SCIENTIFIC AMERICAN

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

Vol. XVII.--No. 20. [NEW SERIES.]

NEW YORK, NOVEMBER 16, 1867.

$3 per Annum. [IN ADVANCE.]

Improved Coupling and Cold Rolled Shafting.

For several years there has been in the market a quality of shafting known as the "cold rolled" shafting, which, being perfectly round—rolled to a gage—and bright, requires no turning, nor straightening, and is rolled in sizes from three-sixteenths of an inch to four inches, and twenty feet long, but is cut or rolled into lengths to suit customers. It is perfectly homogeneous, and is very fibrous and tenacious. We had opportunities to examine, and, in some measure, test this shafting about three years ago, and were satisfied at the time that it could not be surpassed, an opinion we have not yet seen reason for modifying. It is manufactured by Jones & Laughlins, of Pittsburgh, Pa.

This firm also manufacture adjustable hangers, pulleys, and Collins' patent, self-adjusting, double-compression couplings, all of which, with the cold rolled shafting, are represented in the engraving which accompanies this article. The hangers have swivel boxes, suspended, with the shaft, by bolts adjustable in hight by nuts. The pulleys are at once light and strong, being of a graceful pattern, as seen in the engraving.

In the engraving, A, represents a line of shafting with hangers, pulley, and coupling; B B are two lengths of cold rolled shafting, fitted to receive the coupling. C C are inside and outside views of the coupling proper; D, the coupling, with its appendages complete, represented in half; E E, the thimbles, and F F, the securing nuts G is the coupling whole, as it appears when secured to the shaft.

The coupling is a cyl nder in halves, bored with a "shim" between the two sections, to fit the shaft to which it is to be attached. This allows something for compression or hug. When the two halves of the coupling are placed on the shaft, where they are retained—if desired, by pins seated in the coupling, and reaching into corresponding holes in the shaft —the thimbles or cone rings are slipped on and hold the two halves in place. Then the outer nuts, F, are screwed to place by means of a "spanner," or wrench, which operation makes the combination snug and close, and effectually se cures the two ends of the shafting without keys or set screws.

The coupling, when complete, is a pulley or drum, without a single projecting point, bolt head, or nut, and may be used as a pulley for belts, if required; while a belt, however ragged or frayed, cannot be caught if it comes in contact with the coupling. Although heavy when complete, its parts are light and easily handled, and can be readily attached and detached. It makes a neat finish, and requires no turned shoulder to keep it in place; even the pins before referred to are not absolutely necessary.

The cold rolled shaft has been subjected to severe tests, both in this country and in England, and has proved its superiority over the ordinary refined iron commonly used for shafting, both in the resisting of torsion and weight, while it is easily drilled, clipped, and filed.

For further particulars address Jones & Laughlins, American Iron Works, or H. F. Mann, General Agent, both at Pittsburgh, Pa.

JONES & LAUGHLIN'S SHAFTING AND COUPLING.

PEASE'S OILS AT THE RECENT FAIR.

Visitors at the late exhibition of the American Institute could not fail to notice the splendid collection of oils entered by the manufacturer, F. S. Pease, of Buffalo, N. Y. It was one of the most attractive groups in the fair from its beauty of material and artistic arrangement of specimens. But the excellent qualities of the oils were proved by the unanimous commendation of those who ran machinery, as his lubricating oil was used on all the machines at the fair, from the large steam engine to the delicate sewing machine. It was used also for lubricating the machinery at the Paris Exposition and received the first premium, as it did also in London, in 1862.

Mr. Pease had on exhibition at the Institute fair over fifty samples of oils for engines, signals, druggists, medicinal—requiring two years to manufacture—refined and colorless petroleum, standing a fire or heat test of 142°, and many other varieties. He claims that his oils possess all the requisites for reliability, which are these:

They must stand the highest heat without change (even of melted lead) in order to stand friction and lubricate the cylinders of steam engines. (The heat under a pressure of 150 pounds of steam, is enough to decompose or distil and dry up most of the natural oils in market.) They must be fixed and not volatile oils, as produced by destructive distillation, otherwise they are decomposed by friction and burnt or dried up. They must not show or possess any acid reaction, either naturally or artificially, otherwise the bolts are cut in the steam chest, and the iron, particularly wrought iron, is made porous. They must possess a sufficient power of tenacity without oxidization, otherwise they will gum.

These same laws are applicable to signal and burning oil, for it makes no difference whether the oil is subject to immediate heat, as in a lamp or steam cylinder, or whether it is slow and long continued as in slides and other bearings, the effect and result is the same on the oil in the end.

HINDMAN'S PATENT HUSKING PALM.

The engraving so plainly exhibits the form and manner of application of this device that a detailed description is unnecessary. It is a broad leather band, enveloping the hand and having a strap or stay passing over the thick est part of the thumb to retain it in place. The larger strap is armed with a hook for splitting and stripping the husk from the ear. This band also guards the hand in the act of breaking off the stalk. Both the straps are adjustable by buckles so as to fit any size of hand. It can be put on and adjusted instantly, and as readily removed. The work of husking is, at best, laborious, and this device seems to be well adapted to diminish this labor. It is neatly got up, durable, and cheap. It was patented by John Hindman, who may be addressed for territorial and manufacturer's rights at Indianapolis, Ind.

THE MANUFACTURE OF PARAFFINE.

Liebig, in his "Familiar Letters on Chemistry," long ago expressed his belief that one day olefiant gas—the illuminating ingredient of common coal gas—would perhaps be obtained in solid form for burning on our tables in candlesticks. The Exhibition of 1851 saw the realization of this desideratum, for there was first exhibited one of the greatest triumphs of chemical science, in the the shape of solid paraffine. This was the result of the labors of Mr. James Young, the founder of the well-known Bathgate Chemical Works, and the originator of the mineral oil trade; for years before the Pennsylvanian natural petroleum was an article of commerce, Mr. Young's oils were in great demand, as was also his solid paraffine, which was, and still is, largely used for making candles. The way in which the important and extensive manufacture of mineral oil in the Torbanehill district originated and became developed is worthy of notice. Some years since, in 1847, we believe, Mr. Young's attention was drawn by Dr. Lyon Playfair to a petroleum spring in an old coal mine near Altreton, Derbyshire. On careful examination, it was found that the oil issued from a layer of sandstone over the coal. Mr. Young took a lease of the mine in the hope of working it for lubricating oils, but the supply proved so limited that he gave the matter up. He next turned his attention to the artificial production of the oil by distilling coal, and ultimately he found that the parrot, cannel, and gas coals, and especially the Boghead or Torbanehill mineral, yielded the desired results. In 1850, Mr. Young built the extensive works at Bathgate, to carry out the process as a commercial undertaking, and thus laid the foundation of an industry which in a few years has attained immense proportions. The works at Bathgate are of a very extensive and well appointed character, and are conveniently situated in close proximity to the Torbanehill mineral. The importance of this manufacture, and the leading part Mr. Young has taken in its development, as well as the interesting nature of the works, induces us to give some particulars respecting their arrangement and their products.

It is curious to trace the process by which a pure, white, shining, tasteless article like paraffine is produced from a compact, dull-looking, rusty black coal. It is also interesting to note the various products which result from the numerous processes involved in the manufacture. At the Bathgate Works, four different articles are manufactured by Mr. Young, namely, paraffine oil for burning, paraffine oil for lubricating machinery, the light volatile fluid known as naphtha, and solid paraffine or wax. The Boghead coal is conveyed from the pits by means of branch railways to the works where it is first subjected to crushing to bring the large blocks down to a size fit for the retorts. For this purpose a machine is used, which is formed of two large iron-toothed cylinders, which revolve in opposite directions, and crush up the coal. The broken mineral falls into a pit below in pieces ready for the retort house, to which they are conveyed by a lift. The retorts are vertical cast-iron tubes 12 feet in length and 14 inches in diameter, and are arranged in sets of four, placed in the form of a square, each set being built into one furnace and attended by one man. There are about fifty sets of retorts constructed upon this principle; they rise about 3 feet above the feeding platform, and have funnel-shaped tops to facilitate feeding. The tops of the funnels are closed by valves which are worked by counterbalanced levers. The body of the retorts pass down through the furnaces, the lower ends being made air tight by immersion in water. A low red heat is constantly kept up in the furnaces, sufficient to promote the distillation of the coal in the retorts, care being taken to keep the temperature exactly even. The coal fed in at the top of the retort is decomposed as it passes through that part of the tube surrounded by the furnace, and the oil is produced in the form of a vapor, which is led off through a pipe. The refuse material passes down the tube into the water at the bottom, from whence it is removed as it accumulates. As the vapors are generated, they pass off into a main pipe which conducts them to the condensers, which are placed outside the building, and are constructed upon the same principle as those employed in gas works. The vapors are thus condensed into a liquid, with the exception of a small portion which is always incondensible, and which is collected into a gas holder and used for lighting the workshops. The liquid portion is run off into a tank or reservoir capable of holding 100,000 gallons of this thick, black, greasy fluid, which constitutes the first result of the process of transformation which the Boghead coal undergoes.

From the reservoir, the crude oil is drawn off as required to cisterns for supply to the stills, to which it is fed by gravitation, and where it undergoes the first purification. The stills are cylindrical in form, and are placed in rows, with passages between them for the attendants. The stills are filled with crude oil, and the joints made air tight with clay;

fire is applied beneath, and a regular heat is maintained, which once more converts the oil into vapor. This vapor passes through iron pipes immersed in cold water, and is re-condensed, passing into receiving tanks. The color of the oil is now a dark green, and its consistency much thinner than when it entered the still. The impurities are left behind in the still in the form of a compact lustrous coke, which makes an excellent fuel, and is used on the works. The oil, after the first purification is passed, into a series of cast-iron tanks, resembling a row of boilers, where strong sulphuric acid is added to it for the purpose of separating the remaining impurities from the oil. Each tank is fitted with a revolving stirrer which is worked by machinery and which violently agitates the liquor for four hours, causing the acid to act upon the whole of the oil. The color of the oil has now changed from a dark to a light green, and the organic impurities have settled to the bottom of the tank in the form of coarse tar, which is used as fuel. The third stage of purification is effected by an alkali which neutralizes any sulphuric acid that may remain in the oil, and further divests it of other impurities not acted on by the acid. After a thorough cleansing the liquor is allowed to settle; the refuse is then drawn off, and the oil is returned to the stills, where it undergoes a second distillation. From the receiving tanks it is again led to the cleansing tanks, where it is treated a second time with sulphuric acid and afterward with soda. The oil has now arrived at a state of comparative purity, and has assumed a pale yellow color. In this condition it embodies the elements of four different products, each of which has its own separate valve.—*Mechanics' Magazine.*

EDITORIAL CORRESPONDENCE.

Lake Maggiore and the Borromean Islands—Characteristics of Lombard Towns, Hotels, and People—The Simplon Pass—The Rhone Valley and its Inhabitants.

Geneva, Sept. 20, 1867.

My last letter was written from Lake Maggiore, but I must go back just far enough to say a few words about the old town of Bellinzona, the first impressions of which were somewhat peculiar. It stands in the Valley of the Ticino near the borders of Lombardy, and naturally commands the passes that lead over the Great St. Bernard and St. Gothard—a line of embattled walls surmounted by three old feudal towers, stretches across the valley on the Swiss side and locks together the stupendous mountains that lie on either side, imparting to the place, externally, a most imposing appearance, but like many other things,

"Distance lends enchantment to the view,"

for though one of the chief towns of a Swiss Canton, its characteristics are all Italian. The streets are narrow, and the houses are constructed to form an arcade over the sidewalks, which afford an agreeable shelter from the summer heat and the winter cold. The inhabitants are generally a slovenly, listless, lounging set, who appear to vegetate in a condition of dreamy unconcern about the present or the future.

The first view of the beautiful Lake Maggiore is obtained from the splendid highway that leads from Bellinzona over Mt. Cenere to Lake Lugano. It requires two hours to make this ascent, and owing to its steepness, three horses are required to drag up the carriage and two passengers; but no traveler can be impatient to complete this beautiful drive, affording as it does a succession of magnificent views of the upper end of Maggiore and its amphitheater of surrounding mountains, clothed in the richest garniture of luxuriant vines hanging in festoons; dark fir trees and noble chestnuts, the sight of which awakened the most pleasing recollections of the autumnal glories of our own country. Mt. Cenere, so fair and so beautiful, has, until recently, formed a safe cover for a band of Italian robbers, and is rendered comparatively safe only by the presence of a few guards—men who occupy rude cabins at the summit where the roadway winds through the denser forest.

The sun was just dropping behind the distant Alps, and the deep shadows of twilight had fallen upon the mountain top when we passed this gloomy spot, but we were kept in comfortable ignorance of all real or imaginary danger until we had safely reached a miserable village in the open country, which seemed fit only to shelter a band of brigands. Beyond Lugano, at the foot of the mountain, at a small place which bears the euphonic name of Fornasette, we passed the frontier into Lombardy, or Northern Italy, and here a few of Victor Emanuel's humble servants in blue waited upon us and examined our little effects, and informed us that we might depart in peace, which act of kindness we returned by polite bows and a few sous to a young, black-eyed mother who brought out her little baby—sans culottes—that we too might admire the object that charmed her heart.

Our Italian vetturino, anxious to get hold of the expected reward for the journey, drove us hurriedly down the sharp declivity, into and through the narrow streets of Luino, cracking his whip in the most vigorous manner to warn the inhabitants that we were actually coming, and thence wheeled us through the *porte cochere* of a singular looking building, which upon inspection turned out to be a hotel of nondescript architecture. In answer to an inquiry, "could we have rooms?" the little landlady answered, with a half sigh, "that we could have our choice of all the rooms in the house," and I am willing to confess that she did all she could to make us comfortable—anxious to show that her house stood high in public estimation, she brought us a little register which contained an autographic endorsement by Garibaldi, who here fought a sort of rough and tumble with the Austrians in 1849. He also seized the little steamers running on the lake, worried the inhabitants, and levied contributions upon the numerous convents that exist in this region.

Garibaldi's name is still a wonderful power in Northern Italy and his call to arms, for the unity of Italy, which simply means the desecularization of the Pope, would rouse these seemingly dull people to heroic deeds. The inhabitants of Lombardy are thoroughly and almost superstitiously attached to the Church of Rome. They were born, baptized, and reared within its folds. It is their "Notre Dame," and yet, strange as it may seem, they are eager to take up arms and fight to overthrow the pope as a temporal sovereign—but as the spiritual head of the Church, they would cling to His Holiness with all the affection of loving children.

Lake Maggiore, about which so much has been written and said, is a beautiful sheet of water about fifty miles long and three miles wide, inclosed at its upper end by high mountains, on the sides of which stand numerous ancient square-towered Lombard churches, convents, fine villas, and remains of feudal castles which belonged to noble families now either partially or wholly extinct. More than six centuries ago, during the stormy times of the Italian Republics, noble families lived upon the borders of this lake, and struggled powerfully to maintain the mere semblance of a Republic which was simply a government of civil and ecclesiastical tyrants who robbed the people of their substance and stripped them of their rights; but the spirit of freedom was not extinguished, and Europe will know no repose till the nation, which in the dark ages lighted the torch of civilization with that of liberty, shall be permitted to enjoy the light which she created. The borders of the lake are studded with picturesque little villages which just now look seriously scared as if every one had fled from them. Byron's description of "The Last Man," would not inaptly apply to these places, so desolate do they appear at this moment through fear of the pestilence which has turned back the vast tide of summer travel that usually flows down the mountains to this interesting group of Italian lakes. One of the most interesting features of Lake Maggiore is the Borromean Islands which cluster within the little bay of Baveno, upon one of which stands the Castle of Count Borromeo, and the magnificent gardens, formed two centuries ago by the patient application of soil to a ledge of rocks that rise a hundred feet above the water, forming a sort of little fairy land upon whose artificial surface flourish, in open air, the cactus, the aloe, the orange, citron, myrtle, pomegranite, and the camphor tree, all natives of the tropics; but some fastidious writer, not admiring this forcible treatment of nature, within view of the Alpine snows, describes this garden as "a huge Perigord pie, stuck round with heads of woodcock and partridges."

Some few miles below the Borromean Islands we quitted the little steamer and landed at Arona, which is chiefly famous for having been the birthplace of St. Charles Borromeo, Archbishop of Milan, whose life was spent in acts of humanity, self-sacrifice, courage, and benevolence, a combination of rare virtues which are intended to be memorialized in a colossal though somewhat uncouth statue of the saint which mounts up sixty-six feet high, and stands upon an eminence above the town overlooking the lake. Persons entering the head of the statue are permitted to rest themselves by sitting down in a recess of the nose, which serves as a very comfortable arm chair, but inasmuch as a nest of bats have got possession of the head, it is much more comfortable to keep outside.

At Arona a railway runs to Milan, a place we were anxious to visit, but owing to the existence of cholera, we decided to return to Switzerland over the Simplon. Having made a written contract for our transportation—a precaution which should never be omitted in this region—and seated in a comfortable old carriage with armorial bearings on its panels, and which we were assured was once the property of a noble family, we journeyed for two hours over the terraced road that runs along the margin of the lake, until we reached the shore opposite to Feriolo, where we were ferried over a small bend in the lake upon a rough barge propelled by ropes. It occurred to us at the time, that this rude mode of transportation was an awkward link in the magnificent chain of roads that terminated at this little firth, and upon inquiry, we were informed that several months before the roadway that led across the spur of the mountain suddenly sank beneath the water, carrying with it a portion of the village, together with several of its inhabitants, who were hopelessly engulfed in this subterranean stream, which for ages has been gradually wearing away the under crust of the mountain. At this point there are immense deposits of beautiful gray marble, and hundreds of workmen are employed in quarrying it it out for building purposes, and in cutting a new road which promises, when completed, to form a permanent stone bridge over this treacherous undercurrent of the mountain.

Our first night upon the Simplon road was spent in Domo D'Ossola, at a house which sports the title of "Hotel de Ville, or Ancienne Poste," a sort of barrack for the dilligences that run over the pass. The landlord ushered us into apartments immediately above the horse-stables, and, according to a prevailing custom at European hotels, inquired at once if we would have any thing to eat. Upon being told that we could not dine well amidst such "odoriferous concentrations," he seemed surprised, and ordered our luggage to be taken to a front room, where we found clean beds—a luxury never wanting in even the meanest looking European inns. There are no halls within the interior of some of the old Italian inns, therefore communication is had with the chambers, either from outside galleries, or through doors which open from one room into the other. I will not pretend to describe the architecture of the Hotel of the Ancient Post, but should think that it was a conglomerate of all styles since the time of the invasion of Barbarosa. Our exit in the morning was across a triangular-shaped stone balcony, down a narrow flight of steps into the stable yard, and from thence into a dark breakfast room, where everything looked very uninviting except a few boiled eggs, which seemed to have escaped contamination.

The distinguishing characteristics of Domo d'Ossola, are houses with colonnade, awnings over the streets, shops with a choice assortment of sausages, macaroni, and garlic; stupid looking lazzaroni, in red night caps and bare, mahogany-colored legs; sleek looking, well fed priests; females of a dreamy, unwashed cast of countenance—these all go to make up a picture which may aptly apply to any of these Italian towns; but the country is grand and lovely in the extreme, and in the hands of an industrious and enterprising people, it would become the fairest of the earth. With the exception of the Ravine Gondo, which is wild and savage in the extreme, together with that portion of the roadway that runs along the gorge of the Schalbet and through a tunnel underneath the the Kaltwasser which flows from an extensive glacier above, there is nothing in particular that distinguishes the Simplon above the other great passes of the Alps. Indeed, it is inferior, on the whole, to the St. Gothard, the scenery of which is sublime from beginning to end, a remark that cannot justly be ascribed to the Simplon. It is, however, a stupendous piece of engineering, and must forever stand a monument to the memory of the great Napoleon, who projected its construction, and to Ceard, the engineer, who planned and executed its gigantic details.

Another hard day's travel brought us from Domo, over the Simplon, to Brieg, a small Swiss village in the valley of the Rhone. In this valley the inhabitants are usually poor, simple, and wretched. They subsist upon the products of a cold, sterile soil, which supplies little else than scanty pasturage for cows and goats. They are also exposed to constant dangers from the overflow of the river, and from avalanches that sometimes slide down from the higher portions of the mountains, plowing their way through fields and villages, uprooting trees and rocks, presenting, often, a scene of savage desolation. In one of the little mountain villages we counted a flock of upwards of one hundred and fifty goats, with little bells jingling upon their necks, being driven through the streets by two boys, whose appearance indicated that they were strangers to the use of water as an external application. In passing through the streets, the goats were gradually taken in by families on the route, and the next morning the same unwashed boys gathered the flock together and drove them far away to the mountain pastures, where they tended them until the hour of the evening milking.

In the Rhone valley the inhabitants are, also, afflicted with the goitre, or swollen neck, in its most repulsive forms. A disease which has baffled all medical skill and research to discover its cause or to effect its cure. Here, also, we found the Cretans, or idiots, who, though bearing the human form, are always repulsive objects of commiseration. I cannot imagine any other reasons why people should try to live in this valley, except that they are ignorant of a better country beyond, or are too poor to get away.

We stopped an hour at the poor little village of Tourtmagne, which was nearly overwhelmed by an earthquake in 1855. The postmaster very civilly explained to us that at the time of the earthquake, he was standing in the street, fronting the old hotel, which was at one time the residence of a Baron, who must have had a *barren* time indeed if his luxuries were supplied from the surrounding country. The postmaster, in order to give emphasis to his fearful situation, planted himself in the middle of the road and described the "Baronial Hotel" as about to pitch on to him, and that he thrust out his hands most vigorously to resent so uncomfortable an intruder. But the most singular feature of all was, that the adjacent mountains were thrown upward, and, during the upheaval, they were ripped open in several places, the evidences of which plainly appear in the form of deeply-cut fissures, extending from the base to their summit. A little further on there is an immense crater, called Il Graben, the jagged interior walls of which resemble an extinct volcano; but it is not extinct for mischief, for, during high rains, and at springtime, large masses of dirt and stone have been forced down with such violence that a channel fifteen feet deep has been cut all the way down to the edge of the river.

In a few hours more we reached the active and picturesque old town of Sion, where we were glad to dismiss our Italian vehicle, and to get into a comfortable railway car, which safely landed us at Villeneuve at the head of Lake Geneva, one of the most lovely spots in Switzerland. S. H. W.

Correspondence.

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

Conveying Steam through Long Pipes without Condensation.

Messrs. Editors:—We notice in your answer to H. L. W., of Pa., you say: "If the steam pipe is of ample size and well protected there will be but little loss from condensation in carrying steam 1,000 feet." We think this answer is calculated somewhat to lead persons astray, as they might think the larger the pipe the less the condensation. We will give some of our experience in carrying steam and our reasons for using small pipe. We have a steam pump working in a mine slope 1,540 feet from the boilers. The steam cylinder is 14 inches diameter, 3 feet stroke, and we are carrying steam the whole distance in a 2-inch wrought-iron pipe. We had some little trouble before the pipes were covered, but now experience no difficulty in working the pump up to its full speed. We also have two steam pumps in mine slopes 800 feet from the boilers; the steam cylinders being 25 in. diameter and 4 ft.

stroke. The steam pipe for each pump is of cast iron, 3¼ inches internal diameter. These pumps are working with perfect satisfaction, without any protection whatever to the pipes. This, we think, demonstrates the utility of small pipes. Our idea is this: the pipes should be just large enough to convey a sufficient quantity of steam to do the work, then the steam is passing rapidly through the pipes and is used soon after leaving the boiler, whereas if the pipe be large there will be more surface exposed to the elements that condense the steam; the steam will move through the pipes slowly and will not be used for some time after leaving the boiler. To illustrate: suppose we take the pump with a 14-inch steam cylinder, at a piston speed of 100 feet per minute; if we should use a 14-inch pipe to carry the steam it would be over fifteen minutes from the time the steam left the boiler until it arrived at the cylinder and there would be over 6,000 square feet of surface exposed to condense the steam. Now compare the above with a 2-inch pipe. In using a 2-inch pipe the steam would remain in the pipe about twenty seconds, and there would be but a little over 900 square feet of surface exposed to condensation. In some instances we have seen large receivers placed at the end of the pipe, ostensibly to draw off the condensation and give the engine dry steam, but in our estimation all such appliances are only so many condensers, and the more of them used, the less steam you will have and the more saturated. We should like to hear from your correspondents upon this subject, as it is one of much interest.

A. & B.

[It is obvious that pipes for conveying steam under the conditions stated by our correspondent—indeed we may add under all conditions—should be of as small diameter as will permit the necessary quantity of steam to pass through them. Of course, as condensation is produced by the difference in temperature, between the steam inside the pipe and the atmosphere outside of it, and is governed by the conductibility of the material, the area and condition of the surface exposed to the air, the loss from this cause will be proportionate to the radiating area. Hence a steam pipe should never be made any larger than is necessary to convey the required quantity. The opinion of many rule-of-thumb engineers, that efficiency of steam engines is increased by the use of excessively large steam pipes is incorrect. As an illustration it may be mentioned that the steam pipes and passages of the screw engines planned at Washington for the navy are so ridiculously large, that scarcely any change at all is perceptible in indicator diagrams taken with the throttle valve half closed, and again with it wide open. Such blundering as this not only wastes steam, but, of equal importance, it increases the weight and cost of the structure.

We think the letter of our correspondent will do much good in calling the attention of the users of steam to these obvious and important facts.

Although an exaggerated estimate of the economy resulting from the felting of steam pipes and boilers is very generally entertained, whatever saving that can be effected by the prevention of radiation, is so easily obtainable, that there is scarcely ever any excuse for omitting it.

Our reply referred to by our correspondents, was intended for a particular case. This explanation, we think, makes it perfectly clear.—EDS.]

Pumping Hot Water.

MESSRS. EDITORS: As some of your correspondents are discussing the theory and practice of pumping hot water, and as I have had considerable experience in that line, I will give you some of the conclusions that I have come to. I believe that water can be pumped as hot as it can be got to the pump if the following directions are complied with: First, discard all ideas of forming a vacuum in the pump, which I consider impossible to do when the water is heated to, or near the boiling point. Second, place the heater and pump in such a position that the water will flow by its own gravity from the former to the latter. Third, put no obstruction between the heater and the pump in the form of a stop cock unless it is of the same capacity as the pipe, and see that it is fully open when the pump is working. Gage the water as it runs into the heater, and not between the heater and pump. Fourth, set the heater and pump as near together as can be done conveniently, as the water does not start readily through a long pipe. I have found that when the pipes were of considerable length and obstructed by gage cocks, the work of the pump was very uncertain, and would at times be subject to thumping and chattering of valves as mentioned by your correspondent. I have found that by connecting a pipe to the supply pipe of the pump, near the induction valve, and letting it project up about four feet with the top open it would entirely prevent all irregularities in its working. The water should be filtered through straw or something of the kind, after it has been heated, to take out any sediment that it may contain. When the above directions are strictly carried out I have no more trouble pumping hot than cold water with any of the force pumps in common use.

J. B. GREELY.

Muscatine, Iowa.

Tunneling or Bridging the Atlantic.

MESSRS. EDITORS:—The SCIENTIFIC AMERICAN for October 26th, in an article entitled "Speculation Run Mad," speaks of two wonderful propositions; one for sub-tunneling the Atlantic, and the other for causewaying it.

I have in my possession a novel, published by Long & Brother, of your city, some ten or twelve years ago, entitled "The Ship Carpenter's Family," written by Wm. E. S. Whitman, and dedicated to H. Ward Beecher. In this is a proposition by Mr. Ichabod Snorter to run a wire bridge across the Atlantic. Mount Washington, and one of the mountains of Newfoundland, were to be the American piers; while the Peak of Teneriffe, and Mont Blanc were to be the European. The structure was to be kept from sagging by means of huge ships anchored mid ocean. Mr. Snorter had constructed a model, but happening to sneeze, it fell to pieces; whereupon he gave up the plan. He arrived at that conclusion by means of the following proportion: Sneeze: earthquake:: fate of model: fate of bridge.

His next proposition was to tunnel the Atlantic. Hear him speak for himself: "That dot on your right is New York, while the one on your extreme left is Bristol. The lines running parallel from point to point are supposed to be a tunnel, a trifle over three thousand miles in length, of an elliptical form, twenty-five feet from apex to base, and fifty feet subcontrary. I intend that the whole structure shall be built of angular blocks of granite, neatly dovetailed into each other, the instertices being filled with cement. Well, all I've got to do, d'ye see, as soon as the workmen get fairly under way at each terminus, say ten miles under ground, is to put down coffer dams in mid ocean, and pump out the water, as you see by the figure which represents my apparatus, d'ye see.

