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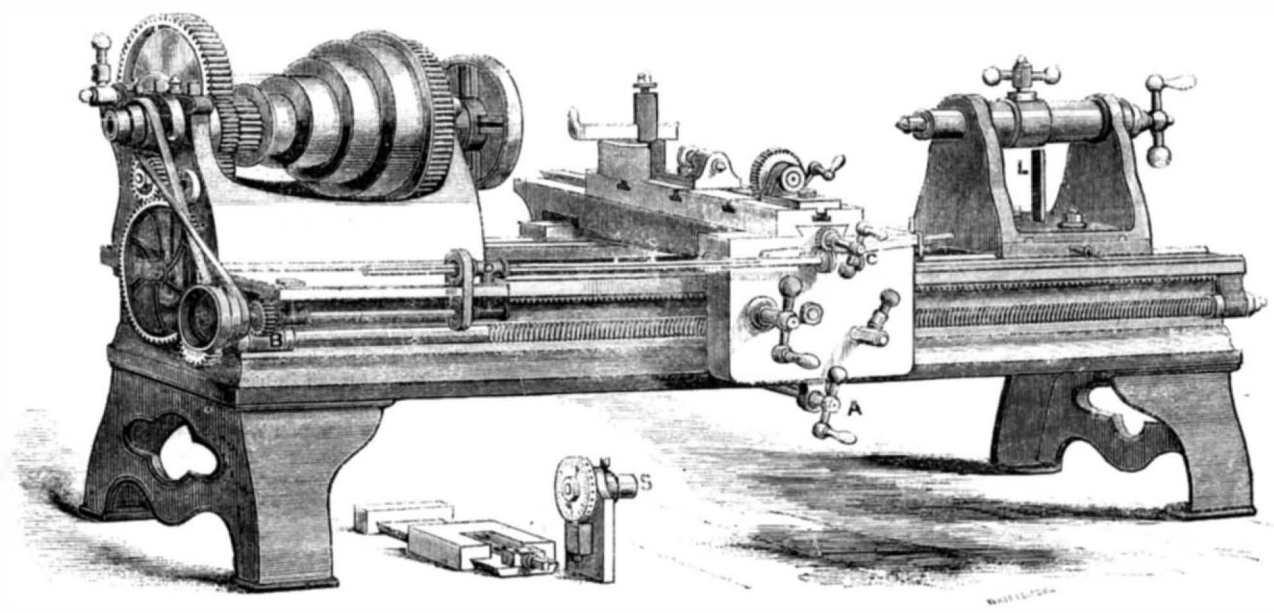
Combined Screw Lathe and Milling Machine.

A noticeable feature in modern American workshop machinery is the several uses to which the same tool can be applied. Time was when a lathe was merely a rude affair for making an object round, but it has been vastly improved upon by the efforts of ingenious men, and the different attachments which have been made to it render it one of the most indispensable tools.

The lathe here illustrated is a strong and well-designed machine: it swings 28 inches, and is a screw-cutting and milling machine combined; besides this it can be used for a variety of purposes, such as boring, that other lathes are not well adapted to.

A novel feature in this lathe is the addition of



FAY'S COMBINED SCREW LATHE AND MILLING MACHINE.

cross-feed. This is a most important advantage on some kinds of work, as it is done more expeditiously than by hand, and of a much better quality. The arrangement can be seen in the engraving where the feed screw shaft has a small pinion cut on it, in which a worm runs; the worm is driven by a small countershaft and belt on the shears near the cone pulleys. This arrangement can be easily detached and thrown out of gear by removing the box, D, and releasing the thumb screw, C. The carriage and slide rest is raised or lowered so as to adjust work thereon by the handle, A, which works a vertical screw by bevel gears on the back of the lathe.

The variety of work for which this lathe is adapted is as follows:—It may be used as a common turning and screw-cutting engine lathe, with the advantage of a cross-feed, which is not usually obtained with lathes of this size. It may be used as a boring engine. The work can be easily fastened to the table and afterward adjusted perpendicularly or laterally with the same facility as in the improved boring engines now in use in the best shops. It is eminently adapted for use as a heavy milling machine. One of its merits, in this respect, is the facility with which it can be adjusted perpendicularly, enabling the workman to make two or more cuts upon any piece and then return the lathe to exactly its first position, ready for the first cut on another piece by simply turning one handle. The machines have been used during the past year for working pieces of wrought iron and steel of larger dimensions than are commonly worked in milling machines, doing the work quicker and getting a smoother surface than by the planer. It may be used as a gear cutter for any size within its range, for the making of rimmers and cutters, fluting of taps, slabbing of bolt heads, etc. For cutting bevel gears the spindle, S, has a joint attached capable of adjustment at any angle.

For further particulars address L. D. Fay, Worcester, Mass.

Portable Furnace for Casting Large Anvil Blocks.

The rapidly increasing demand for huge castings of this kind has induced Mr. Ireland, of Manchester, to take up their production as a distinct branch of trade. In pursuance of this design he has organized a staff and provided portable plant, with which he proceeds from place to place as circumstances require, pitches his camp, and runs off anvil blocks of any dimensions to order with the utmost promptitude, finding everything but iron and blast. At the first glance it might be thought that foundery plant, to be portable, must be inefficient. We can assure our readers that Mr. Ireland's plant is nothing of the kind. That used at Mr. Bessemer's works consisted simply of a cupola 4 feet in diameter within the lining, and 12 feet deep to the charging door, constructed on the "upper tweer" principle, patented by the owner. There is, apparently, no very material difference between this and the ordinary cupola with multiple tweers, extensively used in the States, and rapidly gaining favor here. A belt about 2 feet 9 inches deep surrounds the cylinder at about 7 feet from the ground, and into this belt the blast is delivered by two large pipes, one on either side. The upper row of tweers consists of sixteen orifices, each about 3 inches diameter, ranged equidistantly above the level of the main supply pipes, which discharge into the lower portions of the belt. The lower tweers are only four in number, each about 8 inches in diameter, disposed opposite each other, but not opposite the main pipes. By this means the blast is very equally distributed through all the tweers. The upper row do most of their work round the edges, while the lower supplies air to the very center of the mass of fuel, which would otherwise hardly procure enough from the diffused blast proceeding from the smaller orifices. At the time of our visit, this cupola was bringing down 9 or 10 tuns of iron per hour, but the blast, produced by a 4-foot Lloyd's fan, running about 900 revolutions per minute, was insufficient. Its pressure barely equaled 11 inches of water; properly it should not be much less than 16 inches, with which Mr. Ireland states that he can easily melt 13 tuns per hour—a very high performance, our readers will admit. He has recently cast an anvil block, weighing no less than 205 tuns, at the Bolton Iron and Steel Works, at the rate of 25 tuns per hour, with two cupolas precisely similar to the one under consideration. The consumption of coke is very moderate, once everything is well warmed up, not greatly exceeding 1 cwt. of coke per tun of iron. The inferior performance at Greenwich, was due mainly to want of power in the engine driving the fan—a 12-horse portable. A strange contrast exists between such operations as this and those in which Mr. Ireland first engaged in the year 1809, when he, in common with many other founders, considered it a good day's work to melt a single tun of iron in ten hours.

It is not easy to see how the casting of large masses can be more economically effected than under this system. The lining of the cupola being removed, it is brought into the condition of an ordinary boiler shell of no very excessive weight, easily admitting of transport by either rail or water. The whole affair being carried out by contract, the manufacturer is saved an immense amount of trouble and responsibility, while all the operations being conducted by those who possess a special knowledge and experience of the matter in hand, the best results are sure to be obtained at the least possible outlay. In many cases, without the existence of such a system, the manufacturer would find himself compelled to erect a cupola of large dimensions for which, the block once cast, he would have no further use.

It is out of the question to think of casting such masses at a distance within the walls of an ordinary foundery, and then removing them to their permanent destination. The handling of such unwieldy blocks is an excessively expensive task, while their carriage over considerable distances is next to impossible. They cannot be conveyed by rail, and no vessels but those specially constructed for the purpose could take one as cargo.—*London Engineer.*

DURING the war 75,000 persons served in the navy. Of these 1,406 were killed, and 1,638 wounded.

NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

IS NITROGEN AN ELEMENT?

Chemistry and astronomy unquestionably stand out from among the sisterhood of the sciences as being the two which of late years have made by far the greatest progress, and are still advancing with the most rapid strides. Scarcely an hour has passed during the current century, and certainly not an hour passes now, without adding some new fact to the vast stores of knowledge which it is the province, on the one hand of the chemist, and on the other of the astronomer, to study and increase. And it is curious to note how the two sciences help each other. There exists, indeed—so, at least, it seems to us—such a perfect "correspondence," to use that word in the sense in which Swedenborg employs it, between the laws which govern the great orbs of which it is the object of the astronomer to learn all he can and those which rule the minute atoms into whose properties the chemist inquires, as must necessarily insure, when it shall be fully recognized, that any step forward taken by the student of the former shall be a step forward for the student of the latter also, and *vice versa*. We have not yet got to that point, but already it has begun to be not unfrequently the case that observations made from the astronomer's watchtower confirm and support those made in the chemist's laboratory. The latest instance of this has reference to the constitution of nitrogen, and is afforded by Mr. Huggins's observation ot the spectra of some of the nebulæ, taken in connection with certain observations of the nitrogen spectrum which have recently been made in the laboratory of M. Waltenhofen. It consists simply in the fact that Mr. Huggins and M. Waltenhofen have both been lead to the suspicion that nitrogen is not an elementary substance, but a compound of more simple forms of matter—the former by observing in the spectra of some of the nebulæ some, but not all, of the lines of the nitrogen spectrum, just as though nitrogen were a compound body, and those nebulæ contained, among the materials ot which they are composed, one of its constituents and not the other, and the latter by the discovery that in a highly rarified nitrogen atmosphere the violet rays disappear before the blue and green rays.

MECHANICAL POWER FROM SUNSHINE.

M. Babinet has communicated to the Academy of Sciences an account of some experiments by M. Mouchot, Professor of Mathematics at Alencon, on the mechanical effects produced by confined air heated by the rays of the sun. In these experiments M. Mouchot employed a cylindrical vessel of thin silver, blackened on the outside, and inclosed within two cyliuders of glass, placed one inside the other. The office of the glass cylinders, of course, was to prevent the heat which might pass through them to the blackened silver cylinder being radiated back again—glass, while affording a free passage to the direct rays of the sun, being practically opaque to radiant heat. The silver cylinder was half filled with water, and an airtight cover was then fitted on it; a tube, fitted with a stopcock, passing vertically through this cover to very nearly the bottom of the vessel. Thus arranged, the apparatus was placed in the sun, whereupon the air in the upper part of the vessel speedily became heated sufficiently to cause it to exert so much pressure on the water under it, that the latter, on the stopcock in the tube passing through the cover of the vessel being opened, escaped in a jet more than ten meters high. This very remarkable result lead M. Mouchot to construct an apparatus on the same plan which yielded a continuous jet of water as long as the sun was shining on it. M. Babinet is of the opinion that machines on this principle might be found useful for raising water on the great scale in tropical countries.

ALLOY FOR BEER TAPS.

M. Vigouroux, of Nimes, has devoted much attention to the production of a white alloy suitable for taps for wine and beer barrels, etc., and he has found that alloys of tin, antimony, and nickel answer the purpose best. For the body of the tap he prefers an alloy consisting, per thousand parts, of 785 parts tin, 195 antimony, and 20 nickel, and for the key an alloy of either 807 parts tin, 175 parts antimony, and 18 parts nickel, or of 715 parts tin, 215 parts antimony, and 70 parts nickel. These alloys are quite inoxidable under any ordinary circumstances, and, although containing antimony, are otherwise quite harmless, not being acted upon in the least by any of the elements of ordinary beverages.

ANOTHER METHOD OF OBTAINING ZIRCONIUM.

We mentioned some little time back that M. Troost had obtained zirconium in crystalline laminæ by heating, in a crucible made of gas-retort carbon, to the temperature at which wrought iron melts, one part of the double fluoride of zirconium and potassium with one and a half parts of metallic aluminum, and afterward separating the reduced zirconium from the excess of aluminum by dissolving the latter in dilute hydrochloric acid. Dr. T. L. Phipson has since obtained zirconium by reduction from its oxide, the earth zirconia, by means of metallic magnesium. Like carbon, boron, and silicon, zirconium is capable of existing in three distinct forms, the crystalline, the graphitic, and the amorphous, and by Dr. Phipson's method it is obtained in the amorphous state, as "a velvety black powder." The reduction takes place at the moment the magnesium begins to melt. The magnesia, which is formed by the combination of the oxygen of the zirconia with the magnesium, may be dissolved away by dilute hydrochloric acid, which has not the least action on the reduced zirconium. Dr. Phipson was led to try this method of obtaining zirconium by his having previously found that magnesium will reduce carbon, boron, and silicon from the acids which those bodies respectively form with oxygen. He concludes that carbon, boron, silicon, zirconium, and titanium all belong to the same group of elements. In most of their properties these five bodies certainly resemble each other very closely, but in their relations to hydrogen there is some difference between them. Carbon, silicon, and titanium form, very readily, gaseous compounds with hydrogen, and carbon forms also various liquid compounds therewith; but neither boron nor zirconium has yet been made to combine with hydrogen at all.—*Mechanics' Magazine.*

Discoveries in Boiler Explosions.

