or reamer will come out all right when hardened. I have tried this process with taps ½ inch diameter and 3 inches long up to those 1 inch diameter and 2 feet long and found it always safe and sure.

Providence, R. I. D. B. K.

How the Scientific American is Appreciated.

From a private letter written by a prominent engineer in neighboring city we extract the following: "Your favor is at hand, and I have now, by me, completely finished and bound, all the volumes, new series, of the Scientific American from I to XIX, and many numbers of the old series. I intend to preserve each number and to pick up, at whatever reasonable cost, the earlier numbers. The Scientific American is a library in itself." T. P., Jr

Providence, R. I.

A recent analysis of Croton water by Professor Chandler, shows that the city of New York may congratulate itself upon having a supply of as pure water as is furnished to any city in the United States.

* Calley.

For the Scientific American.

"WASTE" AND "ECONOMY" OF FUEL.

NO. 2.

ON BOILER INCRUSTATIONS.

Without entering into a history of all that has been said and written on the incrustation of boilers and its prevention, we will limit ourselves to a summary of the late conclusive experiments conducted by Arthur Morin and H. Tresca, which give a clear idea of the loss of fuel caused by "dirty" boilers.

These gentlemen have practically demonstrated that, in a clean boiler, in good working order, they actually evaporated 441 lbs. of water by the combustion of 51·81 lbs. of coal, whereas, this same boiler, after having been run for some time, and becoming coated, only produced 299·88 lbs. of steam by the consumption of 76·51 lbs. of the same kind of coal. In the first case, 18·74 lbs. of water were converted into steam by the combustion of 2·205 lbs of coal; in the second, only 8·53 lbs.; this being equivalent to a loss of 52 per cent.

In the ordinary apparatus for distilling salt water on board of ships at sea, the same quantity of coal which will evaporate 600 lbs. of water, when the kettles have been newly cleansed, will, in a short while, only produce 200 lbs. of distilled water; being a waste of two-thirds of the fuel, attributable to incrustation alone.

All impure waters, or such as hold in solution chloride of sodium (common salt), sulphate of soda, carbonate of soda, carbonate of lime, or carbonate of magnesia, protoxide of iron, silica, chloride of magnesium, sulphate of magnesia, or sulphate of lime (and few waters are completely free from one or other of these substances), will, inevitably, after a longer or shorter period of time, form solid deposits on the sides and bottoms of the vessels in which they are heated.

The effect of this phenomenon is a constantly increasing waste of fuel by the gradual obstruction occasioned to the transmission of heat, from the coal to the water in the boiler, through a bad conducting medium.

The danger of burning the boiler-plates is well known to be great whenever incrustation is allowed to progress to any considerable extent, beside which, some of the impurities are sure, sooner or later, to find their way into the slide-valves and cylinders, where their action is eminently prejudicial to the durability of these parts of the engine.

The genius of inventors has been, for some time past, tasked to a remarkable degree, in order to discover some means of preventing incrustation in steam boilers. Chemical science, natural philosophy, and mechanics have, each of them, contributed many supposed "panaceas" for the attainment of this very important purpose, but we must humbly confess (regardless of the anathemas of said inventors), that we know of no *universal* remedy applicable in all cases, neither do we believe that such a one will be discovered.

A good chemist, knowing the impurities of any particular water, may, in some cases, be able to indicate to the engineer a chemical agent which will precipitate a portion of these impurities in a special feed-water tank; but in many instances the chemicals used will end by acting deleteriously on the iron or copper of the boiler or on the rubbing surfaces of the engine, so that they must always be applied with the utmost caution.

Heating the feed water by means of the exhaust steam is in most cases quite inefficient, the temperature attained being too low to be serviceable, except in the case of bicarbonate of lime.

Successful precipitation at temperatures higher than boiling water, needs the employment of accessory high-pressure boilers, which in their turn become incrustated, and waste as much fuel as the original boiler.

Blowing off is the usual mode of relief resorted to by our present engineers; how unsatisfactory this has proved itself to be, we attempted to show in a previous article.

Surface condensers, as at present manufactured, are too expensive and objectionable from many other causes.

Mashed potatoes, oxalic acid, carbonate of potash or soda, nitric, muriatic, or acetic acids, sulphate of alumina, and one hundred or more "patented" and "unpatented" *anti-incrustators*, may each of them individually find their useful application in special cases; but, as we have before remarked, none of them will answer for all sorts of boilers nor for all kinds of water.

Which method is to be preferred must be left to the judgment and science of the competent engineer, who ought to know, the *least objectionable* remedy to be applied in his own particular case.

Much valuable information in regard to the present subject will be found by looking through the back volumes of the Scientific American.

We conclude by the following "truisms," which are, unfortunately, too seldom sufficiently attended to, although of the highest importance in their bearing on the saving of fuel.

1. Use as pure water as your locality affords.
2. Clean and scrape your boilers as often as you possibly can
3. "Blow off" without excess.
4. In case of salt or brackish waters, never use steam of over 90 lbs. pressure to the square inch.
5. In case of sulphate of lime waters, never use steam of over 70 lbs. pressure.
6. In case of water holding carbonate of lime in solution, pass it through a feed-water heater made hot by exhaust steam or by waste heat.
7. In case of muddy waters, use large feed-water cisterns or reservoirs, on the bottom of which the suspended earthy matters will soon form a soft deposit, when the surface water can be drawn off for use.

8. Favor the invention of a compact, simple, cheap, and efficient surface condenser or its substitute, more than you do the quack "nostrums" of most anti-incrustators.

For the Scientific American.

EXAMINATION OF APPLICATIONS FOR PATENTS--THE TWO SYSTEMS COMPARED.

It is a subject of vital importance, not only to inventors but to the community at large, when it is proposed to discuss the workings of a system of laws relating to useful inventions or discoveries and their encouragement, and to propose or advocate changes therein, and one that should call for a full and free expression of opinion in order that all interested may understand some, at least, of the probable consequences thereof.

We have at present laws regulating the granting of patents, the principal feature of which is a full preliminary examination; and it is supposed by legislators, and others, that such feature has been well tested, or at least ought to have been, by this time. The question then arises with respect to it. "Are we ready to pronounce it a failure?" And if so, and in order to come to the conclusion that a radical change should be made, by doing away with such examination, are we prepared to assume that the same or increased benefits will flow from the change? May not possibly evils spring up in other directions, for we must bear in mind that the whole system of protection is an artificial one, and its defects inherent from its nature, no matter how the system is established by a code of laws for practice.

Assuming that the preliminary examination does not prevent the granting of invalid patents, it is not shown that little or no precaution, as practiced at the present time in England, will do so wholly or to a very considerable extent, and it therefore reduces the question of change merely to one of saving the expense of our present system. Here, however, it will be well to consider if this course may not be poor economy, when compared to the advantages gained by the adoption of at least some precautions against the granting of invalid patents.

In carrying out the system, as adopted in England, in order that the trouble to be anticipated in another direction might not occur, namely, the rapid increase of invalid and annoying patents, it would be necessary, also, to introduce the payment of large fees by patentees. But this the patentee ought properly and will resist, as it tends to impede the developing and patenting of that class of improvement, and which is by far the largest, which progresses by small stages only, but each step of which must be necessarily protected as it is developed.

Can we be satisfied that a system not requiring a preliminary system of examination, will work well in a community where invention is so rife, and patents have been found so lucrative as property, that many persons will patent not only their own actual improvements, but what they for a time *merely believe* to be theirs, without the payment of large fees, thereby tending to prevent an indiscriminate issue of patents? Even in England, however, with their enormous patent fees, the industries of the country do not solely receive benefit from, but are frequently burdened and oppressed by, the granting of patents. It is a question to be considered, then, whether the trouble in that country does not arise from the want of a proper system of preliminary examination, in order that the industries may be relieved, at least, from a large portion of the worthless and invalid patents that have been and will still continue to be granted.

The English do not believe that the system of preliminary examination would relieve them much, because they do not think that any examining corps would be competent for the work assigned them, and they look at what the Americans have done in this wise to be to a great extent a failure. It is evident, however, from all accounts, that their open system of granting patents is not wholly satisfactory, and it is, perhaps, only their extravagant fees which prevents an *exposé* of the worthlessness of their system, so far as the protection to the public and the community is concerned from worthless and frivolous patents. Even now the English manufacturer is compelled to buy up useless patents, that have been run through under their system, as a means of avoiding litigation, upon the principle that it is cheaper to buy off than to fight.

To what the American manufacturer and capitalist would be subjected in this way under a similar system, with a moderate system of fees, there is no arriving at, except by an actual trial of it. As all inventors are to be protected, according to the policy for many years past in existence here, in their inventions, no matter how small the degree of novelty and utility is, it is apparent that in order to keep this species of protection within reach of all, the fees must not, if at all, be much increased. And if not increased will not the door be open to the granting of a species of patents that will be taken out only for fraudulent purposes, which will cause the grant issued to the really meritorious inventor to be at least looked upon with suspicion, and himself and those interested be placed at greater trouble and expense than at present to establish his patent before the public?

The English have complained of the practical inconvenience from the multiplicity of patents, which, under their system, have been issued only as obstructive patents, which means patents that are issued to harass and annoy manufacturers and tradesmen, and are to be got rid of economically only by being bought up.

Are there not sufficient facilities for this thing now under our present practice without aggravating the evil?—a system which at least does not let everything slip through.

It may be found, after reflection, that it is not our system that is at fault, but the way in which it is carried out, and, therefore, the reform ought perhaps be limited to merely making it more effective by correcting its abuses.

The most perfect system may be rendered odious by the manner in which it is practiced, and its abuse, in this particular, very often makes those most nearly interested unwisely denounce the system itself and seek for relief in a radical change, although such change may not always bring about the desired results.

Extraction of Potash from "Yolk," "Suint," or Potassic Sudorate of Sheep's Wool.

(From Dr. Hoffman's "Report on Chemical Products and Processes," International Exhibition, 1862.)

It is well known that sheep draw from the land on which they graze a considerable quantity of potash, which, after circulating in their blood, is excreted from the skin with the sweat; in combination with which it is deposited in the wool. Chevreul pointed out that this peculiar compound, by the French called *suint*, forms no less than a third of the weight of raw merino wool; from which it may be readily dissolved out by simple immersion in cold water. In coarser wools, it is less abundant; and according to MM. Maumené and Rogelet, the potassic sudorate, or suint, of ordinary wools forms on the average, about fifteen per cent of the weight of the raw fleece.

This compound was formerly regarded as soap; doubtless because wool contains, beside the suint, a considerable proportion (about eight and a half per cent) of greasy matter (Chevreul). This grease however is, in fact, combined with earthy matter, chiefly lime, as an insoluble soap. The soluble sudorate is, according to MM. Maumené and Rogelet, a neutral salt, resulting from the combination of potash with a peculiar animal acid, of which little is known beyond the fact that it contains nitrogen.

At the great seats of the woolen manufacture in France, as at Rheims, Elbeuf, and Fourmies, the new industry of MM. Maumené and Rogelet is either established, or in the course of establishment. Their plan is to buy of the woolen manufacturers the solutions of suint, obtained by the immersion of their raw fleeces in cold water; paying higher, of course, for those liquors in proportion as they are stronger.

The scale of prices adopted encourages the manufacturers to wash their wool methodically, so as to enrich the same water with the suint of a number of fleeces; and these scourings, weak or strong, MM. Maumené and Rogelet fetch away in casks to their factory, established in the neighborhood, and then boil them down to a dry carbonaceous residuum. This, by calcination in close retorts, is reduced to a charcoal, evolving during the process much gas, carbureted and ammoniacal, which may be passed through ordinary purifiers, to detain the ammonia, and to fit the carbureted hydrogen for illuminating purposes. The alkaline salts remain in the charred residuum, and may be extracted therefrom by lixiviation with water.

The alkaline solution thus obtained, contains a mixture of potassic salts, carbonate, sulphate, and chloride, which are separated and purified by evaporation and crystallization in the usual way. The carbonate of potassium thus obtained is stated to be remarkable for its entire freedom from sodic admixture, a purity doubtless valuable to the manufacturers of potassic glass and soap. The insoluble residuum of this lixiviation contains some earthy matters (lime, silica, and alumina, with a little iron and phosphoric acid), and it is stated to be so finely divided as to make a good black paint, possessing, in technical parlance, great "covering power."

An ordinary fleece weighing four kilogrammes contains, according to MM. Maumené and Rogelet, about six hundred grammes of sudorate of potassium or suint. This, according to their analysis, should contain thirty-three per cent of its weight, *i.e.*, one hundred and ninety-eight grammes, of pure potash. Of this, according to another estimate (showing the niter that it would produce), they appear to reckon on about one hundred and seventy-three grammes as being practically recoverable.

It appears from statistics given, that the process may be worked on a large scale, and with a very ample profit. MM. Maumené and Rogelet compute that if all the fleeces of French sheep were subjected to the new treatment, France would derive from her own soil all the potash she requires.

The difficulty of collecting the wash-waters of fleeces, scoured in small numbers by the farmers all over the country, would oppose an insuperable bar to such an extension of the process.

In great manufacturing centers it appears likely to be economically available; at any rate so long as the farmers continue to send away as waste matter, in the fleeces they sell, the potash drawn from the land. Doubtless, in honest husbandry, that potash is due to the source whence it came. Its exportation, year after year, must tend to the progressive exhaustion of the soil; and the policy of the judicious farmer should be to soak his fleeces at home, and to distribute on his fields, as liquid manure of high value, the potassic and nitrogenous wash-waters so obtained.

The Self-raising Flour of Prof. Horsford, and Jones and Standing's Corn Flour.

Our readers will recollect Prof. Horsford's lecture on "The Philosophy of the Oven." Since that time we have been experimenting in various ways with the preparation therein described and with the most gratifying results. We saw in a recent English periodical, in an article on celebrated cooks, a remark that cooks, like poets, were born not made. Our own gifts in that line have generally been supposed not to be great. In our youthful days we once made an oyster stew in a tin paste dish cleaned out for the occasion in a rural printing office, which resulted in making "pi" of an entire form, which unluckily occupied the "stone" upon which we proposed to serve our repast. The stew did not taste well, whether on account of being eater after 'pi" or our want of skill in its preparation, we cannot say, and we have remained in doubt up to the date of our recent experiments, as to whether any amount of "making" would compensate for our natural deficiencies. Our doubts are, however, ended. We are able to make anything of which flour is to any degree a constituent, and make it well too. Bread, white and light; crullers, tender and delicious; apple dumplings of the most tempting character have been the result of our manipulations. The next trip we take to Brown's Tract, this article shall form a part of our stores. All that is necessary to make a good loaf of bread is some water, a pan, a spoon, Horsford's prepared flour, and apparatus for baking. The success of the process depends upon no variable circumstances but upon actual measure; it is therefore uniform. We have eaten of the bread for weeks, and either hot or cold it is both palatable and digestible.

Another preparation which is worthy of commendation is Jones & Standing's corn flour. It is prepared by mixing Indian corn flour with "wheat bran dustings" and "middlings" by a process patented, together with the preparation after it is made, by Charles Jones and William Standing, of De Soto, Ill., Jan. 5th, 1869. We have also tried this preparation and find that it makes most excellent bread, something lighter and better than we have ever before tasted. Those who are fond of good corn bread, and those delicious corn cakes for which many parts of the country are celebrated, will confer a pleasure upon themselves by a trial of this corn flour, which is as wholesome as it is palatable.

Manufacture of Paper from Okra.

We condense from the Mobile *Weekly Register* an account of some experiments which have been in progress during the last two or three weeks at the Chickasabogue Paper Mills, near Mobile, under the direct supervision of Dr. J. B. Reed, well known as the inventor of the Reed Shell which has rendered the Parrott gun so effective an engine of destruction in warfare. The inventive genius, energy, and perseverance of the Doctor were this time, however, directed to the "arts of peace."

The above journal asserts that previous experiments had demonstrated the fact that good brown paper could be made of okra, but it remained to show that this material could be bleached to sufficient whiteness to make it available for printing or book papers, and if so, at what cost in comparison with rag or other material.

On page 36, Vol. XIX, of the SCIENTIFIC AMERICAN we described specimens of okra paper ranging from coarse brown to finest white, therefore the first of the above objects was already determined. The comparative cost was, perhaps, an unsettled question. The experiments were conducted under unfavorable circumstances. The material used was, for the most part, very inferior of its kind, and the orders for paper pressing on the mills, required that as little of the time of the employés, and as small a portion of the machinery as possible, should be yielded for the purpose; consequently most of the work was done without at all disturbing the regular operations of the mills. The experiments were concluded on Friday last, and the result was eminently gratifying to those engaged in them, and is of particular interest to the press, dealers in and manufacturers of paper generally, and to farmers and gardeners in the South within reasonable distance of paper mills. In the opinion of the experienced paper makers who watched the progress of the work from the cutting of the dry stalks of okra to the production of paper from the machine, the following points may be regarded as established:

1. Okra requires but little handling to prepare for boiling, is readily passed through the cutter, needs no sorting, and the entire plant is available from the root to the pod.

2. It is easily boiled if well cured, requires only lime to reduce it, and may be washed and beaten ready for the machine in about half the time required for preparing rag stock, thus largely increasing the productive capacity of the mill without additional machinery.

3. When properly boiled it yields readily to the action of chemicals and can be bleached with no greater expense than ordinary rags.

4. The pulp works as freely and smoothly on the machine as any other fiber—does not stick to metallic press rolls like straw or wood, even when working pure okra pulp. It dries readily and can be run safely at the highest speed of the machine.

5. The paper made from it is very strong, tough and elastic—better in these respects, when made entirely of okra, than either straw or wood pulp when mixed with fifty per cent or more of rags. It has none of the brittleness and hardness so objectionable in straw papers, and may be subjected to strong friction by rubbing between the thumb and fingers, or between the hands, and will open out smoothly and soft as a glove.

6. It will make an excellent substitute to mix with other fibres in the beading engines, and is of itself a superior hard stock.

7. Whether worked pure or mixed with rags, it makes a paper entirely free from the objections justly raised by the printer against straw and wood papers.

8. It makes an excellent stock for fine wrapping paper, and imitation manilla paper, and even in its raw state *without boiling or bleaching*, makes a strong article of common wrapping paper, suitable for grocers and hardware use—superior to any paper made of straw.

THE PRESIDENT has appointed Chauncey Snow, one of the proprietors of the *National Intelligencer*, as a Government Director of the Union Pacific Railroad, *vice* the Hon. James S. Rollins, of Maryland, resigned. Mr. Snow is a practical railroad man, having surveyed and located several of the western railroads, and having also been an engineer, for many years, of the Philadelphia, Wilmington, and Baltimore Railroad.

Steam Gages and their Tests.

The steam gages manufactured by the Utica Steam Gage Co., are so well known and appreciated that it is unnecessary to negatively set forth their excellences by any labored attempt to decry the qualities of others. A description of the gage and its parts and of the method of testing its accuracy will be sufficient.

Fig. 1

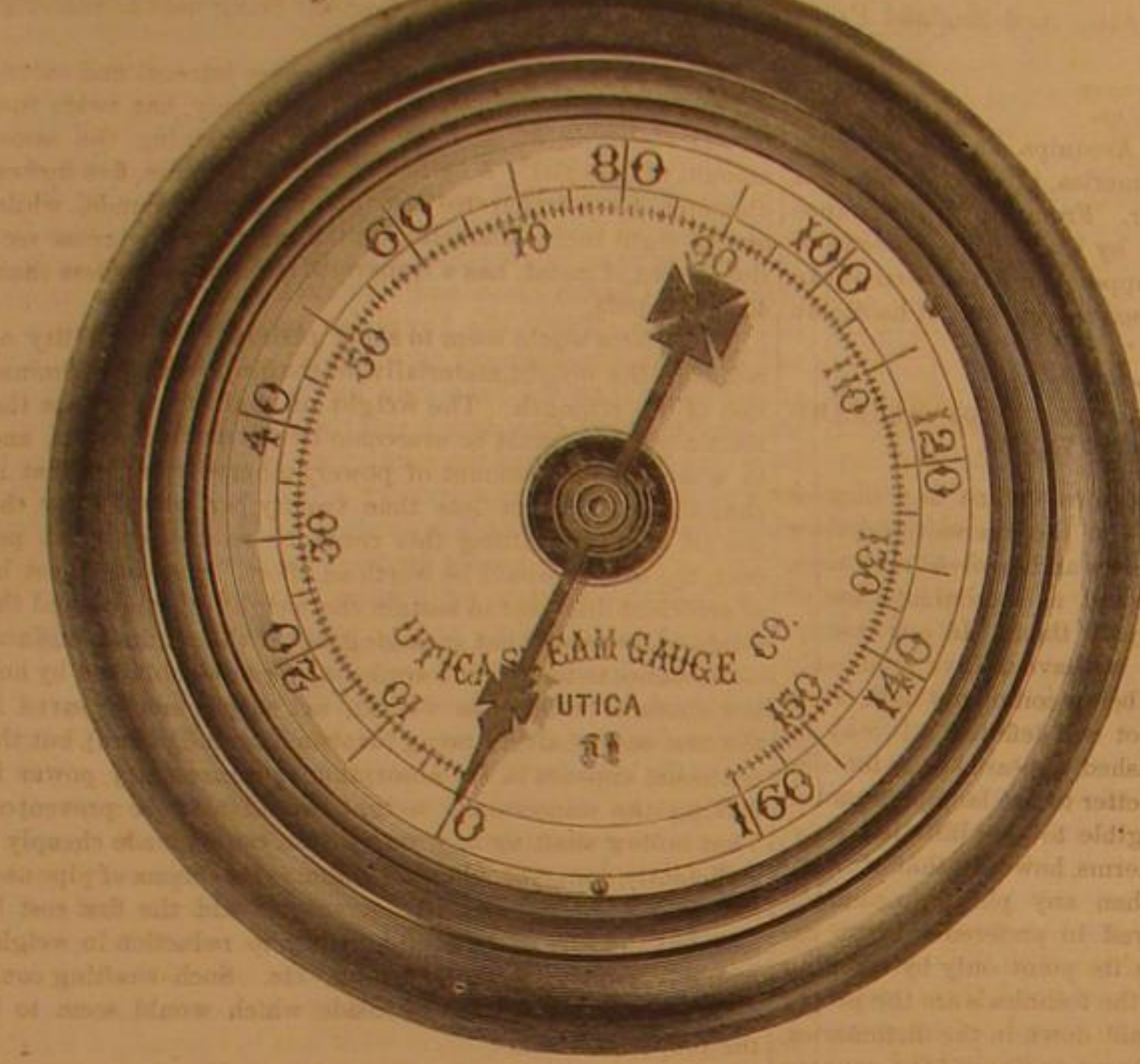
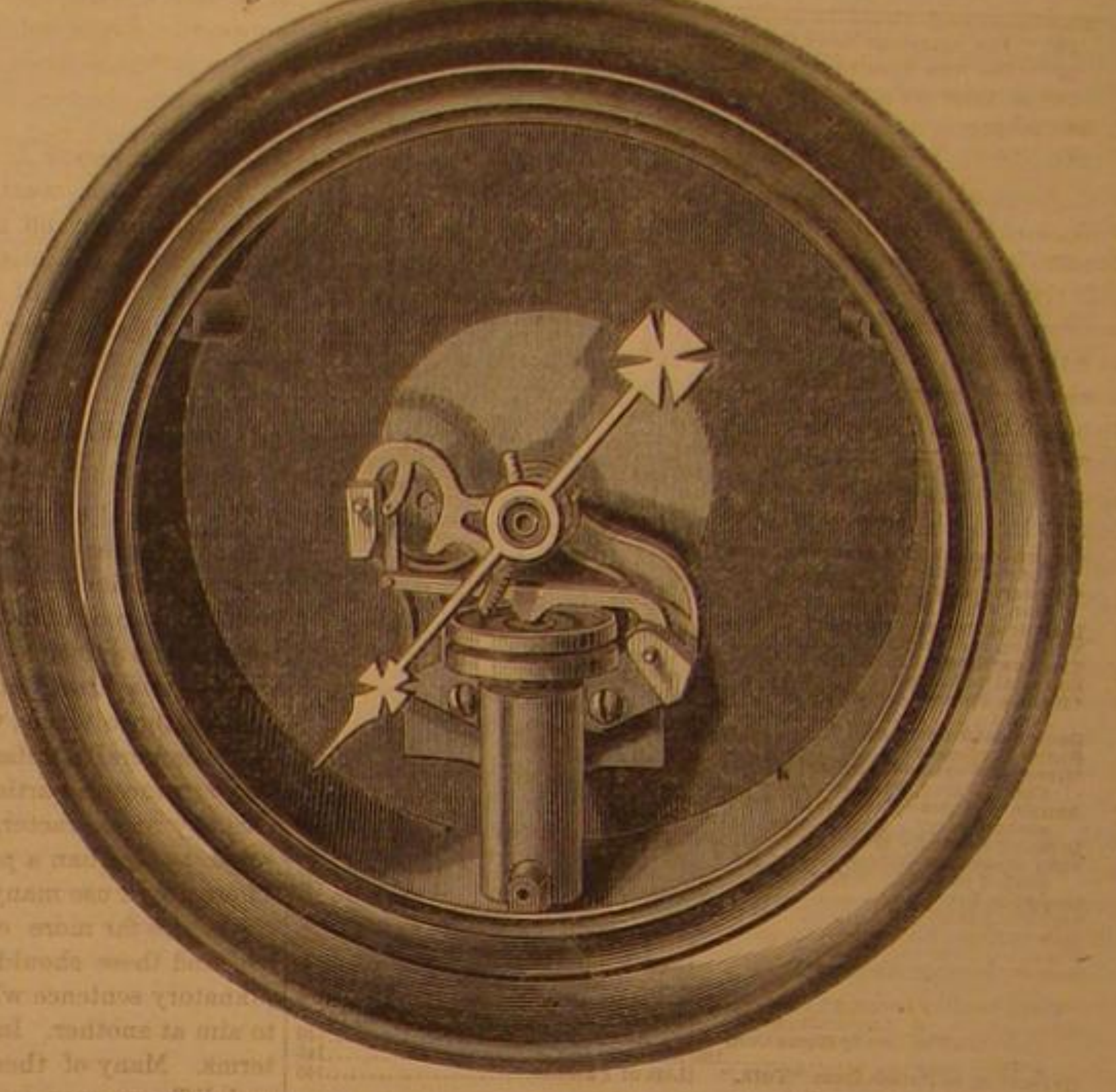