"Then I intend to sink shafts into the tunnel, you know, to raise the dirt, and make a string of islands all along the route, d'ye see, convenient for storing coal for steamships passing to and fro. Each one of these islands will be named after a stockholder. Every kind of produce will be raised on these islands, to be sent down these central tubes, or breathing holes, which I have sketched in red ink, to go on the sub-oceanic railway to Europe or America, as the market commands."

Mr. Snorter expected to illuminate the tunnel with electric lights. Immense mineral wealth was to be brought to view.

I have given the outlines of Snorter's scheme, hoping they may assist "The Sub-oceanic Tunnelers."

Yours, for the tunnel,

Richmond, Ind. S. S. G.

Spouting Wells and Flowing Springs.

MESSRS. EDITORS:—The phenonena of running springs and spouting wells has been mainly attributed to hydrostatic pressure. This is rational enough for all such flows as have a head reservoir, but it will not account for the outflow of springs on the plateaus of high mountains, nor even in plains where there are no adjacent highlands. We must find a more philosophical solution. We find it in the centrifugal force of the earth's axial revolution, What else accounts for the strong outflowing springs on top of the Allegheny mountains where there is no higher land for hundreds of miles? The centrifugal force in the revolution of the earth causes a tidal wave to roll around it in the southern ocean ahead of the solid parts of the planet. A ship will sail upon this tidal wave at the rate of 24 knots an hour, as has been demonstrated by mariners who followed the directions as laid down under this theory of sailing from the Pacific to the Atlantic by doubling Cape Horn. On this tidal wave fact may yet be found a more rational theory of the tides than that of moon attraction. The tidal wave by gurgitation and re-gurgitation will account for the flowing and the ebbing of the tides by the water striking the Capes Horn and Good Hope, and it will moreover account for the absence of tides on the open ocean and on the lakes.

But our subject now is spouting wells. How the water gets to these submundane basins may be accounted for in two ways. Rains percolate the earth to seek these basins, and centrifugal force will not prevent this. And as the earth is cavernous the oceans will also sap into these interior basins. Some of these basins may be fresh by the water giving up its salt in passing through substances having more affinity for salt than water. It may also become fresh by passing hot regions where it is evaporated and then passing in the form of vapor into cooling regions and there condensed into pure spring water. When we consider that land occupies only one fourth of the earth's surface it is not difficult to believe that water may find its way to any point under the dry land either plain or mountain. Many springs reveal the phenomenon of rising and falling in accordance with the changes of weather. I know a spring (a sulphur spring), that rises always when a rain is pending, and falls when the weather clears off again. Why is this? Just before a rain the atmospheric pressure is diminished. Centrifugal force has at such time less supercumbent resistance, and the well rises. When the atmosphere in clear weather resumes its normal elasticity and weighs more heavily upon the surface of the earth and the well, the water resumes its normal level. Many years ago in passing over the tops of the Alleghany Mountains in a stage coach a fellow passenger asked me the question, "Do you know what makes the water run out of the top of this mountain?" This puzzling question made me think over the matter with much interest, and as hydrostatic pressure would not account for it in this case, as it does not in the cases of some of your intelligent correspondents, we are compelled to seek for a solution that will answer these extreme cases, and I am persuaded, after weighing the matter well in the balance of great natural laws, that centrifugal force is at the bottom of this singular phenomenon Centrifugal force will not prevent the rains from percolating into these deep basins through the sinuous pores of the earth. If you take a sponge and saturate it with water to a degree that it will not run out without considerable pressure, and tie this sponge to a string and swing it around your hand it will not throw off the water by centrifugal force. Now take and fully saturate it and swing it around and the water will fly off. Take a sponge perfectly dry and whirl it around in like manner in a drizzling rain and it will absorb a quantity of water. I state this merely to show that centrifugal force will force out water in some cases and not in others.

Centrifugal force is the cause assigned for the bulging of the earth round its equator about 14 miles beyond the common surface of our planet. We know also that this centrifugal force throws out around the earth's equator a mass of vapor that forms a cloud belt around the world several hundred miles broad.

If this solution of the question has any insurmountable scientific obstacles, I would like to have them stated by you or any of your philosophic correspondents. After a while I will demonstrate through your paper how this same law of nature will more rationally account for the tides.

Lancaster, Pa. JNO. WISE.

THE AMERICAN INSTITUTE FAIR.

The following notices were omitted from our last issue:—

The Parallel Vise of Messrs. Stephens & Co., 91 Liberty street, N. Y., is shown in several different sizes. It is one of the most useful and ingenious implements of the kind that has come under our notice. The claim of the makers that it is stronger, more durable, and can be adjusted in less time, holding firmer than screw vises, appears to be well sustained. It is a superior article.

Pumps.—Among the several devices for raising water exhibited at the Fair we were struck with the excellence of those exhibited by Rumsey & Co., Seneca Falls Pump and Fire Engine Company, of Seneca Falls, N. Y. Among these we observed particularly their steam cistern pump, of great capacity, brass force pumps, steam boiler force pumps, etc. The work turned out from this establishment enjoys a high repute for excellence and reliability. They make from two to three hundred pumps of different styles and varieties, and justly command an extensive share of the public patronage.

THE AWARDS.

The Fair closed, as stated in our last, on the 26th ult., and on that day the awards were made. We regret that our limited space prevents us from giving a complete list of all the premiums. We can only subjoin the first prizes for the leading mechanical things. The full list can be seen at the office of the Institute, Cooper Union Building, N. Y.

DEPARTMENT V.

Washington Iron Works, Newburgh, N. Y., Wright's Horizontal Engine.
Knowel & Warren, Mass., Knowel's Automatic Boiler Feeder.
H. K. Smith, Norwich, Conn., Small Engine Lathe.
J. Patterson, Williamsburgh, N. Y., Blacksmith's Forge and Tweer.
Charles Murdoch, Automatic Stave Machine.
Baxter & Whitney, Smoothing Machine.
Baxter & Whitney, Cylinder Surface Planer.
L. J. Knowles & Bros., Warren, Mass., Webbing and Tape Loom.
L. J. Knowles & Bros., Warren, Mass., Woolen Loom (three shuttles).
D. McFarland, Worcester, Mass., Curling Machine.
Brown & Ashworth, Lowell, Mass., Wire Heddle Machine.

DEPARTMENT VI.

Joseph Pace Woodbury, Boston, Mass., Working Model of Locomotive Street Cars.
Bridges & Lane, New York, four Jack Screws.
T. W. H. Moseley, Boston, Mass., Model of Bridge.
Joseph Dixon, New York, Cast-iron Plates for Underground Railway.
Alfred E. Beach, New York, for the exhibition of a working section of a Pneumatic Railway.
James Eustace, New York, case of Fancy Leather Goods.
J. Palmer & Co., Concord, N. H., Improved Carriage Springs.
John Raddin, Lynn, Mass., Elastic Carriage Wheel.
George P. Overin & Co., New York, case of Whips and Lashes.
C. Ducreux, New York, arrangement for Detaching Runaway Horses.
John Goulding, New York, Life preserving Mattress.
Spalding & Coffin, Boston, Mass., Uniton Power Capstan.
Jas. L. Jackson & Bro., New York, Screw Steering Apparatus.
Samuel Brown, New York, Boat detaching Apparatus.
F. G. Fowler, Springfield, Ill., Working model of Steering Propeller.
L. Bradley, Jersey City, N. J., Telegraphic Relay.
The Bishop Gutta Percha Company, New York, Submarine Cables.
Thomas S. Ball, Stamford, Conn., Magnetic Railway Switch alarm Signal.
Jerome Kidder, New York, Electro-Medical Apparatus.
The American Fire Detector Company, New York, Fire Detector.
Alfred E. Beach, New York, Pneumatic Postal Dispatch.
Milo Peck & Co., New Haven, Conn., Newspaper Directing Machine.
Heath, Smith & Co., New York, Graining Machine.
J. F. Trow, New York Type Setting and Distributing Machine.
Wood & Tuttle, Boston, Mass., Printing Press.
George P. Gordon, New York, improved Card and Bill-head Press.
Otis Brothers, New York, Hoisting Apparatus.
John P. Gruber, New York, Bank Scale.
Herman Kohlbursch, Jersey City, N. J., Diamond and Druggists' Scales.

RAILROADING EXTRAORDINARY.—A correspondent assures us that engineering art has accomplished many wonderful achievements, but congratulates himself on originating an undertaking surpassing in its grandeur any thing yet attempted. This project of unparalleled magnitude is the construction of a first class double track railroad from this city *via* the inviting regions of Alaska, and ferry boat across Behring's Straits to Asia. Running across this continent, scattering in its course the New York dailies, and the seeds of christianity and civilization, the road will reach Europe, terminating finally in the city of London. In passing through the regions of extreme frigidity, any trifling inconvenience arising from heavy snows is to be obviated by the construction over the track of a substantial archway of masonry, and at convenient distances apart, forming part of the structure, "hotelets" might be erected for the accommodation of travelers desirous of remaining for short periods for scientific or other purposes.

Temple of Xochicalco in the Champ de Mars.

We reproduce in this issue another of those national monuments exhibited at the Paris exhibition, which serve better than the most vivid description to convey a proper idea of the characteristics of a people and nation long since passed away. From *L'Exposition Illustrée* we condense the following description:—

The edifice that is here reproduced in its severe and primitive aspect, and with its walls covered with hieroglyphic basreliefs, is not a creation of the artist's fancy, but a faithful restoration of a temple found about twenty-five leagues southeast of the city of Mexico. It had been vaguely described by Father Alzate, and by MM. Humboldt, Nebel, and Col. Dupaix, before the able and ingenious explorer, M. Léon Méhédin thus placed it before us in the model in the *Champ de Mars*.

It proves that civilization and art existed in Mexico before European feet had trodden its soil. The annals of the Conquest of Mexico have already told us something of the atrocious sacrifices that were celebrated in these temples, and of the human beings immolated to appease the thirst for blood of the deities of the New World. It is unnecessary to recall the overwhelming indignation of the Spaniards against these altars reeking with blood, where the companions of Hernando Cortez were miserably slaughtered by hundreds. These awful temples, that all narrators speak of with horror, and in one of which a Spanish officer counted sixty thousand skulls, disposed as decorations, are brought in tangible form before us in the structure in the *Champ de Mars*. Nothing is wanted, neither the skulls ranged along the architrave, the fantastic hieroglyphics, nor the brilliant curtain decked with plumes that closes the entrance. Lift this curtain and the sacrificial stone will appear, on which five priests brutally slaughtered the victims whose bloody hearts were rendered up as burnt-offerings to their god, the Sun. Facing this block, and portrayed as faithfully as possible from the descriptions of Father Sahagun, Prescott, and others, rises the colossal statue found at Téotihuacan, and that M. Méhédin thought to be the statue of the Sun, rather than another in the Museum at the city of Mexico, called the Téoyaomiqui. Even the stone tubs are shown in which they collected the human hearts reserved for the communion of the High Priests. The body was rejected as something vile, and beneath the dignity of the Temple.

Near the Temple is seen a monolith of the highest importance, reproduced in plaster from a casting taken on the spot, and representing the Zodaic of Tenotchtitlan, showing a surface four times as large as that of the Zodaic of Dendérah, and ornamented with alto-relievos of great perfection.

The statue of a Mexican woman, most skillfully executed, gives the visitor a perfect picture of an age long past; she is sleeping at the brink of a fountain. Beside this woman of the olden time are seen the men of modern Mexico in all the brilliancy of their national costume, the sarapa on the shoulder and the flowing pantaloons open at the foot.

It is proper to note four modifications that have been made in the representation of this Temple: 1st. The grand stairway, which was very steep in the ancient structure, is here at a more gentle incline, in order to facilitate the access of visitors. 2d. The terrace on which the temple rested at Xochicalco was of earth, with fronts of masonry; here it is built of timber and hollow, and is used by M. Méhédin as a repository for the collection of articles made by him during his scientific mission in the Crimea, Egypt, Italy, and Mexico. 3d. The large windows painted from manuscripts of that period, are anachronisms—but essential to obtain the correct effects of light here, which were unnecessary under a more brilliant sun. 4. The interior partitions are covered with Egyptian mouldings brought from Thebes in 1860.

In conclusion, the Temple of Xochicalco is an object to attract the attention and interest of the literati, as well as the curious. It is something very different from all we have ever known, and it will linger in the memory as a strange and peculiar spectacle, a vision of a world that has long disappeared.

THE ANCIENT MEXICAN TEMPLE AT THE PARIS EXPOSITION.

Japanese Mechanics---How They Work.

A correspondent of the New York *Times* gives the following interesting account of the Japanese artisans in San Francisco:—

"The steamship *Colorado* brought over a company of Japanese performers, calling themselves the Ha-ya-ta-kee troupe. During the past week they have been fitting up the Metropolitan Theatre in the similitude of a Japanese temple, for the exhibition of their feats of strength. It is said that the entire company, even the workmen who are engaged in putting up the stage, belong to one family. It is a curious sight to see these Japanese carpenters at work. They use their hands and toes at the same time, the latter being as handy as their fingers. At first there seems to be a great advantage in their having four hands instead of two, and, although they seem to work with great rapidity, yet they do not accomplish one-half as much as a good American mechanic would in the same time. A Japanese carpenter makes no use of workbenches or vices. If he wants to sharpen a saw, he squats on his hams, places the back of the tool to be operated on on the ground, grips one end of the saw with his left hand, seizes the other with the toes of his right foot, and goes to work. Their tools are not like American tools, though they have a slight similarity, showing that all tools have one common parentage, whether their inventor was Tubal Cain or some other artificer. All Japanese saws are shaped like butcher's cleavers. The handle is like the handle of a cleaver, but flattish, as if whittled out of a piece of inch board; the metal shank of the saw is driven into that handle, and the whole is secured by being wrapped with fine split cane. The metal of the saw is about the substance of our saws, but the teeth are narrower, giving more of them to an inch, and much longer. They are all pointed toward the handle, and cut the wood like so many hocks. When a Japanese wants to rip a plank, he places it across any thing which will elevate the end a few inches, then stands on the wood and cuts it by seizing the cleaver-looking saw in both hands, and pulling it toward him. Thus, by a number of short, quick, up strokes, he gets through a plank not so speedily, but quite as effectively, as an American carpenter would with the long, slow, down stroke of the rip-saw. The planes are small, with single irons—no handles. The planes are shorter, lighter, and the wood shallower than ours, being generally not more than an inch deep. To plane a piece of wood, they lay it on the ground, squat on their hams, hold it fast with their toes, and work the plane with both hands toward them. To drill a hole they have a short awl inserted in a round piece of stick eight or nine inches long. They take the wood between their toes, squat as before, and make the hole by rubbing the handle of the awl between their hands, in less time than one of our carpenters could drill one with a gimlet. Their hammers are solid cylindrical pieces, not made shapely with waists and graceful outlines like ours. They have the same flat-sided handles as the saws. The Japs. have iron squares, not unlike American squares, marked with degrees. Their measures are brass, very light and fluted. On one side the inch, or what stands for the inch with us, is 1 3-16 inches, and divided into ten parts. On the other side is a different scale, measuring 1 13-16 inches, and divided into twelve parts. Some of their tools appear to be mere children's toys: for instance, they have a smoothing plane two and one-half inches long, one inch broad and half an inch thick. Their chisels are light and small. The cutting parts of some are the size and shape of a section of half a dollar—the square side being the cutting edge, and a round metal shaft connecting the convex side with a wooden handle.

"The most ingenious article in their tool-chest is a chalk-line. It is a wooden cup containing a spongy substance steeped in Indian ink. This is pierced front and back, and the marking line passes through it. The end of the line is attached to a small awl; the other end of the line, after passing through the cup, is wound round a reel, not unlike a fishing-rod reel, which takes the place of the handle of the cup. To mark a line down a plank, the Japanese carpenter sticks the awl in at one end of the proposed line, carries the cup to the other, the line paying itself out as he does so; he holds the line down to the board when he reaches the desired spot, strikes the mark, and then takes up his cup and reels up the line as he walks back to the spot where he inserted the awl. The process of paying out the line and of reeling it up again both draw it through the ink supply in the cup and keep it ready for action."

The Velocity of Light, according to a calculation recently published by Prof. Chase, of Boston, is nearly the same as would be acquired in one year by a falling body under the influence of an accelerating force equivalent to the force of gravitation at the earth's surface, *viz.*, 32 1-6×86,400×365¼÷5280=192,254 miles per second.

Grindstone Grit, being mainly silica, offers an excellent resistance to heat.

Improvement in Hoisting Machinery.

The construction of this elevator or hoisting machine may be understood by a glance at the drawing. The pulley in the center drives a worm screw, which, by means of a gear working into it and by miter gears, moves the two main screws on the sides, that engage into the screw racks, which are firmly secured to the posts. Thus the whole platform and gearing moves up and down together, this being the only elevator in which the motive and sustaining power are inseparably connected with the platform.

An endless belt, running from top to bottom of the hatchway, gives motion to the center pulley, being passed under and over the smaller pulleys at the side. If this belt should break or come off, the platform remains stationary of itself, without the aid of other mechanism, such as pawls or catches used in other elevators, and is incapable of being moved up or down till power is again applied to the pulley.

By means of an improved belt-shipping apparatus furnished with the elevator, only the belt to be used at the time is moved on to the working pulley, thus saving much wear and tear of belts. The brake for overcoming the momentum of the platform is applied by the same movement which ships the belt, so that the very instant the belt leaves the working pulley the elevator stops.

If the elevator should rise higher than the ends of the screw racks on each side, it goes no further, the screws merely revolving till the motion is reversed, when they again engage and descend as usual.

The platform, with the gearing, is counterbalanced by an iron weight, suspended over suitable sheaves by a wire rope, so that all power used is taken up for hoisting what is on the platform, and not the platform itself.

One great advantage of this elevator is its security against the accidents so terribly common to those which are raised by means of wire or hemp ropes or by chains. Another is its great strength, one of the smallest size built raising over 2,000 pounds from the lower floor to the upper story, while the largest raise easily over four tuns.

This machine cannot fall, it rises no higher than is desired, and can be stopped within an inch of the intended spot. Its cost is no greater than that of first-class rope elevators. It can be run at any speed by altering the size of the center pulley. It was awarded the gold medal at the Lowell (Mass.)Fair, for general excellence and utility.

It is manufactured by Campbell, Whittier & Co., who may be addressed at Roxbury, Mass.

MILLER'S PATENT SCREW HOISTING MACHINE.

HOW GUN-COTTON IS MADE.

There are at present only two places in England, perhaps in the world, where the manufacture of gun-cotton is carried on upon anything like a large or systematic scale, viz., at the government powder works at Waltham Abbey, and at the private works of Messrs. Prentice, at Stowmarket. The manufacture falls naturally into three main subdivisions: 1st, The preparation of the cotton; 2d, The conversion of cotton into gun-cotton; 3d, The preparation of the gun-cotton for use. Formerly, until Baron von Lenk elaborated an improved system of manufacture, gun-cotton was made exclusively from cotton wool. This substance, however, was generally regarded as presenting difficulties in its preparation. It was argued that the complete and uniform saturation of masses of cotton wool was a thing not easily accomplished, and under the old process of manufacture the objection undoubtedly held good. On immersion the wool assumed a new character. It caked into a wet mass far less readily penetrated either by water or acids, and less convenient to handle than the skeins of cotton which Von Lenk introduced, and in the introduction of which he has generally been held to have effected a radical improvement. The present system of working gun-cotton has, however, removed many of these difficulties, and it seems now to be coming to be understood that it matters little in what form the cotton be employed.

The cotton is first boiled in an alkaline solution, and from this point remains, with one exception, damp, and therefore absolutely innocuous during the whole of the subsequent processes. The safety attending the manufacture of gun-cotton is an important feature in its production. There is no danger or possibility of accident until the material reaches the final stage at which it has to be dried; and although the same precautions are officially insisted upon in a gun-cotton factory as are necessarily observed in gunpowder works, they are in truth superfluous, and their observance is only calculated to conceal one of the strong recommendations of the substance, viz., its absolute immunity from danger in manufacture.

The cotton, after being boiled in the alkali, is placed in a revolving cylinder with perforated wire sides, which makes from 600 to 800 revolutions per minute, and by means of the centrifugal force thus generated the alkaline water is wrung out. The cotton is then washed in clean water, which is afterward wrung out in the same way. The final operation in the preparation of the cotton consists in thoroughly drying it, partly by atmospheric exposure, partly by depositing it in a chamber artificiallly heated to about 120 degrees. On the thorough drying of the cotton at this stage a great deal depends. If the drying be imperfectly effected, the water which the cotton retains will afterward generate heat by union with the acids, and establish a destructive action.

Having by these simple processes obtained a mass of practically pure dry cellulose, the next operation is to convert that substance into "trinitro cellulose," or gun-cotton. The acids with which the cotton is to be impregnated are mixed in the proportion of three parts by weight of sulphuric to one part by weight of nitric acid, only the very best and strongest acids being used. After mixing, they are allowed to cool before applying them to the cotton. The cooling process occupies ordinarily two or three days. The cotton, in charges of 1 lb., is immersed in a bath of the mixed acids, which is kept surrounded with cold water to prevent the heat generated by the chemical action from accumulating. The cotton is then removed on to a strainer, and roughly expressed until it retains only about ten times its weight of acids, in which condition it is transferred to an earthenware jar. The jars are placed in water to keep down the temperature, a point of considerable importance, in order to avoid the destructive results which would be due to any elevation of temperature. During the whole of the processes into which the employment of acid enters, iron tools are used, as, by a curious apparent contradiction, iron, although so susceptible to the action of weak or dilute acids, is not acted upon by pure strong acids. The fumes of the acids are drawn away from the workmen through a shaft, up which an intense draft is artificially created. The jars remain in the water forty-eight hours, to insure the thorough conversion of every particle of the cotton, which is then removed from the jars, and the free acid expelled by means of the centrifugal machine. The cotton is now no longer simple cotton, but gun-cotton; and at this point it may be well to explain what change has taken place, and what gun-cotton really is.

Cotton wool, wood fiber or cellulose, consists of the two oxidizable or combustible elements, carbon and hydrogen, in combination with a proportion of oxygen. Nitric acid is the chief constituent of saltpeter, and a very powerful oxidizer. Thus it is to the tendency which that substance possesses to oxidize carbon or charcoal with great rapidity and energy that gunpowder mainly owes its explosive properties. If the strongest nitric acid be added to cotton wool, and its properties slightly assisted by heat, it will violently and rapidly oxidize the hydrogen and also partially the carbon in the cotton. But if its oxidizing powers be moderated as far as possible by abstracting the heat as fast as it becomes generated by the chemical action, only a certain proportion, amounting to three tenths of the whole of the hydrogen, becomes oxidized by the nitric acid, the remainder being converted into water. During this slight oxidation of the cotton wool, the space created in the construction or composition of that substance by the removal of so much hydrogen is at once occupied by the nitric acid, which has given up a small proportion of its oxygen to the abstracted hydrogen, but which thus conveys into the composition of the cotton a large additional proportion of oxygen, ready upon the first favorable opportunity—that is, upon receiving a slight assistance from heat—to oxidize the remaining hydrogen and the carbon in the cotton and convert them into gases with explosive rapidity. In this action the nitric acid is aided by the oxygen originally existing in the cotton wool. Gun-cotton is therefore cotton wool from which a small proportion of hydrogen has been removed, a powerful oxidizing agent becoming introduced into its composition in place of that of hydrogen; and thus with but very slight alteration of its appearance and physical properties, the simply inflammable substance becomes converted into a powerful explosive. The object of mixing the nitric with strong sulphuric acid is simply to give greater strength to the former. The affinity of sulphuric acid for water is so powerful that it takes to itself a proportion of that with which the strongest known nitric acid is still diluted, combining also with the water liberated from the cotton by the nitric acid, and thus by preventing the dilution of the latter it assists indirectly in its action upon the cotton.

The gun-cotton now undergoes a most elaborate process of washing. It is absolutely essential to its safety that every particle of free acid should be removed, otherwise spontaneous decomposition will ultimately be set up with destructive and possibly dangerous results. The first washing is effected by plunging the gun-cotton suddenly, so as to prevent heating, into a stream or fall of water. The gun-cotton is then deposited in a tank of running water for forty-eight hours. The water is then wrung out in a centrifugal machine; another bath and another draining; a third bath and third draining, and so on, until, in addition to the drench-bath, the cotton has been washed and drained six times. At Waltham Abbey these processes of washing are reduced in number, although not in degree, by placing the gun-cotton after the drench-bath in a river, where it remains for a fortnight, the river impurities being afterwards washed out. The gun-cotton is finally washed in a warm alkaline solution, to remove the last traces of acid.

It might almost seem as though this washing were immoderate and excessive, but, on the contrary, the washing of the gun-cotton under the system now observed is not even yet complete. And here the processes of making the gun-cotton become merged and in a measure lost in the third and final subdivision of the manufacture, viz., the preparation of the material for use. That preparation consists in converting the gun-cotton into pulp, similar to that from which paper is made. To whatever use the gun-cotton may be intended to be put, it is now invariably pulped, and it will easily be understood by those who know how paper is made that the process of breaking up the cotton into pulp constitutes in itself a very thorough and effectual process of washing, since it is one in which the water is necessarily brought into contact with every fiber and particle of the cotton. The pulp once obtained, it can be applied as desired. It can be compressed

into dense compact masses for mining charges; into disks for charges for cannon, each charge containing a number of disks, corresponding to the pellets which compose a charge of the new "pellet gunpowder"; or, it can be formed into paper, which, cut up into strips and rolled into little cylinders, forms charges for sporting guns. The pulp, too, can be used pure, or it can be diluted down to any degree of weakness by the admixture of a certain proportion of incombustible pulp—plain cotton, not gun-cotton pulp. In practice, advantage is taken of this to reduce the strength of the gun-cotton for sporting purposes, the charges for which contain a proportion of raw cotton. The same mode of dilution is also advantageously employed for certain special blasting operations, particularly in slate and stone quarries.

At this stage if the gun cotton be intended for mining or cannon charges it is pressed damp into masses of the required form and size and density. It is then dried, and now for the first time it puts off the armor of damp which has hitherto rendered it innocuous and proof against possible explosion. The drying is effected in small charges of 20 lbs., isolated in fire-proof-cages; and so little danger is there attending this the only "dangerous" operation in the manufacture that the whole of the charges undergoing drying at any one time might be exploded simultaneously without giving rise to any accident. If intended for sporting charges the pulp is formed into sheets of paper and then dried. On each sheet is printed the nature of gun and weight of shot for which the charge is intended, and this printing is repeated along one edge of the paper as many times as the sheet will make charges. The paper is then cut up into strips defined by the printing. Each strip is carefully weighed, and the excess cut off. It is then rolled up, with a definite and carefully adjusted pressure, and the edge cemented down. Each roll constitutes one charge, with the printed particulars on the outside. After passing the roll through a gage, they are water-proofed by inclosing them separately in a fine film of india-rubber. The operation by which this is effected is neat and ingenious. The charge of gun-cotton is introduced into a cylinder, over the mouth of which is placed a disk of india-rubber. By means of a pair of small bellows worked by a pedal the india-rubber is blown into a bubble, into which the charge of gun-cotton is introduced; the bubble is allowed to collapse, and the mouth of it is tied securely over the end of the charge. The waterproofing of the charges contributes greatly to their uniformity of action.

The extreme simplicity of all the processes connected with the manufacture of gun-cotton, and the absence of all necessity for costly machines and appliances, together with the perfect safety which attends the operations, are points which will not escape notice. Under the present system, also, there is no waste, since all the cuttings from the strips and spoiled work can be thrown back into the mill and reconverted into pulp. The key to the successful production of gun-cotton is the thoroughness with which the several processes must be performed. The thorough purification and drying of the cotton, its thorough conversion into gun-cotton, and its thorough washing, are the salient features in the preparation of the material; and where this element of thoroughness is wanting an inferior or dangerous substance must be the result. From this source one of the chief practical difficulties in the way of the general use of gun-cotton may be expected to proceed. Manufacturers greedy of gain and anxious to meet an immediate demand, will always be exposed to the temptation of "scamping" some of the operations, and producing an imperfect and inferior material. But it may be hoped that the evil will provide to some extent its own safeguard. When it comes to be understood that a failure of a sportsman's cartridges is due not to inherent defects in the gun-cotton itself, but to bad workmanship, manufacturers will be checked by a consideration which will probably prove potent enough to keep them within the lines of fair dealing. —*Pall Mall Gazette.*

Institute of Reward for Orphans of Patriots.