A New York letter to the Philadelphia *Inquirer* says:—

"A curious fact in connection with the explosion of the *St. John*, that has not yet been noted, is that all the boiler explosions that have occurred in this vicinity for some months past, and there has been quite a number, causing at least a hundred terrible deaths, have been of low-pressure engines. It had always been supposed that low-pressure engines and boilers were safer than those made for high pressure. It seems natural that it should be so, and yet when we come to look at the results, they are such as to entirely puzzle and confound even those most expert in such matters.

"I was talking yesterday with a gentleman who has a very high reputation here as an engineer and scientific man, and he assured me that the whole subject of boiler explosion is as yet comparatively little understood. [That is by the scientific 'gent.'] In fact, they form a subject worthy of much scientific research and investigation. It is supposed that steam, heated beyond a certain point, necessarily passed, even in low-pressure boilers, when coming in contact with an iron surface, generates a certain amount of electrical or galvanic action, that finally destroys the fibrous strength of the iron and renders it brittle and liable to fracture. Another theory is that long-continued pressure on the inner surface of an iron boiler gradually destroys the strength of the iron, so that although a boiler may stand the initial test of hydraulic pressure, that will form but little proof of its capabilities to withstand the long-continued elastic and varying pressure of steam.

"It is certainly true that in the use of steam it has yet been studied but very little apart from its mechanical effect. These explosions, for which the theory of superheated steam will not account, as the boilers were fixed to 'blow off' at a low pressure, will turn a large share of attention to this subject, and possibly we may soon find it necessary for every steam boiler to be arranged with an electrical machine or indicator, to show the amount of electrical action, and the approach of electrical or galvanic storms."

[Such pompous nonsense as the above matter consists of is beneath criticism were it not, unfortunately, the fact that hundreds of persons believe it. There are men of sound mind on all other subjects who are perfectly insane on the subject of boiler explosions, and they go about seeking whom they may buttonhole, endeavoring to make proselytes.

The whole subject of boiler explosions is not understood, because men are determined not to understand it, and juries not to do their duty. We attended an examination into one of these disasters recently, and two of the jury were personally known to us as practical boiler makers. These men sat at the examination, with stolid faces, like men of wood; they opened not their mouths, and we have not the slightest faith that they could repeat ten consecutive words of any of the witnesses.

When we find earnest inquiry and investigations directed to the palpable facts in the case—to the causes positively pointed out by experience, by precedent; when we find juries not content with swallowing such nonsense as is put forth in the letter above, we may hope for some reform—not before.—EDS.

Rosin in Lard.

In the Scientific Convention at New Haven, Prof. Olmstead stated that rosin added to lard gives it a degree of fluidity not before possessed by the lard, and also prevents the latter from forming those acids which corrode metals—copper and brass for example.

Several important practical applications result from this property. Its use for lubricating surfaces of brass or copper has already been alluded to. It is equally applicable to surfaces of sheet iron. I have found a very thin coating, applied with a brush, sufficient to preserve Russia iron stoves and grates from rusting during summer, even in damp situations.

I usually add to it a portion of black lead, and this preparation, when applied with a brush, in the thinnest possible film, will be found a complete protection to sheet-iron stoves and pipes. The same property renders the compound of lard and rosin a valuable ingredient in the composition of shaving soap. The quality of shaving soap is greatly improved by a larger proportion of oil than is usually employed, so as completely to saturate the alkali; but such soap easily becomes rancid when wet with water and allowed to remain damp—as it commonly is when in use.

If a certain proportion of this compound is added to common Windsor soap (say one-half of its weight) the tendency to grow rancid is prevented.

A very soft and agreeable shaving compound, or cream, may be made by steaming in a close cup a cake of any common shaving soap, so as to reduce it to a soft consistency, and then mixing intimately with it half its weight of our resinous preparation, adding a few drops of some odoriferous substance. The same compound forms an excellent water-proof for leather.

Curious Effects of an Earthquake.

The San Francisco *Bulletin* says:—One of the most astounding effects of the late earthquake is to be seen on the front of the new bank and insurance building lately erected on Montgomery street, between California and Sacramento streets. The gilt letters composing the signs that overspread the building have been thrown into such confusion that it is utterly impossible to tell what kind of business is carried on there. It looks as though half a dozen sets of the English alphabet had been fired out of a mortar and stuck promiscuously all over the front of the building. The passer by can distinguish here and there the words "Globe," "and," "Liverpool," "&," "Life," "London," "Fire," "412," "limited," "San Francisco," "414," etc.; but as for deciphering any connection between the words, it is out of the question. No attempt has yet been made to replace the letters in their proper position, and it is said that the occupants of the building have agreed to let them stand as they are, and surmount the building with a new sign labeled, "curiosities of earthquakes."

THE razor question has received all the attention at our hands that the subject merits. We thank those persons who have sent us letters which have not been published; their attention is not unappreciated, but we are quite unable to continue the discussion.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Port-monnaie, Pocket-book, Etc.—The object of this invention is to make a port-monnaie, pocket-book, etc., in such a manner that it cannot be abstracted from the pocket of the owner without his knowledge; and the invention consists in attaching to port-monnaies, pocket-books, memorandum books, etc., in a suitable manner, a serrated or roughened metallic strip or plate; and it consists in roughening or nicking the frame of a port-monnaie, or other like article, the effect being to cause the serrated or roughened surfaces to catch into the side of the pocket, so that an attempt to abstract it will attract the attention of the owner, but which, at the same time, will permit the article to be withdrawn by the owner without any difficulty. B. F. Cowan, of New York City, is the inventor.

Water Wheel.—This invention relates to a new and improved water wheel, of that class which is placed in a scroll, and are on a vertical shaft, and are commonly termed horizontal water wheels. The invention consists in a new form of bucket and its arrangement on the wheel, whereby it is believed that the direct force of the water, and also its reacting force, are obtained with a more favorable result than hitherto. Uriah H. Goble, of Dubuque, Iowa, is the inventor.

Pump for Oil and Other Deep Wells.—The object of this invention is to produce a pump for operating deep wells—such, for instance, as oil wells—and it consists, among other things, in securing the cylinder within and near the lower end of the ordinary well tube, which is usually carried down to, or nearly to, the bottom of the well. It also consists in extending the well tube, or that portion thereof into which the bottom of the pump cylinder is secured, some distance below the pump—the extended part being perforated with numerous holes, to admit oil or other liquid, as well as gas, to the valve in the bottom of the pump. The piston and piston rod are hollow, the piston being made of considerable length, and its diameter being reduced at two or more places intermediate of its extremities, to allow any liquid which finds its way between it and the sides of the cylinder to be collected in the annular spaces left at such reduced places, and so prevent any injurious effect upon the working of the piston. The piston is used without packing, being made, with the exception of the reduced places above mentioned, of a diameter sufficient to occupy the cylinder of the pump, and, at the same time, be capable of being moved freely up and down in it. The lower end of the piston is brought to a sharp edge by beveling its bottom on the inside, thereby making its bottom in its interior of a conical or funnel shape, the narrowest part forming the seat of the piston valve. S. Emilius Hewes, of Albany, N. Y., is the inventor.

Operating Oil Wells.—The usual method of operating oil wells is to sink a well of a diameter of four inches, more or less, and, after tubing the same, to raise the oil by suitable pumps. By this method only that oil is reached which is inclosed in crevices that are pierced by the well, and, in order to reach all the oil in a certain tract of land, it is necessary to sink a large number of wells. This invention consists in extending from a central vertical main well a series of radiating drills, in a horizontal or inclined position, in such a manner that a communication is effected between the several crevices situated outside the main well, and not otherwise in communication therewith, and all the oil contained in a certain tract of land can be collected in the main well and raised by one and the same pump, without the necessity of sinking a large number of wells and removing the pump from one well to another. Paul Casamajor, of New York City, is the inventor.

Operating Oil Wells.—This invention relates to an oil well composed of a vertical main shaft with a series of horizontal or oblique galleries and a series of drills extending from said galleries in a vertical or oblique direction. The main shaft terminates above the rock which contains the oil, and is provided at its bottom with a reservoir in which all the oil rising through the drills collects, and whence it can be easily raised to the surface by a suitable pump. By these means all the oil contained in a large tract of land can be collected in one and the same ressrvoir, and all the secondary wells pierced by the vertical or oblique drills can be converted into flowing wells, their depths being comparatively small, so that the labor of pumping is materially reduced, by having one large pump to raise the oil from the reservoir. Paul Casamajor, of New York City, is the inventor.

Trace Buckles.—This invention consists in the use of a buckle frame hung by a center cross bar within a loop of the inner end of the hame tug, the outer end of which frame has a swinging bar, bent into a circular shape, or nearly so, and provided with a center tongue or pin, which tongue, when the outer end of the trace tug has been drawn sufficiently through and under both ends of the frame, securely holds the same in position, by inserting it within the proper aperture thereof, and of the hame tug. H. S. Woodruff, of Janesville, Wis., is the inventor.

Improvements in Apparatus for Carbureting Air.—These improvements are embraced in two separate Letters Patent, the first of which consists in a novel and peculiarly constructed wheel, divided into a series of separate and similar-shaped compartments or chambers, extending its whole length, open at the periphery of the wheel, and communicating at their inner ends, and at one end or head plate of the wheel, with any suitable conducting pipe for the gas formed by it; which wheel is so arranged and hung within the receptacle containing the naphtha, that as it is revolved in any proper manner, and the open ends of the chambers at the periphery of the wheel are passing through the naphtha, the air contained in said chambers will be forced out thereof into the conducting pipe for the gaseous vapors so formed, the communicating ports of the chambers therewith then being above the naphtha; while, when the open outer ends of the chambers are passing through that portion of their plane of revolution above or outside of the naphtha, the said ports communicating with the conducting pipe are closed by the naphtha liquid itself, which naphtha, through suitable ports at the opposite end of the wheel to the conducting pipe, has free access at all times to the interior of those chambers below the naphtha at their inner ends. And the second, in covering the wheel, and for its whole extent, both in its length and periphery, with a sheet or sheets of wire gauze, or other suitable open or perforated material, the object of which is to secure a more perfect combination of the atmospheric air with the naphtha, as it passes to the receiver. Also, in a novel arrangement of parts, for regulating the amount of gas generated in the apparatus, the same being connected with the gas receiver at one end, and with the driving shaft of the chambered wheel at the other, in such a manner that when the pressure of gas within the receiver exceeds the desired amount, either in a greater or lesser degree, the revolution of the said bucket wheel shall be, in direct proportion thereto, retarded in its movement, thus causing a greater or lesser quantity of gas to be formed and forced into the receiver, as the case may be—these regulating devices being self-operating. And, also, in interposing between the gas receiver or generator and the burners employed for consuming the gas, and in its conducting pipe, a double-chambered tube or vessel, formed by an inner and concentric tube made of wire gauze or other suitable open material or substance, through which gauze tube the gas in its passage to the burners is obliged to pass, whereby the gas is thus relieved from all impurities and other condensable products which may be contained in it, a result of much importance for the production of a clear and perfect light from the gas when consumed. John Chase, of Windsor Locks, Conn., is the inventor.

INTERESTING PATENT-LAW TRIALS.

In another column we copy from the New York *Times* reports of the recent trials in the U. S. Court, in this city, for alleged infringements of patents.

One of these trials took place before Judge Benedict, upon the question of the validity of a design patent. The Judge held, in effect, that in order to sustain such a patent the improvement must be novel, and that the mere adoption, or borrowing, by the patentee of an old form was not sufficient to support a claim.

The other trial related to the validity of the reissue patent of James Draper, for an improvement in hoop skirts, originally granted in 1859. In 1863 James J. West obtained a patent for improvements in hoop skirts, and became an extensive manufacturer thereof under his patent, without molestation from the plaintiff. But in August, 1865, the plaintiff obtained a reissue, with a new claim, under which he now comes to the Court, declares West to have been an infringer, and asks for an injunction.

Judge Nelson denies the motion for an injunction, and holds that the inference, *prima facie*, is against the plaintiff; that Draper's reissued patent was a suggestion taken from West's patent, as the latter contains the whole improvement of the reissued patent. But if the plaintiff can clearly show that he was the first original inventor previous to the date of the first patent, then the reissue must be upheld.

SPECIAL NOTICES.

Louisa R. Ketchum, executrix of the estate of William F. Ketchum, deceased, of Buffalo, N. Y., has petitioned for the extension of a patent granted to him on the 10th day of February, 1852, for an improvement in grain harvesters.

Parties wishing to oppose the above extension must appear and show cause on the 22d day of January next. at 12 o'clock, M., when the petition will be heard.

Robert T. Osgood, Orland, Maine, has petitioned for the extension of a patent granted to him on the 17th day of February, 1852, and reissued in three divisions, on the 13th day of August, 1860, and numbered 1,250, for an improvement in grain and grass harvesters.