Fig. 2

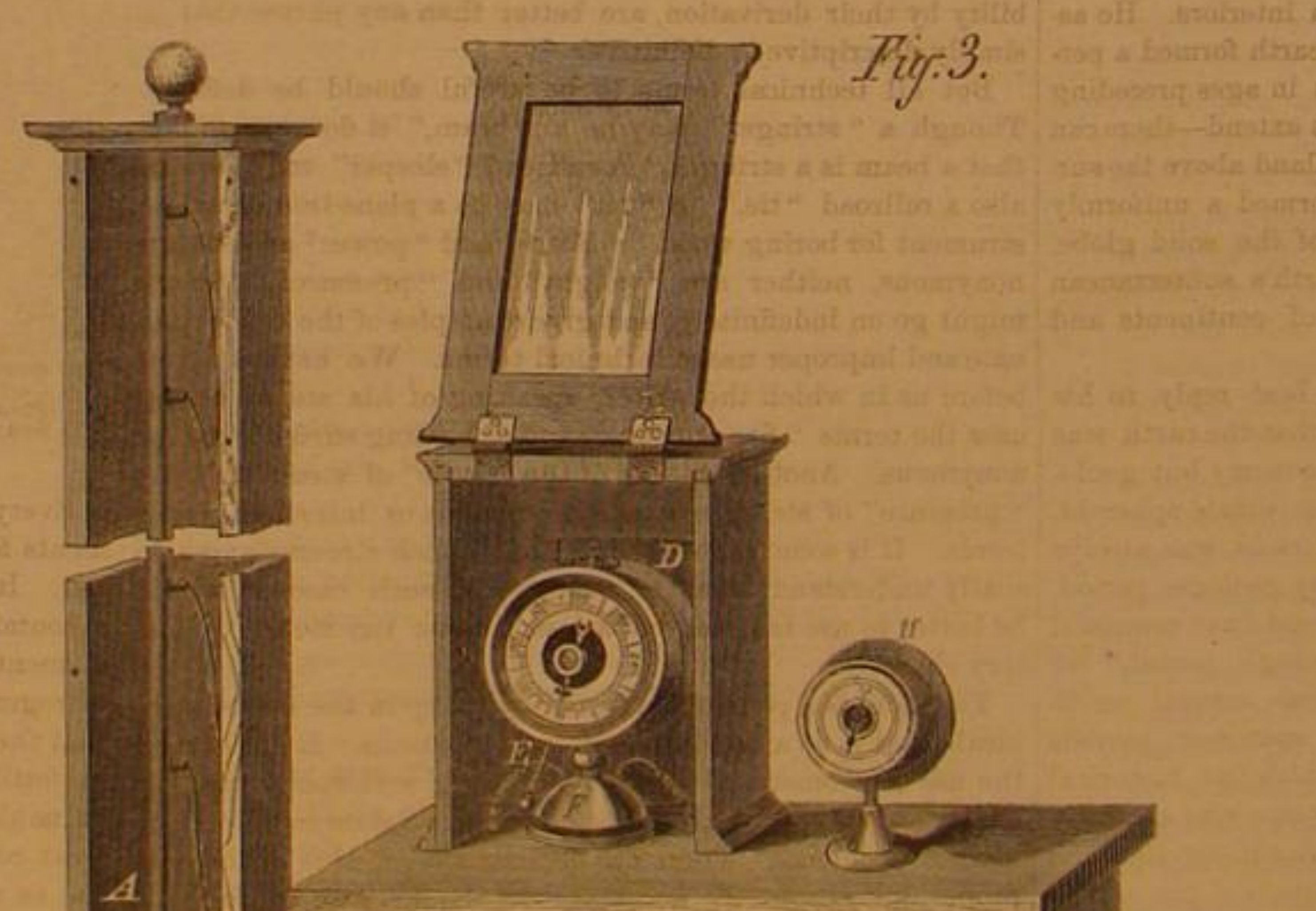


THE UTICA STEAM GAGE AND MERCURIAL TESTER.

Fig. 1 shows the face of the gage, and Fig. 2 the inside with the face removed. Fig. 3 represents the apparatus for testing the gages. A is a tube more than fifty feet in hight terminating at its base in a reservoir, B, of mercury. C is an ordinary galvanic battery, having one of its poles in the mercury in the tube and another in the hand, which is insulated, on the register, D; the wire connecting this hand with the battery passing around a temporary magnet in the register, which magnet works the bell hammer, E, striking the bell, F, whenever a circuit is made.

At proper distances from each other in the tube, A, are insulated points, G, piercing the tube and successively connecting with the mercury as it rises, each point being connected by a wire with a corresponding insulated point on the face of the register, D, these points being numbered to indicate the actual pressure of the mercury when standing at the correspondingly connected points of the tube. In short, the graduations of the tube are brought on to the face of the register, and are read from it. To use the apparatus, place the hand of the register, say on the second point on the face of the register, which is marked, 5; as it is connected with the second point of the tube, and the graduations are of five pounds each, and forcing the water into the gage to be tested, and at the same time upon the mercury in the reservoir, the hand of the gage begins to turn and the mercury to rise in the tube, until the instant the mercury reaches the second point in the tube, the circuit is completed, the bell sounds and the dial of the gage is marked at the spot indicated by its hand, to show a pressure of five pounds. Moving now the hand of the register on to the third point on its face, marked 10, and proceeding as before, when the mercury reaches the third point in the tube, the bell again sounds, the mark to show ten pounds pressure is made on the dial of the gage, and so on until the gage is graduated.

Fig. 3.



The accuracy of the instrument is proved by removing the gage, H, placing the hand of the register, D, on the point marked O, on its face, and using the pump until the water appears even with the top of the coupling for connecting the gage, H, when the bell should sound, the mercury then standing at the starting point in the tube, A, and allowance being made for the pressure of the water contained in the tube, I, of the force pump, J, which takes water from the reservoir, K, and on the surface of the mercury in the reservoir, B.

Fig. 4

The spring of which Fig. 4 is a section in perspective, is made of two flanged corrugated disks, A, of spring brass, and a band, B, of brass, which is spun up without seam. In this band a groove is spun, which forms a shoulder or seat, against which the disks rest, when pressed to their places in the band, one above, the other below the groove. The edges of the band project beyond the flanges of the disks, are soldered and then spun or locked over the flanges, holding the disks firmly, without interfering with their elasticity. The lower disk has a pipe fixed in its center by which it is fastened to the gage case and through which pressure is communicated to the interior of the spring. The spring is an inch and three-quarters in diameter and is capable of an expansion of 1-12 of an inch without injury.

It is claimed that the objection made to ordinary disk springs, that after being used for a time they either become set or the disk cracks, is fully met in the construction of this spring. While the corrugations of the disks alone, would not be adequate to meet the strain which would follow the application of pressure, these are supplemented by the flanges, which give as occasion requires, and by the band, which is elastic. The strain instead of coming most severely upon the edge of the disks, as is the case where these are fastened in a rigid manner, and where the fracture generally occurs, is distributed equally throughout this spring.

The movement by which the action of the spring is conveyed to the dial is simple in its character and readily understood from an inspection of the engraving, Fig. 2, in which it is represented. It is of cast brass, and is made and fitted from gages. It is fastened to the case by two substantial screws at the bottom of its frame, on each side of the spring, the rest of the frame being set away from the back of the case, leaving the index hand wholly unaffected by any springing of the case in putting the gage up, which sometimes happens. By bending the tongue, C, of the sector, Fig. 2, backwards or forward, the leverage is altered and the gage can readily be adjusted to the correct standard, should it ever require it. The index hand of the dial is left free from any action other than that of the varying pressure within the spring, and the vibration of the hand so common in gages upon locomotives, is wholly avoided. The gage is graduated from the patent mercury column, invented by the patentee of the gage and is thoroughly tested by steam pressure, in addition, before leaving the works. These gages have been before the public for five years and some 5,000 of them are now in actual use.

Cerium.

Woehler has prepared metallic cerium in the following way: A solution of the oxide in hydrochloric acid is mixed with equal parts of chloride of potassium and chloride of ammonium and evaporated to dryness, fused, and poured out to partially cool, and then coarsely pulverized and mixed while still warm with pieces of sodium, and the whole projected into a clay crucible previously heated to redness. In this manner the cerium is reduced, and appears in the slag in the form of two pellets, which can be collected and fused into one mass.

The color of cerium is between that of iron and lead, and when cut and polished exhibits a high metallic luster. It is easily hammered into a thin leaf, and can be cut like lead. Its specific gravity is 5·5, though this must be taken as only approximate, as the specimen tested was impure. The metal has no application in the arts, and is of very rare occurrence. Some of the salts of ceria are, however, highly prized in medicine.

THE District of Columbia contains twenty-seven regular telegraph offices, exclusive of fire-alarm and police telegraph stations. The bulk of these are in Washington from whence they transmit news, at all hours of the day or night, to the press at all points of the country.

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.

A. Asher & Co., 20 Unter den Linden, Berlin, are Agents for the German States.

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.

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

VOL. XX., No. 9....[NEW SERIES.]....*Twenty-fourth Year.*

NEW YORK, SATURDAY, FEBRUARY 27, 1869.

Contents:

(Illustrated articles are marked with an asterisk.)

LAND AND WATER---ARE EARTHQUAKES LAND MAKERS?

A writer in a late number of *Chambers' Journal*, under the caption, "The Usefulness of Earthquakes," attempts the theory that these phenomena, combined with volcanic eruptions, are the means of repairing the waste made by the action of the sea on shores and of rainfall on interiors. He assumes that "*If* the solid substance of the earth formed a perfect sphere in ante-geologic times—that is in ages preceding those to which our present geologic studies extend—there can be no doubt that there was then no visible land above the surface of the water; the ocean must have formed a uniformly deep covering to the submerged surface of the solid globe. In this state of things, nothing but the earth's subterranean forces should tend to the production of continents and islands."

The *if* which we have italicized is the best reply to his doubtful assumption; there is no evidence that the earth was ever a perfect sphere; in fact, not only astronomy but geology witnesses the contrary. The earth is an oblate spheroid, and, so far as our means of ascertaining extends, was always of this form. If the earth was ever, for any geologic period, submerged with water, some evidences would have remained in every portion of its surface. By a "geologic period," we mean the duration of time between one great natural condition, as determined by geologists, and its successor; periods counted by a lapse of time compared to which our historical period is as the dust in the balance. Any one who carefully reads the records of geological investigation will see that the probabilities are strongly in favor of a condition of the earth's surface as regards protuberances and depressions—mountains and valleys, elevated plateaus and depressed plains, land and water—in ancient times very similar to that which now exists. To be sure, it is evident that portions, now dry land, formed once the bottom of seas, and mountains were but islands, but there is no reason for doubting that the present seas might have been dry land; our means for determining this fact, however, are meager compared with those afforded for an examination of dry land. We cannot traverse the ocean's bottom as we can the valleys of the habitable earth. It may be possible that a larger proportion of the earth's surface was once covered by water than at present; but while this opinion may be entertained, it is morally certain that where seas now roll their unobstructed waves dry land in many instances existed. Why could not the peninsula of Yucatan with Cuba, Hayti, Jamaica, and the group of Caribbean islands once have inclosed as an inland lake what is known now as the Caribbean Sea? And why not the peninsulas of Florida and Yucatan with western Cuba have similarly inclosed the Gulf of Mexico? So at the Straits of Dover, there is evidence, from recent soundings and examinations, that England and France were once physically united as they subsequently were politically.

The writer makes this statement: "At first sight it may seem paradoxical to assert that earthquakes, fearfully destructive as they have so often proved, are yet essentially preservative and restorative phenomena; yet this is strictly the case. Had no earthquakes taken place in old times, man would not now be living on the face of the earth; if no earthquakes were to take place in future, the term of man's existence would be limited within a range of time far less than that to which it seems likely, in all human probability, to be extended."

This *does* seem paradoxical, because, for every case of the permanent upheaval of barren rock by earthquakes there can be brought the record of permanent disappearance of fertile lands. Indeed, the destruction caused by earthquakes in the sinking or ingulfing of tracts of land and producing in their place lakes of noxious waters, or allowing the inroads of the sea has been so great and so much more frequent than the gift of solid land, that earthquakes are, the world over, and in all times, regarded with dread as the most destructive agent in nature. From the time that (as the "New England Primer," published in 1770, has it),

Proud Korah's troop
Was swallowed up,

down to the recent destruction of Arequipa and other cities on the western coast of South America, the earthquake has been a destroyer and not a restorer. From the disappearance of the island, Atlantis, mentioned by Plato in his *Timæus* to the recent reports of similar disappearances, the earthquake has diminished rather than increased the amount of habitable land.

IMPORTANCE OF ACCURACY IN THE USE OF MECHANICAL AND SCIENTIFIC TERMS.

The general employment of technical terms and phrases among scientists and mechanics, and the necessity for their use to avoid inconvenient paraphrases and involved sentences, make a thorough understanding and a discriminate use of these terms a duty to all who employ them. In our descriptions of machinery and processes we have always studiously avoided those terms, which, not being commonly used, were either generally unfamiliar or not self-defining. It may be that at times the article as published appeared to be too elementary in character, but it is better to use language understood by all than a *patois* intelligible to the initiated only. There are in use many technical terms, however, that of themselves are far more expressive than any phrase in common use, and these should be employed in preference to an explanatory sentence which reaches its point only by seeming to aim at another. In such cases the technicals are the proper terms. Many of them are not laid down in the dictionaries, and different ones are used in different sections of the country by men engaged in the same business; but some are so apparently demonstrative and in their sound so well convey the idea that they are always understood. For instance, if a smith speaks of a "suant" heat, every one knows at once that it means a soft, even heat, permeating the mass of iron—the very sound of the word conveying the idea. The "bite" of an acid or file, the "hang" of a hammer, the "rake" of a turning tool, and many others beside those which show their applicability by their derivation, are better than any phrase that is simply descriptive or definitive.

But all technical terms to be useful should be definite. Though a "stringer" may be a "beam," it does not follow that a beam is a stringer. A railroad "sleeper" may not be also a railroad "tie." A "bit" may be a plane iron or an instrument for boring wood. "Force" and "power" are not synonymous, neither are "weight" and "pressure." So we might go on indefinitely, and give examples of the indiscriminate and improper use of technical terms. We have a letter before us in which the writer, speaking of his steam boiler, uses the terms "fire surface" and "heating surface" as synonymous. Another speaks of the "force" of steam and the "pressure" of steam, also as synonymous or interchangeable terms. It is sometimes difficult, under such circumstances, to really understand what is meant. In such cases it would be better to use language of a less concise but more explanatory character.

Yet there is a pedantry affected by many in the use of technicals that is as annoying as it is pretentious. It is seen in the use of geometrical terms in defining well-known and familiar forms, and of algebraic formulas to state simple arithmetical problems. There are occasions when this is not only proper, but absolutely necessary for the defining of the subject. As to those who air their superficialties by a malapropos employment of all the technical terms they have been able to pick up, they do not deserve notice; such are beneath criticism and beyond improvement.

But even our professional teachers, the compilers of manuals designed to aid the beginner, are open to the charge of pedantry, and not unfrequently to that of writing about what it is evident they do not themselves understand. It would be unkind and harsh, perhaps, to refer by title to such works, but we have been several times much surprised to note the ingenuity of two, at least, of these authors in concealing their own ignorance while assuming to teach others. Nystrom, in his "Technological Education" says: "We frequently find most valuable formulas given by scientific men in such a shape that it requires to know more than the author in order to employ them; they are not only not trimmed to a practical shape, but even the meaning of letters is rarely explained in proper technical language."

We are convinced that the reason why our mechanics do not generally take kindly to scientific education applicable to their department, is not because of a dislike to the subject, but because of the needless obstructions in the way of ambiguous and involved statements that seem to be made or presented in a form purposely designed to annoy, or carelessly calculated to mislead.

HOLLOW vs. SOLID SHAFTING.

Hollow shafting, where large diameter is not objectionable, has long been in use, made generally of cast iron, and frequently used as a drum or continuous pulley for the reception of belts. Such a shaft was used in the "pistol shop" of Colt's factory before the destruction of the building by fire about four years ago, and a similar line may now be in use in the reconstructed building. This shaft was five hundred feet long and fifteen inches diameter, made of hollow cast-iron cylinders, connected with each other by a solid shaft or bearing at each end, resting in a box as a journal. The result was an almost continuous drum, of five hundred feet in length, from which belts led to the counter shafts of the machines, the speed of each machine being regulated by the diameter of the pulleys on the counter shafts. We have heard also of wrought iron pipes of only two inches diameter being used as shafting successfully.

Tredgold says that a round tube whose internal and external diameters are as seven to ten, respectively, has twice the lateral strength of a solid cylinder containing the same amount of material. A cylinder (solid) of cast iron, five inches diameter, has a transverse strength of 21,104 pounds, while one of eight inches diameter, containing the same cross sectional area of metal, has a transverse strength of no less than 45,416 pounds.

These facts would seem to show plainly the possibility of reducing the weight, materially, of shafting without a diminution of its strength. The weight of shafting is a mass the inertia of which must be overcome by the driving power, and in some cases the amount of power, otherwise useful, that is thus absorbed, is not less than twenty per cent. If by the use of lighter shafting this could be reduced only five per cent, the saving would be worth an effort. Shafting must be of sufficient diameter to sustain the weight of pulleys and the strain of belts without springing, but if the requisite stiffness—resistance to torsion and springing—can be obtained by hollow shafts of much less weight, not only is money saved in the first cost (shafting being furnished by the pound), but the continual expense in the absorption of unnecessary power in driving the unnecessary weight would also be prevented. That hollow shafting of wrought iron can be made cheaply is sufficiently apparent when we examine specimens of pipe used for various purposes. And not only would the first cost be less, but the ease of handling, owing to reduction in weight, would lessen the cost of turning, etc. Such shafting could also be easily oiled from the inside which would seem to be the proper method.

THE WICKEDNESS OF WASTE.---VALUE OF BONES.

If persons who carelessly and thoughtlessly throw away what they consider useless to themselves, understood the intrinsic value of these discarded trifles or this unpleasant rubbish, we are certain some little trouble would be taken to preserve and direct them to their real use. We will, from the thousand and one of these unconsidered trifles, select but one—bones—as a text for a few words in regard to their waste; and we will not refer even to their use in the arts as material for manufacture into various forms of use and beauty in which they reappear on our persons and in our dwellings, but confine our remarks to the value of bones as a fertilizing agent.

Let us see, first, of what bones are composed. Take ox bones, which comprise the larger part of household bone waste. Berzelius gives the following as the constituents of the dry bones:

Phosphate of lime with a little fluoride of calcium	53·04
Bone gelatin	33·30
Carbonate of lime	11·30
Phosphate of magnesia	1·16
Soda and common salt	1·20
	100·00

Every intelligent farmer knows that these are just the elements for combining with inorganic matter to make a fertile soil. It is, however, maintained by some that the nitrogen—contained in the gelatin—is not beneficial as a fertilizing element, from the fact that calcined bones deprived of their nitrogen, are still very valuable as a manure. But we believe that the nitrogenous element is really a valuable ingredient in fertilizers, for nitrate of soda, NaO, NO_5 is known to be a valuable fertilizer, and where found in natural beds as on the west coast of South America, it is exported for agricultural use as well as for the manufacture of nitric acid. The necessary amount of soda to form this combination exists in bones, and as the oxygen of the atmosphere readily combines with it, the objections against it as being unfit for fertilization do not seem to be tenable.

Prof. Johnston (than whom no better authority can be quoted) says that one hundred pounds of dry bone-dust add to the soil as much organic animal matter as three hundred or four hundred pounds of blood or flesh, and also, at the same time, two-thirds of their weight of inorganic matter—lime, magnesia, common salt, soda, phosphoric acid—all of which should be present in a fertile soil. From this it will be seen that even if the usefulness of bones was limited to their application to the soil, their value is sufficient to induce care in their saving and preparation. The superphosphate of lime so favorably known to our farmers is simply bones treated with one-third their weight of sulphuric acid and an equal quantity of water. The farmers of England understand the value of bones. Beside those gathered in their own country, they import them from the pampas of South America, the feeding and slaughtering grounds of millions of semi-wild cattle, and prepare them for their soil.

VEGETABLE OILS USED IN PAINTING.