The Institute held its sixth anniversary at the rooms of the President, Dr. Webster, College of the city of New York, Wednesday, Oct. 23d. The reports of the Secretary and Treasurer were very encouraging. The Institute holds valuable scholarship contributions. In various institutions scholarships for qualified patriot orphans have been founded or donated by individuals, corporations, and legislatures:

In Union College, Schenectady, N. Y., twelve perpetual scholarships.

In Middlebury College, Vt., an unlimited number of scholarships.

In Williams College, Williamstown, Mass., an unlimited number.

In Dickinson College, Carlisle, Pa., scholarships held by certain Sunday schools.

In Wittenberg College, Springfield, Ohio, an indefinite number.

In Knox College, Galesburg, Ill., scholarships for twelve sons and twelve daughters of fallen patriots.

In Kansas State University, Lawrence, scholarships for an unlimited number of patriot sons and daughters of the Union

In Phillips Academy, Exeter, N. H., free tuition for all patriot orphans.

In Eastman's Business College, Poughkeepsie, twenty scholarships.

In Kimberly's Commercial College, Philadelphia, ten scholarships.

In sundry other Business Colleges in various States.

In the National Academy of Design (city of New York) perpetual scholorships, founded by the liberality of R. A. Brick, Samuel B. Higenbotam, Wm. H. Bridgeman, James B. Alling, and Charles P. Daly.

[For one young lady, an accepted candidate for one of these *Art Scholarships*, board is proffered by Mrs. Joel T. Benedict.]

In Ontario Female Seminary, Canandaigua, N. Y., by B. Richards, five scholarships for five years.

In Dr. Adolph Douai's school, N. Y., tuition and board for a Union soldier's orphan child, girl or boy, acceptably qualified, and *protegé* of the Institute.

In the Northwestern University, Evanston, Ill., a scholarship for twenty years' tuition, the gift of Messrs. Bryant & Stratton to the Institute.

Applicants for these and other scholarships, address David P. Holton, Corresponding Secretary, 124 West 54th street New York City.

Momentum and Inertia.

J. H., of Pa., gives us this most unnatural and almost impossible problem, which, by the way, is almost as old as known science, and probably will never be solved to the satisfaction of inquirers:—

"Suppose two *perfectly non-elastic bodies* should meet each other in space, both in motion, and one body considerably larger than the other, now it is plain that the smaller body would be carried away in the direction of the greater, after their contact. But as the smaller body was going forward before it came in contact with the larger, and also as it (after the contact) went backwards, it is evident that it must have paused or stopped at the turning point, and if the smaller body stopped the larger one must also have stopped; then they both stopped. Now I want to know, if they stopped, what set them in motion again, for we all know there is some motion after contact of unequal forces; but if there is a motion, how does the law of inertia hold good?"

Editorial Summary.

Automatic Cookery.—A Norwegian cooking apparatus exhibited at the Exposition, consists of a wooden box lined with some non-conducting material, and containing a tin vessel which fits into the stuffed aperture of the box. The stuffed lining is so poor a heat conductor that water in the interior tin box only cools down from 212° F to 172° F in seventeen hours In cooking a piece of beef, the meat is placed with water in the tin vessel, over an ordinary fire, until the water has boiled for five minutes, when the vessel with its contents is quickly placed is the isolated apparatus, and left alone for three hours, when the beef is found to be thoroughly boiled. This method of cooking is pronounced the truly philosophic one, the maximum nutritive quality being retained. Economy of fuel, and great saving in labor are other recommendations. The patentee lately had all the materials for a *pot au feu* prepared, and shut up in the apparatus at Paris, and brought it with him to London, where it was opened, and furnished a smoking hot meal four hours after leaving the fire.

The Decomposition of Carbonic Acid by Plants, as influenced by different colored rays, has been investigated by M. L. Cailletet, who observed that green light afforded unexpected results, whether this color was obtained from glass vegetable leaves, or solutions. Under its influence carbonic acid is never decomposed; a fresh quantity of gas seems, on the contrary, to be evolved. When a glass containing pure air and a leaf was placed in full sunlight under a green glass shade, after a few hours a quantity of carbonic acid was obtained, scarcely inferior to that which the leaf would have evolved in the dark.

A Manufacturers' Convention, consisting of delegates from all parts of the United States, will meet in Cleveland, O., on the 18th of December next. The most prominent object of the convention will be to urge Congress to repeal the internal taxes on manufactures and productions, except luxuries, and simplify and remodel the tax list, so that taxation may be confined to a few articles, and taken from all of prime necessity. We have had a copy of the resolutions, and a circular appealing to manufacturers, signed by a number of large Western manufacturers, sent to us, from which we judge the movement to be a formidable one.

No Full Moon.—Last February was a month in which there was no full moon, a remarkable fact, but not so rare as some of the Italian journalists would make it, for these authorities asserted that this occurrence could only take place once in 25,000 centuries. A Milanese astronomer, M. Schiaparelli, who noticed this rash assertion, has just shown that the same thing occurred in 1847, when the moon came full on the morning of January 31st, and next again on the morning of March 2d following. In 1828 there was a similar occurrence in this country.

Can Wood Imprint or Engrave Iron?—Some rails of one our city railroads were taken up a few days ago and on their lower surface was a perfect representation, or reproduction of the grain of the sleepers on which they rested, with all the knots and the curvatures of the wood, as neatly done as if by the painter's art. On applying the fingers to aid the sight, these lines were found to be really engraved or indented into the iron, so much so as to be readily detected by the sense of feeling. Whether produced by chemical action or by mechanical force is a question.

American Tin.—For a few weeks past experiments have been conducted by Dr. T. R. Goulding, of St. Louis, to decide upon the proper flux for, and the best manner of roasting and smelting tin ore from the Missouri mines. As a final result, on the 18th inst. was produced the first pig of pure tin ever made in this country. The yield of pure metal was eight per cent of the quantity of ore.

An Electric Organ.—The *Scientific Review* describes a method of employing electricity in organ playing, so that the key board and pipes may be separated any distance apart, and in performing on the most powerful instrument the tones will respond with readiness to the most rapid touch. Whenever a key is pressed down, an electric current is completed, the keeper of a small electro-magnet is attracted, a valve is opened, and air passing into the organ pipe causes it to sound at once, and as long as the key is depressed. The battery is arranged on the upper surface of the bellows, and each cup contains a solution of sulphate of mercury, into which the action of the bellows forces a plate of zinc, which at other times is protected by two plates of graphite, so that there is no waste of battery force unless the organ is actually playing.

The Engineering Powers of the Beaver are really astonishing, as those most conversant with the habits of the animal testify. On the southern shore of Lake Superior, in Marquette county, a naturalist found remains of long canals and dams constructed by them for the purpose of transporting their cuttings—consisting of trunks of trees two or three feet long—from the place where the trees had fallen to their lodges. Some of these canals were from three hundred to five hundred feet long, by three feet wide and deep. In order to maintain a continuous depth of water they made dams at certain distances, and followed the Chinese plan, in lieu of locks, of drawing their load from one level to another.

The Pyrenees Disappearing.—A Madrid paper laments over the fact which scientific researches have established, that the range of the Pyrenees mountains during the space of twenty years has lost about one hundred feet in altitude, and proceeds to make a calculation whereby it appears that after the lapse of one thousand years the chain separating France and Spain will be no more, in which case the Ebro will empty into the Bay of Biscay instead of the Mediterranean.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The New Haven, Hartford and Springfield railroad, are about putting on the road two coaches of the English style.

The best oil well in Pennsylvania has to be pumped, and only yields two hundred and fifty barrels a day.

There are but three manufactories of wire rope in the United States.

Pittsburg, Pa., has two hundred and one firms, principally manufacturers of iron, steel and glass, who did a business last year of over one hundred thousand dollars each.

A foundery and machine shop at Austin, Nevada, is supplied with Lehigh coal shipped around Cape Horn to San Francisco, thence by river to Sacramento, thence *via.*, Central Pacific railroad to Cisco, whence it is carted to its destination. The Austin *Reveille* under the heading "Good News" lately congratulated conductors of mills and those using machinery, on the receipt at this foundery of a six month's supply of coal enabling the proprietors to execute all orders without delay. The freight on twenty tuns of coal thus transported amounted to nearly $3,000.

The porgy oil manufacture in Maine last year, amounted to $2,000,000 in value, and the guano to $400,000. This year's production will be only about one half as large, and the price is much less than last year.

An elm tree at Hampden, Ohio, furnished seven thousand feet of inch boards, clear stuff. The tree was six feet ten inches in diameter, and weighed sixty thousand pounds. The concentric circles, which indicate one year each, numbered seven hundred and ninety two.

In the neighborhood of Colesburg, Cape of Good Hope, the people are prospecting in all directions in search of diamonds, several very valuable stones have already been found. Garnets are found here in considerable numbers. Amber abounds in this district, also formations containing phosphorus and quicksilver, while it is reported on good authority that some gentleman searching for diamonds have come upon a lode of silver and lead ore.

In St. Charles, Mo., there is a manufactory of that valuable pigment used in oil and water colors, ultra marine. The ordinary method of obtaining this coloring matter has been by manipulating the *lapis lazuli*, but Missouri furnishes the material for making this precious blue, so that it can be afforded at much lower cost than the European article.

The section of the Troy and Greenfield railroad, from Greenfield to Shelburne Falls was formally opened on the 29th ult. Next summer the road will be continued to the east end of the Hoosac tunnel, where it will be likely to rest for some time.

The low water in the Ohio has caused a coal famine in Cincinnati, and the inhabitants finding they can no longer depend upon water communication for commercial purposes, appointed a committee who reported this state of affairs to the Chamber of Commerce, and urged a railroad South to supply the deficiency.

The French railways have profited by the Exhibition. Five lines show an increase of receipts for the summer, ranging from two hundred and fifty thousand dollars to four hundred thousand dollars, as compared with the corresponding period of 1866.

By contract, 2,400 railway ties must be provided for every mile of the Union Pacific Railway. When it is considered that each tie, which must be of oak, costs $1.50 within sight of the Missouri river, and must at date, be transported by mules and locomotives over five hundred miles before being laid in position, we can form an estimate of the immense cost of this one item in the construction of this road.

There are in both hemispheres at least 75,000 miles of railway in actual use, constructed at a cost varying from $20,000 a mile in the Western prairies, to $4,250,000 per mile for the London Metropolitan road, and averaging throughout the world perhaps $30,000 per mile. The capital then, expended in construction alone is represented in round numbers by $6,000,000,000.

The willow ware factory on the Colt estate, Hartford, is the only one of large size in the country, and employs when in full blast one hundred and fifty persons. The company import most of the light, fancy baskets which they sell, and confine their work to coarser goods; for labor is so much cheaper in Germany than here, that even though a duty of thirty-five per cent is laid upon them, it is still cheaper to import. The company have thirty-eight acres planted with the species of willow required in the manufacture, and supply a great abundance of slips to various parts of the country, sending last year one hundred thousand to Delaware.

The number of gold and silver watches manufactured in the French town of Besançon, is about 300,000 a year, or about four fifths of the whole consumption of France. This industry has increased surprisingly since 1845 when only 54,000 were annually produced, and just as the home manufacture has augmented, the importation has decreased. In the town of Besançon and also in Cluses, there have been established under governmental support schools of horology, whose object as stated in an imperial decree, is to form educated and able workmen for the different branches of the trade and to secure the necessary instructions for those who intend to become manufacturers, finishers, or repairers. The course of instructions extends over three years, and the teaching which is theoretical as well as practical, is gratuitous. A collection of finished watches, movements, and detached pieces made at their schools is exhibited at the Paris Exposition.

The linen trade of Dundee, Scotland, was nearly doubled by the American war, and now employs seventy two firms, steam engines of 580 horse power, 200,000 spindles, 8,000 power looms, 6,000 hand looms, and there is worked up in the district 130,000 tuns of jute, flax and hemp, making fabrics valued at $40,000,000 a year. The jute comes from the East Indies, the hemp from Russia, the flax mostly from the continent, and it all comes here to this barren nothern coast to find coal, iron and Scotchmen, and then with its value increased from ten to a hundred fold, be distributed over the world again. Jute comes ten thousand miles to be spun and woven, and then goes back to where it grew, to be worn, just as copper comes from Chili to Birmingham, and goes back, doubling Cape Horn again in brass buttons.

Latest accounts from the inter-oceanic railroad of Costa Rica, presents an encouraging prospect. The route is from Port Limon on the Atlantic to Port Caldera on the Pacific. The former port was discovered by Columbus on his fourth voyage, and the town of Estrella was subsequently built there, but being destroyed by pirates the knowledge of that old highway became extinct until the begining of this century. From this port the proposed railway will cross the isthmus in a westerly direction, past the City of San José, the capital of Costa Rica. The only difficult piece of engineering is the descent of 1,344 feet over a length of fourteen miles, or a grade of 128 feet per mile. The cost of construction is estimated at $12,000,000. A governmental concession for this road has been granted to a company of New York capitalists for seventy years.

Recent American and Foreign Patents.

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

LOOM.—G. W. Firestone, Fredericksburg, Ohio.—In this invention the oscillation of the lathe works the shuttles by means of the mechanism hereinafter explained.

WINDOW-SHUTTER FASTENER.—Will. H. Wayne, Philadelphia, Pa.—This invention consists of a new, simple, and convenient device for fastening window shutters together so as to allow them to be adjusted, instantaneously, to a greater or less degree of opening, and without tying or untying a cord.

RAILROAD CHAIR.—B. J. Romaine, Hackensack, N. J.—This invention relates to a new railroad chair, which consists of wrought iron plates bent to inclose the sides of the rails, and resting upon two sleepers, being long enough to reach between them; these plates extend downward below the rail, and are held together and connected by means of bolts or screws passing through these downward projections.

SAFE LOCK.—Rees Lewis, New York City.—This invention relates to a burglar proof lock which is to be used on safes, vaults, and on such doors on which the key is only to be applied from one side, and consists in a novel construction of the key and lock, whereby feeling of the lock is prevented and the insertion of any but the right key made impossible, as long as the lock is not broken.

LIFTING JACK.—Christian Holmes, Washington, Ohio.—This wagon jack is so constructed as to be self-sustaining when placed under the wagon axle.

CHURN DASHER.—John Leaken, Clinton, Ill.—This dasher is of such form that in churning butter the milk is worked from the bottom of the churn to the top, and the gathering together of the butter greatly facilitated.

CARD FOR HOOKS AND EYES.—Maltby Fowler, Northford, Conn.—This invention consists in so puncturing cards for hooks and eyes that a tongue piece will be left in such punctures, whereby the hooks and eyes can be firmly secured to the card.

WAGON JACK.—Wm. Trusty, Philadelphia, Pa.—This wagon jack consists of a foot or base piece, provided with a standard carrying the lifting bar or lever, but in addition thereto has combined with it a pawl and ratchet surface for holding the lifting bar in whatever position it may be brought.

OX SHOE.—Hazelton Lake, Shelburne, Vt.—This invention has for its object to so improve the form and construction of ox shoes that they may be more securely held to their place upon the feet of the oxen.

CRUET CASTER.—Westel E. Hawkins, New York City.—This improvement has reference to the manner in which the apertures through which the cruets of a table caster pass are formed and completed, and the invention consists in forming the bead on the center plate of the caster by a peculiar and greatly improved method, and of one and the same piece of metal.

LIME KILN.—John L. Livingston, Mount Carroll, Ill.—This invention consists in the peculiar formation and arrangement of parts of the kiln, whereby the process of burning and removing the lime from the kiln is greatly improved and the labor lessened.

BUGGY SPRING.—William Humphrey, Brooklyn, N. Y.—This invention consists in so constructing and attaching the springs of light wagons and buggies that the perch (so generally used) is dispensed with, whereby the middle of the rear axle is relieved of nearly all the weight usually put upon it, and the buggy is made much lighter in consequence.

SETTING TIRES ON WHEELS.—Anders Fagerström, Wyoming, Pa.—This invention relates to a new and improved mode of setting tires on wheels, whereby the tire, by a very simple manipulation, may be tightened or loosened on the wheel as the condition of the latter may require—tightened during the summer season when the wheel is dry and the wood consequently contracted, and loosened during the fall or winter, when the wood is moist and consequently swollen. The object of the invention is to have the tire bind at all time properly on the wheel, so as to hold the spokes firmly in the hub and the rim firmly on the spokes, and thereby avoid all working of the parts, which would otherwise be occasioned by shrinkage, and also avoid an undue pressure of the tire by the swelling of the wood, which frequently causes the spokes to bend and gives the wheel too much "dish," either condition being very detrimental to the wheel.

CULTIVATOR.—E. W. Pike, Galesburg, Ill.—This invention has for its object to improve the construction of W. H. Smith's Cultivator, patented January 15, 1861, and numbered 31,132, so as to make it more convenient, reliable, and effective in operation.

BUNK FOR LOGGING SLEIGHS.—James P. Davis, Stiles, Wis.—This invention has for its object to furnish an improved bunk for attachment to logging sleighs, by the use of which the logs of the lower tier will be prevented from spreading while loading the upper tier, or tiers, and which will enable the logs to be bound and unloaded in much less time than is necessary when the logs are bound in the ordinary manner.

RUDDERS.—D. W. Howard, Detroit, Mich.—This invention has for its object to furnish an improved rudder, so constructed and arranged that a slight movement of the rudder will produce as much steering power as a much greater movement of the rudder post in a rudder constructed in the ordinary manner.

DOOR FASTENER.—P. L. Weimer, Lebanon, Pa.—This invention relates to an improvement in door fastenings, and consists of a weighted figure (as of a man carrying a basket), having a side projection to one foot, which is placed under the door and wedged in the required position by the falling back of the weighted figure. The door may be further prevented from falling forward by the body of the figure and the other leg, and from falling backwards by the free arm of the figure, which carries a cross piece, and is held in a strap stretched partly across the door, in which strap it is free to move.

PORTABLE DUMPING AND LOADING MACHINE.—Wm. Goff, Big Flatts, N. Y.—This invention relates to an improved portable dumping and loading machine, and consists in a self-adjusting dump frame, furnished with folding aprons, the whole capable of being readily transported in a wagon, and be got ready for use in a few seconds.

FASTENING METAL PLATES UPON DOOR-HINGES.—Wm. W. Whiting, Brooklyn, N. Y.—This invention relates to a new method of fastening the silver-plated, or other ornamental plates, which are used to cover and conceal the screw-heads of door-hinges. The invention consists in so securing the said plate upon the hinge that it can be easily detached for cleaning and other purposes, and can be easily refastened; and that it will be secured without the use of pins or screws, whose heads appear on the face and injure the appearance of the same.

CLOTHES FRAME, OR RACK.—R. D. Chandler, Fairhaven, N. J.—This clothes rack, or frame, consists of a square center post, having pivoted to its sides a clothes frame, so as to swing therein in combination with sliding spring bolts, so applied to such bolts as to hold them in position.

MODE OF TREATING OR PREPARING WOOD, ETC.—Harrison Smith, Phillipsburg, Pa.—This invention relates to the mode of imparting to wood, etc., a smooth surface, before the application of the color, or colors, with which such wood or other material is to be covered or ornamented.

PICKER AND STAFF COMBINED.—William E. Card and Parden Andrews, Phœnix, R. I.—This invention consists principally in so making the picker and its staff as to be one and the same device, and also in using an India rubber cushion within the staff, for the picker to act against.

SEWING MACHINE.—George W. Baker, Hinsdale, N. H.—This invention consists in arranging a bar under the platform of the sewing machine, which bar is pivoted at its rear end eccentrically to a horizontal gear wheel, driven by the main gear wheel of the machine, so that a kind of oscillating motion is imparted to this bar; its front portion, which is below the front part of the machine, is by a spiral or other spring drawn off the needle, against an adjustable stop, and thus, when the aforesaid horizontal gear wheel is turned, the bar will be moved forward and backward, and will have its fulcrum on the aforesaid stop, whereby, as the stop is close to its front end, and as the diameter of the gear wheel is not large, the side motion of the said bar will be very little; still it will be large enough to make the front end of the bar strike against the needle, when the same is down with thread for a new loop, thereby feeding the cloth before a new loop is formed.

LAMP BURNER.—George K. Osborn, Brooklyn, N. Y.—This invention relates to a new and useful improvement in lamp burners of that class which are designed for burning coal oil and other hydro-carbons which require a large amount of oxygen in order to support proper combustion for illuminating purposes. The invention consists in the application of a jacket to the upper part of the wick tube constructed and arranged in such a manner that a current of air is supplied to the base of the flame all around the top of the wick.

REMOVING CARBON FROM GAS RETORTS.—B. E. Chollar, Leavenworth, Kansas.—This invention relates to a new and improved method of removing the carbon which is deposited in retorts used for generating gas for illuminating purposes, and it consists in providing for a supply of air within the retort whereby a more perfect combustion is produced.

COAL SCREEN.—George Whittle, New York City.—This invention consists in constructing a cylinder screen and revolving the same in a tight box and in constructing the box in a peculiar manner so that the parts thereof are rendered otherwise useful.

PNEUMATIC SPRING.—W. A. Dripps, Fort Wayne, Ind.—This invention consists in confining compressed air in a chamber and thereby taking advantage of its elastic character for forming springs for various purposes.

PORTABLE BODKIN AND TWEEZERS.—William Quail, New York City.—This invention relates to a new and useful device whereby certain instruments which are in constant use by printers are combined and rendered portable.

BREECH-LOADING FIRE-ARM AND CARTRIDGE.—S. S. Rembert, Memphis, Tenn.—This invention consists in various improvements in the breech-loading gun, especially in the manner of moving and holding the barrel, the construction of the cartridge case and in extracting the same from the barrel.

CHURN.—William Newberry, Clarksville, Mo.—This invention consits in arranging an upright shaft with wings or dashers attached thereto which are revolved within the churn, and also in the arrangement of stationary crosses and wings in the angles of the churn.

HEATER.—Thomas Shipton, Newark, N. J.—The object of this invention is to construct a heater which will make use of the heat generated therein.

TRY SQUARE.—N. Hamblin, Flatbush, N. Y.—This invention has for its object to so improve the construction of a try square that the workmen may be able to see whether his work is exactly true by simply looking at the top of the square.

PAINT BRUSH.—Joseph M. Estabrook, Milford, Mass.—This invention relates to a new manner of connecting the bristles of paint and paste brushes with the handle of the same, and the object is to so arrange the devices by which the bristles are held that the bristles may be firmly clamped by a conical ring against the outside of a wedge projecting from the handle, without the use of cement or other similar material, and so that the bristles can be secured to the handle by any person not experienced in brush-making.

DOOR STOP.—Geo. F. Atkinson, Seymour, Conn.—This door stop or bolt is so constructed that it can be set for operation or put out of operation as may be desired.

DEVICE FOR MEASURING HORSES' FEET.—Moses S. Woodward, Marshalton, Pa.—This invention relates to a device by which the exact measurement of horses' feet can be taken, and which can be used for fitting horse shoes to the feet, so that the same may be very accurately adjusted without burning or cutting the feet.

CAR BRAKE.—A. Z. Long, Scranton, Pa.—This invention relates to a new and improved brake, designed to prevent a retrograde or back movement of a car or a train of cars, when the same is on an incline or rising grade. The invention is more especially intended for cars on roads having great inclines, or steep grades, up which the cars are drawn by a rope and stationary engine, and is designed to hold the cars perfectly stationary on the grade in case the rope should break, a contingency of not unfrequent occurrence, and which is frequently attended with serious accidents both to life and property.

STAINED GLASS.—John C. Millward, New York city.—This invention consists in laying a piece of crystallized sheet zinc under or behind a piece of stained or painted glass, whereby the glass will not only be considerably strengthened, but whereby those portions of the glass which are left transparent will look as if they were inlaid with pearl.

BOOT-JACK.—A. P. Seymour, Jr., Hecla Works, N. Y.—This invention consists in a novel construction of a boot-jack, whereby the implement, when not desired for use, may be folded or closed up so as to occupy but a very small space, and when required for use be capable of being readily extended or unclosed.

SLED BRAKE.—Samuel K. Sutton, Paterson, N. J.—This invention relates to a new and improved brake for sleds, and it consists in operating a dog by means of a toggle, connected to a shaft provided with a spring and a lever, all so arranged that, by manipulating the lever, the dog will be forced down into the ground and the motion of the sled checked or entirely stopped, as desired.

MACHINE FOR CUTTING PAPER, PASTEBOARD, OR OTHER SIMILAR MATERIAL.—Stephen D. Tucker, New York city.—This invention relates to a new and improved machine for cutting paper, pasteboard, or other similar material. The invention, however, is more especially designed for cutting paper for printers' and bookbinders' use, and consists in a novel construction and arrangement of parts, whereby the paper or other material may be cut very expeditiously, and the working parts of the machine placed under the complete control of the operator.

WATER WHEEL.—George W. Herring, Bangor, Me.—This invention relates to a new and improved center-beat water wheel, and it consists in a peculiar construction and arrangement of the same, whereby the usual platform for the wheel to run upon is avoided, and the wheel rendered capable of running in either direction, right or left, at the option of the millwright.

MACHINE FOR STRIPPING WILLOW.—James Swan, Paterson, N. J.—This invention relates to a new and improved machine for stripping willow of its bark, preparatory to the manufacture of the same into baskets. The invention consists of a rotary stripping device provided with blades or strippers arranged in connection with a spring or springs in such a manner that the strippers will be made to bear or press upon the willow by centrifugal force generated by the rotation of the hollow mandrel to which the stripping device is attached. The invention also consists in a means for cleaning the stripping device, or preventing the same from clogging, and the invention finally consists in a clamp of peculiar construction for grasping the willow, and drawing it through the stripping device.

ANTI-KICKING ATTACHMENT FOR HORSES.—O. H. P. Fancher, New York city.—This invention relates to a new and improved anti-kicking attachment, to be applied to horses in harness, the object of the invention being to obtain a device for the purpose specified, which will be self-operating, and require no special care or attention on the part of the driver to apply it, or cause it to act.

PORTABLE FENCE.—G. W. Campbell, Pendleton, Ind.—This invention relates to a new and improved fence of that class which are designed to be readily put up and taken down, and it consists in a novel manner of constructing the fence, whereby a very strong, durable, and economical fence of the kind specified is obtained.

Answers to Correspondents.

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

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at 50 cents a line, under the head of "Business and Personal."

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

J. B. H., of Pa., inquires in regard to the process of polishing horn, and specimens of quartz. The two inquiries are very diverse. In regard to the first we have no information to offer, except that it is similar to that of polishing wood, and as to the latter, the same means employed in finishing the harder qualities of stone will succeed with quartz. This is shown in any work on the business of the lapidary or the treatment of gems.

C. C. M., of Tenn., asks what is the "facial angle" as understood by phrenologists. We advise him to address Fowler & Wells, Phrenologists, New York city. They know more about such matters than we ever hope to imagine.

H. C. B., of N. Y., says: "It is well known that an object capable of casting a shadow gives a converging one if it intercepts the rays of a luminary larger than itself, and a diverging one if the conditions are contrary. If this is true why do clouds appear to give a diverging shadow during a smoky day." Our correspondent does not consider that the diverging shadow includes the penumbra.

E. T. M., of Ill., seems to object to the scent of petroleum. He asks how to alter the smell or partially change it to something else. We can only counsel him to use a stronger and pleasanter odor.

S. F. B., of Conn., asks how to make an amalgam for the old style electrical machine. The recipe is: mercury, 4; zinc, 8; tin, 2. Melt the zinc first, add the tin and pour into a box containing the mercury. Mix by shaking while hot.

J. H. S., of Pa.—"Which would you advise for economy and service in an iron mill, a vertical engine of 12 inches cylinder and 18 inches stroke, 100 strokes per minute, attached directly to the shaft; or a horizontal engine with a cylinder of 14 by 36 at 40 strokes per minute?" We should prefer the 12 by 18 inches, direct acting engine if obliged to choose; but to do its full work 200 strokes per minute would be better than 100. We cannot, however, give a conclusive answer without working drawings of the two engines.

H. F., of Mo., asks how to temper mill picks. We think the question has been answered through our columns. Perhaps some practical man can afford the information.

J. H., of Ind., asks if felt covering is injurious to a boiler. We never knew of injury to a boiler from this source. He sends us also a statement, clipped from a local paper, to the effect that an engineer in trying his gages discovered a bluish flame issuing from the cocks! We have little regard for such "cock and bull" stories.