Robert T. Osgood, Orland, Maine, has petitioned for the extension of a patent granted to him on the 17th day of February, 1852, and reissued in three divisions, on the 13th day of August, 1860, and numbered 1,251, for an improvement in grain and grass harvesters.

Robert T. Osgood, Orland, Maine, has petitioned for the extension of a patent granted to him on the 17th day of February, 1852, and reissued in three divisions, on the 13th day of August, 1860, and numbered 1,252, for an improvement in grain and grass harvesters.

Parties wishing to oppose the above extensions must appear and show cause on the 6th day of February next, at 12 o'clock, M., when the petition will be heard.

Seeing through Water.

The *Edinburgh Review* says:—"Currents in the very bed of a river, or beneath the surface of the sea, may be watched, as Mr. Campbell informs us, by an arrangement that smugglers used in the old days. They sank their contraband cargo when there was an alarm, and they searched for it again by the help of a so-called marine telescope. It was nothing more than a cask with a plate of strong glass at the bottom. The man plunged the closed end a few inches below the surface, and put his head into the other end, and then he saw clearly into the water. The glare and confused reflections and refractions from and through the rippled surface of the sea were entirely shut out by this contrivance. Seal hunters still use it. With this simple apparatus the stirring life of the sea bottom can be watched at leisure and with great distinctness. 'So far as this contrivance enables men to see the land under the waves, movements under water closely resemble movements under air. Sea weeds, like plants, bend before the gale; fish, like birds, keep their head to the stream, and hang poised on their fins; mud clouds take the shape of water clouds in air; impede light cast shadows, and take shapes which point out the directions in which currents flow. It is strange, at first, to hang over a boat's side peering into a new world, and the interest grows. There is excitement in watching big fish swoop like hawks out of their sea-weed forest after a white fly sunk to the tree tops to tempt them, and the fight which follows is better fun when plainly seen.' Mr. Campbell suggested plate-glass windows in the bottom of a boat; it would bring men and fish face to face; and the habits of the latter could be leisurely watched."

PERKINS succeeded in making water red-hot.

ABSORPTION OF HEAT BY VAPORS AND ODORS.

From Prof. Tyndall's lecture on Radiation, published by D. Appleton & Co., we take the account of his investigations of the absorption of heat by vapors and odors:—

"We commenced the demonstrations brought forward in this lecture by experiments on permanent gases, and we have now to turn our attention to the vapors of volatile liquids. Here, as in the case of the gases, vast differences have been proved to exist between various kinds of molecules, as regards their power of intercepting the calorific waves. While some vapors allow the waves a comparatively free passage, in other cases the minutest bubble of vapor, introduced into the tube already employed for gases, causes a deflection of the magnetic needle. Assuming the absorption effected by air at a pressure of one atmosphere to be unity, the following are the absorptions effected by a series of vapors at a pressure of $\frac{1}{60}$th of an atmosphere:—

Name of Vapor.	Absorption.	*Name of Vapor.*	Absorption
Bisulphide of Carbon	47	Sulphuric Ether	440
Iodide of Methyl	115	Formic Ether	548
Benzol	136	Acetic Ether	612
Amylene	321		

"Bisulphide of carbon is the most transparent vapor in the list, and acetic ether the most opaque; $\frac{1}{60}$th of an atmosphere of the former, however, produces 47 times the effect of a whole atmosphere of air, while $\frac{1}{60}$th of an atmosphere of the latter produces 612 times the effect of a whole atmosphere of air. Reducing dry air to the pressure of the acetic ether here employed, and comparing them then together, the quantity of wave-motion intercepted by the latter would be many thousand times that intercepted by the air.

"Any one of these vapors discharged in the free atmosphere, in front of a body emitting obscure rays, intercepts more or less of the radiation. A similar effect is produced by perfumes diffused in the air, though their attenuation is known to be almost infinite. Carrying, for example, a current of dry air over bibulous paper moistened by patchouli, the scent taken up by the current absorbs 30 times the quantity of heat intercepted by the air which carries it; and yet patchouli acts more feebly on radiant heat than any other perfume yet examined. Here follow the results obtained with various essential oils, the odor, in each case, being carried by a current of dry air into the tube already employed for gases and vapors:—

Name of Perfume.	Absorption.	*Name of Perfume.*	Absorption.
Patchouli	30	Portugal	67
Sandal Wood	32	Thyme	68
Geranium	33	Rosemary	74
Oil of Cloves	34	Oil of Laurel	80
Otto of Roses	37	Camomile Flowers	87
Bergamot	44	Cassia	109
Neroli	47	Spikenard	355
Lavender	60	Aniseed	372
Lemen	65		

"Thus the absorption by a tube full of dry air being 1, that of the odor of patchouli diffused in it is 30, that of lavender 60, that of rosemary 74, while that of aniseed amounts to 372. It would be idle to speculate on the quantities of matter concerned in these actions."

THE GREAT LAKES TO BE CONNECTED WITH THE MISSISSIPPI.

At the last meeting of the Polytechnic Association, Mr. Carter, of Chicago, gave some particulars in relation to the work of lowering the bed of the Illinois and Michigan canal, for the purpose of draining the Chicago river into the Illinois. This canal is 100 miles in length, with a width of 70 feet at the surface, and 30 at the bottom. It connects the Chicago river, at a point near the city, with the Illinois river at Peru. It passes over a summit of about seven feet elevation, the water being raised for this level by a steam engine. The first design of the engineers was to sink the canal deep enough to avoid this summit level; but, to save expense in construction, the Commissioners finally decided on the present plan. The citizens of Chicago have, for some time, been desirous to have the canal sunk through this level, in order to drain the waters of the Chicago river through the canal into the Illinois, instead of allowing them to flow, as at present, into the lake, where they foul the water of the harbor by the sewerage of the city. It has finally been decided to do this work at the expense of the city, and on the close of navigation this year, numerous gangs of workmen are to commence the task so as to complete it with the least possible delay. Mr. Carter said that the length of the summit level is about 18 miles.

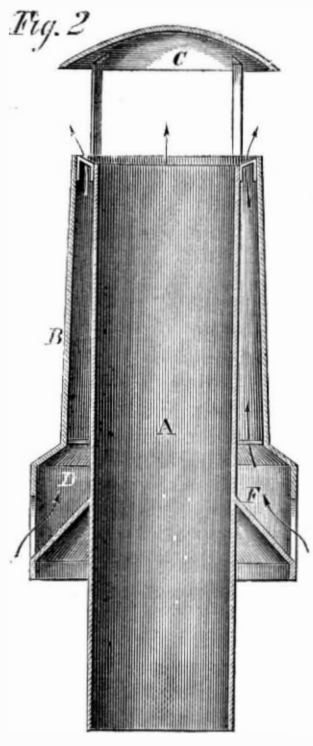
HENRIKSEN'S CHIMNEY TOP.

The inventor of this chimney cap asserts that it is a complete cure for smoky chimneys, and highly desirable where a great draught is needed. It is claimed that on sea-going or other steamers, the funnel may be made much shorter on this plan, and that for sailing vessels it is also desirable, making the fire in the galley burn freely in baffling winds when other arrangements fail. It has been used in some of the hotels and factories in San Francisco, and found to be advantageous.

Fig. 1

In construction it is simply a pipe, A, with a jacket, B, and a hood, C, as shown in Figs. 1 and 2. The lower part of the jacket is enlarged, as at D, and has openings, E, through which the air enters. It issues at the top, as shown. The jacket is supported by braces, F, at top and bottom. The air circulating through this appurtenance creates a current within the main pipe, A, which causes the fire to burn briskly. It would seem to be a useful invention.

Fig. 2



It was patented on Oct. 15, 1865, through the Scientific American Patent Agency, by B.A. Henriksen, of San Francisco, Cal., whom address for further information. [See advertisement on another page.]

FOR INVENTORS AND MECHANICS.

We desire again to call the attention of our readers to the new work, as above, lately published by Messrs. Munn & Co., Scientific American Office, New York City. Every person who is interested in the mechanic arts or inventions should have a copy. It contains a great deal of valuable information, crystallized, so to speak, into the smallest compass; and this reduction of space, by saving paper, permits the issue of the book at the insignificant price of 25 cents. Among other things, it contains 112 diagrams illustrative of the best mechanical movements—reduced by the photograph and engraved expressly for the work. Mechanics and inventors will find these engravings to be of value as references, whenever they are searching for good methods of obtaining any required motion of parts. It likewise contains all the Patent Laws of the United States, conveniently arranged with appropriate headings, for reference; also the official rules and directions for doing business at the Patent Office; forms for assignments of patents; useful advice upon the sale and introduction of patents; diagram of the condensing steam engine, with letters of reference to all of the parts; a chapter upon practical geometry, with diagrams; several illustrations of gasket braiding, with directions of value to engineers; table of the pressure and temperature of steam; table of the effects of heat upon the various metals and other bodies; how to make tracing paper; table of the electrical conducting power of metals; how to calculate the horse-power of a stream of water, a water wheel, or a steam engine—together with instructions how to obtain patents in the United States and other countries, with schedule of fees, etc., and much other interesting matter, which we have not space here to mention. Sent by mail every where. Address Munn & Co., No. 37 Park Row, New York.

LATEST FOREIGN INTELLIGENCE.

What Proper Inspection Does for Steam Boilers.—A few months ago we laid before our readers a summary of the report of the engineer of the Midland Steam Boiler Insurance and Inspection Company, and we now extract the following from the report of the chief engineer to the Manchester Association for the Prevention of Boiler Explosions. In one month, he says, 373 boilers have been examined, and 98 dangerous defects met with. Three explosions had taken place in as many weeks in his district, through which one life had been lost, and four persons injured. Not one of these boilers, however, was under the inspection of the company, and competent inspection would certainly have prevented the explosions.—*The Ironmonger.*

In experimenting upon the wood fuel, Count Rumford found that lime-tree wood gave out most heat in burning.

Highway Steam Locomotives.—"An Engineer" writes the appended letter to an English cotemporary:—Feeling that your paper would be the proper channel through which all mechanical inventions of use and utility should become known, I have thought that the following description of a trial trip, made by Richards and James's patent highway locomotive engine, manufactured at the Victoria Ironworks, West Croydon, would be interesting to your many readers. This engine is nominal 32-horse power, having two 12-inch cylinders, 12-inch stroke, fixed upon the bed-plate or frame, upon which also rests the boiler. The boiler-working pressure is 100 lbs. per square inch, proved 250 lbs., the steering apparatus is attached to the front wheels, and the driver is the engineer and steersman, being able, by the arrangement adopted, to handle his engine from his position as the steering-wheel, one stroker and driver being only necessary to man the engine. The driving gear is divided into three speeds, changed at will of the steersman, viz., two, five, and eight miles per hour. The machinery is entirely hidden from view by a very neat framing. The distance from the ground to ash-pan is 2 feet 2 inches. She carries a tender, with donkey pump attached, for pumping water from the sides of the roads, steam being taken through a flexible tube from a large engine boiler; this pumps throws 10,000 gallons of water per hour, filling the tender, capacitated to carry 1,000 gallons

—enough water for twenty miles. The boiler is fitted with waste steam pipe, which is conducted into the ash-pan for damping the fire when the engine is at rest, or standing on the roads. The engine wheels are constructed upon quite a new principle, having chains to the driving wheels to prevent slipping in ascending steep inclines, or in traveling over rough roads, and side teeth in the front wheels, which may be protruded at pleasure, to act as a flange of a railway wheel, to prevent the engine striking from one side of the line to be pursued, or when it turns sharp curves, or stands upon sideling roads, these teeth are of considerable value. This engine passed through town and district, and main thoroughfares, on Monday last—being the first day of the fair—which were crowded to excess by vehicles, horses, and spectators, without emitting any steam or smoke, and without making any noise, or meeting with any mishap, with a train of eight vans attached, the length of train from front of engine to end of last van being 160 feet.

Work for Women.—The Directors of the London and Northwestern Railway have just completed the erection of a factory for the employment of unemployed females, with sewing machines, at Crewe, and it is in contemplation to give out machines to private families, after the girls have been properly trained.

A "Spectroscope" is now on exhibition in England which produces some strange illusions. The contrivance is based on the inventions of Professor Pepper and Mr. Tobin. The novel portion is that called, "Proteus," in which a box is wheeled on to the center of the stage, and some one is locked up in it. When the box is reopened, after the lapse of a few seconds, some one else is found therein. Although, when at first exhibited, the box appears to be empty, yet a young woman and a boy are seated therein, and in proper order are let out and walk upon the stage.

A Statue Weeping by Steam.—The Florence correspondent of the *Independence Belge* says that a singular discovery has been made in a church in one of the faubourgs of Milan. A statue of Saint Magdalen, which has long been famous for weeping in the presence of unbelievers, was recently moved, in order to facilitate repairs for the church. It was found that the statue contained an arrangement for boiling water. The steam passed up into the head, and was there condensed. The water thus produced its way by a couple of pipes to the eyes, and trickled down upon the cheeks of the image. So the wonderful miracle was performed.