There are two kinds of oils found in plants, called respectively *volatile*, or essential oils, and *fixed* oils. The former are those of which essences and extracts are made, and are called volatile because when exposed to the air they will, like ether or alcohol, entirely evaporate. The fixed oils, on the contrary, will not evaporate, hence their name. The latter are divided into two classes, *unctuous*, or *greasy* oils, and *siccative*, or *drying* oils. The drying oils are of great value in the arts, their principal application being in the art of painting. They are the vehicles for the distribution of colors over the surfaces of materials which it is desirable to ornament or to protect from the chemical action of external substances. Thus used they perform a two-fold office, as beside enabling the colors to be uniformly spread upon any surface, they form of themselves a protective coat owing to their siccative properties.

The sources of the siccative oils are numerous. They exist in the seeds of the order of plants, called by botanists Linaceæ, commonly known as the flaxes. Of these a species is grown in the East Indies, and large quantities of the seed are imported to this country from that source. The plant is also largely cultivated in Ireland, Holland, America, and other places, not only for its fiber, but the seed. The oil obtained from flaxseed, commonly known as linseed oil, is an important and valuable article of commerce, and is sold in two states, called *raw* and *boiled*.

Beside the flaxes numerous other plants produce seeds containing siccative oils. Of these the hemp, poppy, sunflower, and many nut-bearing trees may be mentioned. Indeed good nut-oil, according to some authorities, possesses the siccative property to a greater extent than any other.

The fixed vegetable oils are either cold or hot expressed. The former are the best oils, but the latter are much used, as a better yield can be obtained by the use of heat, and consequently they are cheaper; while if too high a degree of heat is not used, their quality is not very seriously impaired.

In extracting these oils, the seeds are ground under heavy stone rollers, revolving upon an axis which passes through an upright shaft. As the outside of the rollers must travel faster than the sides nearer the upright shaft, a rubbing as well as crushing effect is obtained. The meal thus produced is subjected to enormous pressure, and the oil is squeezed out. This is the raw oil of commerce. The siccative property of this oil, as of all other drying oils, depends upon the effects of oxygen upon it. When exposed to the air, it absorbs oxygen and becomes resinous in its character. This is drying in one sense, but not, as is often supposed, drying by evaporation. The latter takes place when any substance parts with its liquid portions, or that which holds its solid ingredients in solution. Oils, on the contrary, dry by absorbing oxygen and combining with it to form resinous substances nearly allied to the well-known resin obtained from pine. Cold solidifies linseed oil, and most other drying oils. They therefore spread better in in a warm temperature. The siccative property of linseed oil is increased by heating it with litharge. It was formerly thought that the increased drying property of linseed oil, when heated with litharge, depended solely upon its combination with the oxygen contained in that substance, and it would dry quicker when exposed to atmospheric action. But, according to Liebig, the principal use of the lead oxide is to precipitate the mucilaginous and albuminous matters contained in oils, which, when present, interfere with the action of oxygen.

Linseed oil is used not only in painting but in the manufacture of printers' ink, varnishes, oilcloths, etc. When adulterated with fish oil, the presence of the latter may be detected by rubbing a small quantity in the palm of the hand; the smell of the fish oil can then be detected. It is also used in the manufacture of linoleum, which is a combination of the oxidized oil with resinous gums and other substances, possessing the appearance and many properties of india-rubber. This substance can be vulcanized like rubber, and is applicable to very many purposes in the arts.

Many painters suppose that it is necessary to use "dryers" in paint, as litharge, dissolved usually in linseed oil by the aid of heat. It has, however, been demonstrated by Chevreul that these substances are not essential to make paint dry. He performed the following experiments:

Four oak strips were painted, each on one side, with a paint composed of white-lead and linseed oil, and on the other side with a paint composed of white zinc and linseed oil. The strip No. 1 was exposed to the air to dry; No. 2 was put into a bottle of the capacity of two liters (3·52 pints) and closed; No. 3 was put into a similar bottle, containing dry oxygen gas; No. 4 was put into a similar bottle, containing dry carbonic acid gas. The results as to drying were examined after twenty-four hours, and again after 72 hours:

After twenty-four hours the lead paint on No. 1 was almost dry; the zinc paint had set, but was not dry. On No. 2, the lead paint was almost dry; the zinc paint had set, but was not dry. On No. 3, both the lead and the zinc paints were perfectly dry. On No. 4, both paints were still wet and fresh, and had undergone no change.

After seventy-two hours the paints on Nos. 1 and 2 were perfectly dry. The lead paint on No. 4 had almost set, but it had no adhesion to the wood, and could be easily removed by friction; the zinc paint had undergone no change, but stuck to the finger like fresh paint.

These paints contained none of the so-called dryers, yet when they came in contact with free oxygen they dried perfectly. But while it is thus shown that dryers are not absolutely essential, it is none the less true that their use greatly facilitates the setting and drying of paint, a very desirable thing under many circumstances.

Any admixture of non-drying, or unctuous oils, in the oils used for painting renders them "tacky" when spread upon any surface. A good test of their presence is, therefore, their behavior in this respect when their layers are exposed to the atmosphere or oxygen in a closed vessel.

It is the affinity which such oils possess for oxygen that renders them liable to take fire spontaneously when spread over the fibers of wool or cotton waste, by the heat resulting from the slow combustion which takes place under such circumstances. Even animal oils, similarly treated, are liable to pontaneous combustion.

BULLETIN OF THE NATIONAL ASSOCIATION OF WOOL MANUFACTURERS.

The first number of the above publication is received and contains much interesting and valuable information. It is distributed gratuitously among the members of the Association from the commencement of the year in which they are admitted. Whether it is to be obtained by outsiders upon the payment of a subscription price, or otherwise, does not appear, so far as we can see, from the number before us.

Among other interesting statistics we find it stated that the number of sets of machinery or series of cards—a set forming the unit for calculation in woolen machinery—employed in the United States, reported to the National Association of Wool Manufacturers, on the 25th of October, 1865, was 4,100. The estimated number in the United States, as all were not reported at that time, was 5,000. From a carefully prepared table we find that Massachusetts consumes more wool in her factories than any other four States in the Union, her weekly consumption being 857,496 pounds of scoured wool. Of this aggregate 560,896 pounds are domestic wool and the balance is of foreign production. Connecticut stands next to Massachusetts in her consumption of wool, using weekly 252,880 pounds of scoured wool. New York uses 236,510 pounds, and New Hampshire, 217,110 pounds. The total amount used weekly in the United States is, according to the table, 2,252,545 pounds. It will thus be seen that Massachusetts manufactures more than one-third of all the wool consumed in the woolen mills of this country. The smallest consumption of any given in this table, is that of Minnesota, which is only 1,200 pounds per week. Some of the States and Territories consuming little wool are not, however, reported; but they will not vary the statement to any noticeable extent. In New York there are 124 mills that have not been heard from. In Massachusetts 74 have not reported. In all the States there are 624 mills not reported, against 917 which have forwarded their statements. From this it will be seen that the large aggregate weekly consumption, as above stated, falls much below the reality. It is fair to suppose, however, that many of those not heard from are small establishments; but, granting that, the weekly consumption will not fall far below 3,000,000 pounds.

The value of the wool manufacture as given in the report of the United States Commissioner of Revenue, is $121,868,250·33.

The effect of the establishment of mills in California and Oregon has been greatly beneficial to the wool growers of those States; previous to their erection theywere at the mercy of speculating monopolists from the Atlantic States. This is another illustration of the value of home markets.

Returns of woolen machinery constructed by the principal manufacturers of cards and jacks in the country show that *two thousand and eighty-six sets* have been made since January 1865. These facts show that the wool industry of the United States is already not only a large and important, but a vigorously growing one.

The *Bulletin* contains much other matter of interest to which we cannot at present allude. Communications should be addressed to John L. Hayes, Editor, and Secretary of the Association, 75 Sumner street, Boston, Mass.

CONSERVING OF FRUIT.

This may seem to the general reader a more inviting topic than the conservation of force, of which we are frequently called to speak. To our lady readers—for we are well aware there are plenty of them—who look weekly over our columns to find something to help them in their housekeeping duties, we are sure the topic will be interesting, although it may appear a little out of season to them. But they will remember when we put them in mind of it, that the putting up and conserving of fruit has got to be a business of very large proportions throughout the civilized world; and although the bulk of it is put up in the summer and autumn, it is eaten throughout the entire year. Nay, it may be eaten for several years after it is put up, provided proper pains are taken. It is quite possible that the advice we shall give, if followed, may save much loss in the value of fruit already put up, and stored for sale.

"Forewarned is forearmed" and to wait until the very time when information is wanted before attempting to obtain it, is something like death-bed repentance—mostly too late. We recently had something to say on the subject of confectionary, which has called forth considerable correspondence, asking for an extension of the subject so that it should embrace the conserving of fruit. In complying with this request, we shall first call attention to the chemical composition of fruits. To intelligently conserve anything, we should know what it is we wish to conserve.

In all organic substances, the chemical elements which are essential to their existence exist in a state of combination. Destructive distillation or destructive fermentation resolves these, either into their ultimate elements or transforms them into new compounds. Any of the different kinds of fermentations is the partial or entire decomposition of the natural combinations (proximate principles), and their recombination into other and distinct combinations, during which some portions of the proximate principles escape as gaseous products, while oxygen is taken up from the atmosphere or from other sources. The first step toward the total breaking up and destruction of any organic compound is some kind of fermentation. It follows, therefore, that if fermentation be prevented, the keeping of any organic substance for any length of time is possible.

The proximate principles of plants, including fruits, are divided into two classes, those which contain nitrogen and those which do not contain it.

The most important proximate principles not containing nitrogen are starch, gum, fructose or fruit sugar, glucose or grape sugar, pectose or vegetable jelly, cellulose or cellular tissue, lignine or wood substance found in the skins of fruits as well as their stems, and cane sugar, or the sugar in common use for confections and domestic purposes.

The important nitrogenized substances found in plants, are vegetable albumen vegetable casein and gluten. This class of proximate principles owing to the feeble affinities of nitrogen are, under favorable circumstances, particularly liable to decompose.

Starch is acted upon by acids, and converted into glucose (grape sugar). This takes place in the ripening of fruits, as is shown by their greater sweetness when ripe, and also in the mellowing of fruits after they are plucked, which is neither more nor less than partial decomposition. From this it may at once be concluded that fruits which have become mellow to any considerable extent, are more or less unfitted for conserves, as they are already partly decomposed. It does not follow, however, that they are unfitted for food after becoming mellow—as has been asserted by some—unless the mellowing has proceeded too far. When merely mellowed so as to become palatable, the partial decomposition is, in some respects, analogous to that produced by cooking, and renders the fruit more digestible and wholesome. This mellowing will take place in the process of conserving, and in the jars, also, sufficiently to render the fruit tender and palatable, unless the fruit be immature, which is an extreme, also, to be avoided. Gum, although included in the list of non-nitrogenized proximate principles, has but little to do with the subject. Fructose and glucose will be considered in connection with cane sugar. Pectose is an important substance in its relations to the conservation of fruits. It is the proximate principle which becomes jelly when the juices of fruits are boiled. It is insoluble in water, until its characters are changed by the acids contained in the fruits aided by heat, which converts it into pectine which is soluble. It contains the same elements as sugar, but in a very different proportion. By continued boiling it loses its glutinous consistency, an important point as will be seen further on. The so-called "candying" of conserved fruits consists partly in the crystallization of the sugar employed, and the formation of jelly on account of *over-boiling*.

Cellulose is only important as it forms the walls of the cells which inclose the proximate principles, and also of its intimate association with the pectose above alluded to. Lignine (wood substance) forms a portion of the rinds or skins of fruits. It is insoluble in water and, as found in the rinds of fruits, has little effect upon their preservation except to protect the more unstable interior compounds from the action of atmospheric oxygen. But all fruits contain more or less air in their interior, which, in the process of conservation, ought to be expelled and replaced by the substance used as a conserving agent. To avoid a too protracted heating of fruits, which is frequently injurious, they should either be deprived of their skins or the latter should be punctured.

The sugars are the most important substances in this class. The elements of the sugars and their proportions by weight in the different sugars, are as follows:

	CARBON.	HYDROGEN.	OXYGEN.	WATER.
Cane Sugar..................	72	9	72	18
Grape Sugar (Glucose)....	72	12	96	18
Fruit Sugar (Fructose)....	72	12	96	00

As water is composed of one part by weight of hydrogen and eight parts of oxygen, it will be seen that only three elements are found in the sugars, and that the variations in their proportions are very slight. The natural change which cane and grape sugars first undergo when incipient decomposition sets in, is combination with water, they thus becoming transformed into grape sugar. Alcoholic fermentation then sets in, followed by the acetic and destructive fermentation and total decay. It is unnecessary, for our present purpose, to follow out the two latter fermentations, as when the alcoholic fermentation takes place the fruit, considered as a conserve, is already spoiled. It is true that the fermentation may be arrested by boiling, but the latter process so greatly deteriorates the appearance and flavor of the fruit that it is not too much to call it spoiled.

Albumen is particularly liable to decay, but as little of it occurs in the pulp of fruit, and that contained in the stems is coagulated by heat during the usual processes of conservation, it need not be considered here. The same is true of caseine and gluten, except the remark upon coagulation. Thus it will be seen that the chemistry of fruit conservation is chiefly confined to the non-nitrogenized substances contained in fruits.

Beside the proximate principles above enumerated, there are over two hundred distinct acids of vegetable origin which are isolated by chemists. But few of them, however, exist in a free state, they being for the most part combined with alkalies or vegetable alkaloids to form salts. Malic acid, which exists in the apple and its kindred fruits, citric acid which is found in lemons and kindred fruits, tartaric acid found in grapes in the form of tartar or bitartrate of potassa, oxalic acid, the acid of the sorrel and rhubarb, or "pie-plant," etc., may be mentioned. A minute description of them is unnecessary. They all contain the same elements as sugar,in different proportions, and their action upon starch is, as above described, to change it into grape sugar.

Having thus reviewed the principal substances found in fruits, let us next trace some of their more important reactions when decomposition takes place. First,the starch becomes more or less converted,first into dextrine,and subsequently into grape sugar which,being soluble,dissolves in the juice; thus the solid portions of the fruit become liquid and it becomes mellow. Vinous or alcoholic fermentation supervenes and the grape sugar, is decomposed, alcohol being formed and carbonic acid being disengaged. The alcohol thus formed is changed to acetic acid, thus constituting what is called the acetous fermentation. Finally the destructive fermentation begins, which speedily breaks up all the compounds not yet unchanged, and total decay is the result. Conserving fruit is the prevention of these changes for a greater or less period, by the use of *cane sugar*.

The mechanical structure of fruits has, however, much to do with conservation. If you peel an orange carefully and then dissect it, it will be found to be made up of divisions, each of which contains a seed or the rudiments of one. Each of these divisions is covered with a continuous skin of cellulose which, although it would not totally prevent the absorption of liquid sugar would greatly retard it. If one of these divisions be dissected, it will be found to contain numerous sub-cells of irregular form, having the same cellular tissue for a covering. It is at once obvious, therefore, that an entire orange would need to be kept much longer in a mass of liquid sugar, in order to become saturated, than one separated into the single divisions above described; and the latter would also be slower in saturation than slices of orange, in which large numbers of the cells would be severed. It follows that it is necessary to consider the structure of the first in order to consume it in the best manner.

Three results are to be attained in the proper conservation of fruits, viz.: They must look well; they must taste well; they must keep well.

The latter result depends upon the removal of air from the cellular structure of the fruits, replacing it with, and enveloping the fruit in liquid sugar; by which means, if properly done, further danger of fermentation by the action of the atmospheric oxygen is obviated for a considerable time; although if the air be excluded by mechanical means (self-sealing jars), the fruit may be preserved much longer than without. In the latter case a solution of sugar may be employed, instead of concentrated sugar. This is much the best plan, as by it the natural taste of the fruit may be preserved if other proper precautions are taken.

The putting up of fruits in concentrated sugar is rapidly going out of use for most domestic fruits, and it is to be rejoiced at, for a more ill-looking, ill-tasting compound than many of the old-time conserves, would be hard to find.

The first thing to be done, in successful conservation, is the selection of the fruit. From what we have already said of the constituents of fruits and their chemical changes, it will be seen that it should be *ripe, but not mellow or stale*, of good size and fair surface. The next thing is the sugar, which should be the best white lump sugar obtainable. It should be perfectly dry, and should be destitute of foreign odors. Frequently a musty smell may be detected in sugar. Sugars sometimes also acquire the smell of kerosene, etc., by being placed in the vicinity where the latter is kept.

The fruit and sugar being selected, the nature of the fruit should be well considered. Fruit looks very well when put up whole, but if in order to do so they require boiling until the pectose is changed to jelly, and the fruit is so cooked as to drive off its delicate flavors, you have paid dearly for the privilege of having your fruit whole. Beside, long boiling is sure to darken the color and thus damage the appearance. Apples should be quartered unless very small. Pears should be halved, unless quite small; the little Secklers may be put up whole. Peaches may be put up whole or halved, with the pits removed: the last is much better, as the prussic acid in the pits gives otherwise too strong a flavor to the fruit. All fruit having thick dense rinds should have the rind removed or punctured. Puncturing may be done by setting a number of very fine needles in a piece of pine wood which serves as a handle. The use of an ordinary fork for the purpose is barbarous, as it makes the fruit appear as though it had had the smallpox and was just recovering. The fruit should be peeled or punctured only the shortest time possible before it is put in the sugar, otherwise it will become discolored, therefore the sugar should be first prepared. If, however, fruit when peeled or punctured be placed under cold water and kept until the sugar is ready its color will not change.

If hermetically sealed jars are used only enough sugar is needed to make the fruit palatable this should be put into a brass kettle with a little water, and allowed to melt slowly, and then the heat should be gradually raised to nearly the boiling point. The fruit properly prepared is next put into the jars, from which it should not again emerge until wanted for the table. The amount of sugar proportioned to the fruit by weight, established by previous experiment, should then, after being cooled, be divided as equally as possible between the jars, and the remaining space nearly filled with pure water. The jars should then be placed in a kettle containing cold water, pebbles being used to prevent contact with the bottom and consequent cracking of the jars, and the whole raised as quickly as possible to the boiling point and kept there about ten minutes. Too long boiling alters the taste and color of the fruit, and changes the pectose into jelly. It should be borne in mind that all the heating is intended to do is *to expel the air*, not cook the fruit. Whatever space is left in the jars should now be filled with hot water, and they should be immediately sealed. We have eaten fruit put up in this way that, after two full years' keeping, could scarcely be distinguished either in color or taste from that freshly prepared and placed by it on the same table.

The old method of cooking fruit in sugar, pound for pound, is a relic of barbarism. The sugar needs to be boiled by itself in this process, else it will crystallize upon standing. Care is also necessary not to cook the fruit too long, else a gummy, sticky, dark-colored mass will be the result, as much inferior to fresh fruit as molasses is to nectar.

In making jellies the boiling is for the most part too protracted. The pectose, as we have seen, is the jelly principle of fruits, and it requires heat to cause it to form a jelly, but too much heat causes it also to lose this quality. It is this that gives the granular consistence often seen in jellies which have been too long boiled.

Fruit, after it is conserved, should be kept in a dry, cool, and dark place. All these requisites must be observed if you desire perfection. The action of light discolors the fruit. Heat promotes fermentation. Dampness, strange as it may appear, also favors a sort of sub-fermentation, which greatly deteriorates quality. We can give no reason why outside dampness should affect fruit inclosed in hermetically sealed jars; but our own experience and that of others whom we have consulted on this point, warrant the assertion that it is a fact.

Much, however, depends upon experience in this as well as other arts, but if the directions we have given be intelligently followed, in the light of the chemical principles involved, a good degree of success is sure.

THE GARD BRICK MACHINE.

In volume XIV, page 238, and Vol. XVI, page 132 of the SCIENTIFIC AMERICAN, we published illustrations and descriptions of the above machine and subsequently we saw it at work in this city, and found that the machine, much improved in its construction, fully corroborated the favorable opinion we had conceived from an examination of the model. More than sixty bricks per minute can be turned out by this machine, each perfect in form and so well pressed that it may be hacked at once. The clay is used direct from the natural bank, no preparation being required except occasionally the addition of a little water previous to throwing it in the pugmill. The quality of the bricks is very superior, the faces being smooth, the corners sharp and the sides just rough enough to hold the mortar firmly. The only limitation to the capacity of the machine is that of the attendance necessary to remove the bricks as they are made. The simplicity, strength, and durability of the machine, having no parts to get out of order, the rapidity of its operation, and the superiority of its products entitle it to the notice of every builder and brick manufacturer. Over 14,000,000 of bricks were manufactured by these machines in Chicago, alone, the past year.

The machine may be seen, for a time, in operation at the rear of 59 Ann street, New York city. Mr. Gard's manufactory is at Nos. 116, 118, 120, and 122 South Clinton street, Chicago. For the present he may be addressed at the Astor House, New York.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

A Pennsylvania exchange says an old mill, built in 1844, under the authority of the Moravian church, was burned last week in the town of Bethlehem, in that State. It had an historical interest. It was owned by David and Anthony Luckenbach, whose family have held possession of it ever since it was erected. In the olden time it was a central point to which farmers and others gathered from great distances. The building was of stone, massive and strong. The first miller employed was Christian Christianson, who was placed in charge under Count Zinzendorf. He was a man of skill, and projected the plan of the water works at Bethlehem, said to have been the first works of the kind built in the State.

The artesian well of St. Louis, which has reached a depth of nearly three thousand five hundred feet, and is still going downward, is said to be two degrees colder than at the surface. How is this? Have the philosophers been wrong in the opinion that the temperature of the earth increases toward the center.

It is said that the coal dealers in London are obliged to have their carts or wagons so made that each of them is in effect a weighing machine. By the use of a lever near the wheel the load of coal is placed upon the scale, and the true weight immediately and easily ascertained.

Engineers are now testing the bed of Detroit river with a view to a railroad tunnel connecting the Great Western railroad of Canada with the Michigan Central Michigan Southern, and Detroit and Milwaukee roads. Tough clay is the result on the Michigan side of the river.

The Shah of Persia has recently granted to English capitalists the monopoly of railroad building in that country for twenty years.

The yield of the coal mines in Prussia during 1867, was 105,000,000 tuns of coal from 426 mines, and they give employment to 102,773 men and 175,229 women and children.

A flag made entirely of California silk is to be presented to the State for the new Capitol at the next session of the legislature by an extensive silk manufacturer.

A Boston firm have received an order from China for 600 cases of boots and shoes. This is supposed to be the first order of the kind ever received in this country, and will probably lead to a larger demand for this line of goods.

About 60,000 tuns of ice, mostly for transportation, have been stored in Gardiner, Maine, this winter. Three hundred vessels will be engaged in taking it away next summer.

NEW PUBLICATIONS.

THE LADIES' REPOSITORY for February is at hand, with an unusually rich table of contents. This magazine is the representative of the highest type of intellectual taste and culture to be found among American women. Were it to crowd out the trashy publications filled only with fashion plates and silly love stories, now the only literature, especially designed for women, to be found in many homes, and occupy the place of the latter, it would be "a consummation devoutly to be wished." It opens with a graphic description of Surrey Chapel, in which the Rev. Newman Hall officiates, and of his work and method as the head of a peculiar ecclesiastical organization. This article is followed by a large number of most excellent essays, poems, and miscellanies, forming one of the most attractive collections to be found in any of the monthlies published in this country. This magazine is doing good work, and we wish it most heartily Godspeed. Published by Hitchcock & Walden, Cincinnati, and Carlton & Lanahan, New York city.