S. M. S., of Pa., asks how to melt and cast such metals as brass, copper, and nickel to the best advantage. We presume nothing more is required than good plumbago crucibles, a clear anthracite fire, and good molding sand.

C. W. C. & Co., of Montana, state that they are cracker bakers, and the only lumber obtainable of which to construct their boxes is a pine that possesses a strong odor which is imparted to the crackers. Seasoning the lumber and lining the boxes with paper is ineffectual. We think it doubtful if the wood can be deodorized without considerable cost. Lining the boxes with tin foil would be cheaper and probably effectual.

S. M. P., of R. I.—You can whiten or restore ivory which has turned yellow by boiling it in lime water and polishing it with whiting and chamois leather. In many cases where, as in piano keys, the ivory cannot be removed, the polishing process will be found partially successful.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Improved Combination of Steamer and Roaster.

Many of our readers remember the old "tin kitchen" or "Dutch oven," and later the reflecting "Yankee baker," the later of which cooked food by the aid of a small cylinder holding a little charcoal. The Dutch oven, however, cooked the food by the reflected heat from an open fire. One of the purposes of the implement shown in the engravings is this latter; the other is to steam or heat food already cooked, or to bake, stew, or roast without losing any of the aroma of the edibles.

It is seen at A, both figures, and is made of tin or other sheet metal. The bottom compartment, B, is a reservoir for water, and the rest of the box holds shelves or racks for sustaining dishes of meat, vegetables, etc. The front is closed by a sliding door, C. In Fig. 1 it is set on a cooking stove, the front covers being removed and their openings covered by the bottom of the steamer. Fig. 2 shows it set upon legs the ends of which are held by staples or straps, D. In this form it is convenient for standing before an open fire, as a grate or Franklin stove, for roasting purposes. In this position the door, C, is removed from the front and introduced into the chest on inclined snuge, so that it will form with the top a double incline, reflecting the heat from both surfaces. As a steamer the door, C, closes the front and the reservoir is filled with water. The backward incline of the top prevents any condensed steam from falling on the food, but conducts it back to the reservoir.

Fig. 1

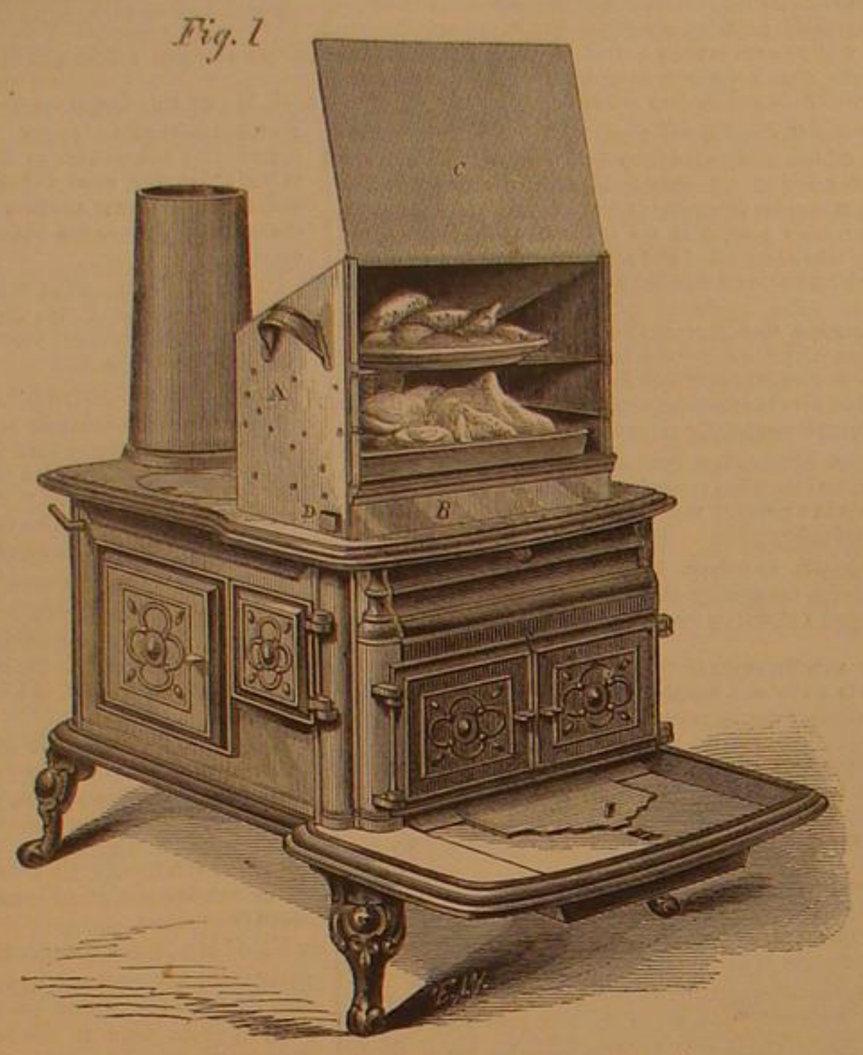
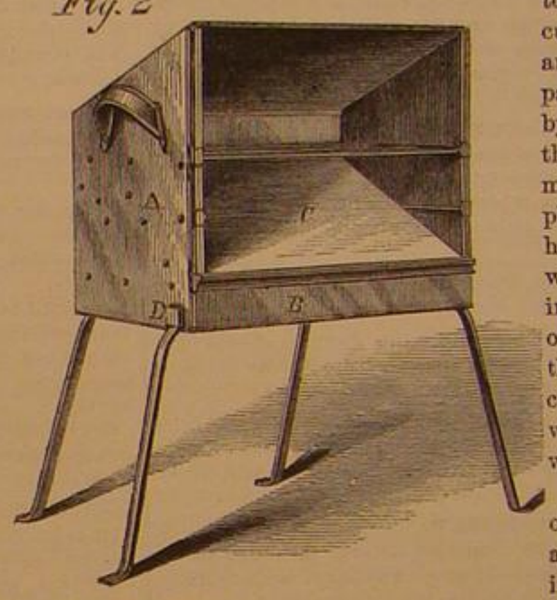


Fig. 2



FORMAN'S COMBINED STEAMER AND HEAT REFLECTOR.

The inventor says that it bakes light bread without any hard crust, cooks green corn and other vegetables, fruits, etc., without robbing them of their flavors and without the possibility of burning or scorching them. Cakes, puddings, custards, and pastry of all kinds are cooked safely and evenly and sauces, even in glass dishes, may be prepared in this apparatus without injury to the dish. As a roaster it is superior to the old-fashioned Dutch oven.

It was patented through the Scientific American Patent Agency by Israel Forman, Fairmont, W. Va., who will dispose of the entire right on favorable terms. Address as above.

Coal Cutting by Machinery.

Mr. Sturgeon, of Burnley, East Lancashire, England, has constructed a machine for mining or cutting coal, a description of which we condense from the London *Colliery Guardian*: In general appearance Mr. Sturgeon's machine, which is self-acting, resembles a mortar, carried in trunnions, by means of which it can be adapted to any dip of the seam. The engine which gives motion to the machine is worked by compressed air, and consists of a small cylinder about seven inches in diameter, in which a piston works with a backward and forward motion, as in a steam hammer. The piston gives motion to an angularly-vibrating "cutter," working upon a center or fulcrum, and carried upon the machine. In its general form the "cutter" resembles a heavy pick. Its length of stroke is 36 inch. Hitherto it has been a defect in these machines that when cutting coal of unequal hardness, or in which pyrites or other solid matter are prevalent, the cutter has been prevented from penetrating to its depth and the work left very irregular and incomplete.

In Mr. Sturgeon's machine this is obviated by a very simple contrivance which causes the cutter to repeat its blows in the same place until the obstruction has been either cut through or dragged forth from the strata, and when at length the full length of the stroke is attained, the machine is advanced to make a fresh cut. The "cutter" having gone the length of its stroke, it would be almost impossible to withdraw it from the coal by a direct backward motion, and hence Mr. Sturgeon has applied a self-acting arrangement to his machine which gives the point to the "cutter," at the end of its forward strokes, a slight retrograde motion, thus enabling it to disentangle itself, and also to return without friction against the strata. The machine will enter a seam of eighteen inches in thickness. Including the "cutter," it only occupies a place three feet square, and its total weight is only seven to eight cwt.

As already stated, the machine is worked by compressed air. The air is condensed outside the pit, by a suitable air pump, into a receiver, from which it is conveyed to the machine in the workings by an india-rubber pipe, and the machine may thus be moved about from one part of the workings to another without being cut off from the motive power. The compressed air, when liberated by the action of the piston, proves most beneficial. The cutter, coming with great force upon the stones imbedded in the strata, is apt to "strike fire," which, in fiery seams, would of course be attended with much danger. By a well-known law of gases, however, compressed air when suddenly allowed to expand, produces great depression of temperature, and Mr. Sturgeon has availed himself of this law to prevent the firing of splinters while his machine is at work. A pipe leading from the exhaust port meets another pipe leading from a small water vessel carried on the machine. The mouths of these two pipes meet at right angles, and the suction caused by the velocity at which the exhaust air makes its escape over the orifice of the water pipe causes to be drawn up a small quantity of water, which on mixing with the cold air current is dashed into spray. This is directed towards the "cutter," and the groove it is forming, and has the combined effect of keeping the "cutter" cool, of reducing the temperature in the groove, preventing the accumulation of gas and the ignition of splinters, and also serving to keep down the dust. The production of cold air by this method may also materially affect the supply of coal from our coal fields.

It is commonly known that the deeper we descend into the bowels of the earth the higher the temperature becomes. Extensive seams of coal lie at a depth so profound as to be utterly beyond reach with present appliances, owing to the heat which is known to prevail at these depths, and the cost of raising the coal. But by the use of coal-cutting machines an abundance of fresh air, of very low temperature, might not only be thrown into the workings, but would be ejected at those points where it would be most required, and hence vast tracts of coal field might be made available, and that, too, at a moderate cost. There is another peculiarity about Mr. Sturgeon's machine which we ought not to pass over. Hitherto only one operation has been performed by coal-cutting machines—under cutting in long lengths—but Mr. Sturgeon's machine will do the necessary work in tunneling and in pillar and stall cutting.

TABER'S IMPROVED SINK TRAP.

The object of the device shown in the accompanying engraving is to provide a safeguard against the rising of impure and deleterious gases from sinks, cesspools, and water

Fig. 1

Fig. 2

closets, and to prevent the evaporation of liquids under certain circumstances. It is evidently excellently well adapted to this purpose, as it is simple and acts wholly without springs or other auxiliary contrivances, being entire in itself.

It is composed of a ferrule or ring with a broad projecting flange, A, to rest on the sink bottom or the top of the pipe, and secured in the usual manner. To the barrel of this ferrule are pivoted two half funnels by rivets at B. These project down into the pipe and when empty close by their own weight as in Fig. 1; but when liquids are passing through from the top they are forced apart as in Fig. 2. When closed, the longitudinal joint is air and water tight, wholly preventing the rise and escape of unpleasant and noxious effluvia. The flange of the ferrule may be constructed to stand at an angle with its barrel without disturbing the action of the two half funnels. These may be made in three parts if desired, the only objection being the formation of another air-tight joint. It may be used to admit volatile liquids to any vessel but prevent their escape by evaporation.

It was patented April 2, 1867, through the Scientific American Patent Agency, by John E. Taber, of Fall River, Mass., who will reply to all inquiries relative to the sale of rights, etc.

Collodionized Paper for Transfers.

Those who desire may transfer to ivory, enamel, porcelain, or a sheet of gold or silver paper, the collodion on which the positive image is obtained in the pressure-frame, and detached from the paper which has served to hold it.

The whole method consists in pouring on a porcelain paper, the enamel which is composed of a salt of alabaster, a very thick collodion sensitized with chloride of silver. Chloride of strontium and nitrate of silver, dissolved beforehand and in equal proportions, the former in alcohol, the latter in distilled water, in the proportions of 2 p. c., and poured, with subsequent agitation, into a very thick plain collodion, give perfect results. Any chloride soluble in alcohol may be employed. The tone of the print varies, according to the chlorides, between red and violet.

It is necessary, in order to collodionize the paper, to cut the sheet into quarters, and to transform a fourth part of a sheet into a basin by turning up the edges to the level of half a centimeter. The paper is then placed on glass, which is held in the left hand, while with the right, in the first instance, ether is spread over the paper, and after the excess is poured off the collodion is poured, without waiting, precisely in the way as a *cliché* is made.

At the end of a quarter of an hour the sheet is dry, and can be used for printing positives. The collodion will not keep, and loses its properties in twenty-four hours, but the paper thus prepared continues fit for use after six days. The yellow tinge which disfigures it subsequently disappears.

The proof leaves the frame with a poppy red color, very bright, and passes to a violet, then to black in the following toning bath:—

Water	1,000 gr.
Hydrosulphite of soda	125 "
Chloride of soda	60 "
Chloride of gold	1 "

It is toned and fixed at the same time; this result is obtained in ten minutes.

The proof is afterward washed in a basinfull of water, and the collodion, detaching itself, floats on the surface. If care has been taken to varnish the four corners of the proof, the transfer is easier. In this case the image never leaves the sheet of paper which bears it. The operator now lays it face downward, upon a sheet of glass, a little larger than the paper, and presses it in close contact; removes the paper and washes carefully the image, now soiled by the alabaster salt, with a little wet cotton. This operation is not attended with any danger to the proof, the collodion being stronger than would be supposed.

Finally, it is washed with plenty of water under the tap and allowed to drain for a few seconds. For transferring the collodion, which is now on a sheet of glass (and where, if a transparency be desired, it can be allowed to remain), the following mixture is passed over the surface with a soft brush:—

Water	1,000 gr.
Gelatin	10 "
Arrowroot or gum	5 "

A sheet of gold or silver paper is then applied over the collodion, avoiding creases. If it is intended to make a porcelain *carte*, place over the image a square of enameled paper. The air bubbles must be got rid of and the whole removed. It is well to mount the proof while it is damp, and to roll it after it is dry.

All these operations are simple and easy, and, commercially speaking, quite as many can be produced as by the ordinary processes. The proofs are unalterable, for the paper which sustains them has not passed through any bath, and the collodion which forms the proofs has been subjected to sufficient washings. By employing a more fluid collodion the image adheres to the porcelain paper. The transfer is no longer necessary. The same result is obtained by coating Rive paper in a dish with the following mixture, which should be warm:—

Water	1,000 gr.
Gelatin	5 "
Arrrowroot	10 "
Sugar candy	20 "

The brilliance is not equal to that obtained with the porcelain paper, though the proofs are exquisitely fine and delicate, and the ordinary papers do not give the details of the *cliché* so perfectly.—*M. Geymet, in Bulletin Belge.*

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.
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VOL. XVII., No. 20....[NEW SERIES.]....*Twenty-first Year*

NEW YORK, SATURDAY, NOVEMBER 16, 1867.

Contents:

(Illustrated articles are marked with an asterisk.)

THE INVENTOR---SOME OF THE OBSTACLES TO HIS SUCCESS.

Did it ever occur to the reader of the SCIENTIFIC AMERICAN who looks over the long list of patents published weekly, how few of these he ever hears about afterward? It would seem, sometimes, that the result of a patent was to send the invention to oblivion, from the fact, so frequent, that its publication is the last heard of it. That this is not so, however, is proved by the hundreds of successful patentees whose inventions bring wealth to their owners. We must look elsewhere for the reasons of failure, and no direction is more natural and proper than that which points toward the inventor.

Ignorance of the laws of mechanics is a fruitful source of failure. Men will spend years of time and much money in trying to contravene the simple, but immutable and unvarying laws of nature, when a slight acquaintance with natural philosophy would prevent this waste of valuable time and treasure. In machinery the expectation of getting more than is given, increasing power by multiplying intermediates between the source of power and its development, is the cause of the hallucination of hundreds. Refusing to recognize the presence of friction and attempting to remove it by adding to its sources of production is so common among those who essay improvements in machinery that the wonder is so many succeed rather than that so many fail. We might, from our experience, cite many individual instances of earnest, honest, struggling men vainly attempting to override the bounds of physical possibilities, when a little calm reflection, combined with knowledge of nature's laws, would show them, at once, their error.

Want of mechanical practice is another cause of failure. No doubt many mechanical improvements have been made by men not practical mechanics, but their success was not because of the want of this practical experience, but in spite of it. They will be found to be, in nearly all cases, natural mechanics, whatever their profession or occupation, and, in the pursuit of their object, to have acquired not only a theoretical knowledge of mechanics, but skill in manipulation. In many cases, however, the inventor possesses only a crude idea of his device and the model maker is the real inventor, working out the half formed idea into shape. This class of our mechanics has never been properly estimated. They do much toward the improvements which assist the progress of the race. Usually they are regarded merely as skilled workman, while, in fact, they are actual inventors. It requires something more than a practical knowledge of the use of tools to become a successful model maker; he must also have a fund of intellectual knowledge, great patience, perseverance, and a faculty of overcoming obstacles. He is the main reliance of many inventors.

Another cause of failure may be found in misdirection of endeavor; either the object sought is valueless, or the means employed to compass it inadequate. The number of so-called improvements which are merely alterations, and of so-called inventions which are revamps of long ago, exploded ideas is surprising. Instead of informing himself of what has been done in the department to which the would be inventor directs his attention, he blunders on over a road which has been laid out for him by those who have gone before and either achieved the goal or stopped disheartened by the way; or he persists in attempts at success by the employment of means and appliances wholly unfitted for his purpose. What can be the benefit of using machinery for an object much easier attained by hand? Yet hundreds persist in pushing these useless inventions before the people. Still, the value of an invention is not to be judged by its apparent insignificance. The balanced handle table knife was a simple and seemingly trifling improvement, yet it became very valuable to the inventor. In soliciting the extension of a patent in as simple an article as a clothes pin the other day, the only difficulty we had to encounter before the patent office was the large sum, almost sixty thousand dollars, which had been realized in working the patent during its existence.

Having, perhaps, perfected a working model of his invention, the next thing for the inventor is to make it "pay." Here is where more fail, perhaps, than in any other stage of their progress. To be pecuniarily valuable the invention must become popular, and to become so it must be introduced to the public. The inventor, not seldom, is peculiarly unfitted to this task. He has been directing his attention, perhaps for years, on the details of his improvement—has concentrated his whole mind on its perfection—and understands nothing about "business" or has no inclination for its excitements and annoyances. Or, he lacks the faculty of properly presenting the claims or explaining the construction, operation, and merits of his invention, and bores and annoys where he would interest and please. Many fail here. Such cases come before us continually. They seem to suppose that because every detail of their contrivance is as plain as day to themselves, who have watched, and worked, and thought on it for years, it must be so to others. Perhaps they become disgusted at the want of enthusiasm evinced by him to whom they would exhibit the excellences of their improvement, as though everybody should ride their hobby, and give up the task in despair. No doubt many inventions now lie unused from these causes which if properly managed might yield a rich return to their owners.

BAD WORKMANSHIP IN STEAM BOILERS.

The unusual number of steam boiler explosions which occurred during the past three or four months, prompts us again to call the attention of those who employ steam power to those fruitful causes of boiler explosions, namely faulty construction and deterioration.

We feel confident that if these two points receive that attention which their importance as agents in destroying human life, demands that they should receive, boiler explosions will be reduced in frequency to such an extent that careless management or ignorant planning will be found sufficient to account for the rest of the boiler accidents without calling in the assistance of either "gas" or "electricity."

Of equal importance with the requisite thickness of iron, particularly if the form is circular, to resist the pressure put upon it, with an ample margin for safety, is the construction of the seams or laps where the plates are joined. And a large proportion of the fearful boiler catastrophes which are of almost daily occurrence may by accounted for by carelessness or, in too many cases parsimoniousness on this very point. To say nothing of the improper size of the rivets which are not infrequently employed, as well as the improper pitch of the holes, we will in the first place briefly allude to the use of that abominable tool known as the "drift pin"—a tool which by the way should be kicked out of every boiler shop in the land.

This tool, it is well known, is used by boiler makers to force the two rivet holes, which have been carelessly laid out in overlapping sheets, to come in line with each other so that the rivet can be inserted. It is a piece of round steel, tapering from the point which is about ⅝ of an inch in diameter to the butt which is considerably larger than the hole in the sheet; suppose the edge of one hole overlaps so that its circumference passes through the diameter of the other, this part of the tool is inserted in the lunar space left between them and a pair of sledges, handled by a pair of stalwart arms, applied at the other end soon rips, tears or strains the iron so that a rivet can be put through the hole. If even after this treatment the proper sized rivet cannot be got in, a smaller one can, and this is the very thing which is constantly done even in "first class" establishments. Let five or six of the rivet holes in a single riveted seam of say thirty rivets, be treated in this way, and we have a structural deficiency which no doubt if it were known would account for many a first class blow up.

Here then we have two causes which no one we think will deny are of constant occurrence and which we likewise think could be wholly prevented by proper legislative enactments specifying among other things, the sizes and pitch of rivets for various thicknesses of iron and prohibiting the use of "drift pins" in boiler shops.

In England, we are informed, these matters of detail receive much greater attention than they do in America; and one firm near Manchester, has we believe, given so much care and attention to the joints of their boilers as to have achieved a very high reputation for constructing safe boilers. This concern carries this important matter to such a degree of nicety as to lay out the boiler sheets with very accurately made steel templets and then to drill the holes instead of distressing the iron by the usual method of punching.

We are also informed that the boilers built by this establishment are remarkably free from accidents, and we must say that we are glad to hear it; beside it corroborates our view that very many accidents may be prevented by proper attention to construction and proportion.

Before leaving the subject of boiler joints, let it not be forgotten that the ignorant use of the caulking tool very frequently destroys that small margin of safety which is left after the "drift pin" and small rivets have done their best to weaken the joint. This for the most part is done by holding the calking tool nearly perpendicular to the sheet and banging away on it with a heavy hammer: by this process we have, on more than one occasion seen sheets of iron cut into nearly a quarter of their thickness. We did not always witness this defect be it remembered, during the life of the boiler, but on one occasion after a huge gap had been rent in it and eighteen or twenty people were scalded to death. As usual philosophers were as thick as blackberries, every one with a theory, which included every agent from "gas" to "super heated steam."

These remarks which were merely intended in the outset as a short caution to boiler builders and users have reached such a length that we must close them by a word of caution respecting braces and stay bolts. Braces and stay bolts are for the most part used to sustain flat surfaces and hence the strain which will be put upon them by the pressure of the steam may be pretty accurately calculated.

Now when it may be set safely down as a rule that no brace should have more than one fifth of its breaking strain put on, there is no difficulty in determining their sizes; and it remains to see that the jaws, pins, and crow feet, are made of good material and so proportioned that they will stand as much as the brace rod or bar.

It is intended in a short time to take up this subject again when some suggestions will be offered on other matters connected with the construction and durability of boilers, particularly the subjects of design and corrosion, we trust however that enough has been said to show that causes strictly within the control of the boiler maker will go far to account for very many explosions and much loss of life.

THE USEFUL MECHANIC.

All mechanics are useful; but the useful mechanics, *par excellence*, may be be divided into two classes, those who are skillful or "close" workmen, and those who are ready for any emergency. The first are always in demand in shops where fine work is the rule; the second are useful everywhere. The sewing machine, gun, and tool business have had the effect to educate machinists, probably more than all other causes combined—at least to educate them to skillfulness in the use of tools. In the gun business, the construction of plugs and templets, for gaging the bore of rifle and pistol barrels, requires the careful manipulation, the experience, and the judgment of a first class workman. The result may appear to be purely mechanical, but it is not so. No machine yet invented could produce these gages. The plug, as its name imports, is simply a cylinder finished to a certain size, which is the same throughout its length. This fits a hole drilled through a block of steel—the plug, also, being of steel, and both hardened. Now it may be a work of no peculiar difficulty to turn and finish a plug to fit nearly, if not quite air-tight a corresponding hole in a block; but when both must be subjected to a hardening process, which will invariably warp them more or less, and still leave them as hard as steel can be made, the problem of perfection becomes somewhat difficult. The hole in the templet must be scoured, ground, abraded, and polished until its surface is like glass, and at the same time perfectly true from end to end. Then the plug must be also ground, polished, etc., to fit perfectly air-tight, yet without binding or requiring pressure to pass it through the hole. So delicate are these gages, and so perfect their fit, that not a particle of air can pass between their engaging surfaces. Such work as this requires the talents of the close workman, of whom there are few. Many other manipulations in the mechanic arts require similar skill. Such concerns as Whitworth's, in England, Brown & Sharpe's, Providence, R. I., Pratt, Whitney & Co., Hartford, Conn., and Colt's of the same place, have secured a world-wide reputation for their attention to these niceties in details of the machinist's art. They use the best tools and employ the best mechanical talent, and they have their reward.

The "men at a pinch" are an entirely different class of mechanics. They have always a plan at their fingers' ends. They can contrive and manage almost without means, or with means which none but they would think of using. In the late war such men, drawn from the ranks of our armies, were invaluable. They improvised bridges over otherwise impassable streams, repaired dilapidated and almost destroyed locomotives, relaid tracks, constructed roads through otherwise impassable morasses, utilized the means at hand, otherwise valueless, and contributed largely to the success of the armies of the nation. Such men are invaluable on railroad lines, on steamships—indeed on all vessels—in "job shops," and in a hundred places. Their faculty of adaptation of means to an end should bring to them an adequate reward—a reward they do not always receive. In a country like ours, where cultivated mechanical skill is pitted against the obstacles or obstinacies of nature, such men are always required. They are born engineers, and from them are drawn our best specimens of engineering talent.

We knew of one, who, sent to repair a boiler in an out-of-the-way place, found no tools with which to work. He wished to remove the manhole of a boiler, but had no wrench and could get none made. He managed, by twisting a rope, to coax the nut from its seat, and after inspecting the boiler and packing the manhole flange, to return the plate to its place and secure it steam-tight by the same means.

Such men are invaluable mechanics. They are not dismayed at difficulties before which some others might succumb, but, "making the best of a bad job," they go heroically and confidently to work, and generally "snatch victory from the jaws of defeat." So long as our country needs such men—which it must until we have tamed the forces of nature and wildness that beset us—we believe in the man for an emergency. In other words, the best apprenticeship for a young man who desires to become a thorough mechanic, is first a job shop, where he has to work on building or repairing everything.

from a wheelbarrow to a steam engine, and then to go into a first class shop and learn the niceties of the business.

ORDNANCE AT THE EXPOSITION.

A tour through the Ordnance Department of the Great Exposition furnishes the opportunity, though scarcely the material, for a comparison of the relative progress of the several Christian nations in the science of destruction, as applied to modern warfare. The display is a very unequal one. England takes the lead in the completeness of her exhibition, and America follows after all her rules in this respect. The French, who make so imposing a display in other departments, were at first strangely behind here. In July, however, they brought out their largest and best guns, and fine specimens of workmanship they are, whatever they may be in other respects. Most of them are manufactured at Ruelle, on the Louvre, near Angoulême. This site for the Government manufactory was originally selected in 1776, on account of its not only affording good water power, but because of its proximity to mines furnishing ores best adapted for the manufacture of iron having that peculiar quality of tenacity which is so essential in the metal used for ordnance. The extensive forests in the vicinity also furnish an ample supply of charcoal. Thus most of the material used at Ruelle is obtained near, though some gray pig iron, of a peculiarly tenacious quality, has recently been imported from Alelich in Algeria. The system adopted at Ruelle for securing the most perfect material for casting cannon, is worthy of notice. After testing the pigs by breaking them, they are cast into a cannon, which is tested to the bursting point, the contractor paying the expenses of the trial if his ore is not accepted. The ore is then broken into small pieces, and the extraneous matter carefully removed. It is next exposed to the air, until the sulphur and magnesia contained in it are dissipated, after which the ores from the different mines are carefully mixed, so that every casting shall contain a due proportion of each.

The heavy guns exhibited by the French are cast upon the core system, and are all breech-loaders and reënforced. Their rifle guns are uniformly made with six grooves. All of their siege and battery guns are made of gun metal. This is less enduring, and not so good for securing a perfect range as a harder material, but it has the merit of economy, as it can be cast over and over again. The bore of the French gun is larger, in proportion to weight of metal, than the steel guns exhibited by Krupp, Whitworth & Armstrong. One French gun in the Exposition is 18 feet long, 16 inches bore, and weighs 85,000 lbs. It throws a shot of about 700 lbs., with a charge of 100 lbs. This the first and only gun of its size yet made in France, has only been fired twice with ordinary charges. In size it is excelled by a gun exhibited by Krupp, which weighs 112,000 lbs, and with its steel carriage and turntable 200,000 lbs. It is a rifled breech-loader, intended for harbor defence, and will prove a most formidable weapon if it answers expectation. Thus far it has never been fired, having been put on a car, built especially for its transportation, and brought direct from the foundry to the Exposition building. The diameter of the bore is 14 inches; weight of steel shot, 1,212 lbs.; shell, 1,080 lbs., with a bursting charge of only 17 lbs. The charge of the gun is 110—130 lbs. Length of gun, 17½ feet. The insignificance of the bursting charge is explained by the fact that the deep grooves required for the lead case leave no room for a heavier charge. The cast-steel in the shell weighs 843 lbs.; the lead jacket, 220 lbs.; the bursting charge, 17 lbs.: total, 1,080 lbs.