A Novel Railway Brake.—Some few months since, says the *Mining Journal*, we referred to an improved anti-friction railway brake, invented by Mr. Shaw, and it is gratifying to find that an opportunity will speedily be afforded for the making of comparative trials with the brakes now in use—the London, Brighton, and South Coast Railway Company having kindly lent a carriage to enable Messrs. Gardiner and Mackintosh, of New Cross, to apply the invention for the purpose of testing the principle upon which the brake is constructed. Mr. Shaw claims that a train traveling at the rate of 50 miles per hour can, with his brakes, be brought to a stand in 150 yards, or about one-third the distance required with the ordinary brakes; and that, although he applies a brake to every wheel on the train, the entire brake power is in the hands of the engine driver. It will be remembered that, in the place of the ordinary brake blocks, Mr. Shaw proposes to employ anti-friction wheels, acting upon the peripheries of the wheels of the carriage to which the brake is to be applied, and upon the axle of the anti-friction wheels he places a "fly," or fan, similar to that used in a clock or musical box. When the train is traveling in the ordinary manner, the anti-friction wheels fall free from the peripheries of the running wheels, and the progress of the train is not interfered with; but in the event of the engine driver perceiving danger, he forthwith proceeds to stop his engine, and the buffers being thus pressed together, levers are caused to press the anti-friction wheels against the running wheels, and the "fly" is at once set in motion. Mr. Shaw is confident of success, because, inasmuch as the power required to drive a fan of the size he uses is estimated to be equal to about three horses he anticipates that each fan applied will give a 3-horse power retarding force. As soon as the carriage to which the brake is being applied is ready for running we shall publish the results obtained. Mr. Shaw has now encased the fan in a cylinder, so that the inconvenience he feared might arise from the dust created by the revolution of the "flies" cannot possibly be experienced.

English Patent for Refining Iron.—Mr. R. F. Crawshay, and J. A. Lewis, of the Cayfarthfa Iron Works, have patented a plan for refining iron by introducing into the boiling furnace sulphate of iron and oxide of lead. The chemical changes produced by these ingredients are said to be 1. The conversion of the carbon of the mass into sulphuret of carbon by the decomposition of the sulphate, and its removal by sublimation, 2. The separation of the silicious and argillaceous substances, by the lead of the oxide forming by their union a matrix from which the iron rapidly precipitates, 3. A rapid elevation of the temperature of the mass operated on by the evolution of oxygen from the acid of the sulphate of iron and the oxide of lead, producing suddenly a greater liquefaction, which facilitates the separation of all foreign matter.

The "Winooski" and "Algonquin"—Official Report of the Results of the Trial.

New-York, Nov. 9, 1865.

Sir:—We have the honor to present this our report on the late competitive trial of the machinery of the *Winooski* and *Algonquin*, to determine the economy of fuel with which the power was respectively developed in the two cases.

The trial was conducted in exact conformity with the instructions of the board of civilian experts, consisting of Messrs. Everett, Copeland, Baird, Hibbard, Coryell, Bromley, and Wright.

The paddle-wheels were exactly alike, and the paddles had the same dimensions and immersion.

The vessels were placed on opposite sides of the same pier, with a view to equalize the influence of the tide; but it was discovered in the course of the preceding trials that, owing to an opening through the pier at its head, the tide acted more unfavorably for the machinery of the *Winooski* than for that of the *Algonquin*. The opening was not suspected when the pier was originally chosen.

The coal was weighed on the pier for both vessels, taken from the same pile, and weighed on the same scales. An agent of the contractor for the *Algonquin's* machinery was present and noted the weighing. An indicator diagram was taken every half hour, from each end of the cylinder of each vessel; and the mean result from them will be found in the accompanying table, which also contains all the other data necessary to be known.

The *Winooski's* machinery made the ninety-six hours' run, working in the most perfect manner, and steadily inproving, giving a better result for the last twelve hours than for the first. The performance of the machinery, in every particular, leaves nothing to be desired for efficiency in a marine paddle-wheel steamer. Its durability and reliability could be depended upon for any length of cruising.

The machinery of the *Algonquin* was evidently wanting in these particulars; and in proper adaptation for marine purposes; in style, finish, and convenience for manipulation, it was also far behind its competitor. Instead of performing this in the stipulated 96 hours of the trial, it was stopped by Mr. Dickerson, its designer, and the agent of the contractor, after 69 hours and 8 minutes, and it will require about six weeks from date of stopping to repair and readjust it sufficiently to commence the full power trial which is still to be made.

At the time the *Algonquin's* engine was stopped it was falling rapidly behind the *Winooski's*, the difference in the performance being nearly one revolution of the wheels per minute.

The stoppage, in our opinion, was caused by this fact, and was wholly unauthorized, unwarranted, and unjustifiable, and was done in open defiance of our prohibition.

With regard to the economical results, they are as follows, according to the two methods of determining them:—

By the first method, taking the cubes of the number of revolutions made per minute by the paddle-wheels for the measure of the power, we find the power with the *Algonquin's* machinery to cost about two and one-tenth per cent more in fuel than the power with the *Winooski's* machinery

By the second method, taking the indicator results for the measure of the power, we find the power with the *Algonquin's* machinery to cost about ten and six-tenths per cent more in fuel than the power with the *Winooski's* machinery.

By both methods, the economy of fuel is in favor of the *Winooski's* machinery, and the difference in the results given by the two methods is probably due to the difference in the effects of the tide on the paddle wheels of the two vessels.

As the anthracite used in this trial did not give the same per centum of refuse for both vessels, on account of the difference of time of the experiment, we have taken the coal consumed per hour, less the refuse, as the true weight of fuel consumed.

With regard to the rapidity with which steam could be raised in the boilers of the two vessels, from water of the same temperature, and with equal weights of wood and coal, the difference upon this trial was six minutes in favor of the *Algonquin's* boilers.

The point at which the steam was cut off in the cylinder of the *Winooski* was ascertained by hooking on the eccentric rod, and turning the engine by hand, noting exactly on the main guides the point at which the toe of the rockshaft left the lifter on the lifting-rod.

This measurement gave 4 feet 10 inches for the upper stroke, and 6 feet for the lower stroke; which, as the stroke of the piston is 8 feet 9 inches, gave a mean of 0·619. The cut-off of the *Algonquin's* engine, not being a positive one, could not be so measured, but has been computed from the indicator diagram.

We are, very respectfully, your obedient servants,

Chief-Engineer Robert Danby,
Chief-Engineer Edwin Fithian,
Chief-Engineer Mortimer Kellogg.

Hon. Gideon Welles, Secretary of the Navy,
Washington, D. C.

Data of the Competitive Trial of the Winooski and Algonquin, for Economy of Fuel, at the Wharf, New York, 1865.

	Winooski.	Algonquin.
Date of commencement, Oct. 23, P. M.	4·28	4·22
Duration of the experiment in hours and minutes	96	69·8
Total number of revolutions	85,884	62,407
Total number of pounds of coal consumed	152,015	111,344
Total number pounds refuse from the coal	30,400	19,500
Total number pounds of coal consumed, less refuse	121,615	91,844
Percentum of refuse	20	17·51
Average steam pressure in steam-pipe, in pounds per square inch	19·64	71·63
Average point of cutting off steam	0·619	0·132
Average vacuum in condenser, in inches of mercury	27·80	20·54
Average barometer	29·94	29·94
Average revolutions per minute	14·9104	15·0450
Average indicated pressure on piston	26·276	31·6
Average indicated horse-power	545·485	517·317
Pounds of coal consumed per hour	1583·49	1610·57
Pounds of coal consumed per hour, less the refuse	1266 82	1328·50
Pounds of coal consumed per hour, per indicated horse-power	2·905	3·113
Pounds of coal, less the refuse, consumed per hour, per indicated horse-power	2·322	2·568
Temperature on deck	53·6	53·6
Temperature in fire-room	98	108·9
Temperature in engine-room	66·8	70·1
Temperature of injection water	55	55
Temperature of discharge water	85·9	69·2
Temperature of feed water	104·3	161·4

Scheme to Tunnel the Chicago River.

At the last meeting of the Polytechnic Association, Mr. Stetson stated that a plan is proposed in Chicago, which it is understood is to be carried into effect, for tunneling the Chicago river. The river is only about twelve feet deep, and the plan is to exclude the water by coffer dams, and construct the tunnel in the open air, having the top of the tunnel come just level with the bottom of the river. The footpath is to be in the middle, with a carriage way on each side.

A concentrated solution of chloride of zinc, which has been boiled with an excess of the oxide of that metal until it does not discolor litmus, will dissolve silk. By means of the dialyser the silk can be separated from its solvent in the form of a colorless inodorous solution.

Notes and Queries

W. H. B., of N. Y.—It is not new to make springs in one piece, as you propose; nor is it considered specially advantageous.

T. J. L., of Va., and thirteen others.—You have probably noticed that in attributing the beneficial effect of dipping a razor in hot water to the softening of the beard by heat, you have been anticipated by the communication of Mr. Lewis, published on page 293.

D., of Pa.—If any one infringes your patent, your remedy is to notify them of the fact, and if the infringement is not stopped you can then commence legal proceedings.

F. K., of N. Y.—Your plan for making a vertical sundial, by inserting a rod perpendicularly in the side of a barn, with the arc of a circle divided in equal parts to receive the shadow, is very imperfect; it would give the hour at 12 o'clock always within sixteen minutes, but the other hours would be far from correct and the errors would vary every day in the year.

C., of Mass.—Wood naphtha is even a better solvent for gum shellac than alcohol. In England, acetic acid, for the manufacture of acetates, is made in large quantities by the destructive distillation of wood, and wood naphtha is one of the incidental products; but in this country, vinegar is generally made by fermentation, and in this process no wood naphtha is produced. Except alcohol and wood naphtha we know of no efficient solvent of gum shellac.

J. H. J., of Md.—Your improvement can, perhaps, be patented if it makes the churn better. But the mere addition of some trifling part, if you still use the other device, would not give you a right to use the prior patent. If your improvement results in the formation of a substantially different invention from that before claimed then you will have the exclusive right of use anywhere.

O. S.—There are several plans for rolling shades from the top and also bottom. But if you have any new arrangement for the purpose you could obtain a patent.

A. E. A. M., Ill.—Toggle-joint presses, with right and left screw, substantially as you propose, were invented long ago. You will have to try again.

E. A. P., of Wis.—In Canada patents are only issued to inventors who are British subjects and resident there. The doors are closed against Americans. You cannot obtain a Canadian patent.

W. H., of Me., asks:—"Is there any fluid black ink which can be used successfully for drawing and tracing, as a substitute for india ink?" Ans.—We know of no good substitute; we wish we did. Can you not invent one?

S. B. S., of N. Y.—There are many improvements in paddle wheels in which the floats are made to enter and leave the water in vertical position. Your improvement, if new, can probably be patented. But, to enable us to judge of its novelty, you will need to send us a description.

S. P., of N. H.—Engines with double pistons, the steam admitted between them, as you propose, are old.

N. & M., of Ill.—We are glad to hear of the success of your improvements in making sugar from sorgho. The idea of supplying water to boilers from an elevated reservoir, with cocks operated by the engine, substantially as you propose, is quite old. Your arrangement of parts could, perhaps, be patented.

J. R., of Mass.—The best way to prevent unpleasant smell from new paint on inside work is, to keep the windows open till the paint is dry. No action yet in your patent case.

R. W. B., of Mass.—A column of water one foot in hight exerts a pressure of 0·434 lbs. to the square inch; therefore, a column eighteen feet in hight will give a pressure of 7·812 lbs. To get the area of the cross section of a pipe, multiply the square of the diameter by 0·7854. To get the number of cubic feet discharged per minute under eighteen feet head, multiply the area of the orifice in square inches by 9·5.

R. B., of Pa.—The patentee, under the circumstances, would be entitled to receive the Letters Patent. The assignee of certain rights under the patent could procure an official copy of the patent for his own use.

S. W., of C. W.—Sawing devices, for felling trees in the forest—the force being communicated to the saw by compressed air or steam, through a flexible pipe—are old. The general principle of your proposed mechanism cannot, therefore, be claimed, but any novelty in your construction of the parts thereof could be patented.

S. R. B.—If you will send to H. C. Baird, No. 406 Walnut street, Philadelphia, for the books you require he will furnish them.

A. F. C., of Mich.—There is no employment office in New York specially for civil engineers.

R. B. P., of Mo.—We believe there is no patent on one machine which will saw fire wood, rip up lumber for moldings, and grind sugar cane, all at one operation, either by hand power, horse power, water power, or steam power. You can probably obtain a patent on such a machine. The first thing to be done is to make a model.

C. S., of Pa.—We think it probable that a patent could be had on your improvement. There is a patent for turning on the gas, lighting, and shutting off, by electricity. This is Gardner's patent, and is in successful operation at the Capitol, Washington.

D. B. C., of N. Y.—When it is said that a turbine wheel has yielded 87 per cent of the whole power of the water, the meaning is that it has raised a weight equal to 87 per cent of the weight of the water employed to drive it, through a hight equal to the head or fall of the water.

Correspondence

Exhibition Hall at the Patent Office—Important to Manufacturers.