HEARTH AND HOME is the title of a new weekly of sixteen quarto pages, which has made its appearance with the advent of the new year. Edited by Donald G. Mitchell and Harriet Beecher Stowe. It is specially designed for families situated in rural districts, and is largely devoted to agriculture and horticulture. It contains also well-selected miscellanies and stories from the best and most popular story writers in the country, among whom are J. T. Trowbridge, Mrs. Stowe, Grace Greenwood, and Mrs. Mary E. Dodge. The first number contains the beginning of a story entitled "Life in the Ice," by Trowbridge, which is to be followed by a novel from the pen of the gifted authoress of "Life in the Iron Mills." It also has a department devoted to the "Boys and Girls," filled with amusing and instructive matter. It is illustrated profusely, and in the best style. A good paper. We wish it success. Published by our neighbors, Pettengill, Bates & Co., extensive advertising agents, 37 Park Row, New York. Single copies $4 per annum, in advance.

Recent American and Foreign Patents.

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

WINDOW SASH LOCK AND SUPPORTER.—William Lee McKibbin, Buck Valley, Pa.—This invention has for its object to furnish an improved lock and supporter for window sashes, which shall be so constructed and arranged as to hold the sash securely locked when lowered, and to securely support it in any position to which it may be raised.

MOLDERS' RIDDLES.—James C. Ward and Joseph Hudson, Peekskill, N. Y.—This invention has for its object to furnish an improved riddle for molders' use, simple in construction, strong and durable, not liable to break and not liable to burn out when used to receive and screen hot metal.

SASH CLAMP—Elijah F. Dunaway, Cincinnati, Ohio.—This invention has for its object to furnish an improved machine, by means of which sashes may be quickly, conveniently, and accurately shaped, and the joints tightened and squared ready to be pinned.

HARVESTERS.—William Michael, Murrysville, Pa.—This invention has for its object to improve the construction of harvesters and mowers, so as to make them more effective in operation and more reliable in the various places, and under the various circumstances in which they may be used, and which shall, at the same time, be simple in construction and not liable to get out of order.

HORSE HAY FORK.—Samuel Miller, Mohawk, N. Y.—This invention has for its object to furnish an improved horse hay fork, simple in construction, and effective in operation, doing its work better, and with more ease to the operator than the forks now in use.

SAIL BENDER.—Henry W. Ketcham, New York city.—This invention has for its object to furnish an improved sail bender or detachable metallic seizing, by means of which the sail may be securely attached to the hoop in such a way that it may be securely held and easily and quickly detached when required.

CIGAR TRIMMER.—P. A. La France, Elmira, N.Y.—This invention relates to a new machine for trimming the ends of cigars, and especially the thick ends, which, for cigar makers' use, is of great importance to have nicely executed, as thereby also the length of the cigars is regulated. The invention consists of a grooved bed, on which the cigars is supported, and of two cutters, operating like shears, one of them being secured to the edge of the bed, while the other is pivoted to be swung up and down at will; a spring keeps the knives apart, so that the machine is always in a position ready for action.

VELOCIPEDE.—William Denovan, Philadelphia, Pa—This invention relates to a new velocipede, which is propelled partly by muscular, partly by spring power. It consists in a new manner of connecting the swinging seat with a crank axle and with a spring, whereby the aforementioned object of combined muscular and spring propulsion can, in a satisfactory manner, be obtained.

MACHINE FOR FILLING BOTTLES.—James Alcorn, Charleston, Mass.—The object of this invention is to afford a simple and effective means for filling bottles with fluid, whether the latter is under pressure or not, as the circumstances of the case may render most convenient.

MACHINE BELTING.—George Hurn and Daniel Hurn, London, England.—This invention relates to an improvement in the manufacture of driving belts for machinery, and it consists in forming the same from a weft and warp of leather, woven with selvages without joints or splices, and with a double face or running surface.

HAY TEDDER.—M. D. Myers, Frankfort, N.Y.—This invention consists chiefly in attaching the tines to a shaft, that has its loose bearings in the cranks of a rotating shaft, and in connecting the tine-shaft with a stationary drum, or disk, that is arranged concentrically around the rotating shaft, by means of an endless band or chain, thereby the tine-shaft is, while it is being carried around the rotating shaft, also turned around its own axis in such manner that the tines will always remain in the same, *i. e.*, nearly perpendicular, position.

STEM-WINDING WATCH.—Vitalis Himmer, Brooklyn, N. Y.—The object of this invention is to produce a stem-winding watch, which is so arranged that the spring cannot be overwound, and that, if it is wound up to the requisite limit, the gearing connection between the drum and the stem will be automatically and effectually interrupted. It consists more particularly in the use of a pin, fitted through the wheel that is mounted on the spindle of the spring, and in a fingered wheel, resting upon, and turning with the drum; during the revolutions of the aforesaid spindle, while the spring is being wound up, the pin is carried round and against the fingers of the wheel on the drum, thereby turning the said wheel; when the spring is wound up, the pin again strikes the fingered wheel, and travels upon an inclined edge formed thereon; it is thereby raised, and pushes the wheel that connects the spindle wheel with the stem up, out of gear, so that the stem can be turned at pleasure without affecting the spring.

GLUE POT.—Joseph Tinney, Westfield, N. Y.—This invention relates to a new glue pot, in which the vessel for containing the glue is made annular or otherwise, so that a pipe is formed with, in which the water from the lower vessel may stand; thereby additional heating surface is not only provided, but also an escape for the surplus steam, and an open water vessel is produced to allow the wetting of a sponge or cloth for cleaning the surplus glue from the work, and for washing the brush without removing the upper glue cap.

FISHING TACKLE.—Ferdinand Tellgmann, Stamford, Conn.—This invention relates to a new sinker attachment for fishing tackle, and consists in the use of a hollow sectional sinker, which is so arranged, that it will be without corners, projecting flanges, and such devices, which might serve to retain it on the ground; the knots formed at the junction of the hand line with the hook cords are all concealed within the hollow sinker, and can, therefore, not be caught by projecting stones, shells, or other obstructions.

DOUGH BOX FOR CAKE MACHINES.—Daniel M. Holmes, Williamsburgh, N. Y.—This invention has for its object to improve the construction of the dough boxes of that class of machines in which the dough is cut off into cakes or slices as it is forced out through orifices in the bottom of the box; and it consists in the construction of said orifices and of the parts connected therewith, so as to make the machine more accurate and satisfactory in operation, cutting off the cakes or slices of uniform thickness.

PAGING AND NUMBERING MACHINE.—Philip Koch and Gottlob Schule, New York city.—This invention relates to a new machine for paging blank books, and for numbering bank notes, bills, checks, and other suitable articles; and the invention consists, first, in a new apparatus for turning the printing roller, which is turned or set when it arrives at its highest elevation by a lever, which can be adjusted so as to turn the said roller one-tenth or one-fifth part of a revolution, as may be desired, or not at all, if the same figure has to be continually printed. It consists also in a novel device for nking the printing type, and in a new manner of operating the said device. The inking roller is applied to the figure which is to print, immediately after it has been set by the aforesaid setting device.

CARPET STRETCHER.—William Brown, New York city.—This invention has for its object to furnish a simple, convenient, and effective self-clutching carpet stretcher, which shall be so constructed and arranged as to require much less space for operating it than the ordinary carpet stretchers while, at the same time, drawing the carpet up closer to the side walls of the room than is possible with carpet stretchers constructed in the ordinary manner, which can be handled in much less time than other stretchers, and requires no set screws to clamp the carpet in the jaws of the stretcher.

NEEDLE WRAPPERS.—Charles Bartleet James, Redditch, England.—This invention relates to improvements in needle cases and wrappers for packing needles for market and use, whereby it is designed, by the employment of an outer case and an interior packet, arranged in a peculiar manner, to facilitate the removal of the packet when access to the needles is desired.

BREECH-LOADING NEEDLE GUNS.—Jean Mathieu Deprez, Liege, Belgium.—This invention refers to an improved system of breech-loading needle firearms, the peculiar distinctive features of which are: 1st. The manner of opening and closing the breech for the insertion of the cartridge, and the drawing off of the same. 2d. The adaptation of this arm to the use of either paper or pasteboard cartridge, or metallic central percussion ones. 3d. The employment, according to the use of either paper or metallic cartridges of either one of two cylinders; one of these cylinders serving only, for instance, to fire paper cartridges, while the other serves to fire the ones the shells of which are entirely metallic. A fourth feature consists in fitting to this system of arm a safety trigger, whereby are prevented accidents whenever the arm is loaded and maneuvered.

PACKING NEEDLE.—Wm. H. Marriott, Baltimore, Md.—This invention relates to a new and useful improvement in needles for sewing canvas, and other heavy and thick material, which needles are known as "packing needles" and the invention consists in forming a cutting edge in the eye of the needle for cutting the thread when desired.

PLANER AND SCRAPER.—Wm. Dutton, Boston, Mass.—This invention relates to new and useful improvement in tools, used for scraping and planing boxes or barrels, for marking, or for removing marks from boxes or barrels, and for other purposes.

GLOBE VALVES.—H. H. Hendrick, Dayton, Ohio.—This invention relates to a new and useful improvement in globe valves, whereby they are made more useful and durable than they have hitherto been.

HEAT-RETAINING PAIL.—John C. Brain, Brooklyn, N. Y.—This invention relates to a new and useful improvement in vessels to be used as non-conductors of heat, whereby the heat imparted to the contents of such vessels may be retained.

VENTILATOR.—John Lesperance, St. Louis, Mo.—This invention relates to improvements in ventilating apparatus for houses, cars, etc., whereby it is designed to provide a purified and regulated flow of air, by the employment of a filtering apparatus to be placed in the window opening through which the air is caused to pass in entering the house, etc.

HAME FASTENING.—J. V. Hutschler, Keyport, N. J.—This invention relates to improvements in devices for fastening hames of harness, the object of which is to provide a metallic fastening of cheaper and more durable construction and more convenient to operate than the leather straps or buckles now commonly employed.

MACHINE FOR MAKING PLUGS OF TOBACCO.—Peter M. Guerrant and Peter M. Rowlett, New Concord, Ky.—This invention consists in the arrangement upon a table of a trimming bed, a portion of which is movable, in combination with trimming cutters, whereon the leaves or strips are laid in suitable thickness to form the sheets, and trimmed to the proper shape, from which they are moved on the said movable portion of the bed to a press to be pressed into sheets; also, in an arrangement of sliding table and rotating cutters, for cutting the said sheets into plugs.

SASH FASTENER.—T. O. Wilson, Fisherville, N. H.—This invention relates to improvements in sash stops, the object of which is to provide a simple arrangement of spring bolt for working the sash in any position, all the parts being arranged and attached to a plate which may be readily attached to any window with but little labor.

ROTARY HARROW.—Samuel Lubolt and Jacob Trout, Lykens, Pa.—This invention relates to that class of double rotary harrows in which two horizontal harrows are caused to rotate by means of a vertical wheel between them, and has for its object an improvement of the construction of such harrow so as to render the whole instrument lighter, neater in appearance, and cheaper in construction, than as it has heretofore been made, while operating in the field to better advantage.

BEEHIVE.—R. P. Buttles, Mansfield, Pa.—This invention relates to a new and useful improvement in the construction of beehives whereby perfect ventilation is obtained, simplicity in construction, and suitable guides provided for the building of the combs.

THRESHING MACHINE.—Matthias Fuos, Castroville, Texas.—This invention relates to a new and improved machine for threshing grain, and it consists in a novel construction of the same.

BAKING DISH.—H. C. Wilcox, West Meriden, Conn.—This invention relates to a new article of manufacture for baking puddings, pies, and other similar dishes, and consists in employing an iron enameled dish in combination with an outer plated containing vessel or casing.

FIREARM.—S. G. Bayes, Wauseon, Ohio.—This invention relates to a new and useful improvement in that class of firearms which are known as "magazine" guns.

MANUFACTURE OF BOOTS AND SHOES.—S. C. Phinney, Stoughton, Mass.—This invention relates to an improvement in the method of cutting leather in the manufacture of boots and shoes.

CULTIVATOR AND SEED PLANTER.—D. B. Morgan, Washington, Ohio.—This invention relates to a new and improved cultivator and seed planter, and consists in a novel construction and arrangement of parts.

CARRIAGE WHEEL.—Dr. W. S. Mayo, New York city.—This invention relates to a new and useful device for aiding and facilitating the crossing of railroad tracks by carriages and other wheeled vehicles, and consists in forming a series of shoulders and inclined planes on the edges or corners of the wheel by notching or crenating the same, so that the wheel, when brought in contact with the rail at any angle angle other than a right angle, will take hold or bite the rail, and thereby allow the wheel to mount and pass over the rail.

BOTTLE FILLER AND CORKER.—T. W. Cowey, Cannonsburg, Pa.—This invention consists, in the first place, in adapting to a vessel for receiving liquids from the barrel preparatory to the bottling corking processes, an automatic device for regulating the quantity to be drawn off.

SAFETY STOVE FOR RAILROAD CARS.—Arnold A. Wheelock, Washington D. C.—The object of this invention is to construct a stove for railway cars of such a character, that, if accidentally overturned from any cause, the coals, ashes, etc., will not escape, but the fire will be instantly extinguished.

VELOCIPEDE.—A. D. Thompson and J. Marden, Jr., Baltimore, Md.—The object of this invention is so to improve the construction of three-wheeled velocipedes, that their speed and the power necessary to move them can be adjusted and changed without changing the movement of the pedals, and that they can be operated either by foot or by hand, or by both together. In attaining these ends the general construction of the vehicle has been so changed and improved that several other important advantages result therefrom.

CORN PLANTER.—Jacob R. Randall, Camargo, Ill.—By this invention the corn planter is so improved in construction that it can be turned more easily, and the action of its plows, seeding apparatus, etc., can be more readily and conveniently controlled than heretofore.

MATCH SPLINT CUTTER.—M. D. Murphy and O. C. Barber, Middlebury, Ohio.—The object of this invention is to produce a cutter which can be kept sharp more easily and perfectly than those hitherto used, and which will economize the material to better advantage. To this end the invention consists, first, in the form of the edge, and of the holes through which the splints are forced, and secondly, in the method of forming the said edge and holes in manufacturing the instrument.

SLEIGH AND SLED.—D. C. Frazeur, Siddonsburg, Pa.—This invention is an improvement upon the device patented to D. C. Frazeur, January 28, 1868, No. 73,885, and consists in a new apparatus for throwing the carriage upon its wheels or its runners, a new method of attaching the wheels to the runners, and a new construction of the axle and reach, whereby the vehicle can be more readily turned, whether on wheels or runners.

SEED SOWER.—M. F. South and T. J. Howe, Owatonna, Minn.—This invention relates to that class of seed sowers in which the seed is distributed by means of a series of grooved cylinders arranged upon a rotating shaft under the seed box, each working in a concave cap through which the seed is fed. This improvement consists in a novel construction and arrangement of the shaft, clutch, draft wheels, and axles, in connection with said cylinders and caps, and the lever for regulating the feed; whereby the construction of the machine is greatly simplified and its cost reduced, while it is rendered stronger and more durable than heretofore.

PREPARED PHOSPHATE.—O. A. Moses, Charleston, S. C.—This invention has for its object the production of an improved article of manufacture by extracting, by a new method, the most valuable fertilizing ingredients of the so-called South Carolina phosphates and marls, and of all other substances possessing characteristics analogous thereto, that is to say, containing the valuable phosphates of lime, magnesia, etc., intermingled with useless particles of said carbonate of lime, the oxides of iron, etc., etc.

AX HANDLE SHIELD.—Beauman Butler, St. Johnsbury Center, Vt.—This shield is composed of sheet iron, lap-brazed, one and one-half inches in length on top by three or more on bottom. It is driven firmly on to the helve and then inserted about one half inch into the eye of the axe; it prevents the helve from being bruised in splitting wood, also makes it much stronger in resisting side strains, rendering the helve (at the trifling cost of a dime) of equal value to two or three without it, a very small but excellent improvement. One of them adjusted to an axe can be seen at our office. Patented January 26, 1869.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,800.—SECURING SOLES UPON SHOES, ETC.—B. D. Godfrey, Milford, Mass. September 11, 1868.

3,969.—EXTRACTING THE COLORING MATTER OF MADDER ROOT.—A. Paraf, New York city. December 29, 1868.

3,979.—SPINNING MACHINE.—John Goulding, Worcester, Mass. December 18, 1868.

3,980.—MACHINERY FOR SEPARATING THE FIBERS OF HAIR ROPES.—Abner Mellen, John H. Wilcox, and Abner Mellen, Jr., New York city. December 31, 1868.

3,981.—REVOLVING BREECH-LOADING FIREARMS, AND CARTRIDGES AND CHARGING DEVICES.—Colt's Patent Firearms Manufacturing Company (Incorporated), Hartford, Conn. December 31, 1868.

3,985.—WRENCHES.—Wm. Baxter, Newark, N. J. December 31, 1868.

3,986.—WASHING MACHINES.—H. E. Smith, New York city. December 31, 1868.

3,987.—REVOLVING FIREARMS, AND CARTRIDGES FOR FIREARMS.—E. H. Plant, A. P. Plant, and A. Hotchkiss, Southington, Conn. December 31, 1868.

16.—APPARATUS FOR SEWING IN THE OPERATION OF BOOK-BINDING.—H. G. Thompson, New York city. January 2, 1869.

18.—PROCESS OF REFINING IRON AND MAKING STEEL.—C. J. Caumon (also known as John Absterdam), New York city. January 4, 1869.

31.—SEWING MACHINES.—Greenleaf Stackpole, New York city. January 5, 1869.

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; beside, as sometimes happens, we may prefer to address correspondents 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 advertisemets at $1 00 a line, under the head of "Business and Personal."

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

A. S. W. A., of Mo., asks "what power would be gained on an engine with a single slide valve having twice the capacity for exhaust as for inlet, the valve having one and a half inches throw, opening the inlet port half an inch, and the exhaust one and a half inches?" We cannot see in what respect this proposed valve differs from many single slide valves in common use. As to the "gain" of power there is none whatever; all engines should have abundant exhaust space or large exhaust ports.

J. O. S., of N. Y.—"If large drivers were best on freight engines why are they not used?" You know—or at least railroad men know—that for loads small drivers give the best results, while large wheels give speed, not power. The reason is apparent.

E. T. of Pa.—Your drawing and description is almost identical with others which have been devised for rotary engines and for other purposes. If you write to Pratt, Whitney, and Company, Hartford, Conn., you can procure an engraving of a much superior, because simpler, device used successfully as a pump and water motor, but never considered by the inventor, Mr. Stannard, one of the firm, as suitable for a steam engine; yet it is better than your plan. One great difficulty in the production of a good rotary engine is the excessive friction, and another the excessive amount of steam required. Overcome these, the annoyances and stumbling blocks of your predecessors, and then you may look for success.

W. W. P., of Mass.—Brass, either a rod or pipe, expands in length more than iron at the same temperature. Brass expands from 32° Fah. to 212° Fah. 1 in 536, and iron 1 in 846.

M. L. R., of Col., says that to prevent kerosene lamp explosions the holes in the net or screen under the chimney should be made as large as possible to admit more air. This may be done by reaming them out with a hand reamer. The amount of oxygen admitted to the flame he thinks is usually too small.

E. S. N., of Mich.—In Vol. XII, page 151, we published an article on the "Pressure of a slide valve," to which we refer you as a reply to your interrogatory. As you are an "old subscriber," undoubtedly you have the volume.

J. P., of Pa.—One of our correspondents writes that the best hardening pickle he ever used was spring water made into a brine strong enough to float an egg, then boiled to precipitate the lime and allowed to cool.

J. C. M., of Ohio.—The following are the most amusing and easily prepared sympathetic inks: Yellows—Sulphate of copper and sal amoniac equal parts disolved in water. 2d. Onion juice. Both colorless when first applied, but visible when heated. Black—A weak infusion of galls, show upon application of a weak solution of proto-sulphate of iron. 2d. a weak solution of proto-suluhate of iron; gives a blue when moistened with a weak solution of prussiate of potash; black, when moistened with infusion of galls. Brown or yellow—Very weak solutions of nitric acid, sulphuric acid, muriatic acid, common salt, or nitrate of potash. Shows when heated. Green—Solution of nitro-muriate of cobalt, appears when heated and disappears again on cooling. Rose-red—Acetate of cobalt solution with the addition of a small quantity of nitrate of potash, appears and disappears alternately on heating and cooling. Solutions of nitrate of silver and terchloride of gold, become permanently dark on exposure to sunlight.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING FEBRUARY 9, 1869.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT OFFICE FEES:

On filing each caveat	$10
On filing each application for a Patent (seventeen years)	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filling application for Design (seven years)	$15
On filling application for design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

Patents and Patent Claims.—*The number of patents issued weekly having become so great, with a probability of a continual increase, has decided us to publish, in future, other and more interesting matter in place of the Claims. The Claims have occupied from three to four pages a week, and are believed to be of interest to only a comparative few of our readers. The publication of the names of patentees, and title of their inventions, will be continued; and, also, as heretofore, a brief description of the most important inventions. We have made such arrangements that we are not only prepared to furnish copies of Claims, but full Specifications at the annexed prices:*

For copy of Claim of any Patent issued within 30 years $1

A sketch from the model or drawing, relating to such portion of a machine as the Claim covers, from .... $1 *upward, but usually at the price above named.*

The full Specification of any patent issued since Nov. 20, 1866, at which time the Patent Office commenced printing them .... $1·25

Official Copies of Drawings of any patent issued since 1836, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.

Full information, as to price of drawings, in each case, may be had by addressing

MUNN & CO.,
Patent Solicitors, No. 37 *Park Row, New York.*

86,623.—CUTTING STONE.—John R. Abbe, Providence, R. I.

86,624.—RAILWAY SIGNAL.—Jas. D. Akley, Mifflin, and F. P. Coggeshall, Patterson, Pa.

86,625.—DRYER.—Charles E. Ashcroft, Boston, Mass.

86,626.—CAN OPENER.—Richard H. Atwell, Baltimore, Md.