The inner tube of the gun weighs twenty tuns. It was forged under the fifty-tun hammer, at Krupp's foundry, from a massive ingot of forty and a quarter tuns. The waste was over twenty tuns, or fifty per cent. There are three sets of cast-steel rings at the breech, and two at the muzzle. These weigh altogethor thirty tuns, and are manufactured without welding from rectangular pieces of metal split down the center, opened with wedges, forged under the hammer, and finished in the rolling mill. This gun is an admirable piece of work, and is a remarkable evidence of what is possible in the manufacture of heavy guns. Sixteen months of constant work, day and night, were expended upon it. It is claimed that the machinery for working it enables two men to handle it with ease, elevating, depressing, and turning the gun so that it can be brought easily and rapidly to bear upon an object

Besides this mammoth gun, Krupp exhibits a 9-inch breech-loader, weighing twelve tuns, forged as described, without welding, and all from one piece of steel, with the exception of the trunnions. This gun has been fired one hundred and twenty times, with forty-five pounds of powder, the service charge being from forty to forty-five pounds. It carries a solid shot weighing three hundred and thirty pounds, and a shell of two hundred and seventy-five pounds. A smaller gun of Krupp's manufacture is a rifled, breech-loading field piece of crucible steel. It is a 4-pounder, seventy-four inches in length, weighs six hundred and five pounds, with a 3-inch bore, and carries a charge of one pound, throwing an eight-and-a-half-pound shell. Another German firm, Berger & Co, of Westphalia, exhibit some guns of large caliber. The largest is an 8-inch gun, with a breech-loading arrangement similar to Krupp's, though more simple in action. Berger & Co. have made many guns for the Prussian and Russian Governments. Their chief reputation, however, is for steel gun barrels; nearly all of the barrels of the needle gun being drilled out of the solid bar, at their manufactory. Petin & Gaudet, a French firm, exhibit a hooped soft-steel gun, of sixteen tons weight, 9½ inch bore, and carrying a three-hundred-pound solid shot. This firm is best known as the manufacturers of cannon rings or hoops. Up to this year they have supplied rings for eight hundred cannons to Italy, for five hundred to Spain, one hundred and thirty to Russia, one hundred and eighty to Denmark, twenty-five to Turkey, forty to Sweden, and one hundred and twenty to England, besides those furnished to the French Government.

The Swedish Government exhibits two cast-iron Finsburg guns, nearly like our fifteen-inch gun in shape and general character. One is an eleven-inch smooth-bore, without reënforce, and the other a four-grooved nine-inch rifled gun, with a steel reënforce at the breech. Both of these guns are muzzle-loaders. They have been severely tested; first with two rounds of thirty pounds and one-hundred-and-sixty-pound shot, then with forty-pound charges and shot, increasing in weight at each round, from two shots weighing three hundred and twenty pounds to eighteen, weighing altogether 2,880 pounds, and filling the gun to the muzzle. Sweden is striving hard to regain her old reputation as a manufacturer of guns, and recall the days when most of the states of Europe came to her workshops for their heavy ordnance. Russia, Austria, and Belgium exhibit a few guns, but nothing worthy of note.

Coming now to the English department, we find the rival systems of Whitworth and Armstrong fully presented. The largest gun shown by Sir William Armstrong & Co. is a nine-inch wrought-iron muzzle loading gun, rifled, and weighing twelve and a half tuns. Whitworth's heaviest is a 150-pounder, besides which he shows a 70-pounder and 32-pounder, with specimens of shot and shell. Major Palliser exhibits a 9-inch gun, weighing thirteen tuns, manufactured at the Elswich ordnance works. It is a coiled, wrought-iron tube, two inches thick, over which is cast an ordinary cast-iron cannon. A Fraser gun is also exhibited. It is a 12-inch, weighing 52,640 pounds, and is made in four pieces, instead of Armstrong's eight, which is the only difference between them, the Fraser gun being nothing but the Armstrong, with improvements introduced by Mr. Fraser. The length of bore in this gun is twelve feet, one inch; the outside measurement fourteen feet, three and a half inches. It is rifled, with nine grooves, spiral, increasing from one in one thousand two hundred to one in six hundred, or fifty calibers. Its elongated projectile weighs six hundred pounds, and is thrown by a charge of seventy pounds, with an initial velocity of 1,240 feet per second. The *Captain*, a new English turret ship, is to have two of these guns in each of her turrets.

A 9 inch, twelve tuns, and a 7-inch, six and a half tuns, the usual British naval guns, are also exhibited; besides a 7-inch breech-loading, polygrooved gun, on Armstrong's vent system. The British Government exhibit, in addition to the display of private manufacturers, ten pieces in all. On the whole the British department is the most complete of all in the way of ordnance.

America makes a poor show, though the peculiarity of the few guns exhibited has attracted much attention to them. One is the Gatling battery gun, of which two specimens are presented, both six-barrel guns, one 5-8 inch bore, the other 1-inch bore. Then we have the Ferris gun, with its claim of a nine mile range, and its enormous charge in proportion to its size. The one shown is a chamber gun of one and three-fourths inch bore, carrying a ten ounce sperical and a twenty-seven ounce conical ball. The chamber is cone-shaped, with an average diameter of two and seven-eighths inches, and an average length of seven and a half inches. The depth of bore is thirty-one and a half inches. This gun has been fired one hundred and forty-seven rounds, and has attained a range of nine miles, with an initial velocity of 2,200 feet.

Though we have so slim an exhibition of American ordnance, the deficiency is in a measure compensated for by the trial our favorite 15-inch gun is receiving in England. We need have no fear as yet in regard to its capacity to cope with anything this Exposition affords in the way of heavy guns. The huge guns exhibited by the French Government, and by Krupp, are formidable in appearance, but their enormous dimensions are serious objections to them. Our 15-inch gun weighs 43,000 pounds, but one half the weight of the French 16-inch gun, and scarcely more than one-third of Krupp's untried monster. Beside, this gun has endured the test of actual service, while there are grave doubts of the reliability of these heavy French and Prussian guns. No gun is stronger than its weakest point, and the weak point of these guns is their breech-loading arrangement, which the English are discarding, and which we have never tried. Krupp's gun is the least objectionable in this respect, but I hardly think even Mr. Krupp himself would be willing to put it through the test to which the Swedish guns are subjected, as above described. All the heavy French guns are breech-loaders, as are all the guns exhibited by Krupp, with the exception of the small mountain cannon. Thus far Krupp has manufactured 3,500 steel guns, and has orders for 2,200 more. Of these 5,700 guns 19 in 20 are rifled breech-loaders, in caliber from 4 lbs. to 300 lbs., with a few of 600 lbs. and 1,000 lbs. In value they amount to a total of nearly $12,000,000. The admirable character of Krupp's light steel guns is well known, and their longevity is remarkable. How he is succeeding with heavier ordnance remains to be proved. He has certainly demonstrated his ability to handle metal in masses large enough to forge guns of the most extraordinary dimensions, but the breech-loading apparatus he has invented is yet to be proved in these large guns. In the large gun I have described the charge is introduced at the side of the breech and not at the rear. In the heavy French gun, on the contrary, the shot is introduced from the rear, and the breech closed by a screw, with a cap of soft steel, which expands and tightens the joint. In both guns, however, the opening made at the breech must seriously weaken the gun. It is not long since the breech was blown out of one of the French guns on board the *Montebello.—Cor. Army and Navy Journal.*

PLATING OR COATING METALS WITH METALS.

Not very long ago, and quite in the remembrance of most who are likely to read this journal, the principal manufactures that might have been described under the above title were the manufacture of tin plates, of tinned culinary utensils, and the operation of Sheffield plating. The process of "galvanizing" (coating iron with zinc by immersion in the molten metal) has materially interfered with that of tinning, and the introduction of the principles of electro-deposition, to produce articles of beauty at a cheap rate, and to serve many useful purposes, has altered the condition of the Sheffield plating trade to such an extent that it only exists to produce certain articles of large consumption and well-defined form.

Great changes can also be traced in the theory and practice of electro-deposition itself. Smee, in his admirable work, laid down the "laws" of electro-metallurgy, as he was pleased to term them, in which the evolution of hydrogen during the time of deposition was made to determine the character of the deposit obtained; he also put forward certain views relating to the deposition of alloys in which the use of intense battery power was pointed out as a possible means of accomplishing that purpose. Now, it is found that, by the use of alkaline solutions, many deposits can be obtained in a reguline form during the evolution of hydrogen, and that, also, from certain alkaline solutions, brass and other alloys can be electro deposited in a reguline form, without the use of more battery power than is necessary to compensate for the want of electric conduction in the solution employed.

In the five years that are comprised between the years 1861—1865, inclusive, the increase of knowledge (practical and theoretical) does not appear to have been very great in relation to the subject at the head of this paper. The chief attempts at improvement have been made in the practical details of the tin-plate manufacture. The use of ordinary resin as a flux, above the molten metal, is provided for by special arrangements by Messrs. Banks and Morgan, in their patent specification: Messrs. Morewood and Whytock employ ordinary resin, in conjunction with tallow, by using a plurality of coating baths worked in connection, by the aid of machinery. With a view to economy of material and of work ing, rollers, guides, and other machinery, are employed in certain inventions. Some inventors set forth improvements in the fluxes used (independent of the above-mentioned resin), comprising potassium, ammonium, zinc, tin, and cadmium chlorides. H. J. Madge manufactures a cheap alloy for coating iron plates, by using lead and antimony, with perhaps, a small quantity of tin, instead of tin alone. Messrs. Nurse use an annealing pot with a double case. Lastly, George Tomkins coats lead and terne plates by pouring the melted metal over the plate, and uses an alloy of nickel, zinc, and lead.

Electro-gilding has made but little practical progress during this time. The ordinary solution of gold trichloride in potassium cyanide is used by Martin Miller to gild wire, and by Kuhlmann to ornament metal. The depositing solution employed by Moore contains potassium ferro-cyanide, "pearl potash," potassium iodide, sodium carbonate, copper cyanide, silver cyanide, and "fine gold;" it is said to give a rapid, durable, and richly colored deposit. J. B. Thompson prepares iron or steel articles for electro-deposition by tinning, and then pickling and washing them; he also ornaments silver surfaces by electro-gilding them with a polarized paint brush containing the electro-depositing solution.

In electro-silvering, the following are the principal points that appear:—Martin Miller employs a solution of silver chloride dissolved in potassium cyanide to coat wire. Moore uses electro-magnetic force, but does not state his silvering solution. Weil's solution for previously coppered articles is made by means of silver nitrate, hydric tartrate, ammonia, and potassium cyanide; this solution gives an adherent and either brilliant or dead coating.

All the solutions for electro-coppering are evidently intended to coat iron or other easily oxidable metals. Miller uses a mixture of copper carbonate, potassium cyanide, and potassium or sodium carbonate, to coat wire; the alkaline portion of the solution is first boiled, and then the copper carbonate is added, the mixture being kept boiling until ammonia is freely given off. Walcott charges a strong potassium-cyanide solution with copper by electrolysis. Weil's electro-coppering solution is formed by adding a solution of cupric sulphate to a solution containing sodic potassium tartrate and sodium hydrate. Thompson deposits copper (on an article already electro-coated with iron) by means of a solution of hydrated cupric oxide in sodium hyposulphite.

Among the other inventions that may be mentioned are the following:—Marshall prevents the fracture of metals, owing to their crystallization, by coating their bearings with soft metal, by running the molten metal on to the inclosed bearing. Le Chatelier deposits aluminum by electrolysis of fused sodic aluminum chloride. Bennett tins lead pipes, that are made by hydraulic pressure, by the overflow of the melted metal. Beslay electro-coats iron with tin preliminary to the final electro-coating. Holley coats iron with aluminum, in the fire, by means of a frit that contains felspar, silex, china clay, and a potash clay, when an external vitreous coating is required. When only a coating of aluminum is wanted, boracic trioxide is added to a potash clay: the slag throws itself off as the iron shrinks.

Owing to the trouble of arriving at the history of patented inventions prior to the year 1852, many important improvements have been repatented. This difficulty, however, has been much lessened by the printing of the specifications, superintended by Mr. Woodcroft, in his successful endeavor to carry out the amended patent laws. Lately, and more especially since the year 1857, his attempts have received great accession of strength by the publication of "Abridgements

of the Specifications," in series chronologically arranged, and drawn up by competent men acquainted with the subject to which each series refers.

Nothwithstanding this, the number of inventions still repatented may be drawn from the following analysis of those relating to our subject between the years 1861—1865, inclusive:—

Resin was used on the surface of melted metal as early as A. D. 1786. Silvering glass with silver, which is afterwards electro coated with copper, is referred to in the year 1852. Apparently, the first patent in which machinery was used for tinning iron or steel plates was secured in 1852. A solution of copper carbonate in potassium cyanide was used to electro-deposit copper in 1853. Although Smee sets forth the deposition of copper from its electro-solution in potassium cyanide, it forms the subject of Walcott's patent. Smee, in 1851, and Alexander Watt, in 1860, electro-deposit silver from a solution of its chloride in potassium cyanide. Smee points out the electro-deposition of gold from a solution of its chloride in potassium cyanide. The combination of hydric tartrate, ammonia, and potassium cyanide, was used in 1857 to electro-deposit silver.—*Ironmonger* (*London*).

STEAM FIRE ENGINES AND THE PETROLEUM FUEL.

In our issue of Oct. 26th we copied from the Boston *Traveler* an account of the performances of a steam fire engine in that city using petroleum for fuel. The report was quite favorable to the performance of the engine and to the value of petroleum as a means for generating steam. By reference to that notice on page 265, current volume, our readers will understand the force of the criticism which we have received from a "Looker-on," who is evidently a practical man. He says: The engine had but one stream on and the hose could be compressed by the foot. He stood by the engine half an hour, and during that period it was stopped several times to get up steam. The gage never showed over 60 pounds pressure. If the experiment was as successful as the *Traveler* represents, our correspondent inquires why was it taken off the next morning.

We have yet to learn of any experiment made with this fuel where its advantages over coal were undeniably demonstrated.

70,148.—MOLD FOR ARTIFICIAL TEETH.—A. M. Asay, Philadelphia, Pa. Antedated Oct. 15, 1867.

1st, I claim constructing the mold with oblong depressions, c, for receiving and retaining the bowed end of the staples, b, or end of plates which project from the lingual surface of the teeth for confining them to vulcanite or other plates.

2d, The depressions, d and e, constructed and arranged substantially as described, for giving increased strength to the rim, f, substantially as set forth.

70,149.—SPRING BOLT FOR DOORS.—George F. Atkinson, Seymour, Conn.

I claim the bolt, A, moving in casing, B, in combination with spring, C, and screw bolt, F, and nut, G, when all are combined and arranged together substantially as and for the purpose described.

70,150.—CONSTRUCTION OF MILK CANS.—Silas O. Avery, Brewster's Station, N. Y.

I claim the making of a can or vessel to contain milk or other fluid substances from one piece or strip of tin or other metal so constructed in the manner and with the devices described as to have between the inner and outer surfaces an air chamber perfectly sealed and impervious to the external effects of atmospheric heat or cold, and which may be applied to all cylindrical vessels composed of tin or other metals and designed to contain fluid substances.

70,151.—TREENAIL.—John Baird, New York City.

I claim the new fastening herein described namely a treenail combined with a metallic socket and wedges applied thereto, substantially as specified.

70,152.—SEWING MACHINE.—George W. Baker (assignor to himself and Warren E. Eason), Hinsdale, N. H.

1st, I claim the combination of the gear wheel, a, and crown gear, E, needle feeding bar, L, carrying the looper, N, and pin, p', as herein described for the purpose specified.

2d, Regulating the lateral or feeding action of the needle feeding bar, L, carrying the looper, by means of a cam or lever, M, made substantially as herein shown and described.

3d, Combining the looper bar, L, and looper, N, with the slotted or adjustable plate, u, spring, o, and lever, M (or its equivalent), all made and operating substantially as and for the purpose herein shown and described.

4th, The take-up device, J, constructed as described when arranged as set forth on the needle bar, D, and when operated by the motions of the same and by the stationary pin, j, in combination with the hinged bar, H, needle, G, and looper bar, L, all made and operating substantially as and for the purpose herein shown and described.

70,153.—FIELD FENCE.—T. H. Bellard, Colbrook, Ohio.

I claim the special arrangement of the boards, A, stakes, B, yoke, C, and rails, E, in the manner as and for the purpose set forth.

70,154.—SINKING WELL TUBING.—R. N. Bennett, Branchport, N. Y.

1st, I claim the point, C, with its shank, B, provided with the cylindrical portion, a, the chamfer, b b, and the T portion, c, and attached by the slot and pin, d, when combined with the tubing, A, in the manner and for the purpose herein set forth.

2d, The combination with the shank, B, of the star-shaped diaphragm, g, arranged and operating in the manner and for the purpose specified.

70,155.—WINDOW SCREEN.—J. G. Bicknell, Cambridgeport, Mass.

I claim the combination of the outer frame, A, with the inner netting covered frame, B, fitted into it and hinged at its sides, all as and for the purpose described.

70,156.—PLATED WARE.—J. C. Blackman, West Meriden, Conn.

I claim in the manufacture of plated ware or articles, providing such articles at their points of rest or contact with a thickness of the same metal as that with which they are plated, substantially as and for the purpose described.

70,157.—BOOT AND SHOE SHIELD.—G. P. Bradley, Lawrence, Mass., assignor to himself and E. E. Allen, Boston, Mass.

I claim the boot shield or plate, a, provided with the metal strap, b, and flexible strap, c c, all relatively arranged to secure the shield in position to protect the side of a boot in coasting, substantially as set forth.

70,158.—LEATHER QUILTING MACHINE.—Albert G. Brewer, Washington, D. C.

I claim the combined arrangement of the spindle, e, adjusting slide, N, and plate, d, the adjusting bolt, y, and adjusting stud, h, arranged substantially as and for the purpose described.

70,159.—GANG PLOW.—G. T. Brewer, Prairie du Rocher, Ill.

I claim the combination and arrangement of the plows, B B1 and B2, with the beams, A A1 and A2, as described and set forth.

70,160.—MACHINE FOR BRAIDING OPEN-WORK BASKETS.—Franklin H. Brown (assignor to himself, Edward F. Pengest and Lemuel B. Flersheim), Chicago, Ill.

1st, I claim pieces, R and S, in combination with lever, M, as and for the purposes set forth.

2d, Slides, P, having an opening or hole 7, and a groove, 11, as and for the purposes set forth.

3d, Combination of the shaft, E, disk, D, and disk, N, as and for the purposes specified.

4th, Plunger, F, in combination with pieces, R and S, and lever, G, as and for the purposes set forth.

5th, Crank pin, L, piece, K, and rods, k k', in combination with rods, 3 and 4, shaft, E, and sleeve, 9, as and for the purposes specified.

6th, In a braiding machine the movable platform, U, as and for the purposes set forth.

7th, Cam, B, in combination with lever, G, and standard, J, as and for the purposes set forth.

8th, Spring, Q, in combination with lever, M, as set forth and for the purposes specified.

9th, The general construction and arrangement of mechanism, substantially as shown and for the purposes specified.

70,161.—BRUSH.—John Buercky (assignor to himself and Michael Wehr), Overpecks Station, Ohio.

I claim the plate, F, with its arms or guards, f f, and plate, F, with ledges, e e, in combination with plate, b, arms, a a, and adjustable handle, c, constructed, arranged and used in the manner and for the purpose described.

70,162.—PORTABLE FENCE.—G. W. Campbell, Pendleton, Ind.

I claim the connecting together of the upper parts of the panels, A, by means of the hooks, j, and the slots, b, in the upper ends of the braces, C, with the rods, k, passing through said slots for the hooks, j, to catch over in combination with the slots, l, in the upper edges of the centers of the base strips, g g, of the braces to receive the lower ends of the end bars, b, of the panels, substantially as shown and described.

70,163.—CHENILLE.—William Canter (assignor to J. Henry Vogt and J. Jacob Gass), New York City. Antedated Oct. 16, 1867.

I claim the partially uncut chenille made in the manner specified as a new article of manufacture.

70,164.—PICKER FOR LOOMS.—William E. Card and Pardon Andrews, Phoenix, R. I.

1st, We claim the combination of the staff, A, having recesses, E G, of unequal diameters in its end, B, the loose pad, D, elastic cushion, F, and plate, J, as constructed as herein described and for the purpose specified.

2d, So securing the pad in the staff as to have a side or lateral play, substantially as and for the purpose set forth.

70,165.—CLOTHES DRYER.—R. D. Chandler, Fairhaven, N. J.

I claim the combination of the center post, A, having shoulder plates, E, in combination with the clothes frames, C, having slide spring bolts, D, substantially as and for the purpose described.

70,166.—METHOD FOR REMOVING CARBON FROM GAS RETORTS.—B. E. Chollar, Leavenworth, Kansas.

I claim the use of a jet of steam in the stand pipes of gas retorts to cause a draft of air through the retort for the purpose of burning or consuming the deposit of carbon, substantially as described.

70,167.—BEEHIVE.—John Coats, Camden, Ohio.

I claim the herein-described extension beehive when constructed and arranged in the manner and for the purpose substantially as set forth.

70,168.—STOVE DRUM.—J. L. Collins and H. C. Bergie, Chicago, Ill.

1st, We claim the reversible partition, F, when provided with lateral flues and bent at the lower end so as close one half of the lower opening into the drum, substantially as specified.

2d, The combination and arrangement of the outer case, A, and removable partition, F, with the collars, E, substantially as and for the purpose specified.

70,169.—DEVICE FOR TRUSS SPRINGS.—Geo. A. Colton, Adrian, Mich., and Albert D. Angell, Coldwater, Mich.

We claim the plate, B b b', and adjusting screws, C C', in combination with the hinged sections, A A' a a', of the truss spring, substantially as described and for the purpose specified.

70,170.—WASHING MACHINE.—Thomas Courser, Burlington, Iowa.

1st, I claim the combination of an elastic yielding box, B, carrying a concave, b, with a plunger, C, which receives motion from a crank shaft, D, substantially as described.

2d, The combination of a washboard, E, pressure board, G G', and plunger, C, with the concave bed, b, arranged to operate substantially as described.

3d, So constructing and arranging the plunger, C, and combining it with a concave bed, b, that the clothes are raised out of the water and compressed at every forward stroke of said plunger, substantially as described.

70,171.—SHUTTLE.—George L. Crandal, Pitcher, N. Y.

1st, I claim the curved tension spring, a, in combination with the curved fixed wire, c, when arranged and operating in a shuttle, substantially as and for the purpose herein specified.

2d, The inclined groove, m, in the shell of the shtutle opposite the eye, c, for guiding the threading wire, p, as set forth.

70,172.—CONNECTING LINK.—Robert Creuzbaur N. Y. City.

1st, I claim an O connecting link having a closing piece pivoted to it substantially as described.

2d, Adapting the pivoted closing piece of the O-link to serve as a means for strengthening the main portion of the link, substantially as described.

3d, The combination of the pivoted closing piece, B, spring, E, and link portion, A, constructed substantially as described.

70,173.—SHUTTER BOWING BOLT.—J. M. and M. L. Cummings, Philadelphia, Pa. Antedated Oct. 15, 1867.

1st, We claim a shuttle bolt having jointed to the end of its slide, C, an T-piece, c', so as to operate in combination with the case, A, substantially and for the purpose described.

2d, We also claim in combination with the slide, C, having a jointed end and operating in the case, A, substantially as described, the adjustable thumb and finger piece, c'', and the slotted hole, b5, in the plate, B, substantially as and for the purpose set forth and described.

70,174.—BUNK FOR LOGGING SLEIGH.—James P. Davis, Stiles, Wis

I claim an improved logging bunk, A, the ends of which are slotted vertically and which has log chains, B, attached to it within the said slots and at or near their inner ends, substantially as herein shown and described and for the purpose set forth.

70,175.—LEATHER SPLITTING MACHINE.—Alfred Dawes, Hudson, Mass.

I claim the leather splitting machine constructed, arranged, and operating substantially as described.

Also, the compound roll consisting of the central roll or shaft, the sleeve of yielding elastic material covering said roll or shaft, and the outer rings of hard material arranged to operate as set forth.

Also, the construction of a cylinder cam in two separate pieces, adjustable with respect to each other substantially as and for the purpose specified.

70,176.—MANUFACTURE OF ENAMELED AND JAPANNED LEATHER.—Ichabod W. Dawson, Newark, N. J.

I claim leather the Japan or composition of which is applied after the same has been subjected to a powerful stretching action, as a new article of manufacture.

70,177.—PNEUMATIC SPRING.—W. A. Dripps, Fort Wayne, Ind.

I claim the construction of the pneumatic spring consisting of the case, A, and having an eccentric cylinder, B, and cover, J, said cylinder containing the piston, D, having the rings, c d e, and perforated upon its under side at f, and provided with the rod passing through the cover, J, as herein set forth, for the purpose specified.

70,178.—WASHING MACHINE.—H. W. Driver, Havana, Ill.

I claim the drum, B, rollers, I I, and rubbing board, N, when arranged in connection and combination with each other, substantially as and for the purpose described.

70,179.—CRADLE.—D. A. Dunham, Pilatka, Fla.

I claim a child's cradle, A, formed of a barrel with the hoops, b b, projecting over the ends, and the ribs shaped rockers, c c, lying close underneath, arranged substantially as described.

70,180.—HOISTING MACHINE.—Jacob Edson, Boston, Mass.

I claim the arrangement and combination of the lever pawl, G, the brake, H, the windlass barrel, A, the brake pulley, I, the ratchet, D, the shaft, B, and the train of gears, c d C, or the equivalent thereof, such gears being applied to the shaft, ratchet, and windlass barrel, substantially as specified.

I also claim the combination of the screw arm, l', and its nut, l, or nuts, k l, with the brake, H, and the lever pawl, G, substantially as described.

70,181.—CLOTHES WRINGER.—T. B. Emerson, Seville, Ohio

I claim the shaft, A, collars, C, provided with notches, D, when said collars and shaft are constructed in one entire piece, in combination with the rod, E, canvas, F, and rubber, G, in the manner as and for the purpose set forth.

70,182.—PAINT BRUSH.—Joseph M. Estabrook, Milford Mass.

1st, I claim the arrangement of the rings, D and E, having flanges or studs or shoulders, a and c, respectively, and being combined with the handle, A, having the ferrule, B and conical pin, C, all made and operating substantially as herein shown and described.

2d, Making the ferrule, B, and pin, C, of one piece of sheet metal, substantially as herein shown and described.

70,183.—SETTING TIRES ON WHEELS.—Anders Fagerstrom, Wyoming, Pa.

I claim the notched bars, F F, in combination with the hooked or bent ends, a a, of the tire, B, and the bar, G, fitted between the bars, F F, all being arranged and applied to the wheel substantially in the manner as and for the purpose set forth.

70,184.—GAS GENERATOR.—Mathew Faloon, Bloomington, Ill.

I claim the combination of the fountain, C, connected to the generator, B, by means of the tube, d, with the sack, A, provided for different forms of nozzles, substantially as herein shown and described and for the purposes set forth.

70,185.—ANTI-KICKING ATTACHMENT FOR HORSES.—O. H. P. Fancher, New York City.

I claim the strap, C, applied to the thills, A, and bit rings, a', as shown, in combination with the straps, b b, bit rings, a, and rings, c', all arranged to operate substantially as and for the purpose set forth.

70,186.—HAND LOOM.—G. W. Firestone, Fredericksburg, O.

I claim the combination of the lathe, B, with the sweeps, F F, shaft, G, treadles, H, cords, K K, and pickstaves, M M, substantially as and for the purpose specified.

70,187.—RAILROAD SWITCH.—Thomas Fogg, Detroit, Mich.

I claim the switch composed of the three rails, C D E, at each side, in connection with the rigid tongues, I J, yielding main rails, A' A', and guard rails, K, arranged to operate in the manner substantially as and for the purpose set forth.