Messrs. Editors:—The present Commissioner of Patents has decided to throw open the old hall of the Patent Office to the manufacturers of the country, and permit them to place therein cases containing specimens of their manufactured articles. Already, the Douglass Ax Company have availed themselves of the privilege, and set up a beautiful black walnut case, containing over fifty specimens of their art.

This, to the manufacturers of our country, is a most important movement. Not only will the exhibition be highly creditable to the country—if generally participated in, as it doubtless will be—but it will be a standing advertisement of the skill of our artisans to the thousands of foreigners who annually visit the office, from all parts of the world. The products thus displayed, if properly done, will also be a standing proof of the benefits of our patent system; they will represent the *results*—as the models there deposited do the *ideas* of American inventions.

To render the exhibition a perfect one, and what it ought to be, we should have first the raw material, such as iron in the ore, cotton in the ball, wool in the fleece, etc., and then have it represented in all its stages of progress, up to the completed article or fabric, together with the machines or other inventions by which the process is carried on; but this cannot be done in the limited space of the present available room. It is to be hoped that at some future day, Congress may be induced to take hold of this subject, and assist to carry out the idea on a scale commensurate with its importance.

I desire to call the special attention of the manufacturers of fire-arms to this opportunity to display and advertise their arms. There is no other class of inventions which attracts the attention of citizens and foreigners so much as that of fire-arms; and surely no nation on earth can make so fine a display of improved weapons as we, if our manufacturers and inventors will only send on their specimens. This is the more important, for the reason that not one in ten of the models are perfect working arms—many being of wood, others only sectional or fractional parts of the arm, etc. I have on several occasions been called upon to show to officers sent out by European governments our improved arms, and I have found it impossible to give them any correct idea of many of them, because of the imperfection of the models. By depositing a perfect arm, they would be enabled to get a clear idea of it; and it would thus become a standing advertisement for the manufacturer and inventor, much to their benefit, I am certain.

As an evidence of the interest felt by foreigners in this class, I may state that when the Embassy from Tunis visited the office recently, and came to the case set up by the Douglass Company, the first question they asked, was—"Do they make guns also?" England and France both have their grand collection of arms—why may not we? With the skill of her inventors, and the heroism of her soldiers, America may defy the world in arms; and such a display as we can make of improved weapons, will have a most beneficial effect in a national point of view. W. C. Dodge.

Washington, D. C. Nov. 6th, 1856.

[Our correspondent urges that Congress or some other power should aid in securing an exhibition of our industrial arts, such as shall be worthy of our people. Such an exhibition as he proposes ought to be established in New York, where it can be seen and appreciated, and not in Washington, where few, comparatively, will ever see it.—Eds.

Fire-proof Paint for Bridges.

Messrs Editors:—In your valuable journal of the 11th inst., we notice your remarks about the destruction of the Coscob railroad bridge, and a suggestion about a fire-proof paint for such bridges. We give the following, and guarantee it to answer the purpose:—1 lb. best black lead; 1 lb. of fine gilder's whiting, and ¼ lb. of Quarterman's patent dryer—the whole ground together finely with linseed oil, and then thinned for use with linseed oil alone, and applied like other paints. Wood thus covered will not take fire from sparks. J. Q. & Son.

New York, Nov. 14, 1865.

The Pitch of Gears.

Messrs. Editors:—A correspondent of the Scientific American, Nov. 4, on the subject of "Teeth of Wheels," states that "the pitch of a gear is the distance between the centers of two adjacent teeth, measured in a straight line; and these centers are all situated in an imaginary circle, called the pitch circle." He says, "In treating of gears it is customary to consider the pitch as an arc of this circle, instead of a line or chord, and the rules usually given for proportioning the number of teeth, and the diameter of the pitch circle, are based on this assumption. When the number of teeth in the gear is large, or where gears to be matched are the same, for nearly so, these rules are sufficiently accurate or practice, but every mechanic who has had occasion to make gears of different sizes mesh together, particularly if of coarse pitch, has found that teeth determined by circular pitch will not run well together, and he has been compelled in such cases to find the true diameter by a series of trials," etc.

Your correspondent seems to be well versed in mathematics, but labors under a mistake in gearing; and, as there is an important truth involved, please allow a few words in explanation: The pitch of a gear is the distance between the centers of the teeth measured on the pitch circle, not "on a straight line between two adjacent teeth," whether the gears differ in size or not. Now, it is a fundamental principle in gearing, that gears should be so made as to roll together like two rollers of the same diameters as the respective pitch lines of the gears; this is a fixed fact, which we must first understand. And, to obtain this result, the diameters of the pitch circles of the two gears working together must bear the same ratio to each other as their numbers of teeth. For instance, a gear of 50 teeth driving one of 100 teeth, the diameter of the pitch circle of the latter should be twice that of the former, thus: if they be four-inch pitch, then $\overline{100\times4\div3{\cdot}1416}=127{,}323$ inches diameter, and $\overline{50\times4\div3{\cdot}1416}=63{\cdot}6615$ inches diameter.

When gears are of the same size and number of teeth it does not matter whether we consider the pitch a straight line between the centers of two adjacent teeth, or measured on the pitch circle; the diameter of the pitch circles are in ratio to the number of teeth, whichever way we consider it. But when the number of teeth differ, then is it important that the pitch of the teeth, or distance between their centers, should be measured on the pitch circles, if we would have our gears roll together like two rollers; and the very opposite result takes place from what your correspondent claims, if they are not so made, causing unnecessary sliding, crowding and friction of the teeth.

The pitch line of a rack is a straight line near the center of the teeth, and the pinion that moves it should be so made as if it moved the rack only by contact on the pitch lines; this causes the pinion and rack to roll together as a roll on a plain surface. Therefore, to work best together, the teeth being of a proper form, the pitch of teeth of gears should be measured on the pitch circle, whether the gear works into another of its same size or rack. Otis B. Morse.

Chicopee, Mass., Nov. 5, 1865.

Smoke-consuming Stoves.

Messrs. Editors:—I have lately thought of an improvement in stoves, theoretically calculated to save fuel and consume smoke. Fire is ordinarily the result of the combination of the oxygen of the atmosphere with the carbon of the burning substance. Smoke is carbon in a finely divided state, which escapes without undergoing this combination. Smoke, therefore, is so much carbon worse than wasted, for it is now in such a state as to be highly opposed to cleanliness, injurious to clothes, and detrimental to health. If any man could devise a plan for consuming this smoke he certainly would confer a great boon upon society.

My plan for consuming a great portion of smoke seems to me a simple and a practical one. I would

construct a stove with two grates—the one immediately above the other. First, make a glowing fire in the upper grate, and then start a fire in the lower grate. Now, theoretically, all the smoke arising from the lower grate will have to pass through the upper fire, and, in so passing, will be consumed. Live coals, when necessary, from time to time, may be taken from the lower to the upper grate. Fresh fuel should always be put upon the lower grate. Thus, I should think, a continual fire might be kept up, and nearly all the smoke consumed. W. H. B.

Baltimore, Nov. 1, 1865.

[We should suppose that this plan might consume the smoke of the lower fire, but would increase that of the upper fire. Still, this could be ascertained only by trial.—EDS.

PATENT-LAW TRIALS.

Infringement of a Design Patent.

U. S. CIRCUIT COURT.—Before Judge Benedict.

Emma C. Wooster vs. Jason Crane, et al.—This is a bill in equity filed to recover damages for an alleged infringement of a patent issued Oct. 20, 1863, for a design for a reel.

The article in question is a reel for containing ruffles, ladies' dress trimmings, and other goods; and consists of two parallel disks of pasteboard connected by four bits of wood, on which the ruffle is wound between two pasteboard sides. The pasteboard is cut in the form of a rhombus, with the angles rounded, and what the patentee claims is "the design and configuration of the reel."

The statute relied on as giving to the complainant the right sought to be enforced is the act of March 2, 1861. The eleventh section of this act is as follows:—

"SEC. 11. And be it further enacted that any citizen or citizens, alien or aliens, having resided one year in the United States and taken the oath of his or her intention to become a citizen or citizens, who by his, her or their own industry, genius, efforts and expense, may have invented or produced any new and original design for a manufacture, whether of metal or other material; * * * * or any new and useful pattern or print or picture, to be either worked into or worked on, or printed, or painted, or cast, or otherwise fixed on any article of manufacture; or any new and original shape or configuration of any article of manufacture not known or used by others before his, her, or their invention or production thereof, and prior to the time of his, her or their application for a patent therefor; and who shall desire to obtain an exclusive property or right therein, to make, use, and sell and vend the same, or copies of the same, to others, by them to be made, used, and sold, may make application in writing to the Commissioner of Patents, expressing such desire, and the Commissioner, on due proceedings had, may grant a patent therefor, as in the case now of an application for a patent."

I am not aware that any judicial construction has been given to the portion of this act considered applicable to this case. No authorities were cited on either side showing any adjudication upon the question involved. There seems to me, however, little doubt as to what should be the construction to be put upon it, when sought to be applied to a case like the present.

In this case the reel itself is an article of manufacture, is conceded to be old, and not the subject of a patent. The shape applied to it by the complainant is also an old, well-known mathematical figure. Now, although it does not appear that any person ever before applied this particular shape to this particular article, I cannot think that the act quoted above was intended to secure to the complainant an exclusive right to use this well-known figure in the manufacture of reels. The act, although it does not require utility in order to secure the benefit of its provisions, does require that the shape produced shall be the result of industry, effort, genius, expense, and must, also, I think, be held to require that the shape or configuration sought to be secured shall at least be new and original, as applied to articles of manufacture. But here the shape is a common one in many articles of manufacture, and its application to a reel cannot fairly be said to be the result of industry, genius, efforts, and expense. No advantage whatever is pretended to be derived from the adoption of the form selected by the complainant, except the incidental one of using it as a trade-mark. Its selection can hardly be said to be the result of effort even. It was simply an arbitrary, chance selection of one of many well-known shapes, all equally well adapted to the purpose. To hold that such an application of a common form can be secured by Letters Patent, would be giving the act of 1861 a construction broader than I am willing to give it.

The decree must, therefore, be for the defendant.

Validity of a Reissued Patent.

U. S. CIRCUIT COURT.—Before Judge Nelson.

Samuel H. Doughty vs. James J. West et al.—This was a motion for a preliminary injunction in a suit brought to prevent an alleged infringement of a patent belonging to the plaintiff.

This motion is founded upon a reissued patent to the plaintiff for a new and useful improvement on skeleton skirts, on the 1st of August, 1865, as assignee of James Draper, the inventor and original patentee; and also, upon affidavits in support of the alleged infringement of said patent by the defendants. The original patent was issued October 4, 1859, and surrendered and reissued on the 27th of December of the same year, and again surrendered when the present patent was issued in 1865.

The claim of the present patent is "for a new manufacture of skeleton skirts, substantially, as described, consisting of a series of tapes woven in the direction of their length in alternate sections, as single and double tapes, with hoops inserted in the loops formed by weaving the tapes, as double tapes, and there secured to prevent the tapes from sliding latterly on the hoops."

None of the previous issues of October and December, 1859, contained this claim. And it is now, for the first time, put forth as the original invention of the patentee prior to the date of the first patent. This the plaintiff must sustain in order to uphold the present patent.

It appears from the affidavits, on the part of the defendants, that a patent had been issued for this same improvement as early as Jan. 6, 1863, or rather for this improvement with the addition of metallic fastenings; and that the defendants are manufacturing their skeleton skirts under this patent; and which will make it necessary for the plaintiff to overcome the inference against him, *prima facie*, that his subsequent reissue, in August, 1865, was suggested by this patent; for, it seems clear, as stated in the affidavit, that this patent of 1863, embraces the whole of the improvement of this last reissue of plaintiff.

Nearly six years have elapsed since the original patent was issued to Draper, and before he has described and claimed his real invention, according to the theory of this suit. Of course, this delay has had the effect, doubtless, to lead persons engaged in this business to conduct it as if no such claim belonged to him, and may, if his patent is now sustained, work hardship and loss. We agree, however, if he can clearly show that he was the inventor of the skirt previous to the date of the first patent, and was the first and original inventor, his patent must be upheld. We say clearly, because the lapse of time cast suspicion upon the case, and courts and juries will require the fullest and most explicit proof of the fact. Of course the case is not one for a preliminary injunction, and the plaintiff must go to his proofs.

Motion for preliminary injunction denied.

Extraordinary Endurance of a Steel Ship.