86,627.—Machine for Attaching Labels to Spools.—Q. S. Backus (assignor to himself, Sidney Fairbanks, and Orlando Mason), Winchendon, Mass.
86,628.—Blind Fastener.—Jas. M. Barnaby, West Harwich, Mass.
86,629.—Die for Bending Equalizing Bars.—A. E. Barnard, Akron, Ohio.
86,630.—Device for Opening and Closing Window Blinds.—Elias Bascom, New York city.
86,631.—Railway Curve.—Vertot D. Beach, Battle Creek, Mich.
86,632.—Sewing Machine for Sewing Leather.—Edwin E. Bean, Boston, assignor to David Whittemore, North Bridgewater, Mass.
86,633.—Machinery for the Manufacture of Bricks.—Benj. D. Berry, Edwardsville, Ill., assignor to Lauven C. Woodruff, Buffalo, N. Y.
86,634.—Cord-Tightener for Curtains.—Wm. H. Betts, Brooklyn, N. Y.
86,635.—Fire Kindling.—Ira Bicknell, Cincinnati, Ohio.
86,636.—Compound for Removing Silver Stains.—Victor G. Bloede, Brooklyn, N. Y.
86,637.—Combined Blade-Case and Attaching Pin.—W. L. Bowser, Moncton, New Brunswick.
86,638.—Inhaler for Medical Purposes.—John P. Brower, Syracuse, N. Y.
86,639.—Composition for Enameling Paper, Cloth, Card-Board, etc.—Morgan W. Brown, New York city. Antedated Jan. 23, 1869.
86,640.—Apparatus for Imparting Artificial Age to Wine and Spirits.—Samuel C. Bruce, New York city.
86,641.—Latch.—Henry Budd and Samuel W. Budd, Philadelphia, Pa.
86,642.—Braiding Machine.—James D. Butler, Lancaster, Mass.
86,643.—Beehive.—James Alexander Cameron, Memphis, Tenn.
86,644.—Settee Frame.—T. J. Close, Philadelphia, Pa.
86,645.—Forcing Pump.—Nicholas Clute, Schenectady, N. Y.
86,646.—Head Light.—E. Hall Covel, New York city.
86,647.—Needle Threader.—Oliver Cox, Alexandria, Va
86,648.—Wagon-Brake Block.—Heman Crowell, Washington Corners, Cal.
86,649.—Apple Sauce.—A. R. Davis, Cambridge, Mass.
86,650.—Steam-Engine Slide Valve.—A. J. Davis, and Jno. McGill, Pittsburgh, Pa.
86,651.—Loom for Weaving Pile Fabrics.—E. K. Davis, New York city.
86,652.—Flexible Hose.—James Davis, Pawtucket, R. I.
86,653.—Razor Strap.—A. D. Ditmars, Lancaster, Pa.
86,654.—Steam Press.—Wm. Dobbins (assignor to himself and John J. Crawford, Lowell, Mass.
83,655.—Mold for Casting Sleigh Shoes.—Jno. W. Dryer, Macedon, N. Y.
86,656.—Horse Power.—John A. Eberly, Jacob Lutz, and Henry Becker, East Cocalico township, Pa.
86,657.—Knife.—J. Olden Ely, Philadelphia, Pa.
86,658.—Gate-Hinge.—Jerome B. Farmer, Indianapolis, Ind.
86,659.—Wagon Brake.—Gilbert Gibbs, Fairview, Ind.
86,660.—Lamp Chimney.—Wm. T. Gillinder (assignor to himself and Edwin Bennett), Philadelphia, Pa.
86,661.—Horse Hay Fork.—Benjamin F. Gladding, Providence, R. I.
86,662.—Bridle for Preventing Horses form Kicking.—D. V. Grace and J. S. Elliott, Coshocton, Ohio.
86,663.—Ventilating Houses, Halls, etc.—Wm. C. Grimes, Philadelphia, Pa.
86,664.—Brick.—John Grimm, Cuyahoga Falls, Ohio.
86,665.—Clothes Dryer.—Asher M. Gurley, Waterville, N.Y.
86,666.—Apparatus for Drying Paper.—A. E. Harding (assignor to Harding, Erwin, and Company), Middletown, Ohio.
86,667.—Torch and Fire Kindler.—A. T. Harrison (assignor to himself, Wm. P. Hunt and Geo. Estabrook), Clinton, Ill.
86,668.—Shuttle Guide for Looms.—Wm. A. Hastings, Palmer, Mass.
86,669.—Meat Cutter.—Jacob Hetzel and S. H. Hager, Miamisburg, Ohio.
86,670.—Inkstand.—Gibbons G. Hickman, Coatesville, Pa.
86,671.—Cooking Stove.—Michael Holdener, Belleville, Ill.
86,672.—Varnish.—Wm. Hopson, South Malden, Mass.
86,673.—Car Coupling.—Henry R. Howe, Hartwick, N. Y.
86,674.—Countersink.—L. H. Hunt, Rockingham, Vt., assignor to himself and N. G. Manson, Jr., Cambridgeport, Mass.
86,675.—Feed Regulator for Bark Mills.—Benjamin Irving, New York city, assignor by mesne assignment, to South Boston, Iron Company.
86,676.—Apparatus for Towing Vessels.—Jas. M. Kilner, 3 Saltney Road, Chester, England.
86,677.—Apparatus for Confining Horse Powers.—Richard Knott, Suisun, Cal.
86,678.—Excavator.—Joel Lee, Galesburg, Ill.
86,679.—Axle-Box.—J. Stone Lister, Philadelphia, Pa.
86,680.—Newspaper Addressing Machine.—C. K. Marshall, New Orleans, La. Antedated Jan. 29, 1869.
86,681.—Machine for Cutting Grape-Vines.—L. W. Mayer, Sonoma, Cal.
86,682.—Velocipede.—Chas. H. Miller and George Ellis, Cincinnati, Ohio.
86,683.—Attaching Knobs to their Spindles.—W. T. Munger, Branford, assignor to P. and F. Corbin, New Britain, Conn.,
86,684.—Feeder for Threshing Machines.—Wm. Ostermeyer, Kane, Ill.
86,685.—Running Gear for Railroad Cars.—J. R. Perry, D. W. Perry, and James Perry, of Wilkesbarre, Pa. Antedated Aug 10, 1868.
86,686.—Shutter Fastener.—John H. Peterson, Philadelphia, Pa., assignor to himself J. R. Tobin, and Houston Smith, Jr.
86,687.—Grain Separator.—A. W. Powers, Barrington, Ill., assignor to H. W. Crabtree, and John C. Wiltsie.
86,688.—Shuttle-Binder for Looms.—Ephraim Prentice, Wauregan, Conn.
86,689.—Window-Sash Supporter.—Asa H. Read, Factoryville, Pa.
86,690.—Breech-Loading Firearm.—Samuel Remington, Ilion, N. Y.
86,691.—Torpedo for Oil Wells.—E. A. L. Roberts, Titusville, Pa.
86,692.—Mechanical Movement.—Edwin O. Rood, Lodi, Ill.
86,693.—Carriage Axle.—J. A. C. Ruffner (assignor to himself and Wm. N. Prothero), Hillsdale, Pa.
86,694.—Lamp Burner.—Datus E. Rugg, Sing Sing, assignor to himself and A. C. Kuck, Brooklyn, N. Y. Antedated Jan. 25, 1869.
86,695.—Sewing Machine for Sewing Leather.—Wm. W. Russell, Tepic, Mexico.
86,696.—Top-Iron and Prop for Carriages.—C. W. Saladee and Wm. Bauder, Circleville, Ohio.
86,697.—Top-Iron and Prop for Carriages.—C. W. Saladee and Wm. Bauder, Circleville, Ohio.
86,698.—Slop-Pail Lid.—Wm. B. Sawyer, New York city.
86,699.—Apparatus for Supporting Skaters and Invalids.—P. I. Schopp, Louisville, Ky.
86,700.—Liquid Measuring and Registering Faucet.—E. W. Scott, Wauregan, Conn.
86,701.—Preserving Nitro-Glycerin, etc.—T. P. Shaffner, Louisville, Ky.
86,702.—Composition for Cleaning Painted Surfaces.—Benj. F. Shaw, Peabody, Mass.
86,703.—Elevator.—Adam Shoemaker and John R. Gearhart, Marion, Pa.
86,704.—Cotton Scraper.—J. C. Smith, Helena, Ark.
86,705.—Steam Water Elevator.—George T. Snowden, and I. V. Lynn, Pittsburgh, assignors to themselves and Thomas Snowden, Brownsville, Pa.
86,706.—Fastening for Carriage Curtains.—James H. Spencer, Philadelphia, Pa.
86,707.—Threshing Machine.—Isaac Starr, Prairieville, Mich.
86,708.—Draft Equalizer.—Isaac Starr, Prairieville, Mich.
86,709.—Carriage Wheel.—C. S. Stearns (assignor to himself and C. F. Davis, Marlborough, Mass.
86,710.—Composition for Moldings.—Joseph Thiem and Wilhelm Thiem, Lawrenceburg, Ind.
86,711.—Fluting and Puffing Iron.—Amanda M. Thorne Syracuse, N. Y.

86,712.—Paper File.—Jacob P. Tirrell, Charlestown, and S. G. Brett, Somerville, Mass., assignors to themselves, M. S. Marshall, and Hiram Whitney; and said J. P. Tirrell assignor to Hiram Whitney; and said Brett assignor to M. S. Marshall.
86,713.—Volute Spring.—Joseph Trent, Millerton, N. Y.
86,714.—Carpet Rod.—Hyppolite Uhry, New York city.
86,715.—Stair Rod.—H. Uhry, New York city.
86,716.—Stair Rod.—H. Uhry, New York city.
86,717.—Horse Rake.—Moses M. Ward (assignor to himself, Benj. S. Grant, and Thomas Hersey), Bangor, Me.
86,718.—Toy Row-Boat.—Nathan S. Warner, Bridgeport, Conn.
86,719.—Regulator for Drawing Frames.—S. J. Whitton, Coleraine, assignor to G. and W. F. Draper, Milford, Mass.
86,720.—Gun Carriage.—G. R. Wilson (assignor to himself, Wm. Fitch, H. M. Valle, and Chas. E. Rittenhouse), Washington, D. C.
86,721.—Bottle-Filling Machine.—James Alcorn, Charlestown, Mass.
86,722.—Finger-Exercising Apparatus.—Arthur C. Armengol, New York city.
86,723.—Magazine Firearm.—S. G. Bayes, Wauseon, Ohio.
86,724.—Screw Driver Handle.—Eli S. Bitner, Lock Haven, Pa.
86,725.—Uterine Supporter.—R. D. Bogert, Nanuet, N. Y.
86,726.—Rivet.—Edward Bourne, Pittsburgh, Pa.
86,727.—Heat-Retaining Pail.—John C. Brain, Brooklyn, N. Y.
86,728.—Carpet Stretcher.—Wm. Brown, New York city.
86,729.—Beehive.—R. P. Buttles, Mansfield, Pa.
86,730.—Harvester Dropper.—Jarvis Case, Lafayette, Ind.
86,731.—Sulky Harrow.—Jas. E. Cheasebro, Marilla, N. Y.
86,732.—Brick Machine.—Peter Clark, Brooklyn, N. Y. Antedated Jan. 30, 1869.
86,733.—Method for Growing Fruit Annually.—Francis Clymer, Galion, Ohio.
86,734.—Machine for Hackling Shucks for Mattresses.—David A. Cole, Nashville, Tenn.
86,735.—Stopping Mechanism for Looms.—Geo. Crompton, Worcester, Mass.
86,736.—Sheep-Shearing Table.—Jas. E. Daniels, Pleasant Prairie, Wis., assignor to himself, H. H. Doolittle, and N. D. Edwards.
86,737.—Propelling Vessels on Canals.—Baron Oscar de Mesnil, Brussels, Belgium, and Max Eyth, Stuttgart, Wurtemberg.
86,738.—Velocipede.—W. Denovan, Philadelphia, Pa.
86,739.—Breech-Loading Firearm.—J. M. Deprez, Liege, Belgium.
86,740.—Sash Clamp.—E. F. Dunaway, Cincinnati, Ohio.
86,741.—Box Scraper.—Wm. Dutton, Boston, Mass.
86,742.—Metallic Protector or Shield for Traveling Bags.—F. Fischbeck, Chicago, Ill.
86,743.—Threshing Machine.—M. Fuos, Castroville, Texas.
86,744.—Ottoman.—A. O. Ganiard and E. G. Ganiard, New York city.
86,745.—Bag Tie.—L. H. Gano, New York city.
86,746.—Threshing Machine.—J. W. Garver and C. A. Bikle, Hagerstown, Md.
86,747.—Soft Pedal Attachment for Pianofortes.—J. Greener, Elmira, N. Y.
86,748.—Machine for Cutting Tobacco Plugs.—Peter M. Guerrant and Peter M. Rowlett, New Concord, Ky.
86,749.—Globe Valve.—H. H. Hendrick, Dayton, Ohio.
86,750.—Cultivator.—T. Hicks, Pacatonica, Ill.
86,751.—Stem-Winding Watch.—Vitalis Himmer, Brooklyn, N. Y.
86,752.—Dough Box for Cake Machines.—D. M. Holmes, Williamsburg, N. Y.
86,753.—Mode of Attaching Erasers to Pencils.—G. L. Holt, Springfield, Mass.
86,754.—Process of Extracting Copper from its Ores.—T. S. Hunt, Montreal, and J. Douglas, Jr., Quebec, Canada.
86,755.—Manufacture of Machine Belting.—G. Hurn and D. Hurn, London, England.
86,756.—Hames Fastener.—J. V. Hutschler, Keyport, N. J.
83,757.—Needle Wrapper.—C. Bartleet James, Redditch, England.
86,758.—Process for Drying and Renovating Grain.—G. H. Johnson and G. Milsom, Buffalo, N. Y.
86,769.—Handle for Casks.—J. L. Jones, Utica, N. Y.
86,760.—Sail Bender.—H. W. Ketcham, New York city.
86,761.—Oil Cup for Adjustable Boxes.—C. C. Klein, Philadelphia, Pa.
86,762.—Nursing Bottle.—A. M. Knapp, Racine, Wis.
86,763.—Paging and Numbering Machine.—P. Koch and Gottlob Schule, New York city.
86,764.—Machine for Trimming the Ends of Cigars.—P. A. La France, Elmira, N. Y., assignor to himself and H. R. Kendall.
86,765.—Beehive.—A. S. Layton, Yellville, Ark.
86,766.—Ventilator.—John Lesperance, St. Louis, Mo.
86,767.—Fire Kindler.—J. W. Lowe, Ottumwa, Iowa.
86,768.—Rotary Harrow.—S. Lubolt and J. Trout, Lykens, Pa.
86,769.—Needle.—W. H. Marriott, Baltimore, Md.
86,770.—Carriage Brake.—M. S. Marshall, Somerville, and J. G. Bicknell, Cambridge, Mass., assignors to themselves, J. T. Folsom and J. S. Folsom; said Marshall assignor to said J. T. and J. S. Folsom.
86,771.—Envelope.—J. S. Martin, Atlanta, Ga.
86,772.—Carriage Wheel.—W. S. Mayo, New York city.
86,773.—Sash Lock.—W. L. McKibbin, Buck Valley, Pa.
86,774.—Harvester.—Wm. Michael, Murrysville, Pa.
86,775.—Horse Hay Fork.—S. Miller, Mohawk, N. Y.
86,776.—Cultivator and Seed Planter.—D. B. Morgan (assignor to himself and M. Gilmore), Washington, Ohio.
86,777.—Hay Spreader.—M. D. Myers, Frankfort, N. Y. Antedated August 29, 1868.
86,778.—Trunk Lock.—J. Nock, Washington, D. C.
86,779.—Manufacturing Counters for Boots and Shoes.—S. C. Phinney (assignor to himself and John G. Phinney), Stoughton, Mass.
86,780.—Railroad Car Ventilator.—Wm. M. Russell and D. E. Holmes, Cincinnati, Ohio.
86,781.—Game Counter.—E. Schellhorn, Urbanna, Ohio. Antedated February 1, 1869.
86,782.—Soda Fountain.—A. D. Schnackenberg and Otto Rosenkranz, Brooklyn, N. Y., assignors to A. D. Schnackenberg.
86,783.—Meat Chopper.—F. G. Siemers, Winona, Minn.
86,784.—Coating and Water-Proofing Woven Fabrics.—H. F. Smith, London, assignor to J. Buckingham, Walworth, England.
86,785.—Cooking Range.—W. Steffe (assignor to himself and J. Reynolds), Philadelphia, Pa.
86,786.—Fishing Tackle.—F. Tellgmann, Stamford, Conn.
86,787.—Velocipede.—A. D. Thompson and J. Marden, Jr., Baltimore, Md.
86,788.—Glue Pot.—J. Tinney, Westfield, N. Y.
86,789.—Molders' Riddle.—J. C. Ward and Joseph Hudson, Peekskill, N. Y.
86,790.—Railroad Car Stove.—A. A. Wheelock, Washington, D. C.
86,791.—Baking Dish.—H. C. Wilcox (assignor to the Meriden Britannia Company), West Meriden, Conn.
86,792.—Sash Fastener.—T. O. Wilson, Fisherville, N. H.
86,793.—Manufacture of Gas from Petroleum.—G. W. Wren (assignor to U. E. Wren), Brooklyn, N. Y.
86,794.—Cultivator.—G. W. Zeigler, Maumee City, Ohio.
86,795.—Cupola and other Melting and Smelting Furnaces.—J. Absterdam, New York city.
86,796.—Construction of Converters and Furnaces for Treating Iron and other Metals.—J. Absterdam, New York city.
86,797.—Guard for Door Keys.—H. A. Adams (assignor to himself and G. E. Hill), New York city.
86,798.—Manufacture of Saddle Cloths.—R. Allison, New York city.
86,799.—Composition for Pavements, Sidewalks, etc.—A. G. Anderson, Hoboken, N. J., assignor of one-half of said invention to E. W. Ranney.
86,800.—Pocket Knife and Door Fastener.—J. Armstrong, Bucyrus, and O. Dame, Wyandot county, Ohio.
86,801.—Composition for Refining and Carbonizing Iron.—J. E. Atwood, Trenton, N. J.
86,802.—Handle for Taps, Augers, Drills, etc.—William Baxter, Newark, N. J., assignor to himself and W. D. Russell.

86,803.—Apparatus for Extracting Essences, etc.—G. Bantz, Frederick, Md.
86,804.—Pump.—John Bean, Hudson, Mich.
86,805.—Power Loom.—Erastus B. Bigelow, Boston, Mass.
86,806.—Loom for Weaving Ingrain Carpets.—Erastus B. Bigelow, Boston, Mass.
86,807.—Wagon-Tongue Support.—F. Bremerman, Indianapolis, Ind.
86,808.—Compound for Preserving Wood, Leather, etc.—J. P. Bridge, Boston, Mass.
86,809.—Ventilator.—B. J. Burnett, Mount Vernon, N. Y.
86,810.—Curtain Fixture.—R. Cassady, Newport, N. J.
86,811.—Whiffle-Tree Plate.—J. B. Clark, Meriden, Conn. Antedated Feb. 1, 1869.
86,812.—Horse Collar.—J. Cogan, Cambridge, Mass.
86,813.—Propeller.—C. Cole, San Francisco, Cal. (Suspended.)
86,814.—Toy Carriage.—J. Condell and A. Condell, Plainville, Conn. Antedated Feb. 3, 1869.
86,815.—Door Spring.—J. M. Connel, Newark, Ohio.
86,816.—Bottle Filler and Corker.—T. W. Cowey, Canonsburg, Pa.
86,817.—Polishing Needles.—C. O. Crosby, New Haven, Conn.
86,818.—Polishing Needles.—C. O. Crosby, New Haven, Conn.
86,819.—Machine for Scouring Needles.—C. O. Crosby, New Haven, Conn. Antedated Feb. 3, 1869.
86,820.—Mode of Constructing Bed Lounges.—Edward P. Curtiss and H. H. Hendee, Buffalo, N. Y.
86,821.—Well Tube.—D. A. Danforth, Elkhart, Ind.
86,822.—Trace Buckle.—E. S. Dawson, Syracuse, N. Y.
86,823.—Liquid Meter.—G. W. Devoe, New York city.
86,824.—Shade Holder.—G. H. Dimond, G. Doolittle, and T. B. Doolittle, Bridgeport, Conn., assignors to G. H. Dimond, G. Doolittle, and T. Wallace, Jr.
86,825.—Lamp Shade.—G. H. Dimond and George Doolittle, Bridgeport, Conn.
86,826.—Mechanical Movement.—A. Duvall, Baltimore, Md.
86,827.—Rubber Boot.—L. Elliott, Jr. (assignor to L. Candee and Company), New Haven, Conn.
86,828.—Cant Hook.—J. E. Emerson, Trenton, N. J.
86,829.—Compound Scale For Tailors' Use.—A. H. Flores, New York city.
86,830.—Machine for Making Carpet Lining.—J. Foster, Jr., Camden, N. J., and F. J. Dill, Foxborough, Mass.
86,831.—Horse Hay Fork.—D. G. S. Gochnauer, Mulberry, Pa.
86,832.—Boot and Shoe Nail.—B. D. Godfrey, Milford, Mass.
86,833.—Treadle for Operating Machinery.—W. S. Hall, Quincy, Mass.
86,834.—Velocipede.—Wm. Hanlon (assignor to George, Alfred, Edward, and Frederick Hanlon), New York city.
86,835.—Manufacture of White Lead, and Puification of the Products of Combustion for the Same.—H. Hannen (assignor to himself, Thomas Woods, and B. F. Pine), Philadelphia, Pa. Antedated Feb. 1, 1869.
86,836.—Compound for Ornamental Painting, Graining, etc.—B. S. Harrington, Pontiac, Mich., assignor to himself, C. S. Green, J. D. Shults, and M. S. Angell.
86,837.—Saw Gage.—A. E. Hoffmann, Philadelphia, Pa.
86,838.—Fire Kindler.—Henry K. Horton, Winfield, Mich.
86,839.—Plow.—Albert P. Ingalls (assignor to himself and James W. Cheney), Shelbyville, Ill.
86,840.—Dryer.—C. Kaibel, Sacramento City, Cal.
86,841.—Compound for Coating Textile Fabrics for Manufacturing Hats and Bonnets, and for Other Purposes.—John L. Kendall, Foxborough, Mass., and Richard H. Trested, Jamaica, N. Y.
86,842.—Stump Extractor.—T. B. Kirby, Flowerfield, Mich.
86,843.—Glue Cement.—Samuel Krewson, Springfield, Ohio.
86,844.—Safety Watch Key.—Perley Laflin, Warren, Mass., assignor to himself and John J. Sprague, Providence, R. I.
86,845.—Safety Clock Key.—Perley Laflin, Warren, Mass., assignor to himself and John J. Sprague, Providence, R. I.
86,846.—Horse Hoe.—N. H. Lindley, Bridgeport, Conn.
86,847.—Carriage Shackle.—John Low, New Britain, Conn.
86,848.—Sewing Machine.—T. A. Macaulay, Florence, Mass.
86,849.—Construction of Teapots.—E. B. Manning, Middletown, Conn.
86,850.—Saw.—Gottlieb Maulick (assignor to himself and Thomas P. Marshall), Trenton, N. J.
86,851.—Molding Plane.—A. W. Maxwell, Milton, Pa
86,852.—Back Band Hook.—Wm. McKerahan (assignor to Samuel Reynolds), Allegheny City, Pa.
86,853.—Brick Machine.—John McManus, Pittsburgh, Pa.
86,854.—Cooking Stove.—Mary Mellinger, Upper Leacock township, Pa.
86,855.—Horse Rake.—Abraham Miller, Hagerstown, Md., assignor to himself, William H. Protzman, William Updegraff, and A. R. Appleman.
86,856.—Velocipede.—Joshua Monroe, New York city.
86,857.—Calk for Boots.—Herman Myer, Derby, Conn.
86,858.—Engine for Making Paper Pulp.—Wm. Parkison, Monongahela City, Pa.
86,859.—Manufacture of Iron and Steel.—Orville M. Phillips, New York city.
86,860.—Apparatus for Obtaining Cream from Milk.—Andrew Pope, Randolph, N. Y.
86,861.—Beer Faucet.—A. D. Puffer, Somerville, Mass.
86,862.—Grate Bar.—Wm. Randall, Salem, Mass.
86,863.—Spring Draft Link.—Benjamin Richards, North Industry, Ohio.
86,864.—Ornamfnt for Jewelry, etc.—Celius E. Richards, North Attleborough, Mass.
86,865.—Sash Elevator and Fastener.—Bartholomew Roy, St. Clair, Mich
86,866.—Gearing for Carriages.—Cyrus W. Saladee, Circleville, Ohio.
86,867.—Lamp.—John F. Sanford, Keokuk, Iowa.
86,868.—Lamp Wick Trimmer.—John F. Sanford, Keokuk, Iowa.
86,869.—Lamp Burner.—John F. Sanford, Keokuk, Iowa.
86,870.—Vapor Burner.—Herrman S. Saroni, Chicago, Ill.
86,871.—Hydrocarbon Burner.—Clement Sauvage, Paris, France.
86,872.—Machine for Weaving Hair for Wigs, etc.—Lydia A. Seago, Jerseyville, Ill.
86,873.—Compound for Destroying Insects.—Philo B. Sheldon, Bath, N. Y.
86,874.—Railway Rail Chair.—O. L. Shepherd, United States Army.
86,875.—Bronzing Machine.—Henry Skidmore, Mount Vernon, N. Y.
86,876.—Alarm Bell.—C. A. Slack, Frenchtown, N. J.
86,877.—Thill Coupling.—C. A. Slack, Frenchtown, N. J.
86,878.—Car Wheel.—John Y. Smith, Pittsburgh, Pa.
86,879.—Garden Cultivator.—Wm. S. Spratt (assignor to himself and W. T. Jaquith), Allegheny City, Pa.
86,880.—Drill Stock.—Edward A. Stockton, San Francisco, Cal.
86,881.—Manufacture of Sulphuric Acid.—A. H. Tait, New York city.
86,882.—Horn Tip for Cattle.—J. C. Thompson, Charlestown, Mass.
86,883.—Sawing Machine.—Alfred W. Townsend Washington, D. C.
86,884.—Stair Rod.—H. Uhry, New York city.
86,885.—Car Brake and Starter.—A. B. Vandemark, Phelps, N. Y.
86,886.—Fruit Box.—Jonathan Vincent (assignor to himself, Walter Shaw, and Selden D. Redman), Newfane, N. Y.
88,887.—Sash Holder.—Felix Walker, New Orleans, La.
86,888.—Clothes Pin.—Felix Walker, New Orleans, La.
86,889.—Attaching Handles to Saws.—John Walwork, Philadelphia, Pa.
86,890.—Vent Plug.—George Weaver and Horatio N. Allen, Boston, Mass., assignors to themselves and E. R. Cheney.
86,891.—Chimney Cowl.—John W. Whiting and Charles E. Whittemore, Bay City, Mich.
86,892.—Bedstead.—Daniel Witt, Hubbardstown, Mass.