I further claim the combination of the springs, L, with the rails A' A', when the latter are used in connection with the tongues, I J, and the switch, substantially as and for the purpose specified.

70,188.—MACHINE FOR OPENING CANS.—Wm. H. Forker, Meadville, Pa.

I claim the handle, A, with the base, B, and the handle or lever, D, constructed as described, when the same are in combination with the knife, C, and the point, F, as described and for the purpose set forth.

70,189.—HAY STACKER.—J. Forsher and J. C. McCland, Unionville Center, Ohio.

We claim the shaft, a, supported by standard, b, upon the carriage, c, and having at its top, the revolving cross pieces, d, with sheaves, e, over which latter pass ropes, h, attached to windlasses, k, and forks, I, the whole being constructed and arranged as and for the purpose described.

70,190.—CARDS FOR HOOKS AND EYES.—Maltby Fowler, Northford, Conn.

I claim the card, A, provided with two or more series of punctures, s, the convex side of each series facing each other, and provided with the tongue pieces, b, fitting over the hooks and eyes, as herein set forth for the purpose specified.

70,191.—SEAT FOR CHAMBER VESSELS.—Isaac Freed, Harrisburg, Pa., assignor to Wm Getty, Camden, N. J.

I claim the arrangement of the springs, C, the boards, A B, and the rims, D E, as and for the purpose specified.

70,192.—MACHINE FOR CUTTING WOOD GEAR.—Thomas F. Freeman (assignor to himself and Wm. H. Abbot), Brooklyn, N. Y.

I claim, 1st, A pair of revolving cutters set upon the same axis of rotation, but capable of being moved toward or away from each other, in combination with guides or slides, substantially as specified, for directing the cutters in forming gear teeth, as set forth.

2d, I claim the arrangement of the slides, q r, arms, a p, frame, m, slide, c, and bed, b, in combination with the rotary cutters, b b, mounted and actuated as set forth.

70,193.—CAPPING SCREWS.—John Gardner, New Haven, Ct.

1st, I claim the combination of the cap, and screw stem fast to the cap, with the screw head and socket or orifice formed therein for the reception of the said stem, under the arrangement and for operation as set forth.

2d, In screws in which the cap and its central screw stem are combined with the head of the screw as described, I claim making the under surface of the said cap concave, substantially as and for the purposes set forth.

70,194.—HAIR BRUSH.—J. N. George, Boston, and Jacob R. Sanborn, Waltham, Mass.

We claim the combination with a hair brush of a sponge, C, or equivalent absorbent material, substantially as and for the purpose specified.

70,195.—CORN SHELLER.—George Goeway (assignor to himself and Howard Baron), Philadelphia, Pa.

1st, I claim the ribs, i, for the purpose of enabling the ears of corn, while being shelled, to revolve freely and not clog.

2d, The longitudinal flanges, k, for the purpose of compelling the ears of corn to revolve and prevent their getting crosswise in the machine while being shelled.

3d, The concave, c, formed in sections with diagonal toothed bars, each section acting independently of the other sections and corresponding in width with the spaces between any two of the longitudinal flanges, k, at their outer edges, substantially as set forth.

4th, The combination of the cylinder, b, concave, c, and springs, d, in the manner and for the purpose substantially as set forth.

70,196.—PORTABLE DUMPING AND LOADING MACHINE.—William Goff, Big Flats, N. Y.

I claim, 1st, The spring guides, d, operated by lever, K, and system of levers, L, substantially as described, in combination with an incline or inclined track, D, and rest, f, and their respective equivalent, substantially as herein shown and described.

2d, The folding apron, C, hinged at c, in combination with a device for dumping and loading, substantially as above set forth and described.

3d, The folding apron, H, hinged at h, also in combination with a device for dumping and loading, substantially as above set forth and described.

70,197.—WHIFFLETREE, TRACE CATCH, OR COCKEYE.—Wm. W. Gordon, Delhi, N. Y.

1st, I claim the stud, key, or pin, a, Figs. 1, 2, 3, and 4, in combination with a whiffletree tip or trace catch, substantially as set forth.

2d, I claim the slot, c, in combination with the cockeye, c, Figs. 1 and 5, when constructed in the manner and for the purposes set forth.

3d, I claim the combination of the stud, 2, and slot, c, Fig. 1, when constructed in the manner and for the purposes set forth in the above specification

70,198.—VENTILATING MILLSTONES.—John Gray, Dubuque, Iowa.

1st, I claim the fan blower, E, arranged in relation with the box, D, constructed as described, spouts, C C, and millstones, as herein set forth, for the purpose specified.

2d, The box, D, constructed as described, provided with the discharge spouts, G G, at each end, and having the cleaning sweep, g, operated by means of the cord, h, as herein set forth and for the purpose specified.

3d, The oblong box, D, inclined spouts, C, and fan blower, E, arranged in relation with each other and with the millstone, as herein set forth for the purpose specified.

70,199.—RATCHET DRILL.—John Gray, Litchfield, Ill.

I claim the combination of the feeding screw, C, with its head, C1, the sliding head, C1, the yielding cushion, C3, the drill spindle, A, with its dowel, a, and the cylindrical head D, with its flange, d', substantially as described.

70,200.—FURNACES FOR STEAM BOILERS.—Jacob Green, Norristown, Pa.

1st, I claim the ash pit, A, with its arched top composed partly of brick and partly of a cast iron key, when the latter is constructed to form a bearer for the grate bars, all substantially as herein set forth.

2d, The cast iron key, F, its side pieces, a a, and notched ribs, I, in combination with the movable bars, m, for the purpose described.

70,201.—BAG TIE.—Joseph Grimes, Alexandria, Va., assignor to himself and F. A. Reed.

I claim the combination of the lever, c, provided with the teeth, c', with the links, a a', and clevis, b, arranged substantially as described.

70,202.—SAFE.—Joseph L. Hall, Cincinnati, Ohio.

1st, I claim the jointing together two or more metallic plates by means of dovetails, grooves, and tenons at their edges or otherwise, as herein described, when the said plates are used in the construction of burglar proof safes, vaults, and other secure receptacles.

2d, The dovetailed, grooved, and tenoned angle irons, G, when the same are used for securing together the corners of safes, vaults, or other secure receptacles, as herein described and for the purpose specified.

3d, The dovetailed plates, B D, or their equivalents, in combination with the dovetailed, grooved and tenoned angle irons G, and the tapered arbors, c, when the same are constructed and arranged for burglar proof safes, vaults, and other secure receptacles, substantially as and for the purpose herein described and set forth.

70,203.—LIGHTNING ARRESTER FOR TELEGRAPHS.—Wm. H. Hall, Chicago, Ill.

1st, I claim supporting the connecting plate, G, over the ground plate, A, without any non-conducting substance between them, by means of the plate B, substantially as specified.

2d, Connecting the plate, B, to the ground plate, A, adjustably by means of the posts, E, and slides, D, substantially as and for the purposes specified.

3d, The non-conducting plate, B, when surrounding and supporting the connecting plates or disks, G, substantially as specified and shown.

4th, The non-conducting supports, a, substantially as and for the purposes specified.

5th, The combination of the ground plate, A, and posts, E, with the non-conducting plate, B, non-conducting supports, a, and collars or slides, D, substantially as specified.

6th, The combination of the ground plate, A, posts, C, and standards, E, with the plate, B, connecting plate, G, post or posts, F, and slides or collars, D, substantially as and for the purposes specified.

70,204.—TRY SQUARES.—Elson Hamblin, Flatbush, N. Y.

I claim the combination of the plates, C and D, with the blade or plate, B, and handle, A, of an ordinary try square, substantially as herein shown and described, and for the purpose set forth.

70,205.—MACHINE FOR CUTTING SOAP.—Cyrus H. Hardy, Charlestown, Mass.

I claim a machine for cutting soap, provided with ways, a, for receiving the soap from and delivering it upon the "truck," substantially as described.

I also claim one or more screws, b, operated as described, for lifting the block of soap from the truck to the ways of the machine, substantially as set forth.

I also claim pivoting the rectangular frame, O, to one side of the center of vibration of the segmental disks, M, in order that the position of the wires, V, when cutting the block of soap, may be nearly horizontal, substantially as and for the purpose described.

I also claim the rod, s, with its screw nut, u, in combination with the guide bar, t, and shoe, r, for adjusting and tightening the wire in place, substantially as described.

70,206.—WATER RESERVOIR FOR COOKING STOVES.—Conrad Harris and Paul W. Zoinet, Cincinnati, Ohio.

1st, We claim a stove reservior, consisting of two or more covered pots or vessels, A A', A' B', formed and combined substantially as and for the purpose set forth.

2d, A stove reservoir composed of two pots or vessels, A A', having covers B B', on their opposing sides, in combination with closing strips, C C', top plate, D, and bolts, F F', with their described or equivalent accessories, substantially as set forth.

3d, The mode of hinging the lids of the reservoir by gudgeons, N, occupying indent lines, M, in the vessel, and secured by the top plate, D, in manner substantially as represented.

70,207.—GAS COOKING STOVE APPARATUS.—David G. Haskins, Cambridge, Mass.

1st, I claim a gas cooking apparatus, formed with the double casing, a, c, fitted as described, with wire netting in combination with the combustion chamber, b, and exit flue, f, the inner casing being provided with a hole for the reception of a kettle, or other culinary vessel, and with openings and covers, h, for the escape of steam, etc., substantially as specified.

2d, I claim the combination of the metal plate, or cover, e, provided with the diaphragm, e', with the perforated inner casing, c, and the combustion chamber, b, as set forth.

70,208.—PLANING MACHINE.—Warren D. Hatch, South Antrim, N. H., assignor to himself and Lewis Babbitt, Worcester, Mass.

In a machine for reducing a board to a series of cylinders, I claim the rotary cutter carriers, B, C, cutters, D, in combination with the feed rollers, I, I', and K, K', fluted guide bar, L, and fluted guide rollers, O, O, P, P', M, all arranged and adjusted to operate in the manner and for the purpose described.

70,209.—CONSTRUCTION OF CRUET-CASTERS.—Westel E. Hawkins (assignor to Joshua B. Graves), New York city.

I claim the center plate, A, and the bead around the cruet-holes of one and the same piece of metal, substantially as shown and described.

70,210.—COMPOSITION FOR HARDENING STEEL.—Charles T. J. Hayden, Versailles, Mo.

I claim the application of the aforesaid chemical compound or mixture to steel, for the purpose of hardening it, or any other substantially the same, which will produce the same effect; when steel is hardened it can be used in cutting glass, steel, or other hard substances.

70,211.—WATER WHEELS.—George W. Herring, Bangor, Me.

I claim the alternate long and short buckets, b, c, formed respectively with curved and radial portions, c, g, d, f, and placed or arranged relatively with the upper and lower rims, a, a, of the wheel and the shaft, e, and the lower rim, a, fitted in a circular opening in the bottom of the scroll, substantially as herein shown and described.

70,212.—METHOD OF PILING, HEATING AND FLUXING FAGOTS. Anthony J. Hindermeyer, Bohrstown, Pa.

I claim the method herein described of constructing, fluxing, and heating a pile of iron and steel bars, to be subsequently converted into a railroad rail by rolling as set forth.

70,213.—STEAM GAGES.—John P. Holt, Cleveland, O.

1st, I claim the arrangement of the lever, I, link, K, and adjusting arm, D, with the bow, C, chain, G, and spindle, E, substantially as set forth.

2d, The combination of the abutments, P', with the case, A, and spring, R, substantially as herein set forth.

70,214.—LIFTING JACK.—Christian Holmes, Washington, O.

I claim a lifting jack composed of a lifting lever hung to a standard having base board substantially as and for the purpose described.

70,215.—RUDDERS.—D. W. Howard, Detroit, Mich.

I claim the combination of the hinged wings, D, and vertical bar, C, with the upper and lower parts of the blade, B, and with the post, A, substantially in the manner herein shown and described, and for the purpose set forth.

70,216.—RAILROAD CAR VENTILATORS.—James L. Howard, Hartford, Ct.

1st, I claim the combination of the frame of a ventilating aperture, with a double mouthed hood turning upon an axis arranged transversely to the aperture substantially as before set forth.

I also claim the combination of the said frame and double-mouthed hood, with arms, C, F, by means of which the said hood at the outer side of the frame may be operated from the inner side of the frame, substantially as before set forth.

I also claim the combination of the said frame, double-mouthed hood, and arm, with a connection by means of which two or more of said hoods may be turned simultaneously, substantially as set forth.

I also claim the combination of the frame of a ventilating aperture, having a hood connected with it, with a register valve, and with a transverse spindle, K, for the purpose of operating said register valve, substantially as before set forth.

I also claim the combination of each of the first three combinations aforesaid, with a register valve for regulating the passage of air through the ventilating aperture, substantially as before set forth.

I also claim the combination of each of the first three combinations aforesaid, with a register valve and a transverse spindle for operating said valve, substantially as before set forth.

70,217.—WAGON BRAKE.—Wesley Hull, Fort Wayne, Ind.

I claim the brake, A, bent lever, a, connecting rod, C, in combination with slotted connecting rods and lever, for the purpose of locking wheels of wagons while ascending or descending hills, the whole being arranged and combined in the manner and for the purposes herein set forth and described.

70,218.—FASTENINGS FOR BUTTONS.—Henry Humphrey, Adrian, Mich.

I claim the within described button fastener, consisting of the plates, A and B, provided with slots j, s, to encircle the shank of the button, and connected together by the elastic, g, the whole constructed and operating substantially as described.

70,219.—BUGGY SPRING.—Wm. Humphreys, Brooklyn, N. Y.

I claim the springs, A, formed of either wood or metal, substantially as shown and described, and attached to the rear axle and to the D, circle, substantially as set forth, and for the purpose specified.

70,220.—UMBRELLAS.—Julius Jacob, New York city.

I claim the umbrella ribs formed of the sliding tube, as shown in combination with the folding handle and stretchers, as set forth.

70,221.—SASH FASTENER.—George Jelby and John W. Gowell, Boston, Mass.

We claim the improved window sash supporter and fastener herein described, the same consisting of the rack, C, in combination with the spring bolt, D, moving longitudinally in bearings, c, d, and operated by the key, G, substantially in the manner and for the purposes herein shown and set forth.

70,222.—WINDOW SASH STOP.—J. Gay Jewell, Washington, D. C.

I claim, 1st, the screw head or pad, A, made hollow and filled with gutta percha, rubber, leather, composition, cork, or other substance that may be used for preventing the abrasion of the window frame.

2d, The button, or handle, made in one piece with the main screw, and attached to a screw-head or pad by a swivel, or shoulder joint, with a small screw penetrating the screw-head or pad, as and for the purpose set forth.

70,223.—JOINT BOLT.—S. E. Jewett, Haverhill, Mass.

I claim, 1st, a joint bolt furnished with a dovetail slot and a dovetailed segment of wood to fit the same.

2d, The application of a segment of wood and glue, in combination with the ordinary belt-head, or its equivalent, N, or with a hinge-head, as specified and described.

70,224.—PITMAN COUPLING.—William J. Keeney, Florence, Ind.

1st, I claim the wrist, F, G, composed of two cylindrical studs, with correspondingly oblique terminations, when formed to be approximated or withdrawn in the line of their axis, substantially as set forth.

2d, The arrangement of jaws, D, E, having the obliquely terminated cylindrical steels, F, G, and compressing and expanding devices, I, J, K, or their mechanical equivalents, substantially as and for the purpose set forth.

70,225.—PITMAN COUPLING.—Wm. J Keeney, Florence, Ind.

1st, I claim a pitman coupling composed of the recurved heel, B, and adjustable jaws, D, E, which can be adapted to grasp said heel with a uniform pressure on every side, with their described or equivalent accessories substantially as set forth.

2d, In the described combination, the recurved heel, B, jaws, D, E, screw nut, F, and block or spring, G, for the purpose set forth.

70,226.—WINDOW SHADE MATERIAL.—Gibbons L. Kelty, New York city.

I claim a window shade material formed with a printed ground representing the meshes of lace curtains, and in combination therewith I claim the ornamental printed figure representing the embroidered work of lace curtains.

70,227.—OX SHOES.—Hazleton Lake, Shelburne, N. H.

I claim extending the forward part of the shoe, A, inward, and forming nail holes through the inner edge of the said extended part, substantially as herein shown and described, and for the purpose set forth.

70,228.—LABEL HOLDER FOR MAIL.—George A. Lamb, Jeffersonville, N. Y.

I claim the manner of construction and the mode of adjusting and securing the label therein, at set forth in the foregoing description.

70,229.—CHURN DASHER.—John Leaken (assignor to himself and F. H. Bogar), Clinton, Ill.

I claim a dasher for churns provided with wings and arms, substantially as and for the purpose described.

70,230.—COTTON BALE TIE.—R. H. Lecky, Alleghany City, Penn. Antedated Oct. 9, 1867.

I claim a clasp for bands or hoops used for baling cotton, said clasp consisting of the piece, x, provided with openings, C, D, and e, and a projection, B, constructed, arranged, and operating substantially as herein described, and for the purpose set forth.

70,231.—HORSE SHOES.—George W. Lewis, Providence, R. I.

I claim the improvement in toe calkins described, which consists in making one of the faces, b, of each of the holding spurs, a, curved from the top outward toward the base, as and for the purpose specified.

70,232.—SAFE LOCKS.—Rees Lewis, New York city.

1st, I claim the key, B, constructed as described with one or more sliding guards, c, which are operated by springs, d, and which project into the tubular spindle of the key, or from the bit of the same, as herein set forth for the purpose specified.

2d, The revolving shell, D, in combination with the vibrating plate, E, springs, f and g, all made and operating substantially as and for the purpose herein shown and described.

3d, The device herein shown and described for preventing the shell, D, from turning, consisting of the stud or roller, b, on the roller, F, fitting between two jaws, j, j, projecting from the shell, D, substantially as set forth.

4th, The key, B, in combination with the revolving shell, D, vibrating plate, E, and slotted guard plate, H, all made and operating substantially as herein shown and described.

70,233.—HEAT RADIATING STOVE, OR FURNACE, FOR FIRE-PLACES.—John Liddle, (assignor to Jane E. Liddle), Brooklyn, N. Y.

1st, I claim the combination in a fire place heater of the cylinders, A B and C, with their tops, D E and F, respectively, and a suitable opening or openings through the walls of the hot air chamber, G, at or near its top for passing the hot products of combustion from the chamber, I, to the chamber, V, substantially as herein above set forth.

2d, The combination with the hot air chamber, G, and hot exit pipe, M, of the wings, O, connected at the bottom or their equivalents by which all the hot air which enters the said hot air exit pipe, M, is taken from the top of the hot air chamber, G, substantially as and for the purpose specified.

3d, The combination with a heater constructed substantially as described of the lining, A', which prevents the hot air from the room in which the heater stands passing into the hot air flue, N, or into the room above substantially as herein above set forth.

4th, The combination with the hot air chamber, G, of a fire place heater constructed substantially as described of an opening, f, for feeding the said hot air chamber with air from the cellar or other source free from dust; substantially as and for the purpose described.

5th, The combination with the openings, d d and d', in the top plate of the base of a furnace constructed substantially as set forth, of the annular box damper, T, constructed and operating substantially as herein above specified.

6th, The combination with the lining, A', frame, B', front, C', of the hooks, J, substantially as set forth.

7th, Taking the air from a point at or near the top of the hot air chamber, G, within the fire place heater out through the casing, A', and passing it into the hot air flue, N, by means of a suitable exit pipe substantially as described.

70,234.—LIME KILN.—J. L. Livingston, Mt. Carroll, Ill.

1st, I claim the draft holes, a, upon each side of the furnace, C, crossing each other and entering said furnaces upon each side of the partition, D, whereby the effect of the winds is counteracted and the draft in the furnaces regulated as herein set forth for the purpose specified.

2d, The arrangement of the furnaces, C C, upon each side of the interior opening, A, whereby the products of combustion are enabled to pass from each furnaces toward each other at the same time the time is kept from the furnace as herein set forth for the purpose specified.

70,235.—CAR BRAKE.—A. Z. Long, Scranton, Pa.

I claim the toothed wheels, D, and pawls, E E', in combination with the levers, F, connected with the pawls, and the lever, G, substantially as an I for the purpose set forth.

70,23 .—SASH FASTENER.—G. H. Lupton, Cleveland, Ohio.

I claim the bolt, A, hook, D, and loop, E, as arranged in its application to the shutters, B and F, for the purpose and in the manner substantially as specified.

Bolt, A, and rib, H, as arranged in combination with the sill, F', and groove, G', as and for the purpose set forth.

70,237.—PLOW AND PLANTER COMBINED.—J. D. Marshall, Renick, Mo.

I claim the carriage, A, plows, B, vertical posts, a, swing frame, D, and stirrups, d, when combined and arranged in the manner described.

70,238.—METALLIC GARTER.—W. H. McCoy, and A. Wheeler, Charlestown, Mass.

We claim the stocking band or supporter, b, when made in two parts hinged together at c, substantially as described.

We also claim the clamp wire, g, having a band or eccentric, f, working in combination with the grooves, h, to fasten the band substantially as shown and described.

70,239.—CLUTCH FOR HAY FORK.—G. D. Melott, Watertown, N. Y.

I claim the construction of a clutch composed of two members, connected together by a bolt, or pivot upon which bolt or pivot, said members are free to turn in combination with the link, c, as herein described, constructed and operated substantially as and for the purposes herein set forth.

2d, The combination of the shank, d, with the link, c, and the combination of the shank, f, with a member of a clutch, as and for the purposes specified.

3d, The combination of a pole or stole and socket, o, with the shanks, d, and f.

70,240.—ORNAMENTING GLASS.—J. C. Millward, N. Y. City.

I claim the application of the crystallized sheet metal plate, B, to the under side of the glass against the paint or staining as herein described for the purpose specified.

70,241.—FASTENING FOR UMBRELLA RUNNERS.—Wm. Money, (assignor to E. W. Cloud) Paterson, N. J.

I claim the double lever eccentric cam, C, in combination with the umbrella slide, a, constructed and operating substantially as and for the purpose herein described.

70,242.—ROTARY METORS OR MOTORS.—Chas. Moore, and Arthur P. Emery, New York City.

1st, We claim the connecting links, m, hinged together by the independent pin, o, concentric with the outer cylinder in combination with the sliding piston, l, for operation together substantially as shown and described.

2d, The independent pin, o, arranged for connecting the sliding piston, l, by means of the links, m, substantially as shown and described.

70,243.—PLOW.—Josephus Moore, Bushnell, Ill.

1st, I claim the combination of the beams, d and c, the rod, l, and the spring lever, k, as and for the purpose described.

2d, The combination of the lever, n, and handle, t, with the axles of the wheels, a a, and the main frame, A, in manner and for purpose specified.

3d, The combination of the elbow lever, v, with the spring, w, and connecting rod, u, substantially as set forth.

4th, The combination of the elbow lever, v, the spring, u, with the rack plate, s, and lever, n, substantially as described.

70,244.—PUMP.—J. A. Morrell, Chicago, Ill.

I claim the air chamber, A, provided with the arms, d and e, and with a side opening or cavity, J, cast with it and also supporting two stationary plungers, B, in combination with the cylinders, C, constructed with necks having annular cavities and with their internal diameters enlarged below the necks as described valves, D, and balls, I, the several parts constructed and arranged substantially as and for the purposes specified.

70,245.—IRON BRIDGE.—D. H. Morrison, Dayton, Ohio.

1st, I claim the universal washer, B f, constructed and applied in the manner and for the purpose specified.

2d, The combination and arrangement of the arch beams, C, arch joint plates, g, and universal washer, B f, when constructed, connected and operating conjointly in the manner and for the purpose described.

70,246.—BOOT JACK.—J. G. Moulton, Boston, Mass.

I claim the combination and arrangement of the several parts of the machine namely: the standards, a a, the crop bar, a', the brace, b, the jac, c, the screws or pivots, d d, and the bolt, e, whereby a boot-jack is constructed, substantially in the manner and for the purpose above set forth.

70,247.—LAMP.—Wm. Mullally, (assignor to Howard Tilden) Boston, Mass.

I claim arranging the bottom of the cap, H, a little above the convex base, G, leaving an opening between it and the base, G, for the air to pass out and up and cool the chimney and to prevent the cap from heating the base.

Also I claim the deflectors, J J, extending down from the ends of the slot in a blaze cap with closed sides substantially as described.

I claim making lugs or supports on the base plate to fit recesses in the side of the cap so that the cap can be readily removed from the base plate to adjust the wick and clean out the base of the top.

I claim the pins or lugs on the base or bottom plate for the lower edge of the chimney to stand on substantially as described.

And in combination with the cap and base arranged substantially as described, I claim the perforated bottom plate, A, for connecting the top to the lamp or oil vessel.

70,248.—AUTOMATIC VALVE AND FILTERING WATER LEADER John Muss, Quincy, Ill.

I claim an automatic water leader and filter consisting of a waste-pipe strainer valves and float applied to a water leader and so constructed and arranged that the water shall pass through the strainer into the cistern when it requires filling but when the cistern is filled shall cleanse the strainer and pass out through the waste pipe substantially as herein shown and described.

70,249.—CHURN.—Wm. Newberry, Clarksville, Mo.

1st, I claim the crosses, E and F, with the stationary wings, G, attached thereto and arranged substantially as shown and described.

2d, The stationary wings, G, in the angles of a square or angular churn whether the churn has more or less angles, substantially as described.

3d, In combination with the crosses, E F, and wings, G, I claim the revolving dashers, C, substantially as and for the purposes set forth.

70,250.—MODE OF TREATING CAOUTCHOUC, GUTTA PERCHA, AND SIMILAR GUMS.—J. B. Newbrough and E. Fagan, New York City.

I claim gutta percha or other gums combined with or treated in connection with iodine in the manner described or in any other manner by which the within described result is obtained.

70,251.—ROSETTES FOR BRIDLES.—W. F. Niles, Leominster, Mass.

I claim as a new article of manufacture a rosette, the body of which is made of concave convex disks of horn or hoof and combined together substantially as and for the purposes herein specified.

70,252.—LAMP BURNER.—G. K. Osborn, Brooklyn, N. Y.

I claim the construction and arrangement of the tube, B, surrounded by the perforated disk, C, the upper part, b, corrugated and of less diameter than the lower part, c, all supported at their points of connection by the short tube, A, as and for the purpose specified.

70,253.—TENSION REGULATOR FOR LOOMS.—Frank Painter, East Hampton, Mass.

1st, I claim in looms for weaving elastic fabric the construction and arrangement of the feed roll, B, receiving the rubber threads from the threading and guide plates, c c', the adjustable tension roll, C, bearing against the feed roll, B, and clamping the threads by means of the spiral springs, d d, the friction roll, D, take up shaft, E, under the adjustable tension roll, F, that bears the rubber threads against said shaft by means of the spiral springs, d' d', all operating as described whereby the rubber threads are stretched and held positively to any degree of tension while the web is being woven to produce fabrics of any desired elasticity, as herein shown and described.

70,254.—SMOKE STACK.—T P. Peck, Savannah, Ga.

1st, I claim the combination with the stack top or cover, E, and sleve or spark catcher, F, of the wings or plates, f, arranged for action substantially as described.

2d, A smoke stack embracing an interior pipe, A, outer shell, D, with its top or cover, E, having interior ribs or wings, f, sleve, F, and cone box, B, constructed as described and provided with a ribbed or winged cone and outlets or port bevels, or the equivalents of these devices for operation together as herein set forth.

70,255.—STEERING APPARATUS.—Joseph Perkins, Saco, Me.

I claim in combination with the wheel, A, shaft, a, and gear, d, the table, F, having the rack, h, grooves, m n, and slides, 1 2 3 4, attached to the arms, o p, all substantially as and for the purposes set forth.

70,256.—MEANS FOR SETTING, REEFING, AND FURLING SAILS.—Charles Peterson, San Francisco, Cal.

1st, I claim the within-described mode of setting furling and reefing sails from the deck of a vessel by means of the swivel booms, D, swivels, G H, and ropes or chains, 1 2 3 4 5 6 7 and 8, substantially as described.

2d, Setting furling and reefing stay sails and jibs by rolling them on the stay, substantially as described.

3d, Setting furling and reefing the upper square sails from the deck by means of two sets of ropes or chains only operating together with the swivel booms, D, substantially as described.

4th, A swivel boom around which the upper square sails are rolled or furled, substantially as described.

5th, An india-rubber cap, P, on the end of rotating span, for the purpose and manner set forth.