The London papers publish the following extract from the log of the *Clytemnestra*, a clipper ship of 1,250 tuns register, built of three-quarter inch steel plates:—

"The morning of October 5, 1864, commenced with strong winds and thick, drizzling rain. 8 A.M., had gale and tremendous squalls, with thick, constant rain. From 8 A. M. until noon gale rapidly increasing, and barometer falling fast, with very threatening appearance. 2 A. M., tremendous gale and most terrific squalls, with thick rain and dismal appearance. The ships attached to the same moorings below us began to break adrift, with sails blown from the yards and topgallant masts gone. 3:30 P. M., hurricane at its hight, blowing so terrifically hard that it was impossible to stand on deck without holding on. At this time our inshore bower chain parted, our sails were all blown from the yards, and the topgallant mast went with the foretopmast. When the bower chain parted we swung out stern on to the gale, and held on for a few minutes, when in a tremendous burst of wind our stern chain parted, and away we drove across the river, before wind and tide, at a frightful rate, smashing into several ships on our way. Finally, we were brought to a standstill on the opposite side of the river, and became a target for one-half of the ships in Calcutta. One wooden ship driving up struck upon our starboard quarter, walking right through the upper part of our stern, and raising the poop deck. Three or four ships were constantly pitching into our main rigging, being all fast together, and smashing and tearing away at everything thenceforward. At 4:30 P. M., two iron ships and one wooden one drove right into us abaft the fore-rigging, carrying away chain plates and rails. One of their bowsprits struck the foremast, and, with a fearful crash, the foremast fell over the port side, almost burying a small vessel that was fast to us. The rigging of the foremast was totally gone. Some time before the mast went it broke 'tween decks, tearing up the main deck, and breaking two beams. 5:30 P. M., wind abating very fast, and barometer rising, with fine weather. Ship laying almost a helpless wreck."

Ventilation.

General Morin lately read a paper before the French Academy of Sciences on the ventilation of public buildings. The fundamental principle of good ventilation, he observed, was this:—To draw off the vitiated air from the stratum nearest the floor—that is, in the immediate vicinity of the persons in the room, and to admit pure air through the ceiling or apertures made in the walls close to it. In winter the air to be introduced, may be previously warmed by an apparatus placed under the roof; but in summer considerable difficulty is encountered in lowering the temperature of the air to be admitted, since the sun having darted its rays upon the roof during the day, the space under the roof is so hot that, instead of admitting cool air, it penetrates into the building at a much higher temperature than that of the interior. General Morin has tried four different plans for cooling the air. The first consisted in making it pass through a space filled with pulverized water—that is, reduced to a sort of dust, as it were, by making two jets of water strike against each other with great violence. By this method, the temperature is only lowered by two degrees, and moreover it would require a considerable quantity of water and costly machinery to effect it, unless ample water power were at command. The second plan consists in making the air pass along the sides of metallic vessels containing water, which may, if necessary be cooled with ice; but here again there is the difficulty of giving the cooling surfaces a sufficient development—a condition which cannot easily be complied with, and which therefore, in point of fact, renders this method impracticable. The third consists in making openings on that side of the building which is never exposed to the action of the sun, while the vitiated air is drawn off through metallic tubes, the draught of which is increased by the action of the solar rays to which they are exposed. On the side exposed to the sun, the windows should be closed with blinds, or, in case of skylights, the glass panes may be watered outside. The fourth process will be easily applicable as soon as Paris can command abundance of water by the new aqueduct of the Dhuys. It imitates the natural effect of rain, and is very efficacious, since one cubic metre and a third per hour will suffice to water 100 square metres of roofing, which will thus be prevented from being overheated by the sun. Applied from an early hour in the morning, and continued as long as the sun shines on the building, it not only prevents the roof from getting hot, but will reduce the interior temperature of the building very considerably, and cool the air admitted into the garret or space under the roof. As this operation of watering need not be performed for more than 60 days every year, the cost for a large railway station like the Orleans one, for instance, would not exceed 1,000f. each season.

Headless Screws for Boots.

We have all heard of pegged boots and sewed boots, but the last novelty is "screwed" boots. It may be asked, where is the superiority of "screwed" soles over nailed? It is here: the thread of the screw holds the sole upon the bottom of the boot or shoe, as long as enough of the metal is left to retain this thread. It will be understood that an iron, copper, or a steel nail, or wooden peg, may drop out, or so far wear off, that the sole will work through these fastenings, and part company from the upper; but not so when the screw takes the place of the nail. As long as the thread of the screw remains—and it will so remain as long as a particle of the screw is left—the leather sole will be held to its place, and wear till it is worn through. We understand that the French army shoe is manufactured in this manner; good stout soles put on with the headless brass screw. This screw is all thread, and by a peculiar kind of a machine is twisted through the outer sole, and into the inner sole, when it is riveted at each end. The metal being brass is not affected by water, and the wear of one of these soles is equal to four of the kind which are sewed or pegged.—*Shoe and Leather Reporter.*

[A screw will not hold unless there is some substance for it to catch in. The wretched leather in boots and shoes now-a-days would seem to be very poor stuff in which to make a thread.—EDS.]

BESSEMER STEEL.—Recently a cubic block of steel, of the enormous weight of 100 tuns, was successfully cast at the new works of Messrs. Bessemer and Sons, at East Greenwich. At Bolton, Lancashire, a block of similar steel, weighing 250 tuns, was cast by the aid of Messrs Ireland and Sons' patent upper-tweer cupola furnace.

GEN. BURNSIDE is building a railroad in the oil regions, ten miles and a half long, which is to be completed in ninety days. Seven hundred men are employed in the construction.

IT has lately been found that sulphuric acid attacks pure lead more quickly than the same metal in an impure state—a result quite contrary to expectation.

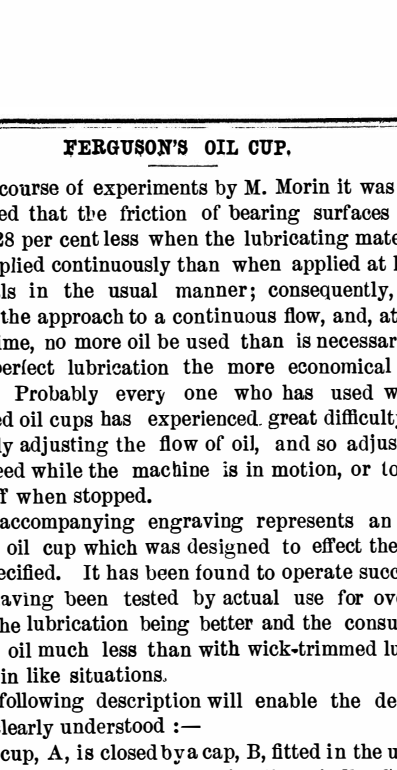
FERGUSON'S OIL CUP.

In a course of experiments by M. Morin it was ascertained that the friction of bearing surfaces was about 28 per cent less when the lubricating material was applied continuously than when applied at long intervals in the usual manner; consequently, the nearer the approach to a continuous flow, and, at the same time, no more oil be used than is necessary to effect perfect lubrication the more economical the result. Probably every one who has used wick-trimmed oil cups has experienced great difficulty in properly adjusting the flow of oil, and so adjusting it to feed while the machine is in motion, or to be shut off when stopped.

The accompanying engraving represents an improved oil cup which was designed to effect the object specified. It has been found to operate successfully, having been tested by actual use for over a year, the lubrication being better and the consumption of oil much less than with wick-trimmed lubricators in like situations.

The following description will enable the details to be clearly understood :—

The cup, A, is closed by a cap, B, fitted in the usual manner, and perforated to receive the spindle, C, the head of which is milled, so that it may be easily unscrewed; it is not allowed rotary motion in the sock et, D, yet it may be readily withdrawn when desired to fill the chamber, or the cap, B, may be removed for that purpose. The plug, E, is operated by means of the spindle, C, and when screwed down the flow of oil from the cup is shut off. By unscrewing the plug, E, sufficiently to raise the top of the triangular groove that leads to the lateral passage, F, above the bottom of the cup, the oil will flow through the passages named, into the hole, G, and over the finger, H, from the point at which it will drop as long as any oil remains in the cup, and be delivered in a frequent succession of small drops, rather than in large drops at long intervals, as would be the case if the fine point



were omitted altogether. The rapidity of the discharge may be regulated by turning the spindle and screwing the plug, E, up or down. The spring, I, is used to prevent the jar of the machinery or any slight accidents from causing the plug, D, to become displaced when once adjusted.

With good oil—and none other should be used on machinery—"there is no trouble," says the inventor, "from clogging the passages if the plug is removed once in two or three months, and the dirt and settlings of the oil wiped out."

For additional information address J. H. Ferguson, No. 195 Nassau street, Brooklyn, N. Y., by whom it was patented through the Scientific American Patent Agency, on Oct. 3, 1865. [See advertisement on another page.]

THE reward of $100,000 for the arrest of Jefferson Davis has been paid to those who made the capture.

JORDAN & SMITH'S SCREW WRENCH.

The common screw wrench of one variety is made with a screw, as shown in this engraving, but the step, A, which the screw works in, is supported by the ferrule on the wooden handle, of which it forms a part. As this is a manifest weakness, putting the strain of screwing up a bolt or nut on the small nut,

B, on the end of the handle, it is better to make the wrench as shown in this engraving. Here the screw step, A, is carried by the shank, C, of the wrench, thus giving great stiffness and rigidity to the jaws and rendering them more capable of retaining a firm hold on a nut. The step of this wrench is made separate, and fits tightly to the shank, where it is retained by a stout screw thimble, D.

This mode of construction makes this wrench a very desirable one, since the handle is entirely independent of the jaws, and is, therefore, less liable to become loose. All common screw wrenches used for any length of time, made with a screw like the one shown, have loose handles, as machinists know.

This improvement was patented through the Scientific American Agency on Oct. 10, 1865, by Lucius Jordan and L. E. Smith. For further information address them at Southington, Conn.

Russian Railroad Cars.

The *Nord* contains a description of the railway carriages running on the Moscow and St. Petersburg line. It appears that for the trifling addition of two roubles to the usual fare, travelers are received in brilliantly lighted saloons, around which luxurious sofas and arm chairs invite the weary to repose, while perusing the latest periodicals and newest novels, which are scattered on the tables. When the hour of retiring arrives, the valet de chambre conducts the gentlemen passengers to their sleeping apartments, while smart chambermaids point out to the lady travelers their bedrooms and boudoirs, fitted up, as the advertisement says, "with every modern luxury, including baths," etc. The smoking room has perfect contrivances for ventilation, and the thorough enjoyment of the cigar, pipe or hookah.

BOOKS FOR MECHANICS.

Attentive readers of the SCIENTIFIC AMERICAN must have noticed frequently, in our advertising columns, long notices of new books on mechanical subjects. The manner in which these works are advertised is especially calculated to draw attention to them. Mr. Henry Carey Baird, the publisher, takes the index of any one of his works and inserts it literally. Such announcements are very expensive, but it pays, or else they would not be inserted.

We desire to call the attention of our readers of all classes to these books, as they are on subjects connected with branches of trade, art matters, and on professional things generally that are not only interesting as sources of knowledge, but positive aids in carrying on business. A man who is content to pursue the same routine his father did before him, is not apt to make a shining mark in the world, but for those who believe that knowledge is power, all practical information is valuable.

Mr. Baird's books are practical and, therefore, useful.

The long winter evenings are approaching, and there is no better way to employ a portion of them than in learning something. We advise every person who reads this notice to send a stamp for a catalogue to Henry Carey Baird, No. 406 Walnut street, Philadelphia, and if, among the long list, they do not find something useful, they must be hard to please. See the advertisement in this number.

KING & SMITH'S WASHER CUTTER.

Leather washers, or rings of leather, are extensively used in the arts, and also for domestic purposes. They are sometimes applied on the axles of wagons, between the wheel and the shoulder; sometimes used for joints in water pipes, and in many other places not necessary to mention in detail. As it is a tedious and unsatisfactory operation to cut many washers with a knife, the tool shown herewith will be found a valuable substitute.

It is simply constructed, and the engraving explains itself. A casting, A, is furnished with cutters, B, which work in slots, C. These cutters are held by screws, and can be set at any point. In the

center of the casting there is a fixed point, D, which is also capable of making a hole. This tool will cut out a ring of leather of any required dimension within the range of its width; it is quickly adjusted, and always ready for use. It is also convenient for joiners and pattern makers to cut their wood into circles when needed. It is used with a common brace.

It was patented on Oct. 24, 1865, through the Scientific American Patent Agency, by Messrs. Charles A. King and Otis A. Smith. For further information address them at Middletown, Conn.

ACCORDING to Newton, the great comet of 1680, at its perihelion, was only distant from the sun by the 163d part of the semi-diameter of the earth's orbit, where it would be exposed to a heat 2,000 times greater than that of red-hot iron, a temperature which would instantly dissipate any substance with which we are acquainted.

THE

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MUNN & COMPANY, Editors & Proprietors.

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VOL. XIII., NO. 22....[NEW SERIES.].. *Twentieth Year.*

NEW YORK, SATURDAY, NOVEMBER 25, 1865.

Contents:

(Illustrations are indicated by an asterisk.)

TO OUR READERS ON THE PACIFIC COAST.

The SCIENTIFIC AMERICAN has now a large and increasing subscription list in California, Oregon, and other Pacific States. Our professional business in those States is also increasing, which clearly indicates a healthy progress in the manufacturing and mechanic arts.

We now desire to thank our patrons and friends upon the Pacific coast for their generous encouragement, and also to remind them that a new volume of the SCIENTIFIC AMERICAN will commence January 1, 1866, at which time there are a large number of subscriptions that will expire. We make the announcement at this early date for the purpose of securing the co-operation of our friends in getting up clubs for the next volume.