86,893.—Combined Breaker and Leveler.—Daniel Witt, Hubbardstown, Mass.

86,894.—Ice Creeper.—David Cumming, Philadelphia, Pa.

86,895.—Quilting Frame and Clothes Dryer.—John G. Ishler, Martinsville, Ill.

REISSUES.

55,087.—Cement Roofing Fabric.—Dated May 29, 1866; reissue 3,287.—Wm. Green, Cleveland, Ohio.

53,140.—Roofing Cement, Paint, etc.—Dated March 13, 1866; reissue 3,288.—Wm. Green, Cleveland, Ohio.

38,744.—Cooking Stove.—Dated June 2, 1863; reissue 3,289.—George P. Hopkins, Albion, N. Y.

19,933.—Rolling Taper Bars of Iron.—Dated April 13, 1858; reissue 3,290.—Charles Parker, Meriden, Conn., assignee, by mesne assignments, of John A. Bailey.

9,611.—Book for Photographs and Other Pictures.—Dated March 8, 1853; extended seven years; reissue 3,291.—Eliza Mascher, Philadelphia, Pa., administratrix of the estate of John F. Mascher, deceased.

43,202.—Iron Bridge.—Dated June 21, 1864; reissue 2,701, dated July 30, 1867; reissue 3,292.—David Hammond and W. R. Reeves, Canton, Ohio.

73,806.—Skating Rink.—Dated January 28, 1868; reissue 3,293.—I. H. A. Hervey, Cleveland, Ohio.

44,382.—Nail for Leather Work.—Dated September 27, 1864; reissue 3,294.—Gordon McKay, Boston, Mass., trustee of the McKay Sewing Machine Company, assignee of Stephen W. Baldwin.

64,175.—Spring Bed Bottom.—Dated April 23, 1867; reissue 3,295.—Dexter P. Webster and Herman W. Ladd, Boston, Mass.

69,738.—Concrete Pavement.—Dated October 8, 1867; antedated July 30, 1867; reissue 3,296.—Russell Fisk, New York city.

79,654.—Velocipede.—Dated July 7, 1868; reissue 3,297.—William Hanlon and Edward Hanlon, New York city, assignees of George, William, Alfred, Edward, and Frederick Hanlon.

DESIGNS.

3,357 and 3,358.—Top or Bottom of a Sheet-metal Can.—Charles Pratt, New York city. Two Patents.

3,359.—Top of a Sheet-metal Can.—Charles Pratt, New York city.

3,360.—Carpet Pattern.—James Allinson (assignor to John Bromley, James Bromley, Thomas Bromley, George D. Bromley, and John H. Bromley), Philadelphia, Pa.

3,361.—Trade Mark.—Taylor Blow, St. Louis, Mo.

3,362.—Bustle.—Spencer H. Brown and Charles H. Willets, New York city.

3,363.—Canceling and Embossing Stamp.—Robt. B. Carsley, Boston, Mass.

3,364.—Group of Statuary.—John Rogers, New York city.

3,365.—Corner of Sheet Metal Can.—Conrad Seimel, Greenpoint, assignor to Charles Pratt, New York city.

3,366.—Trade Mark.—Taliaferro P. Shaffner, Louisville, Ky.

EXTENSIONS.

Machines for Making Weavers' Harness.—Joseph S. Winsor, Providence, R. I.—Letters Patent No. 12,175, dated Jan. 2, 1855.

Machine for Cutting Boot and Shoe Soles.—Jesse W. Hatch and Henry Churchill, Rochester, N. Y.—Letters Patent No. 12,128, dated January 2, 1855; reissue No. 2,321, dated July 24, 1866.

Machine for Blowing Blasts, etc.—P. W. Mackenzie, Orangeville, N. Y.—Letters Patent No. 12,165, dated January 2, 1855.

Grain Harvesterr.—Fanny Holmes, Whitehall, N. Y. executrix of John E. Newcomb, deceased.—Letters Patent No. 12,215, dated January 9, 1855.

Operating Slide Valves in Direct-action Engines.—George W. Hubbard and William E. Conart, New York city.—Letters Patent No. 12,203, dated January 9, 1855; reissue No. 2,359, dated September 18, 1866.

Building Block.—Ambrose Foster, Lauraville, Md.—Letters Patent No. 12,264, dated January 16, 1855.

Corn Planter.—Jarvis Case, Lafayette, Ind.—Letters Patent No. 12,231, dated January 16, 1855; reissue No. 623, dated November 16, 1858; again reissued, No. 2,227, dated April 17, 1866.

Sewing Machine.—Jotham S. Conant, Hackensack, N. J.—Letters Patent No. 12,233, dated January 16, 1855; reissue No. 3,214, dated November 24, 1868.

Hay-making Machine.—George A. Brown, Middletown, R. I.—Letters Patent No. 12,269, dated January 23, 1855.

Rolling Iron Shutters.—Charles Mettam, New York city. Letters Patent No. 12,281, dated January 23, 1855.

PATENT OFFICES,
American and European,
OF
MUNN & CO.,
No. 37 Park Row, New York.

For a period of nearly twenty-five years Munn & Co. have occupied the position of leading Solicitors of American and European Patents, and during this extended experience of nearly a quarter of a century, they have examined not less than fifty thousand alleged new inventions, and have prosecuted upward of thirty thousand applications for patents, and, in addition to this, they have made at the Patent Office over twenty thousand Preliminary Examinations into the novelty of inventions, with a careful report on the same.

This wide experience has not been confined to any single class of inventions but has embraced the whole range of classification, such as Steam and Air Engines, Sewing Machines, Looms and Spinning Machinery, Textile Manufactures, Agriculture and Agricultural Implements, Builders' Hardware, Calorifics, Carriages, Chemical Processes, Civil Engineering, Brick Making, Compositions, Felting and Hat Making, Fine Arts, Fire-arms, Glass Manufacture, Grinding Mills, Harvesters, Household Furniture, Hydraulics and Pneumatics, Illumination, Leather Manufactures, Mechanical Engineering, Metallurgy, Metal Working, Navigation, Paper Making, Philosophical Instruments, Presses, Printing and Stationery, Railroads and Cars, Sports, Games, and Toys, Stone Working, Surgical Apparatus, Wearing Apparel, Wood Working.

Munn & Co. deem it safe to say that nearly one-third of the whole number of applications made for patents during the past fifteen years has passed through their Agency.

CONSULTATIONS AND OPINIONS FREE.

Those who have made inventions and desire to consult with us are cordially invited to do so. We shall be happy to see them in person, at our office, or to advise them by letter. In all cases they may expect from us an *honest opinion*. For such consultation, opinion, and advice, *we make no charge*. A pen-and-ink sketch and a description of the invention should be sent. Write plainly, do not use pencil or pale ink.

If a SPECIAL SEARCH at the Patent Office is required, which embraces a personal examination of all patented inventions and a report in writing, a fee of $5 is charged. This examination is only advised in doubtful cases.

To Apply for a Patent, a model must be furnished, not over a foot in any dimension. Send model to Munn & Co., 37 Park Row, New Yor , by express, charges paid, also a description of the improvement, and remit $16 to cover first Government fee, revenue and postage stamps.

The model should be neatly made of any suitable materials, strongly fastened, without glue, and neatly painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show, with clearness, the nature and operation of the improvement.

THE GREAT ADVANTAGES

OF MUNN & CO.'S AGENCY are that their practice has been ten-fold greater than any other Agency in existence, with the additional advantage of having the assistance of the best professional skill in very department, and a Branch Office at Washington, which watches and supervises all their cases as they pass through official examination. If a case is rejected for any cause, or objections made to a claim, the reasons are inquired into and communicated to the applicant, with sketches and explanations of the references; and should it appear that the reasons given are insufficient, the claims are prosecuted immediately and the rejection set aside and usually

WITHOUT EXTRA CHARGE.

Munn & Co. are determined to place within the reach of those who confide to them their business the highest professional skill and experience.

Caveats are desirable if an inventor is not fully prepared to apply for Patent. A Caveat affords protection for one year against the issue of a patent to another for the same invention. Caveat papers should be carefully prepared.

Reissues.—A patent, when discovered to be defective, may be reissued by the surrender of the original patent and the filing of amended papers This proceeding should be taken with great care.

Patents can be Extended.—All patents issued prior to 1861, and now in force, may be extended for a period of seven years upon the presentation of proper testimony. The extended term of a patent is frequently of much greater value than the first term, but an application for an extension, to be successful, must be carefully prepared. Munn & Co. have had a large experience in obtaining extensions, and are prepared to give reliable advice.

Interferences between pending applications before the Commissioners are managed and testimony taken; also Assignments, Agreements and Licenses prepared. In fact there is no branch of the Patent Business which Munn & Co. are not fully prepared to undertake and manage with fidelity and dispatch

Designs, Trade Marks, and Compositions can be patented for a term of years; also new medicines or medical compounds, and useful mixtures of all kinds.

When the invention consists of a medicine or compound, or a new article of manufacture, or a new composition, samples of the article must be furnished, neatly put up. Also, send us a full statement of the ingredients, proportions, mode of preparation, uses, and merits.

EUROPEAN PATENTS.

American inventors should bear in mind that, as a general rule, any invention that is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. Five Patents—American, English, French, Belgian and Prussian—will secure an inventor exclusive monoply to his discovery among ONE HUNDRED AND THIRTY MILLIONS of the most intelligent people in the world. The facilties of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. Munn & Co. have prepared and taken a larger number of European patents than any other American Agency. They have Agents of great experience in London, Paris, Berlin, and other cities.

For instructions concerning Foreign Patents, Reissues, Interferences, Hints on Selling Patents, Rules and Proceedings at the Patent Office, the Patent Laws, etc., see our Instruction Book. Sent free by mail on application. Those who receive more than one copy thereof will oblige by presenting it to their friends.

Address all communications to

MUNN & CO.,

No. 37 Park Row, New York City

Office in Washington, corner of F and 7th streets.

Schedule of Patent Office Fees:

On filing each Caveat	$10
On filing each application for a Patent, (seventeen years)	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the extension	$50
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)	$30

In addition to which there are some small revenue stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

Receipts.—When money is paid at the office for subscriptions, a receipt for it will be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgment of their funds.

City Subscribers.—The Scientific American will be delivered in every part of the city at $3·50 a year. Single copies for sale at all the News Stands in this city, Brooklyn, Jersey City, and Williamsburg, and by most of the News Dealers in the United States.

Advertisements.

The value of the Scientific American as an advertising medium cannot be over estimated. Its circulation is ten times greater than that of any similar journal now published. It goes into all the States and Territories, and is read in all the principal libraries and reading-rooms of the world. We invite the attention of those who wish to make their business known to the annexed rates. A business man wants something more than to see his advertisement in a printed newspaper. He wants circulation. If it is worth 25 cents per line to advertise in a paper of three thousand circulation, it is worth $2·50 per line to advertise in one of thirty thousand.

RATES OF ADVERTISING.

Back Page .... $1·00 *a line.*
Inside Page .... 75 *cents a line.*

Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.

100 Beautiful Photographs sent on receipt of 10c. Address N.Y. Picture Co., No. 69 Wall st. 9 4

FOR Sale Cheap.—Rights for Moody's Nat'l Wagon Jack. Address S. ELDREDGE, Harwich, Mass. 9 2*

RICH, RARE, RACY,—See Star Spangled Banner for March. $2 for 75c.

IRON PLANERS, SHAPERS, LATHES, SCREW MACHINES, etc., Manufactured by TWISS, PRATT & HAYES, New Haven, Ct., Send for circulars. 9 13

Agents and Canvassers

WANTED in every City and Town in the United States and Canada, for the
ARCHITECTURAL REVIEW
And American Builder's Journal.
BY SAMUEL SLOAN, Architect.
Subscription $6 per annum. Specimen numbers 50c.
Address CLAXTON, REMSEN & HAFFELFINGER, 819 and 821 Market st., Philadelphia.
9 3

R. BALL & CO., Worcester, Mass., Manufacturers of Woodworth's, Daniel's, and Dimension Planers; Molding, Matching, Tenoning, Mortising, Shaping, and Boring Machines; Scroll Saws, Re-Sawing, Hand Boring, Wood Turning Lathes and a variety of other Machines for Working Wood. Also, the best Patent Door, Hub, and Rail Car Mortising Machines in the world. ☞ Send four our Illustrated Catalogue.
RICHARD BALL. E. P. HALSTED.
1 tf

IMPROVEMENT in Window Shades, to admit of rolling from the upper or lower end at will. For Patent Rights address I. J. OLIVER, Jaysville, Ohio.

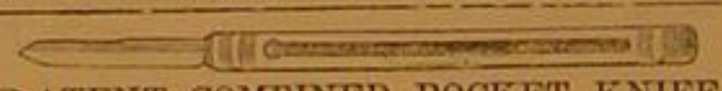
FOR SUPERIOR CORN SHELLERS address (the maker) C. KRATZ, Ag't, for every description of machinery, Evansville, Ind. 9 tf

BRUSH FACTORY FOR SALE—Situated in Newburyport, Mass. Every thing in complete order. Heated and run by steam. Terms easy. Price moderate. Address JOHN N. PIKE, Treasurer, Newburyport, Mass. 9 4*

"IT STILL WAVES."—That "Star Spangled Banner."

1869 ADDRESS, for CIRCULAR, 1869 ATWATER'S Patent COPIER, Providence, R. I., or Brooklyn, N. Y. It copies letters instantly and perfectly. Thousands use it and all approve it. Sent, postpaid, for $1. Agents Wanted. Wholesale Agent wanted in New Orleans.

DEAFNESS, CATARRH, SCROFULA SPECIALITY.—Cures legally guaranteed or money returned. By the Inventor of the Celebrated Patent Invisible Organic Vibrator for Incurable Deafness. Send 10c. for Treatise on Deafness, Catarrh, and Scrofula.
9 4 Dr. T. H. STILWELL, 198 Bleecker st., N. Y.



PATENT COMBINED POCKET KNIFE, Penholder, and Pen. Sample with prices sent by mail on receipt of 60 cents. Address L. F. Standish, Springfield, Mass. 9 2*

WANTED—To Dispose of One-Half or Whole Interest in an Invention that will Revolutionize the World, as much at least, as the Telegraph, has done. This is no humbug, but the most desirable and money-making invention of the age. For conditions and particulars address
1* E. PERIN, Laurel, Franklin Co., Ind.

U. S. Patent Office,
Washington, D. C., Jan. 29, 1869.

George W. Brown, of Galesburg, Ill., having petitioned for the extension of a patent granted him on the 8th day of May, 1855, reissued on the 10th of November, 1857, and again reissued on the 11th day of December, 1860, for an improvement in Seed Planters, it is ordered that said petition be heard at this office on the 19th day of April next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.
ELISHA FOOTE, Commissioner of Patents.

ONE HARRISON CAST-IRON BOILER, 16-Horse power; one Planer for Edges of Boat and Boiler plates; one Improved Ore and Quartz Crusher; one Second-hand 30-Horse Power Engine, for sale low by DENMEAD & SON, Baltimore, Md. 8 4

TO Match Manufacturers.—Prof. H. Dussauce, Chemist, is ready to furnish the most recent processes to manufacture every kind of matches and chemicals employed in the fabrication. Address New Lebanon, N.Y.

MONEY REFUNDED to every one not satisfied with the "STAR SPANGLED BANNER."

PAPER BAG Machines For Sale. Address B. S. BINNEY, 64 Kilby st., Boston. 4 26*

FOR LINSEED AND COTTON-SEED OIL Machinery address W. P. CALLAHAN, Dayton, O. 8 7*

STOCKS, DIES, AND SCREW PLATES, Horton's and other Chucks. JOHN ASHCROFT, 50 John st., New York. 3 tf

STEAM HAMMERS, TURN-TABLES, and Foundery Cranes. Address GREENLEAF & CO., Indianapolis, Ind. 14 tf

H. BOARDMAN, Lancaster, Pa.—Superior Patent Cork-cutting Machinery, Hard-laid Twine, Cord, and Rope Machinery, with Pat. Stop & Condenser. 6 9*

TOOL AND MODEL WORK.—Sample and Model Guns built. Fourteen years' experience on Gun Tools. Will Contract to Build Light Machines, or other Light Articles, Die Sinking etc. GEO. E. PARKER, 74 River st., Newark, N.J., near Center st. Depot.

PROTECT YOUR LIFE AND PROPERTY WITH A
FIRE EXTINGUISHER
Send for Circular. U. S. FIRE EX. CO., 8 Dey St., N. Y.
8 4

WOODWORTH PLANERS a SPECIALTY —From new patterns of the most approved style and workmanship. Wood-working Machinery generally. Nos. 24 and 26 Central, corner Union street, Worcester Mass. Warerooms, 89 Liberty street, N. Y. WITHERBY, RUGG & RICHARDSON. 3 tf

ANY ONE WANTING EITHER OF THE following can have them at a bargain, for cash:—One 100-Horse Power High Pressure Horizontal Steam Engine, 2d-hand. One 60 do. do., Woodruff & Beach Makers. One Muley Saw, Anderson's Pat., at half-price. Address WASHINGTON IRON WORKS, Newburgh, N. Y., or 57 Liberty st., New York city. 8 3

NEW WORK FOR STUDENTS.—ELEMENTS OF GEOMETRICAL OPTICS, by N. F. DUPUIS, A.M., Astronomical Observer to Queen's College, Kingston. It contains a concise yet comprehensive view of the elementary principles of Practical Optics. Illustrated with diagrams. Price, $1 25 free of postage. J. HENDERSON, Publisher, Kingston, Ontario. 8 2*

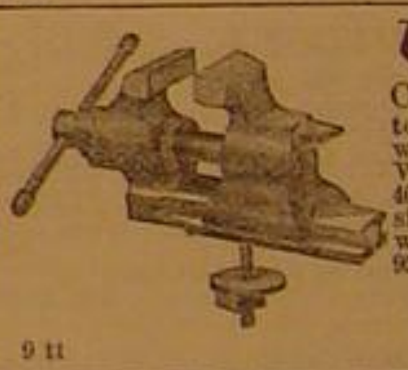
HUMBUGS EXPOSED.—See "Star Spangled Banner."

L. & J. W. FEUCHTWANGER
CHEMISTS AND IMPORTERS,
55 Cedar st., New York.

Soluble Glass, or Silicate of Soda, and Potash, in all forms. **Crude Materials** for Glass, Steel, and Porcelain Manufactures. **Best Manganese,** 94 per cent. Tungsten, Spiegeleisen, Feldspar, Flint, Fluoric Acid, Oxides, Cobalt, Antimony, Copper, Asbestos, Aluminum, Bloodstone, Blacklead, Zaffre, etc. The RAREST CHEMICAL PREPARATIONS made to order. 6 4

PAGE'S GREAT WATER FLAME COAL, Patented Lime Kiln will burn No. 1 finishing lime with any coal or wood, mixed or separate, in same kiln. Rights for sale by C. D. PAGE, Rochester, N. Y. 1 24*

AGENTS WANTED in every town to sell the celebrated CLIPPER Mowers & Reapers—Lightest draft and most durable Machines made. Send for circular. Clipper Mower & Reaper Co., 12 Cliff st., N. Y. 8 4



Union Vise

CO., 61 Water, st., Boston, Mass. Heavy and Pipe warranted for Heavy work Wood and Covered Screw 40 sizes. Milling Machines, simple, great capacity, weighing 2,800 1,600, and 950 lbs.
G. H. NOTT, President.
A. H. BRAINARD, Sup't.
9 tt

CURE FOR THE BLUES—"Star Spangled Banner."

Bolt Cutters.

SCHLENKER'S PATENT.—THE BEST AND CHEAPEST IN MARKET. The bolt revolves, is discharged without being run back, and a perfect clean cut is made with one passage. Complete Machines or Cutter Heads, which can be readily attached to other Machines, or the ordinary Lathe, constantly on hand. Taps furnished, and Price List, with references to first-class Machine Shops, on application. Address HOWARD IRON WORKS, Buffalo, N. Y. 8 13

Lucius W. Pond,

IRON and Wood-working Machinery, Machinist's Tools and Supplies, Shafting, Mill Gearing, and Jobbing. Also, Sole Manufacture of TAFT'S CELEBRATED PUNCHES AND SHEARS. (Works at Worcester, Mass.) 98 Liberty st., New York. 4 tf

Radial Drills

AND Machinists' Tools. For Cut and Description of Drill, see Scientific American, Vol. XIX. No. 25. R. H. BARR & CO., Wilmington, Del. 25 13*

FUN! WIT!! WISDOM!!! — "STAR SPANGLED BANNER." "It Still Waves."—A Splendid Parlor Engraving, "Past and Future," sent on roller to EVERY subscriber. The Banner is a large, eight-page, forty-column paper (Ledger size), overflowing with splendid reading, and ONLY 75c. FOR A WHOLE YEAR, and above elegant work of art (worth $2), free gratis. Now is the Time. Only 75 cents! MONEY RETURNED IF YOU ARE NOT SATISFIED. 1000 New Subscribers weekly. Send NOW. Look at partial contents of March number, mailed for 6 cents:—"Is there Room in Angel Land?" A bright idea; 41 tuns of Indigo; Who works the hardest? Steam engine Jokes; Clerical wit; Well played; Children and fools tell truth; A match; Irishman and fiddle; Rural innocence, Uncle's son; Borrowing trouble; Democracy and Aristocracy. Poetry—Waiting; Under the Snow; Little Brown Hands; How tastes differ; Signor Blitz and the Darkies (Funny). Our puzzle box; Pen and scissors; Things worth knowing; Prestidigitation; Take away your cocktail; Magic pictures; Courting in a sleeping car; Railroad Jokes; Election Jokes; Diamond cut diamon; Our chip basket (forty-one funny items); Literary notices; Correspondence — Humbugs exposed; Swindling advertisers; Humbug music boxes; Butter swindles; Humbug papers, etc., etc. 32 Answers to Correspondents; and 100 short articles, all in the "Star Spangled Banner" for March—NOW READY—ONLY 5c., 75c. a year, and the splendid engraving "PAST AND FUTURE," (usual price $2,) free and postpaid to every subscriber. Subscribe NOW—Only 75 cents—specimen free for 6c. Buy it of any newsdealer. Dealers supplied by Am. News Co., New York, and N. E. News Co., Boston. Send for it. Address STAR SPANGLED BANNER, Hinsdale, N. H.