6th, The swivel, D, provided with friction balls, substantially as described for the purpose specified.

7th, An india-rubber roller over the periphery of a sheave, substantially as and for the purposes described.

8th, A stay for ships' sails constructed of metal links, substantially as described.

9th, The combination of the swivel, H, link, I, and swivel, G, substantially as described for the purpose specified.

10th, The india-rubber covered rollers, g and g', in combination with the india-rubber covered boom, E, substantially as and for the purposes described.

11th, The guide rope, 5, in combination with the courses, substantially as and for the purposes described.

70,257.—APPARATUS FOR FEEDING SCREW BLANKS.—E. S Pierce, Hartford, Conn.

1st, I claim a zig-zag or serpentine channel way formed of corrugated sides, substantially as herein described and for the purpose set forth

2d, The devices, a b c d e f g, for maintaining screw blanks, or other similar articles, in any desired position while passing through a channel or groove, substantially as herein specified.

70,258.—CULTIVATOR.—E. W Pike, Galesburg, Ill.

1st, I claim the combination of the plate, S, jaws, R, and coiled spring, U, with the pivoted catch block, P, and standard, F, substantially as herein shown and described and for the purpose set forth.

2d, The hinged plate, W, and springs, X, in combination with the cross beam, B, and standards, F, substantially as herein shown and described and for the purpose set forth.

3d, The combination of the brace bar, H, with the beam, A, and cross beam, G, substantially as shown and described and for the purpose set forth.

70,259.—RAIL GUIDE FOR GUIDING WAGONS.—Chas. Plagge, Darmstadt, Grand Duchy of Hesse.

I claim the application of rail guides to wagons, carts, and other vehicles, with plain wheels, as used on common roads or paved streets, made and applied substantially and for the purpose as herein descried and set forth.

70,260.—CREEL FOR WINDING YARN.—Moses O. Potter, South Scituate, R. I.

I claim a creel plate (for creels used in transfering yarn from the spools to the sections, etc.,) with a hinge and catch, or latch, combined, with the spool spindle or skeiver permanently affixed in said hinge, and swinging and latching upon the same, alternately, as the case may be, and as herein described and set forth.

70,261.—POCKET CASE FOR PRINTERS' BODKIN AND TWEEZERS.—Wm. Quail, New York city.

I claim the combination and arrangement of the case, B, with the bodkin a, and the tweezers, c, substantially as described and for the purposes set forth.

70,262.—SHUTTER CATCH.—F. Raymond, Woodhaven, N. Y.

1st, I claim the pivoted laterally-moving bar, A*, in combination with the catch, C, and fixed stud, r, on the shutter, substantially as and for the purpose specified.

2d, The arrangement of the pivoted bar, A*, of the catch, with reference to the rod, m, of the shutter, substantially as and for the purpose herein specified.

70,263.—MACHINE FOR MAKING WOODEN WARE.—Adam R. Reese, Phillipsburg, N. J.

I claim the combination of the vertical mandrel revolving in a fixed position and carrying the block, with a series of parallel straight cutters moving in an inclined path nearly vertical at an angle to the block, for the purpose of simultaneously cutting a series of concentric frusta of cones from a solid block.

I also claim the combination of the mandrel with the cutters and the guides, arranged and operating substantially as described.

70,264.—BREECH-LOADING FIRE ARMS.—S. S. Rembert, Memphis, Tenn.

1st, I claim the breech piece, A, constructed with recesses, a a, which pass through the abutment, h, substantially as described for the purposes specified.

2d, I claim the double key, B, operated substantially as described, to hold the barrels to the abutment, as described.

3d, The pointed screws, m, passing through the stock into the cartridge chamber, whereby the cartridge shell is held in place when the barrels are thrown forward, as herein shown and described.

4th, The combination and arrangement of the breech piece, A, double key, B, bar, C, rod, D, and lever, E, substantially as described for the purpose specified.

5th, The T-end of the lever, E, having catch, e, in combination with the notched bar of the double key, B, and spring, g, substantially as described for the purpose specified.

70,265.—LET-OFF FOR LOOMS.—Jacob Remick, Newburyport, Mass., assignor to Amos L. Wood and Josiah G. Abbott, Boston, Mass.

I claim the combination of the whip roll, b, in the bent arms and levers, E, with the springs, G, adjustable rod, k, friction wheels, F, and warp beam, B, all constructed and arranged substantially as and for the purpose set forth.

70,266.—FRAME STAFF FOR GRINDING MILLS.—Walter Ring, Gosport, Ind.

1st, I claim the gage staff, B, centered upon the mill stone by means of the circular center fitting over and around the spindle, b, provided upon its under side with the bush plate, m, having the pivoted eccentric followers, n, and surrounded by anjustable collar, m1, with lugs, n, all constructed and arranged as herein set forth.

2d, The combination of the tram and gage staff, B, with the spirit levels, K, substantially as herein shown and described and for the purpose specified.

70,267.—PLOW.—Gerhard Ringen, Smith City, Mo.

I claim the share, D, and the land side, E, when formed of one piece, and combined with the post, F, having two branches, f f1, substantially in the manner herein shown and described.

70,268.—MACHINE FOR BEAMING HIDES OR SKINS.—Thos. Roberts and Patrick Lennox, Lynn Mass.

1st, We claim the combination with the sliding carriage and mechanism for imparting a reciprocating motion to the same, of the hinged or pivoted beaming tool and spring, or equivalent mechanism, for actuating the same during the movements of the said carriage, in the manner herein shown and described.

2d, We claim the employment of the spring bar, J, for the purpose of raising the tool, I, from off the skin during one movement of the tool, and pressing it down in contact with the skin during the opposite movement of it, essentially in manner as set forth and explained.

3d, We also claim, in combination with the above described arrangement of parts, the movable car, K, in manner and to operate as before described.

4th, We also claim the peculiar construction of the car, K, as composed of the truck frame, b, circular platform, d, and revolving tablet, L, supported by the friction roller, g g, etc., substantially as before described.

5th, We also claim, in combination with the car, K, the device for locking it in position, consisting of the catch bar, i, and notched rail, k, as and for the purposes set forth.

70,269.—RAILWAY CAR.—Daniel T. Robinson, Boston, Mass.

I claim so constructing the running portion of a railway car as to dispense with the ordinary truck, and apply the axle boxes directly to the levers or bars upon which the carriage rests, substantially in manner and for the purpose as described.

I also claim the peculiar combination and arrangement with the carriage body or platform, of the levers, D D D, etc., and springs, d d, applied and operating together in manner and for the purposes as before set forth.

70,270.—METHOD OF HOLDING BRISTLES IN BRUSH STOCKS.—C. D. Rogers, Utica, N. Y., and M. P. Wilkins, Jersey City, N. J.

1st, We claim a bunch of bristles, in combinat on with a flanged ferrule, and these in combination with a hole or aperture and countersink in a brush stock substantially as described.

2d, We claim, in combination, a ferrule, a bunch of bristles, and an attaching contrivance, substantially such as described, the combination being substantially such as set forth, and also, we claim these elements in combination with a hole in a brush stock.

3d, We claim, in combination, a flanged ferrule, an attaching contrivance, and a bunch of bristles, the combination being substantially such as described, and we claim these, also, in combination with a hole and countersink in a brush stock, the combination being substantially such as set forth.

And we wish it distinctly understood that by the word bristles, in all these claims, we mean fiber, vegetable, or animal, suitable for the formation of brushes.

70,271.—RAILROAD CHAIR.—B. J. Romaine, Hackensack, N. J. Antedated May 1, 1867.

I claim the wrought iron plates, C, upon each side of the rail, their upper portions bent to receive the flange of the rail and embrace the web lying flush therewith, their lower ends bent at right angles, and adjusted nearer to or further from each other by means of the screw, a, and nut, b, the projecting portion of the curved upper part under the flange of the rail resting upon the ties, as herein described for the purpose specified.

70,272.—MODE OF LIGHTING STREET GAS BURNERS.—E. P. Russell, Manlius, N. Y.

I claim a small supplemental burner, A, to be kept burning constantly, when operating in connection with a main burner, substantially as and for the purposes set forth.

70,273.—BRAIDING-MACHINE CARRIERS.—Socrates Scholfield, Providence, R. I. Antedated Oct. 16, 1867.

I claim so arranging the outer or extreme eye, or point, of a braiding machine carrier or racer, that it may be made to yield with the tension of the thread, as such carrier or racer passes around the gears, or in the grooves of a braiding machine, substantially as described.

I also claim balancing the carrier or racer upon the edges of the groove in which it runs, substantially as specified.

70,274.—ATTACHING HORSESHOES.—Henry Schreiner, Philadelphia, Pa.

1st, I claim attaching the belts to the sole, B, by means of the tapering mortises, b1, and the corresponding enlargements, d'', on the lower ends of the said belts, substantially as described and set forth.

2d, I claim the combination of the belts, C and D, with the enlarged heads, d'', and clasp, d1 c1, operating substantially as described and for the purpose set forth.

70,275.—BOOTJACK.—A. P. Seymour, Jr., Hecla Works, N. Y.

1st, I claim the sliding jaws, C C1, pivoted together at their inner ends by the pin, B, sliding in the groove, a, of the foot piece, A, said jaws guided in their inward and outward movements by means of the lugs, b b, as herein set forth for the purpose specified.

2d, The feet, D D, applied to the foot piece, A, in such a manner as to be adjusted by the movement of the jaws, C C1, substantially as shown and described.

3d, The construction and arrangement of the foot piece, A, sliding jaws, C C1, and feet, D D, substantially as described for the purpose specified.

70,276.—HEATER.—Thos. Shipton, Newark, N. J.

1st, I claim the arrangement of the pipes, C, circular pipe, b, upright pipes, d, boiler, a, and air pipes, f h, as herein described for the purpose specified.

2d, I also claim the steam pipe circling the boiler with upright pipes, all arranged in the manner and for the purpose substantially as described.

70,277.—COMPOSITION FOR STUFFING WOOD.—Harrison Smith, Phillipsburg, N. J.

I claim the mixture composed of the several ingredients, and mixed together in about the proportions, substantially as described, and for use, substantially as and for the purpose specified.

79,278.—SLEIGH BELLS.—Henry K. Smith, Boston, Mass.

I claim the improved construction of the tongue hook, and the arrangement of it, the rivet, the belt, and the strap, as described.

70,279.—CAR COUPLING.—J. L. Smith, Penn Township, Pa.

I claim the construction and arrangement of the devices, E J M R and P, as herein described and for the purposes set forth.

70,280.—THRASHING MACHINE.—C. L. Snyder, Hardin, Ill.

1st, I claim arrangement and employment of the endless screw, d', in combination with the shaft, E, and zig-zag, a, separator, F, as and for the purpose shown and described.

2d, I claim the construction and arrangement of the feed board, G, when applied to the frame, A, as herein set forth.

70,281.—MACHINE FOR SPINNING METALS.—Chas. F. Spaulding, St. Johnsbury, Vt.

I claim the arrangement and combination of a lever, E, with the spinning wheel or wheels and die wheel, substantially as set forth.

I also claim the die wheel, as constructed, with the peripheral opening, k, and the groove, q, arranged in it, substantially as and for the purpose herein before set forth.

I also claim the combination and arrangement of the supporting roller, G and its adjustable devices, as described, with the die wheel and its shaft movable lengthwise, as set forth.

I also claim, in combination with the spinning wheel supporting lever, and the die wheel supporting lever, and the die wheel shaft, arranged as described, the devices by which the vertical adjustment and longitudinal movements of the said shaft may be effected, as set forth.

I also claim the arrangement and combination of the separate handle, F, and its fixtures, substantially as described, with the lever, E, and the spinning and die wheels, arranged as explained.

70,282.—HINGE AND FASTENER.—Nathaniel B. Spooner, Plymouth, Mass.

In a blind hinge I claim the combination of the upper disk, a, having the pintle, b, set in the socket, d, the pin, v, set in the holes, v', on the lower hinge, the catch pin, e, in the pintle of the upper hinge, and the spiral spring, h, all arranged and operating as and for the purposes herein described.

70,283.—STEAM-ENGINE SLIDE VALVE.—Albert Staley, Clinton, Iowa.

I claim the balancing disk, E, of circular or other form, on the outside of the valve chest, provided with packing, e i g, in combination with the valve, B, and stem, d, to which the said disk is attached, substantially in the manner and for the purpose set forth.

70,284.—MODE OF ATTACHING AXES TO THEIR HANDLES.—Jas. Stewart, Money Creek, Minn.

I claim improved fastening for ax handles, and other tool handles, consisting of a plate, c, attached by a clip, D, and secured by a bolt, a, to the handle, in combination with the bolt, e, and wedge, d, constructed and arranged to operate as herein described.

70,285.—PUMP.—Ransom E. Strait, Battle Creek, Mich.

1st, I claim the detachable spout, C, and rest or fulcrum, E, constructed as specified, and operating as set forth.

2d, I claim the spring, h, and valve, c, and valve seat, f, constructed as described, and operating as set forth and for the purposes specified.

3d, I claim the arrangement of the cup or spout, C, barrel, A, reducing socket, f, joint, A1, barrel, B, and conical point, G, and valves, b1 and c, plunger, F, standard, E, and handle, D, the whole constructed and operating as described and for the purposes set forth.

60,286.—BLOWER WHEEL.—B. F. Sturtevant, West Roxbury, Mass.

I claim the arrangement of the blades and the frusto conical disks relatively to each other and to the flanged rings, substantially as and for the purposes described.

70,287.—SLED BRAKE.—Samuel K. Sutton, Paterson, N. J.

I claim the combination of the dog, C, with the toggle, a a1, and the shaft, B, provided with the spring, e, and the lever, E all arranged and applied to the sled to operate in the manner substantially as and for the purpose set forth.

70,288.—MACHINE FOR STRIPPING WILLOW.—James Swan, Paterson, N. J.

1st, I claim the stripping device consisting of the rotating head or hub, a, having the transverse groove, b, strippers, D D, each composed of two parallel plates, c c, having openings, e, whose outer edges are V-shaped, the plate of one stripper sliding between the plates of the other, said plates secured together at their outer ends by the pins, d, and to the hub, a, by the cap, E, the hub and strippers surrounded by the elastic band, F, substantially as described for the purpose set forth.

2d, The reciprocating slide, O, provided with the jaws, R R, and levers, Q Q, the uprights, T T T' T', endless chain, N, shafts, L H I, connected by bevel gear, i, driving belt, J, fixed and loose pulleys on the mandrel, B, and shafts, H I, all arranged and operating as and for the purposes specified.

3d, The sliding tube, G, fitted within the mandrel, B, for guiding the willow to the strippers, as herein shown and described.

70,289.—CARRIAGE-SHAFT CONNECTION.—Charles Tholl, Boston, Mass.

I claim my improved shaft connection, constructed substantially as described, viz: of the open box, B, with its cover and catch, and the strip of rubber, or its equivalent, arranged and applied together to the journal of the forked arm, F, and to the axle, substantially in the manner as hereinbefore specified.

70,290.—FLASK FOR CASTING CAR WHEELS.—W. R. Thompson, Catasaugua, Pa.

I claim the metal ring, G, constructed with both an upper and lower shoulder for upper edge of the flask, C, and lower edge of flask, A, to bear against, in combination with said flasks and with the clamps, J J, constructed and applied as shown, all substantially as described.

70,291.—WAGON JACK.—Wm. H. Trusty, Philadelphia, Pa.

I claim the pawl and ratchet surface, in combination with the lifting bar, when such pawl is provided with a lifting lever, substantially as and for the purpose described.

2d, In combination with the above, I claim the series of notches to the standard of the jack, as herein described for the purpose specified.

70,292.—MACHINE FOR CUTTING PAPER, PASTEBOARD, ETC.—Stephen D. Tucker, New York city.

1st, I claim operating the knife, G, through the medium of the screw, N, worm wheel, L, lever, J, provided with a slot, d, to receive the wrist pin, e, of wheel, L, and the pitman, I, all arranged to bring the knife slowly down while at work, and throw it up with a comparatively quick movement, substantially as shown and described.

2d, Operating the clutch, Q, to connect the driving pulley, P, with shaft, O, and disconnect it therefrom by means of the rod, R, actuated automatically from the worm wheel, L, substantially as set forth.

3d, The treadles, s s', arranged in connection with the slide rod, R, to admit of the pulley, P, being connected with the shaft, O, at the will of the operator, substantially as described.

4th, The spring or brake, V, operated automatically from the rod, R, substantially as set forth.

70,293.—MACHINE FOR CUTTING TEETH OF WHEELS.—John Underwood, Muscatine, Iowa, assignor to Ephraim Ball, Canton, Ohio.

I claim, in combination with the mechanism for producing the intermittent rotating feed motion given to the gear that is being cut, the mechanism for producing the vertical motion toward the cutting tool, substantially as herein described.

70,294.—BABBITING AND DRILLING JIG.—John Underwood, Muscatine, Iowa, assignor to Ephraim Ball, Canton, Ohio.

1st, I claim a babbiting jig or former, constructed and arranged substantially as herein described, which, in conjunction with the bearings on a cast iron frame, shall control the position of and give shape to the babbit linings of said bearings, as and for the purpose herein set forth.

2d, I also claim the drilling jig herein described, as and for the purpose set forth.

3d, And, finally, I claim the combination of the babbiting jig, and the drilling jig, for arranging and fitting the journal bearings, and boring the screw bolt holes or the caps of the journal boxes, as herein described and represented.

70,295.—BALE TIE.—Joseph D. Van Benthuysen, New Orleans, La.

I claim constructing a cotton bale tie with a triangular opening as shown, when the diagonal side thereof is beveled substantially as described and for the purpose set forth.

70,296.—HULL FOR VESSELS.—John Van Pelt, Perry, Ill.

I claim the transverse trussing braces or floor timbers, a a, in combination with the straight floor beam, A, substantially as described and set forth.

70,297.—LET-OFF MOTION FOR LOOMS.—Richard Walker, Milford, Mass.

I claim the combination with a yarn or dresser beam of a brake, E, attached to a curved lever, G, the bar, K, provided with a slide, f, and spring, h, and the arms or levers, L M, substantially as and for the purpose set forth.

2d, I claim the combination of the vibrating bar, K, provided with a spring, h, a graduated scale and indicator, m, with the arms or levers, L M, whereby the pressure of the pad, p, on the yarn of the yarn beam may be regulated and adjusted.

70,298.—MINER'S PICK.—S. H. Wallace, Parnassus, Pa.

I claim making the head or points, or both head and points, of picks for mining purposes, removable, substantially as and for the purposes hereinbefore set forth.

70,299.—HINGE.—B. D. Washburn, Roxbury, Mass.

I claim as a new article of manufacture a blind hinge formed of the three parts or members, a b c, when these (having the relative arrangement or disposition as shown) are cut in one piece from sheet metal, substantially as set forth.

70,300.—SHUTTER FASTENER.—Will. H. Wayne, Philadelphia, Pa.

I claim the shutter-fastening above described, consisting of the cords, A A, having the snaps, a a, and the tassels, C C, and provided with the elastic ring or thimble, B, substantially as and for the purpose specified.

70,301.—WATER WHEEL.—Samuel Webb, Joliet, Ill.

I claim the combination of the air tube, b, the floats or buckets, d d d, the lid, c, and buckets, h h, of the peculiar shape described, all constructed and arranged as and for the purposes set forth.

70,302.—DOOR STOP.—P. L. Weimer, Lebanon, Pa.

I claim the arrangement of a bent lever, having a flattened projection, c, at the end of one arm, to pass under the door, the other arm being weighted so as to tilt the projection, c, and wedge it in place.

70,303.—HAND TRUCK.—James T. Whipple, Chicago, Ill.

1st, I claim corrugated strap, T, when attached to the sharp curved part of the rear end of the truck, substantially as and for the purpose set forth.

2d, Clasp, L, when used for the purpose of adjusting said holding and stop bar, P, substantially as and for the purpose described.

70,304.—FASTENING METAL PLATES UPON DOOR HINGES.—W. W. Whiting, Brooklyn, N. Y.

I claim providing the plate, C, with one or more lugs, b b, and with an eye c, and securing it to the plate, B, of the hinge, by means of a pin or screw, e, substantially as and for the purpose herein shown and described.

70,305.—COAL SCREEN.—George Whittle, New York city.

I claim the cylinder coal screen, B, and the screen box, A, when the same are constructed, arranged, and operating, substantially as shown and described, for the purposes set forth.

70,306.—LAY-AWAY VAT FOR TANNING.—Isaac C. Williams, Philadelphia, Pa.

1st, I claim the employment of the interstitial supplementary sides and ends, F, substantially as described, for the purpose of allowing a more free and perfect escape of the spent liquor, and the admittance of the fresh, as described.

2d, I claim the application of the supplementary inclined bottom, C, substantially as described, for the purpose of causing the spent liquor to run off from between the hides in a perfect and rapid manner.

3d, I also claim the employment of the skeleton frames, D D, or their equivalents, substantially as described, for the purpose of preventing too great a pressure between the layers of hides.

70,307.—DEVICE FOR MEASURING HORSES' FEET.—Moses S. Woodward, Mahattan, Pa.

1st, I claim, as an improved article of manufacture, a device for measuring horses' feet for fitting the shoes thereto, made substantially as herein shown and described.

2d, The expansion and contraction bars, B B, when arranged on the center plate, A, substantially as and for the purpose herein shown and described.

3d, The manner of arranging the quarter measures, so that they can be moved in either longitudinal and transverse direction, as specified.

4th, The set screws, in combination with the bars, B and E, substantially as set forth, so as to hold the same in any desired position.

70,308.—OPERATING PICKER-STAFF FOR LOOMS.—Edward Wright, Worcester, Mass.

I claim the combination, with lever, E, and its arm, I, of the arm, F, rod, G, and spring, H, substantially as and for the purposes set forth.

70,309.—LOOM.—Horace Wyman, Worcester, Mass.

I claim the mechanism for effecting the changes of the shuttle boxes, substantially as set forth.

70,310.—MOP WRINGER.—Joseph Adams, Janesville, Wis.

I claim a wringer, formed by the two arms, E E1, cogged segments, E2 E2, lever, F, and roller, G, positively actuated by a winch, G, and attached to the outside of the tub, and in such manner that the rollers shall be above the same, substantially as set forth.

70,311.—HARVESTER GUARD FINGER.—William Allen, and Luther Ross, Worcester, Mass.

1st, We claim the combination with a guard, A, of the nipple, e, having a notch or lip, f, to hold the plate down, arranged substantially as and for the purposes set forth.

2d, The corrugated plate, E, made as described, in combination with the guard or finger, A, and nipple, e, arranged substantially as and for the purposes set forth.

70,312.—HYDROSTATIC SCALE.—Ira R. Amsden, Buffalo, N.Y.

1st, I claim the use of mechanism with a dial, and one or more revolving hands, when applied to hydrostatic scales, substantially as and for the purposes set forth.

2d, The combination of the cylinder, B, buoy, D, with the cord or chain, E, and weight, F, substantially as and for the purpose described.

3d, The tube, G, in combination with the weight, F, and buoy, D, for the purpose, and substantially as described.

4th, The chamber, H, for the purposes, and substantially as set forth.

5th, The application and use of the apparatus herein described, as a bilge water indicator, or a liquid gage, substantially as described.

70,313.—BEEHIVE.—Aaron C. Badgley, Earleville, Ill.

1st, I claim the base, B, having inclined boards, b b, forming a bottom for section, A, said base being provided with openings, d d1 d1, leading into chambers, f g g, which chambers are constructed as set forth, having their respective outlets, the whole constructed and arranged in the manner and for the purposes specified.

2d, The vestibule, k, composed of the blocks, r, having passages, s s, and leading into the tube, N, which extends outside of the hive, and is provided with the metal shields, v v, when constructed as described, and used in combination with the bottom boards, b, and chambers, f and g g, having their communicating passages in the manner and for the purposes set forth.

3d, The upper section, A, having a front formed into a hinged door, h', which may be opened into the vestibule, k' l, and false passages, s s, which are formed in the front of this section, all constructed and used in the manner and for the purposes set forth.

4th, The combination of the sections, A B, with their tube entrances, N N', having metal shields, v v', and vestibule, k', with entrance, c', the whole constructed, arranged, and operating as herein described.

70,314.—WHEELED HARROW.—A. C. Baker, and N. O. Hoyt, Lafayette, N. Y.

1st, We claim the arms, a a a, the teeth, t t t, and adjustable braces, b b b, in combination with each other, substantially as and for the purposes described.

2d, We also claim the same parts, in combination with the frame, E, lever bar, F, and chains, f f f, made and operated substantially as and for the purposes described.

3d, We also claim the parts within and attached to the frame, E, as above described, in combination with the axle, A, wheel, B B, tongue, C and seat, D, substantially as and for the purposes described.

70,315.—METALLIC CHECK PIECE FOR BRIDLES.—John C. Baxter, Washington, D. C.

I claim a metallic check piece for bridles, with or without the blinder, E, substantially as described.

70,316.—VASE FOR HOLDING FLOWERS.—L. H. Bigelow, Worcester, Mass.

1st, I claim a vase, provided with a series of cups or vessels arranged one above the other, substantially in the manner and for the purposes herein described.

2d, The combination with the pedestal of the vase of the detachable cups or vessels, under the arrangement herein shown and set forth.

70,317.—PROCESS OF EXTRACTING SALINE MATTERS FROM MARINE PLANTS.—C. F. Brackett, Brunswick, and George L. Goodale, Saco, Me.

We claim the application of dialysis to the extraction of the saline constituents of marine plants, in the manner and for the purposes specified.

70,318.—MACHINE FOR FINISHING BASKETS.—Franklin H. Brown (assignor to himself, Edward F. Peugeot, and Lemuel H. Flersheim) Chicago, Ill.

1st, I claim wheel, E, in combination with hooks, a, and shaft, C, as shown, and for the purposes set forth.

2d, In a machine for finishing the edges of baskets, the universal joint, N, in combination with twister, E, and shaft, C, as and for the purposes set forth.

3d, Wheel, H, in combination with adjustable wheel, H', and set screw, m, as and for the purposes set forth.

4th, In a machine for finishing the edges of baskets, the roofed apron, J, as and for the purposes set forth.

5th, The general construction and arrangement of mechanism, substantially as shown, and for the purposes specified.

70,319.—CHAIR FOR SCHOOLS, ETC.—Samuel C. Brown (assignor to himself and James Smith), Richmond, Ind.

I claim the combination of the seat supports, B and B1, with the spring, D, elastic washer, E, and bolt, C, and nut, C', constructed and arranged to operate substantially as and for the purpose set forth.

70,320.—STRAP HOLDING DEVICE.—G. W. R. Combs, Alliance, O.

I claim the metallic box, A, contracted longitudinally and vertically at its end, having its sides, x x, turned so as to form a groove to allow the plate, C, to be secured and connected to the leather at bottom, by the bar, B, in the manner as herein described, and for the purposes set forth.

70,321.—APPARATUS FOR REDUCING QUICKSILVER ORES.—Joseph C. Coult, San Francisco, Cal.

1st, I claim the fire chamber, B B, ore chambers, C C, and vapor chamber, D, arranged together, and with a steam tank above them, as and for the purpose set forth.

2d, The arrangement of the pans within the chamber, D, with alternate spaces between their sides and the walls of the chamber, as and for the purpose set forth.

3d, The silvered wire screens, c c c, in the condensing flue, H, used as and for the purpose set forth.

4th, The arrangement of the flues, H H' H", water tanks, I, and partitions, J J, substantially as and for the purpose set forth.

5th, The arrangement of the steampipe, F, and its orifice, k, for creating a draft as and for the purpose set forth.

70,322.—PUDDLING AND HEATING FURNACES.—Samuel Cuddick, Pembroke, Me.

I claim, 1st, The shape and form of the inner door, and its brick lining of peculiar shape, and the flanges upon the door with its slides, pins, and pinholes, as above described.

I claim, as an improvement in the applying the water, by the improved manner of wrought iron tubing, detached and renewable at pleasure, instead of being cast in the doors, frames, and other castings of the furnace.

I claim the form of the application or introduction of water over the air blast box by means of detached wrought iron tubing, instead of the cast iron tubing in the air blast box, with the flange of the air blast box attached to support the bottom of the furnace, instead of having the air box resting upon it.

Further, The water tanks, or chambers, in the fire grates as described, and in the introduction of water through the bearers or supporters of the furnace bed or bottom, and in the under side of the bottom or bed of the furnace, as indicated by the drawing.

I claim as my improvement in the chimney u, the skeleton columns as above indicated, by figs. 1 2 and 12.