Notwithstanding the increasing cost of paper, we have determined to offer the SCIENTIFIC AMERICAN in clubs of ten and upward for $2 50 per year, at which rate we hope to largely increase our circulation.

Of the future value of the SCIENTIFIC AMERICAN the past twenty years must be our guaranty. No other journal of the kind in this country, or Europe, can compare with it in the extent and value of the information which its columns supply.

Send in your clubs and subscriptions early, in order to secure the first numbers of the new volume.

BURNING SMOKE.

In Pittsburgh, Cincinnati, and other cities west of the Alleghanies, where bituminous coal is generally used for fuel, the smoke that constantly fills the atmosphere is a very great nuisance. It hangs as a dark cloud in the air; it settles as a sooty deposit upon the carpets, the furniture, the dishes, and all parts of the houses; it fills the clothing and clogs the lungs of the inhabitants. This smoke is unburned fuel—minute particles of carbon floating away in the atmosphere. In England the same evil has been experienced, and great efforts have been made to overcome it—more than a hundred patents having been taken out for different plans of burning smoke. Some of these applied to the furnaces of steam boilers are completely effectual, but we are not aware that any practical plan for burning the smoke of fires for heating dwellings has yet been devised; and, as the quantity of coal burned in houses is several times greater than that used in manufactories, this application is more important than the other.

The principles of the problem are very simple—the whole difficulty is in their practical application. The elements in bituminous coal which burn are carbon and hydrogen, and the burning is the combination of these with the oxygen of the atmosphere. The hydrogen in combining with oxygen produces pure water, and the carbon in combining with oxygen forms either carbonic acid or carbonic oxide, and both of these are gases as clean and invisible as the air we breathe. When smoke is formed it results from the fact that a portion of the carbon does not combine with oxygen—in other words, is not burned.

The reason why a portion of the carbon passes off unconsumed is that it is scattered and cooled before it comes in contact with the air. Carbon and hydrogen combine with oxygen only at high temperatures, and in ordinary burning, the heat generated by the combustion of one particle raises the temperature of the adjoining particles to the degree at which combination takes place. Bituminous coal in burning is generally decomposed by the heat before it is burned, and in the decomposition, carbonic oxide, ammonia, and several hydrocarbons are produced, which expand to the gaseous form, scattering minute portions of carbon and cooling them below the combustion point before they come in contact with the air. What is wanted, therefore, to effect the combustion of smoke, is either to concentrate it, so that the burning of one particle will heat the adjacent particles to the combustion temperature, or else to bring it in contact with very hot air.

One of the successful plans for burning smoke in the furnaces of steam boilers is that patented in England by Charles Wye Williams. The flame and gases resulting from the partial combustion and decomposition of the coal are carried over a bridge wall into a chamber behind the grate, and are here mixed with a fresh supply of air, which is introduced through a number of small holes made in the front plate of the chamber. The situation of the chamber causes the smoke to be maintained at a sufficiently high temperature to effect combustion.

In Siemens's furnace, also, the smoke is completely consumed. In this the coal is decomposed by a dull fire, supported by a limited supply of air, and the gases and smoke resulting are carried through a cellular mass of brick work, which has been previously raised to a white heat, into a chamber where they are mixed with air that has been similarly heated.

Some cheap, simple, and practical plan for burning the smoke in ordinary house grates would be an invention of incalculable value.

ENGLISH INVENTORS—CO-OPERATIVE SOCIETY.

A new company or association has been formed in London called "The Household Patents Company," with the object of bringing out inventions promising to improve the art of housekeeping, and relieve persons who do it of a portion of the drudgery.

The Company also undertakes the manufacture and sale of articles chiefly of domestic use, and mostly protected by patents, and will comprise within its operations improvements in the construction of dwellings, and in their lighting, ventilation, and drainage, the preparation of all descriptions of food, the manufacture and economical use of fuel, and the most recent improvements in kitchen and other household furniture.

It has also secured the exclusive right to a new system of preparing American and Australian beef and mutton, so that it becomes as easily cooked and as palatable as fresh meat; to a portable roasting oven which will economize half the fuel now used; to an improved portable Rumford boiler adapted for the army, navy, and private use, and to a newly-invented stone stewpan, and a cooking range. By a preparation invented by Mr. Warriner, instructor of cookery to the army, boxes of beef and mutton, without bone, will be sold at a low rate, at the same time leaving a large profit to the company, so as to mitigate the impending distress among the poor in the winter season.

These are praiseworthy intentions. It has not been made public, how the large profit to the Company will "mitigate the impending distress among the poor," but this is no doubt secured by Letters Patent also, and is peculiar to the inventors.

The capital of the Company is to be $500,000, in 50,000 shares at $10 each, and the names of several English gentlemen of local celebrity are published as the managers and vouchers. We do not know how many shares have been taken, as Ryland's London *Trade Circular*, from which we copy this announcement, has not revealed the amount; but the Company are bent on vigorous prosecution of their ends, and, it harmony can be secured among the inventors, the scheme will doubtless be successful.

If rival inventors of the same thing on different plans disagree about prices, or if suits for infringement be continually brought forward, the Company will have a sorry time of it, and all its plans prove abortive. This, we apprehend, will prove the chief stumbling block.

A co-operative society for the benefit of inventors has been tried in this country some years ago, on a similar basis to that described above. It is not now in existence. There seems to be a difficulty in carrying out practically what seems plausible enough on paper.

THE "ALGONQUIN" AND "WINOOSKI" TRIAL.

On another page we publish the report of the Board of Engineers on the second unfinished trial between the engines of the *Algonquin* and *Winooski*. It will be seen that by a very slight change in the conditions of the two trials, the results are reversed; thus confirmnig the position of the SCIENTIFIC AMERICAN in relation to the matter.

Most of our cotemporaries have long discussions of these trials; for our own part we prefer to devote our time to the discussion of experiments that are so planned and conducted as to settle some principle or fact, or, at least, to throw some light on the problem under investigation. These trials of the *Algonquin* and *Winooski*, with two engines of very different design and construction—one running at 19 lbs. pressure, and the other at 71—may be well enough to settle the point in personal dispute between Mr. Forbes and the Navy Department, but ten thousand such trials would not show what is the most economical measure of expansion, even in a single engine of given size and form.

POLITICAL ECONOMY IN A NUTSHELL.

The leading questions in our politics at the present time, and for some time to come, must be those relating to finance. The first requisite for a clear and full understanding of these questions is a knowledge of the fundamental principles of political economy. If any one wishes to examine these principles we know of no other way in which he can do it with so small an expenditure of time, money, and mental effort, as by buying and reading the little work entitled "Political Economy in a Nutshell." It can be read in thirty minutes, it costs fifty cents, and its propositions are so plainly stated that every one who reads them must, of necessity, understand them. The work is published by G. Bartlett, No. 246 Canal street, New York, and is forwarded by mail, post-paid, on receipt of the price.

PETROLEUM FOR FUEL.

It will be remembered that we gave an estimate, some time since, of the value of petroleum for fuel, based on its chemical composition, the result being that one pound of petroleum would be equal to one and a half pounds of coal. The English papers say that a man in London has been making an elaborate series of experiments with petroleum in steam and other furnaces, and has come to the conclusion that one pound of petroleum is worth for fuel about as much as one and a half pounds of coal.

BRONZING TIN CASTINGS.—When clean, wash them with a mixture of 1 part each sulphate of iron and sulphate of copper, in 20 parts water; dry, and again wash with distilled vinegar, 11 parts, verdigris, 4 parts. When dry, polish with colcothar.—*Druggists' Circular.*

ISUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING NOVEMBER 14, 1865.

Reported Officially for the Scientific American.

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

50,888.—Vegetable Washer.—Francis Arnold, Haddam Neck, Conn.:

I claim the arrangement of the grate, C, with the tub, A, and shaft, B, as and for the purpose specified.

50,889.—Potato Digger.—L. Augustus Aspinwall, Watervliet, N. Y.:

I claim a vibrating screen or screens, suspended in the rear by hangers from the same line of axis as the plow arms, and in front upon rollers under the plow, the front end of the side bars, which traverse the rollers, being so formed as to give them an upward lifting movement as the screens move from the front to the rear, the screens, when two are used, vibrating alternately with each other.

50,890.—Potato Planter.—L. Augustus Aspinwall, Watervliet, N. Y.:

First, I claim the construction and arrangement of the chambers attached to the revolving plates with their trap valves.

Second, The trip for opening the valves and discharging the potatoes.

50,891.—Scythe Snaths.—S. B. Batchelor, Lowville, N. Y.:

I claim a scythe snath constructed of two or more pieces of crooked timber, joined together substantially in the manner and for the purpose herein described.

50,892.—Coal-oil Lamp for Cooking Purposes.—Wm. B. Billings, Brooklyn, N. Y. Antedated Sept. 11, 1865:

First, I claim the water bath, B, constructed with the no-chimney burner, for cooking and heating purposes, substantially as described and set forth.

Second, The insulation of the water bath, B, from the oil vessel, A, substantially as described and for the purposes set forth.

Third, The wick tubes, c and d d, fastened and attached to the water bath, B, the whole being separate from, yet adjusted to, oil vessel, A, substantially as described and for the purposes set forth.

Fourth, The slots or notches, e e e, in the wick tube, c, or their equivalent, when used with the side water sinks, d d, and water bath, B, arranged and connected substantially as described and set forth.

50,893.—Ejector for Deep Wells.—John Bleckie, Washington, D. C.:

First, I claim a pump consisting of a series of chambers in combination with the sectional tubes, E, provided with valves, e, and one or more tubes constructed and arranged to operate substantially as and for the purpose herein set forth.

Second, I claim the process or method herein described, of elevating liquids, by means of an alternate pressure in one set of chambers, in combination with a vacuum in the corresponding chambers, or by means of a pressure in one set of chambers alternating with the removal of the atmospheric pressure in the other set of chambers.

Third, In combination with the pump herein described, I claim the use of heated air as and for the purpose set forth.

Fourth, In combination with the pump, constructed as described, I claim the use of a steam jet for the purpose of exhausting the air therefrom substantially as set forth.

50,894.—Fruit or Step Ladder.—W. E. Bond, Cleveland, Ohio:

I claim the chords, A, and arches, F, in combination with the steps, A', constructed and arranged in the manner and for the purpose set forth.

Second, I claim, in combination with the above, the making the steps narrowed in the rear than in front, in combination with the chords, substantially as and for the purpose set forth.

50,895.—Drying Apparatus.—Daniel K. Boswell, Corinth, Miss.:

First, I claim a drying house or apartment comprising a central chamber, B, and one or more wings, A C, hinged to said chamber and mounted on suitable wheels or casters, e, for the purpose of ready access to the apartment and easy removal from place to place.

Second, The suit of vertically separated chambers or compartments, A B C, capable of being readily unshipped from one another for the purpose set forth.

Third, The arrangement of furnace, or heater, Q, R, R', R'', placed centrally of the apartment and near the floor thereof, air inlets, K, and deflector, S, for the equal heating and ventilation of every part of the apartment in the manner set forth.

Fourth, The arrangement of connected valves, J and L, for simultaneous floor and ridge ventilation.

Fifth, The arrangement of flexible rod, H, link, C, and hole, C', for the ready hanging and unhanging of the clothes, in the manner explained.

50,896.—Tool for Removing Obstructions in Oil Wells.—William Broowden, Whites Corners, N. Y.:

I claim a cylindrical tool, A B, having a flaring mouth, a', and taper core, a2, in combination with metallic balls, C, or equivalent for the purpose and substantially as described.

50,897.—Pen Holder.—Frederick Brackett, Calais, Maine. Antedated, Nov. 5, 1865:

I claim the construction of the double tube pen-holder attachment, d e, and the adjustable spring guide rod, f g h i, combined with an ordinary pen handle, substantially as set forth, shown and described.

50,898.—Adjusting the Packing of Pistons in Deep Wells.—Erasmus D. Brown, Buffalo, N. Y.:

I claim so constructing the lower end of the screw follower, D, and the upper end of the foot valve, E, as that they may be coupled together and the packing adjusted through the pump rod, in the manner and for the purposes substantially as described.

50,899.—Claw Bar.—George Brownell, Mitchell, Ind.:

I claim, First, The bar, A, in combination with the rib, C, and shackle, E F G, as and for the purposes set forth.

Second, the combination of the shackle, E F, G g, with the shoulders, D, and bar, A, when constructed and arranged to operate as explained.

50,900.—Shingle Machine.—John A. Burnap and James H. Melick, Albany, N. Y.:

We claim, First, The apparatus for working the dogs, to wit: the bars, b b d d, the slots, g, pins, p, springs, i, and the stops, M, constructed and operating together as described.

Second, The apparatus for moving the carriage, C, to and from the saw, S, to wit the shaft, N, with the cog wheels, F, rack teeth, y, of the carriage, the weight and cord or chain, Z, the coupling clutch, Q, wheel, R, bell cranks, L and V, tripping arm, h, with its adjustable plate, W, springs, f and u, and tripping pin, w, constructed and operating together as described.