LICENSED BY THE

UNITED STATES AUTHORITY.

S. C. THOMPSON & CO.'S GREAT

One Dollar Sale

OF Dry Goods, Dress Goods, Linens, Cottons, FANCY GOODS, Albums, Bibles, Silver-Plated Ware, Cutlery, Leather, and German Goods of every description, etc.

These articles to be sold at the uniform price of

ONE DOLLAR EACH,

and not to be paid for until you know what you are to receive.

The most popular and economical method of doing business in the country.

The goods we have for sale are described on printed slips, and will be sent to any address at the rate of 10c. each to pay for postage, printing, etc. It is then at the option of holders whether they will send one dollar for the article or not.

BY PATRONIZING THIS SALE you have a chance to exchange your goods, should the article mentioned on the printed slip not be desired.

The Smallest Article sold for ONE DOLLAR can be Exchanged for Silver-plated, Five-Bottled Revolving Castor, or your Choice of a large variety of other Articles upon Exchange List.

Comprising over 250 useful articles, not one of which could be bought at any retail country store for nearly double the amount.

TERMS TO AGENTS:

We send as Commission to Agents:—

For a Club of Thirty, and $3·00.

One of the following articles:—20 yards Cotton, Ladies' Fancy Square Wool Shawl, Lancaster Quilt, Accordeon, set of steel-bladed Knives and Forks, Violin and Bow, Fancy Dress Pattern, Pair Ladies' extra quality Cloth Boots, one doz. large size Linen Towels, Alhambra Quilt, Honeycomb Quilt, Cottage Clock, White Wool Blanket, 15 yds. best quality Print, 12 yds. Delaine, 1 doz. Linen Dinner Napkins, etc.

For a Club of Sixty, and $6·00,

One of the following articles:—42 yds. Sheeting, Pair Honeycomb Quilts, Cylinder Watch, 4 yds. double-width Water-proof Cloaking, Ladies' Double Wool Shawl, Lancaster Quilt, Alpacca Dress Pattern, Engraved Silver-Plated six-bottled Revolving Castor, set of Ivory-handled Knives, with Silver-plated Forks, Pair of All-wool Blankets, Pair of Alhambra Quilts, Thirty Yards Print, or a Marseilles Quilt, Double Eight-keyed Accordeon, Webster's National Pictorial Dictionary (600 engravings, 900 pages), 3½ yds. Doeskin for suit, etc.

For a Club of One Hundred, and $10·00,

65 yds. Sheeting, Fancy Cassimere Coat, Pants, and Vest Pattern, extra quality, Pair Splendid Rose Blankets, Fancy Plaid Wool Long Shawl, 25 yds. Hemp Carpeting, Splendid Violin and Bow, Splendid Alpacca Dress Pattern, Silver Hunting-cased Watch, Single-barrel Shot Gun, Sharp's Revolver, 1 pair Fine Damask Table Covers, with 1 doz. Dinner Napkins to match, Worcester's Illustrated Unabridged Dictionary, 1,800 pages, etc.

☞ For additional list of Commissions see circular. COMMISSIONS FOR LARGER CLUBS IN PROPORTION.

Agents will please take notice of this. Do not send names, but number your clubs from one upward. Make your letters short and plain as possible.

TAKE PARTICULAR NOTICE OF THIS:

☞ Be SURE and send money in ALL CASES by REGISTERED LETTER, which can be sent from any Post-office.

This way of sending money is preferred to any other method whatever.

We cannot be responsible for money lost, unless some precautions are taken to insure its safety.

SEND FOR CIRCULARS.

Send your address in full, Town, County, and State.

S. C. THOMPSON, & CO.,
9 4 136 Federal st., Boston, Mass.

YOU WANT IT?—That Star Spangled Banner.

Guns, Revolvers, etc.

Double-Barrel Shot-guns, $9 to $50; Single Shot-Guns, Men and Boys', $3 50 to $20; Musket Shot-Guns, using small caps, warranted to shoot shot close and kill 60 yards, $2 50; Fine Sporting Rifles, any size, $12 to $45. Pocket and Belt Revolvers, all sizes, $5 to $20. WANTED.—Second-hand Army or Navy Rifles, Carbines, Revolvers, etc. For priced catalogue send stamp to the GREAT WESTERN GUN WORKS, Pittsburgh, Pa. Liberal discount to Agents, Dealers, or Clubs. Terms, C. O. D. 8 4

CAMDEN

Tool and Tube Works,

Camden, N. J. Manufacturers of Wrought Iron Tube, Brass Work and Fittings, and all the most improved TOOLS for Screwing, Cutting, and Fitting Pipe. Screwing Machines for Pipe, of five different sizes. Pipe Tongs, Common and Adjustable; Pipe Cutters, Pipe Vises, Taps, Reamers, Drills, Screwing Stocks, and Solid Dies. Peace's Patent Screwing Stocks, with dies. No. 1 Screws ¼, ⅜, ½, ¾ Pipe. Price complete, $10. No. 2 Screws, 1, 1¼, 1½, 2 Pipe, $20. No. 3 both screws and cuts off, 2½, 3, 3½, 4, $65. 24 13*

$245 A MONTH. TO AGENTS. 49 New and Useful Articles. Address
6 4 JOHN J. HOWARD & CO., Alfred, Me.

FOR SALE—State Rights for Hyde's Patent Improved Elastic Joint Surcingle, the Best, Most Comfortable, and Cheapest Surcingle in use. For further particulars address or apply to S. HYDE & CO., 41 Wooster st., N. Y.

A BOOK THAT EVERYBODY SHOULD HAVE.

WELLS' EVERY MAN HIS OWN LAWYER, AND BUSINESS FORM BOOK,

Is a complete and reliable guide in all matters of law and business transactions for EVERY STATE IN THE UNION.

THE ENTIRE LEADING PRESS OF THE COUNTRY unqualifiedly indorse the work. We make a few short extracts from the press:

"The most implicit confidence can be placed upon the work as authority on all the subjects of which it treats."—Philadelphia Age.

"You can purchase in this book what may be worth hundreds of dollars to you."—St. Louis Dispatch.

"It contains just the kind of information every business man stands most in need of."—Sunday Mercury.

"Every man, no matter what his business may be, should have a copy."—Pittsburgh Dispatch.

"There is no better book of reference."—Phrenological Journal.

"The book is prepared to meet all the ordinary contingencies of business life, and it meets them clearly, distinctly, and well."—Round Table.

"It contains a vast amount of just such matter as every one ought to be acquainted with in the prosecution of all ordinary business."—N. Y. Christian Advocate.

"It is the best business guide ever published."—De Bow's Journal, St. Louis.

"Every one should have a copy."—N. Y. Eve. Post.

"It is invaluable."—Cincinnati Enquirer.

"Indispensable to every household."—Cincinnati Commercial.

"This work is worthy of the popularity it has acquired as a convenient and reliable manual."—N. Y. Herald.

The work is published 12mo size, 650 pages. Price in full leather binding, $2 50; in half library, $3. Sent post paid on receipt of price.

Good reliable agents wanted everywhere. They will find this the best selling book published. Liberal inducements given. Address

JOHN G. WELLS, Publisher,
432 Broome street, New York.

COUNTY RIGHTS.—Stove and Lamp Patents. $10 per 1000 inhabitants. 25 per cent cash required on amount sold. Address
8 2 ABEL WHITLOCK, Danbury, Conn.

FOR SALE—A Valuable Patent. To see it, call on, or, for particulars, address the undersigned, at Mill st. Pottery. Trenton, N. J. J. W. CORY.
8 4

VINEGAR FABRICATION.—Prof. H. Dussauce, Chemist, is ready to furnish the most recent European methods to manufacture vinegar by the slow and quick processes. Address New Lebanon, N. Y. 8 2

WOOD WORKING MACHINES.

Smith's Improved Woodworth Planer and Matcher, Sash and Door Molding, Mortising, and Tenoning Machines. Scroll Saws, Saw Mills, etc., at reduced prices. Address CHAS. H. SMITH, 135 North 3d st., Philadelphia, Pa.
23 13

LYMAN KINSLEY & CO.,
Cambridgeport, Mass.

Manufacturers of Steam Hammers, Belt Hammers, Rolling Mill Machinery, Power Shears, Cutting-off Machines, Heating Furnaces, Machinery, Wagon, and Car Axles, Forgings, Castings, etc., etc. 6 6

PORTABLE

GRINDING MILLS, MILLSTONES,

Bolting Cloth, Mill Machinery.

HOLMES & BLANCHARD
6 10 Boston.

HOW SHALL WE

Paint our Houses?

Ready Made Colors for Painting Exteriors of Country Houses.

THESE Paints require only to be thinned with Raw Linseed Oil to make them ready for use. The list includes forty shades and tints, comprising all the colors suitable for exterior painting. In durability and permanency of color they will be found superior in every respect to pure White Lead, while they cost (considering the quantity required) only about half as much. Sample Cards, with a descriptive pamphlet, sent free by mail. Be sure you get the genuine "**RAILROAD**" Colors, every package of which bears our full name, in addition to our copyrighted title, "**Railroad Paints and Railroad Colors.**" None are reliable which do not bear these marks.

We would call attention, also, to our **Warranted Perfectly Pure Combination White Lead,** which for economy and durability is the best in the market. For sale by **all Paint Dealers** throughout the country, or MASURY & WHITON,
111 Fulton st., New York.

Proprietors of the Globe White Lead and Color Works, Manufacturers of White Lead, Zinc, and Painters' Fine Colors.

N. B.—"How Shall we Paint?" A popular treatise on the art of House Painting, etc., by John W. Masury. Cloth, 216 pages. $1·50. Also, Hints on House Painting. Cloth, 84 pages. 40 cents. Either of the above sent free by mail on receipt of price. 6 8

BAIRD'S CATALOGUE OF PRACTICAL & SCIENTIFIC BOOKS.

Sent free of postage to any one who will furnish his address to HENRY CAREY BAIRD,
Industrial Publisher, 406 Walnut St.,
PHILADELPHIA.
6 5

EVERY MAN HIS own PRINTER.

With one of our presses, and the material accompanying it, every man can do his own printing, thus saving much time and expense. Circulars containing full information about these Presses, prices, recommendations, etc., mailed free on application. Specimen books of types, cuts, borders, etc., etc., 10 cents.
DAVID WATSON, Ag't Adams Press Co.,
5 8 26 Courtlandt st., New York.

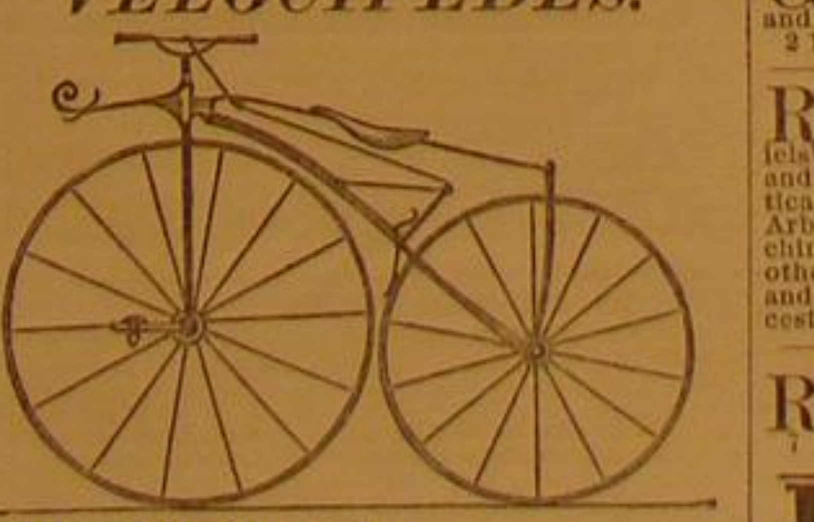
PORTABLE STEAM ENGINES, COMBINING the maximum of efficiency, durability and economy, with the minimum of weight and price. They are widely and favorably known, more than 600 being in use. All warranted satisfactory or no sale. Descriptive circulars sent on application. Address
1 tf J. C. HOADLEY & CO. Lawrence, Mass

THE ALBANY IRON MANUFACTURING COMPANY

Have completed on their property immediately below the south bounds of the city, a building two hundred feet long, seventy feet wide, and four stories high, supplied with ample steam power, now offer for RENT the whole BUILDING and POWER, or SEPARATE APARTMENTS with POWER.

The position of Albany, for manufacturing purposes, is admitted to be unrivaled, and this building, accessible as it is by canal, river, and railroad, is admirably situated, and will be arranged for carrying on an extensive business. For circulars or information, address
S. Y. TALCOTT, Sec. A. I. Manuf'g Co., Albany, N. Y.
8 4

VELOCIPEDES.



WOOD BROTHERS,

596 Broadway, New York.

Manufacturers of Fine Pleasure Carriages, are now prepared to receive orders for the celebrated

PARISIAN VELOCIPEDES,

of their own manufacture, which, for durability and beauty of finish are not equaled. 8 4

WROUGHT IRON

Beams and Girders.

THE Union Iron Mills, Pittsburgh, Pa. The attention of Engineers and Architects is called to our improved Wrought-iron Beams and Girders (patented), in which the compound welds between the stem and flanges, which have proved so objectionable in the old mode of manufacturing, are entirely avoided. We are prepared to furnish all sizes at terms as favorable as can be obtained elsewhere. For descriptive lithograph address the Union Iron Mills, Pittsburgh, Pa. 8 tf

---

LATHE CHUCKS—HORTON'S PATENT—from 4 to 36 inches. Also for car wheels. Address E. HORTON & SON, Windsor Locks, Conn.
6 tf

VELOCIPEDE WHEELS.

MANUFACTURED BY

S. N. BROWN & CO.,

Dayton, Ohio.

They also make a prime article of Spokes and Hubs for light Carriage and Buggy Wheels. Send for price list.
5 13

AGENTS, FARMERS, GARDENERS, and FRUIT GROWERS.—Send for particulars of "Best's Improved Fruit Tree and Vine Invigorator and Insect Destroyer." Samples to test will be forwarded to any part of the United States, and perfect satisfaction guaranteed. Good Agents are wanted in every County in the United States. Address J. AHEARN,
5 8 63 Second st., Baltimore, Md.

Leather Belting,

Card Clothing, & Hose Factory. J.H.Haskell, Baltimore.
1 22*

Power Hammers.

HOTCHKISS' PAT. Air Spring Hammers;
W. H. WATER'S PAT. Drop Hammers.

These SUPERIOR TOOLS made by
CHARLES MERRILL & SONS, 556 Grand st., New York.
3 tf

Sheet and Roll Brass,

BRASS AND COPPER WIRE.

German Silver, etc.,

Manufactured by the

THOMAS MANUFACTURING CO.,

Thomaston, Conn.

☞ Special attention to particular sizes and widths for Type Founders, Machinists, etc. 1 22*

Bridesburg Manf'g Co.,

OFFICE No. 65 NORTH FRONT STREET,
PHILADELPHIA, PA.,

Manufacture all kinds of Cotton and Woolen Machinery including their new

SELF-ACTING MULES AND LOOMS,

Of the most approved style. Plans drawn and estimates furnished for factories of any size. Shafting and mill gearing made to order. 1 tf

---

Sault's Patent

FRICTIONLESS LOCOMOTIVE VALVES, easily applied; require no changes.
25 tf M. & T. SAULT COMPANY, New Haven, Conn.

BENT, GOODNOW & CO., Boston, Mass., Agents for the sale of Patents. FOR SALE—A variety of very valuable "Rights." Send stamp for THE PATENT STAR, Containing descriptions of each. 8 4

REGESTER'S

Patent Gauge Cock.

Agents wanted in every County. Address,
J. REGESTER & SONS,
Baltimore Bell and Brass Works, Baltimore, Md. 25 13

POWER LOOMS. Improved Drop Box.

Spooling, Winding, Beaming, Dyeing, and Sizing Machines Self-Acting, Wool-Scouring Machines, Hydra Extractors Also, Shafting, Pulleys, and Self-Oiling Adjustable Hangers, manuf'd by THOS. WOOD, 2106 Wood st., Philad'a, Pa

---

W. W. TUPPER & CO.'S PAT. GRATES
• Make More Steam, with Less Fuel, do not warp, and are Cheaper than other Grates. Send for circular.
5 13 W. W. TUPPER & CO., 206 West st., New York.

WROUGHT-Iron Pipe for Steam, Gas, and Water; Brass Globe Valves and Stop Cocks, Iron Fittings, etc. JOHN ASHCROFT, 50 John St., N. Y.
3 tf

Excelsior Lubricator.

PATENTED AUG. 25th, 1868.—For Cylinders of Engines. A very Superior and Durable article manufactured by B. E. LEHMAN,
Lehigh Valley Brass Works, Bethlehem, Pa.
Descriptive circular and price list sent on application
26 tf

Agents Wanted.

$75 TO $200 PER MONTH!!! Or a Commission from which twice that amount can be made by selling the latest improved Common Sense Family Sewing Machine. Price $18. For circulars and terms address C. BOWERS & CO., 320 S. 3d st., Philadelphia, Pa. 26 13

ENGINE LATHES—6 ft. bed, 16 in. swing, back geared, screw cutting gib or weight carriage. Weight 1250 lbs. Price $300. Warranted 1st-class tools. Also, Hand & Foot Lathes. Flather & Co., River st., Nashua, N.H.
7 4*

GARDNER'S GOVERNOR AND AUTOMATIC STOP ACTION insures regularity of speed and safety from accident. Send for Circular.
2 13* GARDNER & ROBERTSON, Quincy, Ill.

RICHARDSON, MERIAM & CO., Manufacturers of the latest improved Patent Daniels' and Woodworth Planing Machines, Matching, Sash and molding, Tenoning, Mortising, Boring, Shaping Vertical and Circular Re-sawing Machines, Saw Mills, Saw Arbors, Scroll Saws, Railway, Cut-off, and Rip-saw Machines, Spoke and Wood Turning Lathes, and various other kinds of Wood-working Machinery. Catalogues and price lists sent on application. Manufactory, Worcester, Mass. Warehouse, 107 Liberty st., New York. 9 tf

---

ROBERT McCALVEY, Manufacturer of HOISTING MACHINES AND DUMB WAITERS.
7 13 602 Cherry st., Philadelphia, Pa.

WANTED—AGENTS—$75 to $200 per month, everywhere, male and female, to introduce the GENUINE IMPROVED COMMON SENSE FAMILY SEWING MACHINE. This Machine will stitch, hem, fell, tuck, quilt, cord, bind, braid and embroider in a most superior manner. Price only $18. Fully warranted for five years. We will pay $1000 for any machine that will sew a stronger, more beautiful, or more elastic seam than ours. It makes the "Elastic Lock Stitch." Every second stitch can be cut, and still the cloth cannot be pulled apart without tearing it. We pay Agents from $75 to $200 per month and expenses, or a commission from which twice that amount can be made. Address, SECOMB & CO., PITTSBURGH, PA.; BOSTON, MASS., or ST. LOUIS, MO.

CAUTION.—Do not be imposed upon by other parties palming off worthless cast-iron machines, under the same name or otherwise. Ours is the only genuine and really practical cheap machine manufactured.

WANTED — AGENTS — To Sell the AMERICAN KNITTING MACHINE. Price $25. The simplest, cheapest and best Knitting Machine ever invented. Will knit 20,000 stitches per minute. Liberal inducements to Agents. Address, AMERICAN KNITTING MACHINE CO., Boston, Mass., or St. Louis, Mo.

ASHCROFT'S LOW-WATER DETECTOR will insure your Boiler against explosion. JOHN ASHCROFT, 50 John st., New York. 3 tf

---

SHINGLE AND HEADING MACHINE—Law's Patent. The simplest and best in use. Shingle Heading and Stave Jointers, Stave Cutters, Equalizers Heading Turners, Planers, etc. Address
3 tf TREVOR & CO., Lockport, N. Y.

Change-wheel Tables

FOR SCREW CUTTING, 25c. each, or 5 for $1. W. P. WALTER & SON, Hardware and Machinists' Tools, 1233 Market st., Philadelphia. 8 4

THE NOVELTY IRON WORKS—Ft. E. 12th st., and 77 and 83 Liberty st., New York, Manufacture the most approved Turbine Wheel and Water Meter now made. 7 tf

---

OIL, OIL, OIL.

PEASE'S IMPROVED OILS!

London, 1862. PRIZE MEDALS. Paris, 1867.

Railroads, Steamers, and for Machinery and Burning.

F. S. PEASE, Oil Manufacturer,
Nos. 61 and 63 Main street, Buffalo, N. Y.

N. B.—Reliable orders filled for any part of the world.
7 tf

23261 TOWNS—23261 Agents Wanted. HAND SLITTING SAW—one man rip 3-in. pine, 1½-inch board per minute—600 feet per hour. Foot jig attachment—cut ⅛-inch bracket. WM. H. HOAG,
6 12 Manufacturer, 214 Pearl st., N. Y., Box 4245.

New Patent Mixer

FOR

WHITE LEAD, PAINTS,

Chemicals, Fertilizers, etc.

Also, All Kinds of Machinery for White Lead Works and Oil mills.

SHAFTING, PULLEYS & HANGERS.

POOLE & HUNT, Man'f'rs, Baltimore, Md.
6 4*

GRAY'S PATENT BRICK MACHINE.—Send for circular to
WASHINGTON IRON WORKS,
Newburgh, N. Y., Sole Manufacturers for the U. S.
6 4

WATERS' PATENT FEED-WATER HEATER and SEDIMENT COLLECTOR—Heats Feed Water to the Boiling Point, precipitates all impurities, keeping Boilers free from scale and sediment, preventing them from being burned out prematurely, or destroyed by contraction and expansion, at the same time saving a large per centage of Fuel. No one having once used this Heater will be satisfied with any other. Any number of references will be given, on application, to Engineers and Owners of engines having it in operation. Address The Waters' Patent Heater Co., Hartford, Conn.
6 4*

WOOD-WORKING MACHINERY.—THE subscriber is the New York Agent for all the Manufacturers, and sells at their prices.
3 tf c S. C. HILLS, 12 Platt street.