70,323.—FOLDING CHAIR.—Isaac N. Dann (assignor to New Haven Folding Chair Company), New Haven, Conn.

I claim the combination of the indexible or rigid seat, A, with the cross legs, F and B, and back, D, when the joints of the several parts are arranged relatively to each other, in the manner as herein set forth.

70,324.—TRUSS AND SUPPORTER.—Solon Dike, N. Y. city.

I claim the flexible body brace, C, provided with the adjustable pads, d d, arranged in combination with band, B, and strap A, substantially in the manner set forth, and for the uses and purposes herein described.

70,325.—PROCESS OF MANUFACTURING SILVERED GLASSWARE.—Edward Dithridge, Pittsburg, Pa.

I claim providing a recess for the reception of tenons so as to form any article of silvered glass ware, composed of any number of pieces, without bringing the cement used in contact with the silver on the glass, substantially as set forth and described.

70,326.—CAR COUPLING.—Justin Ebee, Hummelstown, Pa.

I claim the combination and arrangement of the hunter, G, shaft, E, arm, a, cage, D, coupling link, B, and hook, C, substantially as and for the purpose herein specified.

I also claim the lever, L, arranged in combination with the coupling link, B, and hook, C, substantially as and for the purpose herein set forth.

70,327.—HORSE RAKE.—Samuel Eberly and Samuel Hanck, Mechanisburg, Pa.

We claim, in combination with the sliding rod that takes against the projections on the carrying wheel to lift up the rake, the trigger pivoted and connected thereto, and the adjustable tripper, or "let-off," so that the hight to which the rake may rise may be regulated to the hight of the windrows of hay, grass, or other material desired to be gathered, substantially as described.

70,328.—CULTIVATOR.—C. A. Ewick, Rushville, Ind.

1st, I claim the arrangement of the frames, A A', connected together as specified, and provided with the cranks, e e g g, in the manner and for the purposes set forth.

2d, The shovel beams, D D' D D', connected to the cranks, e and g, and secured in position by the springs, G G', and chains, r r, to the frame, A, as specified.

70,329.—CUPOLA BLAST AND SMELTING FURNACE.—Henry Fayette, Port Chester, N. Y.

1st, I claim a downward central blast through a pipe so located in the furnace that the air will become heated by the fire of the furnace before being discharged into the same, substantially as shown and described.

2d, A divided downward blast, one portion passing down a flue or pipe through the center of the furnace, and the residue down side flues so latched that the air in all said flues will become heated into passing down the same, substantially as described.

3d, An upward central blast, from below the furnace, substantially as shown and described.

4th, The combination of an upward and downward central blast, substantially as shown and described.

5th, In combination with the air chamber, B, I claim the curved wings, s to conduct the blast into the furnace, with a whirling, centripital motion, substantially as described.

6th, In combination with a central blast, whether from above or below, or both, I claim the flanges or disks, c, and f, with the intervening curved wings, t, to give the blast from the center, a whirling, centrifugal motion, as described.

7th, In combination with the air chamber, B, and curved wings, s, I claim a central blast from above or below, or both, with the curved wings, t, all constructed and arranged substantially as and for the purposes described.

8th, In combination with an annular air chamber as described, I claim passage ways for a portion of the air to be forced therefrom into the circumference of the furnace, and a curved or bent pipe or flue for conducting another portion of the air from said chamber down below, and thence up through the bottom of the furnace, centrally, as described.

70,330.—BED BOTTOM.—J. P. Flanders, and S. K. Wells, Burlington, Vt.

We claim the slat, A, with grooves formed upon its upper side, substantially as herein represented, for the purpose of securing the bottoms of the springs as is herein fully set forth.

70,331.—NECK-TIE.—Franklin D. Ford, New Bedford, Mass.

I claim the metallic spring fastening, provided with fingers or end, a2, and clamping parts, as herein set forth, and for the purposes specified.

70,332.—REIN HOLDER.—G. W. Fosdick, Dowagiac, Mich.

I claim the plate, A, spring, D, and uprights, B B, and C, constructed, connected, and operating, as and for the purpose set forth.

70,333.—DOOR HOLDER.—John Hale, Scranton, Pa.

I claim the block, A, as constructed and provided with the spring, C, and used for the purpose specified.

70,334.—BALL SOCKET JOINT.—William P. Haskins, Mendota, Ill.

1st, I claim the mode of securing the parts of a ball and socket joint, by means of a pin passing through the socket and ball, and a thong passing through the ball and socket, and also through the pin, substantially in the manner set forth.

2d, I claim the sockets, A A, constructed with rounded cavities, perforated by four holes, substantially as set forth.

3d, In combination with sockets constructed as described, the double headed link, substantially as set forth.

70,335.—CORN HARVESTER.—William Hill and James A. Harpham, Havana, Ill.

We claim, 1st, The cylinders, D, constructed and operating substantially as described with flanges, E, and knockers, e.

2d, The elevator, H, in combination with the cylinders, D, substantially as described.

3d, The elevator, H, in combination with the discharge elevator, I, substantially as described.

4th, The reversible elevator, I, constructed and operating substantially as described so as to discharge the corn on either side.

5th, The "triple tree," S S1 S2 S3, in combination with double pulley, U, and cards, t and u, substantially as described.

70,336.—ANIMAL TRAP.—Seth Hoke (assignor to himself and Val Thompson), Union City, Ind.

1st, I claim, in combination with the box, A, and doors, C and D, the lever, B, hinged floor, F, and connecting rods, F2 and D2, substantially as set forth.

2d, The arrangement of the box, A, bait box, E, oscillating frame, G, and trigger, G', doors, C and D, lever, B, and connecting rods, D2 and F2, substantially as described.

3d, The combination of the hinged floor, F, door, H, and the angular rod, H', attached to the latter with the doors, C and D, and weighted lever, B, for setting the trap automatically, substantially as set forth.

4th, The arrangement of the cage, I, having a sliding door, K', in connection with the box, A, having the parts for setting the trap automatically upon the passage of the animal from the box, substantially as set forth.

70,337.—PROCESS OF TANNING.—Alonzo W. Irish, Rochester, Minn.

I claim the within described process of tanning when composed of the ingredients, as set forth and for the purposes specified.

70,338.—BEEHIVE.—Robert Jones, Cedarsville, Ill.

I claim a beehive with two horizontal sections, A A', having rubber or cloth, x, between them and with the interior and exterior covered with the plastering specified, box, D, honey board, F, ventilating hole, y, and pipe, E, all constructed, arranged and used for the purposes set forth.

70,339.—FOLDING DESK.—T. W. Kreitz, Quincy, Ill.

I claim a portable folding desk consisting of a frame, A, panels, b c, and top, d, jointed or hinged to each other which when elevated for use are supported at the desired elevation by the props or pawls, e, and the notches, f, constructed substantially as and for the purposes described.

70,340.—FLUSH BOLT.—Charles E. Laltin, Birmingham, Conn., assignor to himself and John R. Laltin

I claim the combination of the plate, D, in the plate, A, and the bolt, B, constructed and arranged so as to operate substantially as herein set forth.

70,341.—LOCOMOTIVE.—John L. Lay, Buffalo, N. Y.

I claim a locomotive engine constructed with high and low pressure cylinders the pistons of the high pressure cylinders being upon the same rod with those of the low pressure and the axis of each in line with the other, substantially as and for the purposes set forth.

70,342.—COMPOUND FOR STOPPING LEAKS IN STEAM BOILERS.—H. Lefevre and J. McGuire, Lancaster, Pa.

We claim the composition set forth combined substantially in manner and for the purpose specified.

70,343.—WASHING MACHINE.—E. W. Lowe, Almond, N. Y.

I claim the combination of the spring, I, stump rods, H H, lever nuts, h h, as described with the washing cylinder, as constructed, and the frame, C C, as suspended on the springs, D D, so as to operate substantially in the manner herein described for the purposes specified.

70,344.—FAN AND PARASOL COMBINED.—George Mallory, Bridgeport, Conn.

The combination of the curved or drooping hoop frame, handle and joints, substantially as hereinbefore set forth.

Also the combination of the hoop frame, handle, joint and locking mechanism, substantially as hereinbefore set forth.

Also the combination of the hoop frame, handle, joint, locking mechanism and slide substantially as hereinbefore set forth.

70,345.—COMBINED CULTIVATOR AND SEEDER.—A. S. Markham, Bushnell, Ill.

I claim in connection with the frame of a wheeled cultivator the pendants, E E, beams, I, with the plow shanks, J J, chains or cords, L, and levers, P, with the bar, S, rods, a a, and whiffletrees, b b, arranged and used as and for the purpose specified.

70,346.—BURNING FLUID.—George McLean, Brooklyn, N. Y., assignor to himself, Joel P. Stillwell and George Deland, New York City.

We claim the illuminating compound composed of the ingredients substantially as herein described and for the purposes set forth.

70,347.—PORTABLE RADIATING FURNACE.—Matthias Mead, Lowell, Mass.

I claim the arrangement of the continuous vacuum or flues, e and f, for the purpose of heating foreign air and distributing it into any room or rooms, substantially as described and as herein specified.

70,348.—DETACHABLE WHIFFLETREE.—John W. Melcher (assignor to himself and John J. Sprague), Oshkosh, Wis.

I claim the intermediate connection, C, the spring bolt, e, detachable hook, d, hinged attachment, f1, and swivel bolt, k, when arranged relatively to each other and to the whiffletree, a, and cross bar, c, substantially as described for the purposes set forth.

70,349.—TREE PROTECTOR.—Daniel Mendenhall, Fairfield, Iowa.

1st, I claim the flexible collar or band, B, applied to a trough, C, and adapted to serve the purposes described.

2d, The use of a clasp, a, for uniting the extremities of the trough, C, about a tree, substantially as described.

3d, The combination of the interposed protecting strip, 1, and clasp, a, with a trough, C, substantially as described.

70,350.—EGG HOLDER.—Joseph Nathan, Washington, D. C.

I claim the egg-holding device consisting of the handle, A, with flat portions, e, expanding strips, a a', ring, b, cross pieces, c, and foot piece, d, substantially as described.

70,351.—PLOW CLEVIS.—Jacob Newhart, Terre Haute, Ind.

1st, I claim the oscillating plow clevis, Figs. 1 and 2, in the manner set forth.

2d, The regulating bolt, C, in connection with the looped T segment, Figs. 1 2 3 and 4, substantially as set forth and herein explained.

70,352.—MANUFACTURING KNIVES AND FORKS.—Josiah H. Nichols, New Britain, Conn., assignor to A. H. North and G. W. Lunt.

I claim the blade, a, and one part of a handle, c, when formed of one piece of metal, substantially as described.

I claim uniting one part of a handle, 'c', formed in the common way to said blade and handle, a and c, substantially as described.

70,353.—THIMBLE.—H. D. Peck, Newton, Mass., assignor to Wm. N. Ely, Stratford, Conn.

I claim a sliding knife blade or cutter, attached to and combined with a thimble or finger clasp, when constructed and arranged substantially as described.

70,354.—BOAT-DETACHING TACKLE.—Charles Peterson and Charles Gunner, San Francisco, Cal.

1st, We claim the rods, C, attached to the bottom of a boat, their upper ends being free and provided with loops, c, substantially as and for the purposes described.

2d, The sleeves, D D', on the rods, C, substantially as and for the purposes described.

3d, The rods, B B', pivoted as described in combination with the rods, C, and sleeves, D D', and ropes, b and d.

4th, The roller or drum, e, pivoted in a slot in a thwart or crossboard and provided with a lever, f, substantially as and for the purposes described.

5th, The detaching device consisting of the rods, B B' and C, sleeves, D D, ropes, b and d, and roller or drum, e, provided with a lever, f, and pivoted in a slotted thwart or board, substantially as described.

70,355.—SPRING BED BOTTOM.—Marvin Pierce, Winona, Minn.

I claim the slots, C, C, running lengthwise of the bed and resting upon the extremities of two springs, B, B, formed as here described, and connected through angular openings, c, c, in two bars, A, A, which extend crosswise of the bed, when constructed, arranged and used in the manner and for the purpose set forth.

70,356.—CAR AXLE BOX.—C. Puider and D. C. Robinson, Lowell, Mass.

We claim, 1st, a car axle box, a, having bearing surfaces, d d, d d, each being ready provided with babbitt or equivalent soft metal, c, and arranged to be in turn placed in position for use, substantially as described, and for the purpose set forth.

3d. The cooling chamber, b, in combination with the box, a, for the purposes substantially as herein described.

70,357.—WAGON SHACKLE—Thomas D. Powers, Rochester, Wis.

I claim a draw iron, with a slot E, a cylinder with a slot, E, notch, L, rubber spring, G, metallic spring H, A, shaft iron with F, head shoulders K, K, when arranged to operate as shown and described, and for the purpose set forth.

70,358.—CARRIAGE SHACKLE.—J. E. Prodden, Birmingham, Conn.

I claim the herein described shackle as an improved article of manufacture, consisting of the shackle, B, and coupling, C, constructed and arranged with the conic l bolt, D, made square at its lower end, and provided with nuts, G and H, so as to be adjustable, substantially in the manner herein described.

70,359.—COMPOUND FOR BLASTING POWDER.—Albert T. Rand, New York city.

I claim a compound or powder made substantially as above described, for the uses and purposes above set forth.

70,360.—KNIFE SHARPENER.—John C. Reynolds, Taunton, Mass.

I claim a knife sharpener with two steels, arranged to turn in a stand and present new sharpening surfaces when required, in combination with said stand, and a foot and clamping screw to fasten it to a shelf or table, substantially as described.

70,361.—COMPOSITION TO BE USED IN PUDDLING IRON.—Isaiah E. Richards, Columbia, Pa.

I claim the composition of the black oxide of manganese with litharge, and also with nitrate of potash, when combined in the manner and for the purpose substantially as herein specified.

70,362.—MATCH SAFES.—Adolph Roesler, Warsaw, Ill.

I claim rod, e, and sliding tube, F, in combination with the double safe, A, provided with springs, G, G, or their equivalents, the whole arranged and operating substantially as described.

70,363.—MACHINE FOR HEADING BOLTS.—John Root (assignor to himself and McLazan & Stevens), New Haven, Conn.

I claim the arrangement of the forging dies, e, e, and f, f, the upsetting die, m, and the holding die, J, in combination with the mechanism for operating the same, and the spring, S, all connected so as to operate substantially in the manner herein set forth.

70,364.—STEAM GENERATOR.—Hamilton Ruddick, Boston, Mass.

I claim in traction and climbing engines, when the engine is rigidly connected with the carriage, a boiler hung on trunnions, and delivering steam through said trunnions to pipe D, connecting the same with the engine, substantially as and for the purpose described.

70,365.—MODE OF FACILITATING THE FLOW OF ILLUMINATING GAS THROUGH PIPES.—James F. Russell, Washington, D. C.

I claim the method herein described of heating and keeping at an even temperature gas, water, or other pipes, by allowing steam, hot air, etc., to pass in at one end of a case pipe and follow along its whole or partial extent, pass off in the manner substantially as described for the purpose set forth.

70,366.—COMPOUND TOOL FOR SHEARING, PUNCHING AND UPSETTING.—John J. Sandgren, Lyons City, Iowa.

I claim the combination and arrangement of the levers, G and E, with the toggles, W, W, T, and U, when constructed, arranged, and operating substantially as and for the purposes as above set forth.

70,367.—SIRUP PITCHER.—Daniel Scanlin, Rochester, N. Y.

I claim the spouts, a and b, when constructed so that their outer edges form a curvilineal line, and cover, c, when constructed so that it will open and close both spouts at one operation, in combination with tube, d, constructed substantially as described, and for the purposes set forth.

70,368.—CORN POPPER.—Chas. H. S. Schultz, Cincinnati, O.

I claim the encircling frame, E, whose hooked shanks, f, f', are secured to a perforated and grooved handle, G, g, g', g'', by means of the ring or ferrule H, in the manner and for the purpose set forth.

70,369.—VALVE GEAR OF STEAM HAMMERS.—William and Coleman Sellers (assignors to William Sellers & Co.), Philadelphia, Pa.

1st, I claim the lever, L, or its equivalent, when all its points of attachment may be fulcra in turn, according to the work required of the hammer, substantially as described, and for the purpose specified.

2d, The lever, L, or its equivalent, when arranged in combination with the piston and slide valve, so that the relative position of the piston and valve may be changed for the purpose specified.

3d, The diagonal slot, or its equivalent in the hammer bar within the steam space of the cylinder, or its connection for the purpose specified.

70,370.—ANIMAL TRAPS.—Robert Simpson (assignor to himself and David Wilkinson), Port Jefferson, O.

I claim the combination of the notched bar, F, with the spring triggers, E, wings, C, shaft, B, and spring or weight, D, all arranged and operating in the manner and for the purpose set forth.

70,371.—RATCHET FOR DRIVING WHEELS.—W. W. Smith, Stronsville, O.

I claim the blocks, E', E', shaft, C, crosspiece, D, spring, F', F', and hub, A, constructed, combined, and used as and for the purpose set forth.

70,372.—SAFETY POCKETS.—Henry D. Snyder (assignor to himself, O. Reynolds and A. L. Hunt), Carbondale, Pa.

I claim a safety pocket constructed with a series of springs between the pocket and its lining, substantially as described.

30,373.—MILL BURR DRESSER.—William P. Stalcup (assignor to himself and John P. Lancaster), Brookville, Ind.

1st, I claim the slot, s, in the frame, A, substantially as and for the purpose specified.

2d, The instrument above described for adjusting the loop, O, accurately to the center of the runner, when constructed and operating substantially in the manner and for the purpose required.

3d, The loop, O, when provided with a set screw and used in connection with the frame, A, to regulate the draft of the dress, substantially as described.

4th, The tempering arrangement consisting of the screw rod, F''', and screw, F'', when used in connection with the frame, F, to regulate the force of the cutting tool, K, substantially as described.

5th, The sleeve, o, bearing the two cams, c, c, when used upon the working shaft of a stone dressing machine, to enable it to dress in both directions, substantially as set forth.

6th, The stone dressing machine above described, consisting of the frame, A, horizontal sliding frame, D, vertical sliding frame, F', bearing the tool, K, shaft, E', bearing the sleeve, o, two cams, c, c, rack, b, and gear wheels, w, w, m, adjusted by means of lever, L, all the said parts being constructed, arranged and combined substantially in the manner and for the purposes specified.

70,374.—HORSESHOE NAIL MACHINE.—Antoine St. Louis (assignor to himself and P. S. Whitcomb), Keeseville, N. Y.

1st, I claim constructing, arranging, and operating the hammers, E, F, and H, H, in the manner and by the means herein described, whereby said hammers are given a precise stroke, and one which draws the nail substantially as represented.

2d, The combination of the cross piece, N, the pivoted arm, s, box, e, knife, s, bar, Q and wheel, R, with its projection, used substantially as and for the purpose set forth.

70,375.—CAR REPLACER.—Louis Straus, Louisville, Ky.

1st, I claim the combination of a lifting device with a stool support attached, so applied to the end of the car or locomotive as to admit of the replacement of the same upon the track, substantially as described.

2d, The slotted stool bar, C, and traveling rack, D, in combination with a pinion gear wheel, e, and hand wheel, F, substantially in the manner and for the purposes described.

3d, The manner described and shown of attaching the rack, D, to the stool bar, C, for the purpose specified.

4th, In combination with a device for lifting one end of a car, I claim a device by which such end, while elevated, can be moved laterally, substantially as described.

70,376.—ALARM CLOCK.—Wm. A. Terry, Bristol, Conn.

1st, I claim the spring catch, D, Fig. 2, made as in the drawings, or swinging on a pin or center, with separate springs, or any other manner, to operate substantially as described.

2d, The alarm index, A, Fig. 2, by means of which the alarm can be set to go off at any hour of either 12 or 24, or be prevented from going at all when desired, or any substitute in a similar manner.

3d, The pins, E and F, Fig. 1, in the alarm dial.

4th, I do not claim the use of the slot, K, Fig. 1, the pins in the wheel, J, Fig. 1, or the lock work, I and H, Fig. 4, taken separately, or for other purposes, as I am aware they have been previously used, but I claim the arrangement and combination of them substantially in the manner and for the purpose described.

70,377.—FLOUR SIFTER.—John Tobin, Newark, N. J. Antedated Oct. 9, 1867.

I claim the reversible arm, t, with the rollers, r r, and the flexible beaters or rubbers, q q, constructed and arranged substantially as shown.

70,378.—UMBRELLA.—Wm. F. Turner, Philadelphia, Pa.

I claim an umbrella having a hollow cane or handle, the rib stretchers, cap, runner, and cover all being detachable, as and for the purpose herein shown and described.

70,379.—PUMP.—Hiram Tyler, Gaines, N. Y., assignor to himself, Chas. T. Richards, Albion, and John Marsh, East Carroliton, N. Y.

I claim the boxes, D and E, pipes, B C, valve plates, L, and piston head as constructed with its piston rod, F, the several parts being used with the cylinder, A, when combined, arranged, and operating in the manner substantially as and for the purposes herein specified.

70,380.—CONNECTING LINK FOR CHAINS.—Samuel Vanstone (assignor to himself and John Stewart), Providence, R. I.

I claim the improvement in connecting links described, which consists in making each division of the link with a central tongue, a, which tongues when overlapped by placing the two parts of the links together and uniting the same by a rivet, will form a cross bar, b, substantially as described, for the purposes specified.

70,381.—CULTIVATOR.—Elisha Walker and A. M. Weed, La Porte, Ind.

1st, We claim the mode of counterbalancing the weight of the tongue by that of the driver by means of the seat, K, resting upon the bars, K', adjustably secured to the tongue and supported upon the axle substantially as set forth.

2d, The combination of the tongue, D, doubletree, F, with sockets, F', and beams, G, respectively constructed and arranged substantially as set forth.

70,382.—MACHINE FOR MAKING BLIND SLATS.—Francis W. White, Norwich, Conn.

1st, I claim cutting blind slats from a plank and finishing the same automatically at one operation, by the mechanism substantially as herein set forth.

2d, The railway saw, D, in combination with the connecting rod, f, to throw it into operation by the contact of the plank while passing through the parallel ways, as shown and described.

3d, Cutting the tenons of the slat in the block by mechanism substantially as described.

4th, Cutting the shoulders of the slats in the block by mechanism substantially as described.

5th, the cutters, k and k', formed to fit the space between two slats and employed to finish their sides and edges, substantially as shown and described.

6th, The rests or followers, v, for holding the slats while being cut from the block as described.

70,383.—UNITING SHEET METAL.—S. R. Wilmot, Bridgeport, Conn.

I claim the uniting of the two edges of metal by the formation of the corresponding edges and uniting the same in the manner herein set forth.

REISSUES.

2,790.—MECHANISM FOR STRETCHING LEATHER.—Ichabod W. Dawson, Newark, N. J.

1st, I claim the combination of means for supporting the center of the hide with means for stretching the same breathwise over the said support, substantially as described.

2d, The combination of means for supporting the center of the hide, with means for stretching the same, breathwise and lengthwise, over the said support, substantially as described.

2,791.—STRETCHING AND PREPARING LEATHER AND HIDES.—Ichabod W. Dawson, Newark, N. J.

I claim the process substantially as herein described, of stretching leather or hides.

2,792.—PRINTING PRESS.—George P. Gordon, Rahway, N. J. Patented April 23, 1861.

1st, I claim such rocking platen, when a sliding motion shall be imparted to it bodily, and such platen shall turn upward and away from the form to receive the sheet to be printed, and downward or toward the form for the reception of any impression, whether such platen shall occupy the precise angle shown in receiving the slot or not.

2d, I also claim, after the face of the platen has been rocked down to a position parallel with the face of the form or type, for the purpose of presentation of the sheet to such form, carrying the platen in the parallel position to and from the form.

3d, I claim a sliding rocking platen, having a direct movement to and from the bed, in combination with a bed which shall be stationary at the time of giving an impression.

4th, I claim the elongations or projections at the back of the platen, having upon them the legs or their equivalents in combination with the sliding boxes or their equivalents, which hold and carry the shaft upon which the platen rocks, for the purpose of causing the rocking platen to move in a direct line to and from the impression.

5th, I claim attaching the connections directly to the ends of a shaft of a sliding rocking platen, in combination with the cranks, substantially as shown, for the purpose fully described.

6th, I claim combining with a sliding rocking platen, a cam and roller, or their equivalent, to rock the platen up to receive the sheet to be printed.

7th, In combination with a sliding rocking platen cam and roller, I claim the use or employment of the segment gear and rack, for the purposes fully described.

8th, I claim combining the sheet taking nippers, with a rocking platen, for the purposes described.

9th, I claim combining with a rocking platen the sheet taking nippers, and feed table, for the purposes specified.

10th, I claim combining with a rocking platen the sheet taking nippers, feed table, and sheet holding grippers, for the purpose specified.

11th, I claim lifting the printed sheet, substantially as shown, for the purpose specified.

12th, I claim hinging the face of a rocking platen, beyond the angle at which the sheet is received upon it, to such an angle inclining toward the operator that the printed sheet may be relieved or freely discharged from it by its own gravity.

2,793.—MANUFACTURE OF BELLS.—Andrew Patterson, Birmingham, Pa. Patented March 5, 1867.

1st, I claim making seamless concave bells, of single sheets of wrought or rolled steel, by forming or shaping the metal between dies, while sufficiently heated, and so as to give an increasing thickness of metal at or toward the mouth of the bell, substantially as above described.

2d, Wrought steel seamless concave bells, constructed as hereinbefore described, as a new article of manufacture.

DESIGNS.

2,817.—NAME PLATE.—Samuel S. Bent, Portchester, N. Y.

NOTE.—Fifty-two patents in the above list of claims were issued through the Home Office of the Scientific American Patent Agency.—EDS.

Inventions Patented in England by Americans.

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

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2,497.—MACHINERY FOR CUTTING, ENGRAVING, ETC.—Isaac Hall, New York City. Sept. 3, 1867.

2,529.—MANUFACTURE OF GARMENTS.—Leander W. Boynton, Hartford, Ct. Sept. 6, 1867.

2,538.—ILLUMINATING ROOF AND ROOF PAVEMENT.—Thaddeus Hyatt, Atchison, Kansas, Sept. 7, 1867.

2,547.—CARTRIDGE HOLDER.—Charles Howlett, Charles H. Pond, Jacob R. Schuyler, Marcellus Hartley, and Malcolm Graham, New York City. Sept. 9, 1867.

2,730.—APPARATUS FOR TURNING AND SCREW CUTTING.—Wm. T. Cole, New York City. Sept. 25, 1867.

2,722.—APPARATUS FOR SUPPLYING STEAM BOILERS WITH WATER.—Henry Demarest, New York City. Sept. 26, 1867.

EXTENSION NOTICE.

Aaron Palmer, of Brockport, N. Y., and Stephen G. Williams, of Janesville, Wis., having petitioned for the extension of a patent granted to them the 24th day of January, 1854, for an improvement in grain harvesters, for seven years from the expiration of said patent, which takes place on the 24th day of January, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 6th day January next.

NEW PUBLICATIONS.

THE CHAMPAGNE COUNTRY. Hurd & Houghton, publishers, 459 Broome street, N. Y.

This is one of the most interesting books we have read. An article copied from it in our last issue indicates the nature of the work and the vivacious champagne sparkle of the author.

SOUND. A Course of Eight Lectures by the celebrated John Tyndall, LL.D. D. Appleton & Co., publishers, 443 Broadway, N. Y.

The science of accoustics as treated by the author is interesting and instructive. The work is copiously illustrated, and will be found useful and entertaining to all who are interested in accoustics. In his preface the Doctor says: "There is a growing desire for scientific culture throughout the civilized world. The feeling is natural, and, under the circumstances, inevitable. For a power which influences so mightily the intellectual and material action of the age, could not fail to arrest attention and challenge examination. In our schools and universities a movement in favor of science has begun which, no doubt, will end in the recognition of its claims, both as a source of knowledge and as a means of discipline."

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Your obd't servant,
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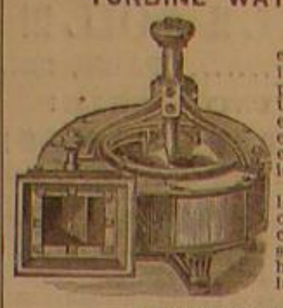

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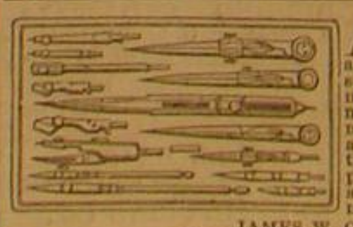

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