SPICE CAN AND BLACKING BOX RIVeting Machines. W. PAINTER & CO., Baltimore.
25 7eow

PLATINUM. H. M. RAYNOR, 748 Broadway, N. Y.

1 6eow*

Brick Machine.

LAFLER'S NEW IRON CLAD HAS MORE advantages combined in one machine than any other ever invented. It makes common brick of very superior quality. By a slight change, press brick are made without repressing. With Lafler's Patent Mold, beautiful stock brick are made. This machine was awarded first premium at the N. Y. State Fair, 1865, 1867, 1868. For descriptive circular address J. A. LAFLER & CO.,
5 tf eow Albion, Orleans county, N. Y.

GLUE.

SAND PAPER.

Emery Paper & Cloth.

CURLED HAIR.

Ground Flint & Emery.

NEAT'S FOOT OIL.

FELTING for Covering Boilers and Pipes. Raw Hide cut to any shape. Manufactured and for sale by BAEDER, ADAMSON & CO.,
Philadelphia: 730 Market st. New York, 67 Beekman st. Boston: 18 Blackstone st. Chicago: 45 S. La Salle st.
1 6eow*

MERRICK & SONS, Southwark Foundery,

430 Washington Ave., Philadelphia, Pa.,

MANUFACTURE NASMYTH & DAVY STEAM HAMMERS,

CORNISH PUMPING, BLAST, HORIZONTAL, VERTICAL, AND OSCILLATING ENGINES.

Gas Machinery of all descriptions.

Sugar Refineries fitted up complete, with all modern apparatus.

New York office,
62 Broadway.
11 eowtf

WOODWORTH PLANER & MATCHER for $350. S. C. HILLS, 12 Platt st., N. Y.
23 8*eow

AMERICAN TINNED SHEET IRON. Coating uniformly over the entire sheet, by an entirely new and patented process. All sizes and gages on hand and made to order.
H. W. BUTTERWORTH & SON,
9 eow tf 29 and 31 Haydock st., Philadelphia, Pa.

MASON'S PAT'T FRICTION CLUTCHES are Manufactured by Volney W. Mason & Co., Providence, R. I. Agents, R. BROOKS & CO., 123 Ave. D, New York; TAPLIN, RICE & CO., Akron, Ohio. 2 tfeow

---

STUBS.

ILLUSTRATED PRICE LIST of P. S. Stubs' Tools and Files, Twist Drills and Chucks, Steel Letters and Figures, Screw Plates and Taps, Machine Screws, Emery Wheels, etc., free to any address.
GOODNOW & WIGHTMAN, 23 Cornhill, Boston, Mass.
9 eow

Advertisements.

Advertisements will be admitted on this page at the rate of $1.00 per line. Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.

Ball, Black & Co.,

Nos. 565 and 567 BROADWAY,

Chandeliers

AND

Gas Fixtures

OF PATTERNS AND PRICES TO SUIT ALL PURCHASERS.

9 ostf

FOUR-SPINDLE Drill Press for sale cheap. Address or see EVAN THOMAS, 25 Park Row, N.Y.
9 1os

THE IMPROVED ECLIPSE STEAM PUMP. Send for a circular to PHILLIPS & CLULEYS, Pittsburgh, Pa.
9 1os

Light Gray Iron **CASTINGS** of all descriptions, from best No. 1 Iron, made to order. Also, Patterns by LIVINGSTON & Co., Iron Founders, Pittsburgh, Pa.
9 1os

DRAWING MATERIALS. Drawing Paper, Tracing Cloth, Swiss Instruments, Colors, Rubber Triangles, etc., etc., specially for Architects and Engineers, at wholesale and retail, by KEUFFEL & ESSER, 71 Nassau street, New York.

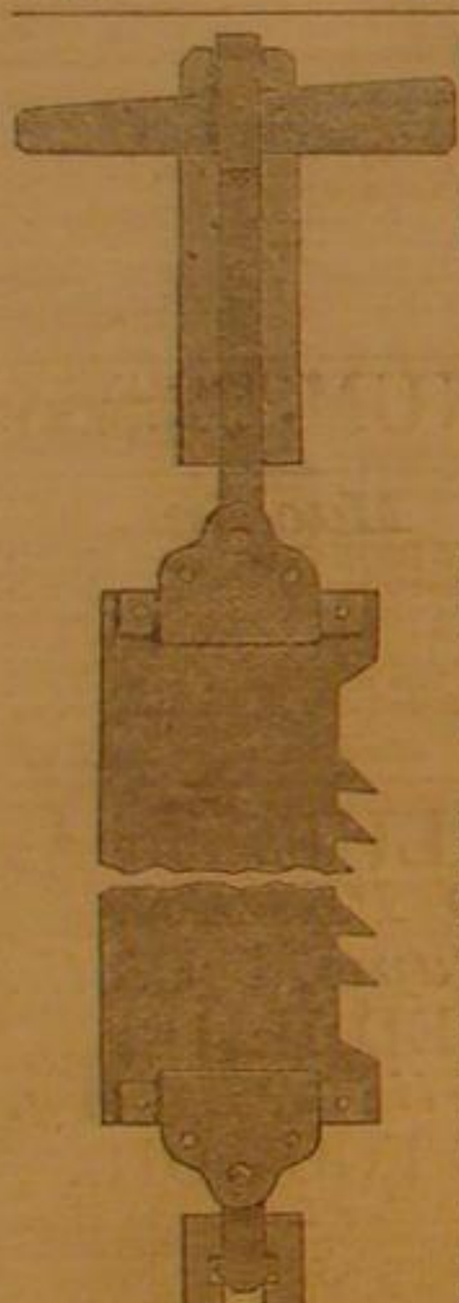
$18,000. FOR SALE—A Substantial Two-set Knitting Mill, with Machinery, etc., all nearly new, never-failing supply of water, power ample for six sets. Eighteen acres of land, Residence, Outbuildings, Tenements, etc. Title indisputable. Terms easy. For particulars address
9 ostf O. B. ARNOLD, Sand Lake, Rensselaer Co., N.Y.

WATER WHEELS.

THE

Duplex Turbine,

NOT Equaled by any wheel in existence.—Great economy of water. The only wheel suitable to variable streams. Manufactured by
J. E. STEVENSON,
9 13os 83 Liberty st., New York.



CROSBY

PATENT

SAW BUCKLE

WITH

Lippincott's

IMPROVEMENT.

Will Save,

In every Saw Mill, which cuts five millions per gang or gangs, not less than

$10,000

per annum.

We refer to

SHAW, BLANCHARD & CO., Lock Haven, Pa., who have used our improvement two years.

Rights and Buckles for sale by LIPPINCOTT & BAKEWELL, Pittsburgh, Pa.; D. H. JEROME & CO., Saginaw, Mich.; H. C. LIPPINCOTT, Williamsport, Pa.

Beware of Infringements.

☞ **Parties using this Buckle, made by other manufacturers, are, and will be held Liable for Damages.**

KIDDER'S PASTILES—A Sure Relief for Asthma. STOWELL & CO., Charlestown, Mass.
4 5*os

CHICOPEE SEWING MACHINE.—1st-Class and fully licensed. AGENTS WANTED. For terms, address CHICOPEE S. M. CO., Boston, Mass. 8 os13

JUTE FACTORY FOR SALE.—Factory for the Manufactory of Jute Carpets, Burlops, & Twine. Apply to TODD & RAFFERTY, No. 4 Dey st.
8 2*ostf

WANTED—A Partner or Partners, with Twelve to Fifteen Thousand Dollars Cash Capital, in an Agricultural Machine Shop and Foundery. Constantly Growing Demand for Machinery. Thousands of Regular Customers. No opposition. Apply at once for further information.
8 4os M. A. KELLER, Littlestown, Adams Co., Pa.

PATENT BAND-SAW MACHINES Manufactured by FIRST & PRYIBIL, 175 and 177 Hester st., New York. Send for circular. 6 13os*

TO INVENTORS AND OTHERS.—Brass, Tin, and Iron Small Wares made to order. Also, Dies and Tools for all description of work. Punching, Stamping, Drilling, Milling, etc., etc. Meritorious articles introduced to the Trade on Favorable Terms.
J. H. WHITE, 157 and 159 Chestnut st., near 3d.
6 4os Depot, Newark, N.J.

HELIOGRAPHIC

STEEL ENGRAVING AND PRINTING CO.,
F. VON EGLOFFSTEIN, Sup't, 123 and 125 W. 25th st., N.Y.

Steel Engravings produced by an Improved Process at one third the usual rates. Portraits, Country Seats, Circulars, Reproductions of Engravings, Designs, etc.
JNO. VINCENT HIGGINS, Sole Agent, No. 658 B'd'way.
2 12 os*

FREE.—Our New Catalogue of Improved STENCIL DIES. More than **$200** A MONTH is being made with them.
S. M. SPENCER & CO., Brattleboro Vt.
5 5*os

Genuine Waltham Watches

Sent to any Part of the Country Without Risk to the Purchaser.

Silver Hunting Watches, $18.
18-Carat Gold Hunting Watches, $80.
Ladies' Gold Watches, $70.

EVERY WATCH WARRANTED by SPECIAL CERTIFICATE FROM THE AMERICAN WATCH COMPANY.

EVERY ONE TO WHOM WE SEND A Watch has the Privilege to Open the Package and Examine it, before paying the Express Co., and, if not Satisfactory, it need Not be Taken. Do not order a watch till you have sent for our Descriptive Price List, which explains the different kinds, gives weight and quality of the cases, with prices of each.

Waltham Watches in Extra Heavy, Tight-fitting Cases, for Railroad Men and Mechanics.
Address in full **HOWARD & CO.,**
Jewelers and Silversmiths, No. **619** Broadway, N.Y.
☞ Please state that you saw this in the Scientific American.
8 ostf

THE

Mercantile Agency's

REFERENCE BOOK, for 1869, contains nearly half a million names, MARKED FROM RECENT REVISIONS. Subscriptions to the BOOK and OFFICE REPORTS taken in conjunction or separately. To MANUFACTURERS, as well as MERCHANTS and BANKERS, it is an indispensable SAFEGUARD. We refer indiscriminately to the great body of BUSINESS MEN, who have used our AGENCY the past 28 years, for testimony as to its RELIABILITY and EFFICIENCY.
DUN, BARLOW & CO., 335 Broadway, New York.
R. G. DUN & CO., 33 S. 3d st., Philadelphia. 9 4eowos

POOLE & HUNT, Baltimore, Manufacture
Leffel's Double Turbine Water Wheels,
For use in the Southern States.
8 13os

PATTERN LETTERS to put on Patterns for Castings, etc., KNIGHT BROS., Seneca Falls, N.Y.
1 24*os

IRON.—W. D. McGOWAN, IRON BROKER, 73 Water st., Pittsburgh, Pa.
4 13*os

IRON PLANERS, ENGINE LATHES, Drills, and other Machinists' Tools, of Superior Quality, on hand and finishing. For sale Low. For Description and Price, address NEW HAVEN MANUFACTURING CO., New Haven. 5 tf os

PATENT SOLID EMERY WHEELS. Specially adapted to Grinding Saws, Mills, and Edge Tools. Solid Wheels for Brass Work, warranted not to Glaze. Also, Patent Emery Oil and Slip Stones, the best article in use for Planer Knives, Carpenters' Tools, and for Finishing Down Iron Work. NORTHAMPTON EMERY WHEEL CO., Leeds, Mass. 8 tf os

WM. D. ANDREWS & BROTHER,
414 Water st., New York, Manufacture
Patent Smoke-burning & Superheating Boilers that are safe. DRAINAGE and WRECKING PUMPS, to pass large bodies of Water, Sand, and Gravel. HOISTING MACHINES, Friction Grooved and, Noiseless, or with Gearing. OSCILLATING ENGINES from half to two hundred and fifty-horse power. All of these Machines are Light, Compact, Durable, and Economical. 1 tfos

INCREASE TWIST DRILLS, FLUTED HAND REAMERS, exact to Whitworth's Gage, and Beach's Patent Self-centering Chuck, manufactured by Morse Twist Drill and Machine Co., New Bedford, Mass.
1 ostf

EAGLE ANVILS, and PARALLEL CHAIN VISES.

MANUFACTURED ONLY BY
1 14*os FISHER & NORRIS, Trenton, N. J.

THE TANITE EMERY WHEEL.—This Solid Emery Wheel is low in price, is free from all offensive smell, is not likely to glaze or gum, and cuts with unusual rapidity. Send for price list to
9 ostf THE TANITE CO., Stroudsburgh, Pa.

Reynolds'

Turbine Water Wheels.

No Complex, Duplex, or Triplex complications. All such are costly, perishable, easily clogged, inaccessible. Mill Gearing, Shafting, and Pulleys. Send for Illustrated Pamphlet.
GEORGE TALLCOT,
96 Liberty st., New York.
2 13*os

SOUTH BERWICK, ME., Jan. 23, 1869.

MR. GEORGE TALLCOT:—Yours of the 18th inst. was duly received. We put in a 3½-ft. Reynolds Wheel, in 1863 to drive our Machine shop, etc. That wheel proved so well, that in 1868, when we needed a wheel for our Cotton Mill, we concluded to get one of the same kind. Prior to 1868, we used three Breast Wheels, each 16 feet in diameter; two of these having 21 feet length of buckets, the other 15 feet. In place of these three wheels we put in one of Reynolds' Wheels, 6 feet in diameter.

This wheel was started in April, 1868, and is now driving 8128 Throstle Dead Spindles on No. 20 yarn, 222 4-4 Sheeting Looms, with all the preparation, except Pickers. The wheel is running under 17 feet head at high tide. We have had, at times, three feet backwater over her without checking speed. We have no means of telling the exact amount of water used, but we think it is about one-third less than the old wheels used. We shall add next week 650 more spindles, and have no doubt that the wheel will carry this additional work, as we have never had full gate on her yet.

The wheel performs admirably, and I do not see how any wheel could do better. She runs very steadily whether driving one-half the work or the whole, and is no trouble at all. Respectfully,
F. W. HALE,
Superintendent, Portsmouth Co.

BUERK'S WATCHMAN'S TIME DETECTOR.—Important for all large Corporations and Manufacturing concerns—capable of controlling with the utmost accuracy the motion of a watchman or patrolman, as the same reaches different stations of his beat. Send for a Circular. J. E. BUERK, P. O. Box 1,057, Boston, Mass.
N. B.—This detector is covered by two U. S. patents. Parties using or selling these instruments without authority from me will be dealt with according to law. 1 13*tf

BOILER FELTING SAVES TWENTY-five per cent of Fuel. JOHN ASHCROFT, 50 John st., New York.
3 tf

JUST PUBLISHED

WOODWARD'S

National Architect.

A Practical Work containing 1,000 Designs, Plans, and Details to Working Scale, of Country, Suburban, and Village Houses, with specifications and estimate of cost, enabling a builder to design, specify, erect, and completely finish dwelling houses in the latest and most approved style. One large quarto volume, superbly bound. PRICE **Twelve Dollars,** postpaid.

Also, New Editions of

Woodward's Cottages and Farm Houses. 188 Original Designs and Plans. Postpaid...........$1.50
Woodward's Suburban and Country Houses. 70 Designs and Plans. Postpaid...................$1.50
Woodward's Country Homes. 150 Designs and Plans. Postpaid...................................$1.50
Wheeler's Rural Homes. Original Plans and Designs. Postpaid.....................................$2
Wheeler's Homes for the People. 100 Original Designs. Postpaid..................................$3
Jacques' Manual of the House. 126 Designs and Plans. Postpaid..............................$1.50
Rural Church Architecture. Designs for Churches exemplified in Plans, Elevations, Sections, and Details. By Upjohn, Renwick, Wheeler, Wells, Austin, Stone, Cleveland, Backus, Reeve, etc. 1 folio vol., printed in colors, 45 plates. Postpaid..............$12

☞ Send stamp for Catalogue of all Books on Architecture. Address GEO. E. WOODWARD, Publisher,
8 tf 191 Broadway, New York.

ASBESTOS.

This wonderful mineral differs from all others in possessing fine, silk-like fibers, which are indestructible by fire.

ASBESTOS ROOFING
Is a CHEAP and RELIABLE substitute for Slate, Tin etc., adapted for all climates, and can be easily applied.

ASBESTOS ROOF COATING
Is a fibrous, water-proof coating for preserving Tin Shingle, Canvas, and Felt Roofs. Prepared ready for use

ASBESTOS CEMENT
Is a fibrous material, to be applied with a trowel, for repairing leaks around Chimneys, Dormer Windows, etc.

ASBESTOS SHEATHING FELT
For use under Slate, Shingles, etc., and under Weather Boards, in place of filling in with brick

DESCRIPTIVE CIRCULARS,
Prices and any further desired information will be furnished free by mail on application to

H. W. JOHNS,
Manufacturer of Improved Roofing Materials, Preservative and Fire-proof Paints, Boiler Felting, etc.
78 WILLIAM ST., NEW YORK.
9 ostf

Factory, Trenton, N. J., ...Office, No. 2 Jacob st., N. Y. ☞ Branch Office for Pacific Coast, No. 606 Front st., San Francisco, Cal. 6 tf

FOR STEAM ENGINES, BOILERS, SAW Mills, Cotton Gins, address the ALBERTSON AND DOUGLASS MACHINE CO., New London, Conn. 1 tf

CINCINNATI BRASS WORKS.—Engine Builders' and Steam Fitters' Brass Goods.
20 26*

BODINE'S JONVAL TURBINE WATER Wheel, combining great economy in the use of water, simplicity, durability, and general adaptation to all positions in which water can be used as a motive power. We are prepared to furnish & warrant the same to give more power than and overshot or other turbine wheel made using the same amount of water. Agents wanted. Send for descriptive circular.
BODINE & CO., Manuf's, Mount Morris, N. York, and Westfield, Mass.

3 os tf cow

STEAM ENGINES

FROM 4 TO 200-HORSE POWER—Including *CORLISS PATENT CUT-OFF ENGINES, SLIDE VALVE STATIONARY ENGINES, and PORTABLE ENGINES. Also, IMPROVED CIRCULAR SAW MILLS, etc.* Send for Descriptive Circular and Price List.
WOOD & MANN STEAM ENGINE CO., UTICA, N. Y.
☞ Warerooms 89 Liberty st., New York, and 201 and 203 South Water st., Chicago, Ill. 21 13eow os

GREAT ECONOMY IN

WATER POWER.

LEFFEL'S DOUBLE TURBINE WATER WHEEL.—Best Wheel in Existence.—Manufactured by
JAS. LEFFEL & CO.,
at Springfield, Ohio, and New Haven, Conn.
New Illustrated Pamphlet for 1869 sent free on application.
6 1osli s cow tf

WIRE ROPE.

Manufactured by
JOHN A. ROEBLING,
Trenton N. J.

FOR Inclined Planes, Standing Ship Rigging, Bridges, Ferries, Stays or Guys on Derricks & Cranes, Tiller Ropes, Sash Cords of Copper and Iron, Lightning Conductors of Copper. Special attention given to hoisting rope of all kinds for Mines and Elevators. Apply for circular, giving price and other information.
1 ostf

Philadelphia Advertisements.

☞ Philadelphia Advertising Patrons, who prefer it, can have their orders forwarded through T. V. Carpenter, resident Agent, 624 South Washington Square

The Harrison Boiler

THIS IS THE ONLY REALLY SAFE BOILER in the market, and can now be furnished at a *GREATLY REDUCED COST.* Boilers of any size ready for delivery. For circulars, plans, etc., apply to

HARRISON BOILER WORKS,
Philadelphia, Pa.; J. B. Hyde, Agent, 119 Broadway, New York; or, to John A. Coleman, Agent, 53 Kilby street Boston, Mass. 6 tf os

UNION SUGAR REFINERY,
Charlestown, Mass., January 21, 1869.

MR. JOSEPH HARRISON, JR.,—SIR: In my last communication to you in regard to your six 50-Horse Power steam boilers, I promised to give you, at a future time, the exact amount of saving in fuel.

I am pleased to be able to do so now, as I kept a very close and accurate account of the fuel used from December, 1867, to December, 1868, in order to compare your boilers with the old ones, which we took out in September, 1867.

The amount of raw sugar we refined during that time was larger than ever before. The steam pressure was always kept over fifty pounds, and we were therefore enabled to do more work in a shorter time, with the same machinery and apparatuses than with our old steam boilers, in which the pressure at times could not be kept up higher than twenty to thirty pounds.

The actual saving in fuel during this time was one thousand seventy-one tuns of coal. Yours truly,
GUSTAVUS A. JASPER, Superintendent.

KEYSTONE ZINC WORKS,
Birmingham, Huntingdon Co., Pa., Jan. 25, 1869.

JOSEPH HARRISON, JR.,—DEAR SIR: In reply to yours of the 7th inst., would say, it gives me great pleasure to bear testimony in favor of your Boilers. We have had them in use for two years. I put them up myself, and had never seen anything of the kind until they came here, and, with the aid of your draft, I had no trouble in erecting them.

They use less coal, never get out of repair—in fact, I have no hesitancy in saying they surpass anything in the shape of boilers. Yours,
8 4os E. O. BARTLETT, Superintendent.

B. F. STURTEVANT'S
NEW PATENT IMPROVED
FAN AND PRESSURE BLOWERS
MANUFACTORY & SALESROOM
72 SUDBURY ST. BOSTON.

HOWARD'S SECTIONAL BOILER—Illustrated in Scientific American, January 23, 1869. For full information address AUSTIN & GERMAIN, 37 Park Row, New York.
5 8*

SCHWEITZER PAT. BOLT CO., Greenpoint, L. I. Office 120 Chambers st., New York. SCREW BOLTS, FORGED NUTS Of every Variety, and of Superior Make. Prices Low.
8 6

STEAM AND WATER GAGES, STEAM Whistles, Gage Cocks, and Engineers' Supplies. JOHN ASHCROFT, 50 John St., New York.
3 tf

MODELS, PATTERNS, EXPERIMENTAL, and other machinery, Models for the Patent Office, built to order by HOLSKE MACHINE CO., Nos. 528, 530, and 532 Water st., near Jefferson. Refer to SCIENTIFIC AMERICAN office. 14 tf

MECHANICS

WILL FIND THE

Scientific American

The Best Paper for Them Now Published

It is the most Popular Journal in the world, devoted to Invention, Mechanics, Manufactures, Art, Science, and General Industry.

THE SCIENTIFIC AMERICAN

Has been Published for nearly a quarter of a Century and has a larger circulation than all other paper of its class in this country and in Europe. Every number is illuminated with

Superb Illustrations

by our own artists, of all the best Inventions of the day and descriptions and illustrations of

LEADING MANUFACTURING ESTABLISHMENTS, MACHINES, TOOLS AND PROCESSES.

Inventors and Patentees

will find in each number an official List of Patents, together with descriptions of the more important Inventions, with decisions in Patent Cases and points of law affecting the rights and interests of Patentees.

TERMS OF SUBSCRIPTION:—$3.00 a year, $1.50 for six months. $1 for four months.

To clubs of ten and upward, the subscription is only $2.50 per annum each.

Specimen copies will be sent gratis.

MUNN & CO., Publishers.
37 Park Row, New York.

THOSE WISHing to secure their rights by

Letters Patent

Are referred to an advertisement on another page.

An Illustrated Pamphlet containing the Patent Laws, and full particulars concerning the obtaining of Patents, will be mailed free on application. Also, a Pamphlet relative to **Foreign Patents** and their cost furnished free.

Address
MUNN & CO., Patent Solicitors,
37 Park Row, New York.