Third, The apparatus for canting the bolt bed, to wit: the bell cranks, j and k, with the pins, m and n, guide groove, p and tripping pin, Y, constructed and operating together as described.

Fourth, The combination of the apparatus for working the dogs, that for moving the carriage to and from the saw, and that for canting the bolt bed, substantially as the same is described and set forth in the within specification.

50,901.—Hair Restorative.—R. Wilson Carr, Baltimore, Md.:

I claim combining the expressed juice of the onion with the alcoholic tincture of the residuum or pulp thereof, as above set forth, and flavoring the compound with the oils of rosemary, lemon, and bergamot, as herein described, and also using the same as a hair preserver and restorative, as herein specified.

50,902.—Mode of Operating Oil Wells.—Paul Casamajor, New York City:

I claim the within-described method of operating oil wells, by extending from the main well, A, a series of radiating drills or channels, d, in a horizontal or inclined direction, substantially as and for the purposes set forth.

50,903.—Mode of Operating Oil Wells.—Paul Casamajor, New York City.:

I claim an oil well composed of a main shaft, which terminates at a suitable distance above the rock containing the oil, and from which galleries extend in a horizontal or oblique direction, in combination with drills sunk from said galleries in a vertical or oblique direction, substantially in the manner and for the purpose set forth.

50,904.—Boot Crimp.—Abram and George W. Caywood, Ithaca, Ohio:

First, We claim the combination, substantially as described, of a jointed or hinged form, operating in conjunction with a hinged and yielding mold.

Second, A boot crimp, composed of a mold having the pair of hinged cheeks, J and J, having a flexible and adjustable connection, when combined with a hinged form, A B, in the manner set forth.

Third, The arrangement of rod, I, and hinged form, A B, as described.

50,905.—Apparatus for Carbureting Air.—John Chase, Windsor Locks, Conn.:

I claim the chambered wheel, B, constructed, arranged, and operating substantially as described, for the purpose specified.

50,906.—Drinking Cup for the Sick.—Martha P. Codman, Boston, Mass.:

I claim the application of a tube to a drinking vessel, constructed with a partial covering, as described, in the manner substantially as described.

50,907.—Retort for the Manufactnre of Prussiate of Potash.—D. B. Coles and A. D. Coles, Newark, N. J.:

First, We claim the double V-shaped ribs, b, arranged in the interior of the retort, A, substantially in the manner and for the purpose described.

Second, The employment of a cylindrical retort with rounded corners and tubular gudgeons, substantially as and for the purpose set forth.

[This invention relates to an improvement in that class of retorts which are generally constructed of cast iron or other suitable material, cylindrical, with gudgeons on which it can be rotated, and one of which is bored out so as to obtain an aperture for the purpose of introducing the charge, or removing the same, when ready.

50,908.—Machine for Attaching Teams to Farming Implements.—Henry A. Cook, Hillsdale, N. Y.:

I claim the combination of the rubber spring compressed between two transverse bars, the temper screw for regulating the elasticity of said springs, and the attaching staples and hooks or rings, all arranged to operate as and for the purposes described.

50,909.—Pocket-book, Port-monnaie, Etc.—B. F. Cowan, New York City:

I claim attaching to port-monnaies, pocket-books, memorandum books, etc., a serrated or roughened metallic strip or plate, or roughening the frame of portemonnaies, etc., substantially as and for the purpose herein shown and described.

50,910.—Packing for Oil Wells.—John R. Cross, Chicago, Ill.:

I claim the combination of the pawls, D D, with or without the wires, a a, pivoted to the ring, A, to form a toggle-joint fibrous packing, C, and ring, A, with suspension rods or wire ropes, f f, arranged and operating substantially as and for the purposes shown and described.

50,911.—Pump.—William H. Culp, Hammondsville, Ohio:

I claim the piston head, C, in combination with bolts, F, and hollow piston rod, D, substantially in the manner described.

Second, The piston head, C, constructed and operating substantially in the manner and for the purposes herein set forth.

50,912.—Bellows.—George W. Dalbey, Wheeling, West Va.:

I claim the combination and arrangements of the parts, consisting of the box, A, with its perforated and valved partition, the valve plunger, D, weighted plunger, C, and springs, e, the motion being derived through the lever, H, and frame, E F i j, substantially as described and represented.

[This invention relates to certain improvements in the construction of that class of bellows used by smiths and in smelting houses, etc., whereby the same can be easily operated, and will insure a continuous blast.]

50,913.—Grain Separator.—John Davis, Alleghany City, Pa. Antedated, Nov. 2, 1865:

I claim the arrangement of the fan, p, screens, u, and m, distributing cone, K, and hopper, b, furnished with lugs, n, screws, c, flange, i', and part, j, the whole being constructed, arranged, and operating in the manner and by the means described, and for the purpose set forth.

50,914.—Grain Drill.—John Davis, Alleghany City, Pa. Antedated Nov. 2, 1865:

I claim the arrangement of the supports, m, hangers, q, wheels, 6 5 4 3 2 and 1, used in connection with the rollers, A, sheaths, B, and hoppers, h and h', the whole being constructed, arranged, and operating substantially as herein described and for the purpose set forth.

50,915.—Corn Planter.—John Davis, Alleghany City, Pa. Antedated Nov. 9, 1865.

I claim the arrangement of the pieces, g g, hoppers, h h, teeth, f f, with extension, p, scrapers, l l, shaft, j, rollers, x x, sheaths, y', y', wheels, q and r, and index, m, the whole being constructed and arranged substantially in the manner herein described and for the purpose set forth.

50,916.—Broadcast Seeder.—John Davis, Alleghany City, Pa. Antedated Nov. 5, 1865.

I claim the use of gum or soft leather strips placed in the grooves of seed rollers, used in connection with a hopper and driving gear for operating said rollers, substantially as herein described and for the purpose set forth.

50,917.—Thread-waxing Attachment for Sewing Machines.—Job S. Dawley and John Bloeher, Buffalo, N. Y.:

We claim, First, Maintaining, by a proper feeding device, a supply of wax in a liquid or semi-liquid state, at or near the needle throat, for the purpose and substantially as herein described.

Second, The combination with the wax-holding cylinder or reservoir of a movable piston or bottom, for the purpose and substantially as herein described.

Third, The combination with the cylinder and piston of automatic wax-feeding mechanism, operating in the manner and for the purpose described.

Fourth, The wax receptacle, f3, formed at or near the needle-throat, for the purpose set forth.

Fifth, The wax receptacle, f3, in combination with the closed shuttle, D', for the purposes and substantially as described.

50,918.—Wagon Shaft Shackles.—Ferdinand Dickenson, Jr., Hartford, Conn.:

I claim a tapering bolt, c, having the screw cut the entire length, in combination with the hinge straps, a b, washers, e x, and nut, i, substantially as and for the purpose described.

50,919.—Tubular Apparatus for Deep Wells.—M. J. Dickerson, Titusville, Pa., and Jacob Stubor, Utica, N. Y.:

We claim, First, The formation of a surface-water chamber, separate from the eduction tube, by means of the application and use of a packing tube, C, driving tube, A, and seed bag or other packing, D, for the purposes and substantially as described.

Second, The combination and arrangement of a steam pipe, J, stop cock, K, and packing tube, C, substantially as described.

50,920.—Bedstead.—J. P. Dorman, Galesburg, Ill.:

I claim the construction of a bed having a spiral spring, D, so arranged in combination with the arrangement of elastic india-rubber springs, C, head piece, A, pulley wheels, a, and a', cord, c, and framing, b', whereby a soft and easy motion is given to the bed, substantially in the manner and for the purpose set forth.

Second, The arrangement of the treadle, d, and cord, d', with the framing, b', in combination with the india-rubber springs, C, and spiral spring, D, substantially in the manner and for the purposes set forth.

Third, The arrangement of the chair, H, chamber, h, and leg, f, in combination with the head or foot pieces, A and B, substantially in the manner and for the purposes set forth.

50,921.—Beefsteak Crusher.—James J. Doyle, Sharon, Conn.:

I claim a beefsteak crusher formed by combining the cylinders, E and H, constructed substantially as described, with each other, and with the frame, substantially as described, and for the purpose set forth.

[This invention consists in combining with each other two cylinders covered with teeth, in the form of truncated square pyramids. The teeth are arranged in rows, and are at a distance apart about equal to the base of the truncated pyramids or teeth. These teeth mesh into each other, and, as the beefsteak is passed between the cylinders, it is crushed and made tender without having its grain destroyed, its juices expelled, or being mangled and reduced to a shapeless and unsightly mass.]

50,922.—Washing Machine.—James K. Dugdale, Richmond, Ind.:

First, I claim the arrangement and combination of the frames, A B and C, with the guides, D, and washboards, E and F, as and for the purposes set forth.

Second, I also claim the device, K, in combination with frames, A B and C, and washboards, E and F, as and for the purpose specified.

50,923.—Nut Machine.—George Dunham, Unionville, Conn. Antedated July 1, 1865:

I claim the yielding clamp, B, composed of jaws, a a, grasping the rod or mandrel, C, so arranged in a nut machine that when the mandrel shall fail, by the wrong presentation or faulty shape of a nut, to enter the hole in the same, the clamp, B, shall recede in the stock, A, by the acceapse of the springs, D D, and the mandrel be saved from fracture or deflection, the whole arranged as described and represented.

50,924.—Stovepipe Thimble.—Samuel Eddy, Brooklyn, N. Y. Antedated Nov. 2, 1865:

I claim the horizontal annular flange, A, ring, B, passages, D, guards, E, and pipe, C, combined to form a ventilating stovepipe ring, made in the manner and for the purposes herein specified.

50,925.—Bale Hoop Strainer.—Edward A. Field, Sidney, Mc.:

I claim the bale hoop strainer, composed of the holding bar, B, the lever, A, the passage, b, and the jaw, c, arranged and applied together substantially as described.

I also claim the combination of the cushioning block, d, the lever, A, the passage, b, and the jaw, c, and the holding bar, B, the whole being arranged to operate substantially in manner and for the purpose as specified.

50,926.—Fly Brush for Tables.—Henry Fisher, Canton, Ohio:

I claim the arrangement of the upright, B, arm, C, pendant, D, cord, F, pulley, d, and treadle, G, the several parts being constructed as and for the purpose specified.

50,927.—Buttons.—Henry Gerner, New York City:

First, In buttons having a spring to force the detachable disk against its locking device, I claim the central fixed disk, B, constituting an abutment for the spring, and separating the latter from the button-hole portion of the garment, substantially as described.

Second, I claim the combination of the disks, A B, and shank, D, with the washers or springs, b, and detachable disk, C, the whole being arranged and employed in the manner and for the purpose specified.

50,928.—Water Wheel.—Uriah H. Goble, Dubuque, Iowa:

I claim a horizontal water wheel provided with buckets, c, which are curved spirally in the manner shown so as to have a concave face side and an inclined surface, both longitudinally and transversely, and projecting below the rim, a', of the wheel into the space inclosed by the curb, in such a manner as to give the water a direction toward the outside of the wheel, substantially as and for the purpose herein set forth.

50,929.—Puddling Furnace.—Daniel Hall and Joseph Hall, Wheeling, West Va.:

We claim, First, In furnaces for boiling and puddling iron and other metals, surmounting the iron chamber or basin with fire brick, substantially as above shown.

Second, We also claim surrounding the basins of iron furnaces with a tube or tubes through which water is forced against the exteriors of the basins, substantially as and for the purpose above described.

Third, We also claim placing the door frame of the furnace inwardly as above shown, whereby the iron chamber or basin is made to be in range with the fire chamber, substantially as described.

Fourth, We also claim placing ribs, vertical or otherwise, on the inside of the inclosing or outside plates of iron furnaces, so as to form air flues for the purpose of keeping the bricks and plates cool, and for strengthening the plates and for preserving the furnace, substantially as described.

[The object of this invention is the improvement of furnaces for boiling, puddling, and heating iron and other metals. It consists in several novel features, among which are surmounting the usual iron basin with fire brick; also surrounding the exterior of the basin with a perforated water tube, from which water is ejected or thrown against the sides of the baain at the pleasure of the workman; also, forming air flues around a furnace between the outside plates and the brick walls, by making vertical ribs on the inside of the plates.]

50,930.—Cultivator.—Starkey Hall, Russellville, Ky.:

I claim the combination in a cultivator of laterally adjustable plows, with a longitudinally adjustable harrow, having a rigid attachment to the rear of the frame, when constructed, arranged, and operating substantially in the manner and for the purpose set forth.

50,931.—Reversible Latch.—Edward Halley, Branford, Conn.:

I claim constructing the latch bolt of the form substantially as described, so as to be reversed without withdrawal from the case, in combination with the slide or key, a, or its equivalent, in the manner and for the purpose specified.

50,932.—Deep-well Pump.—S. Emilius Hewes, Albany, N. Y.:

I claim, First, In pumps for deep wells, securing the pump cylinder at top and bottom to the well tube, substantially as above described.

Second, I also claim extending the lower section of the well tube below the pump cylinder to the bottom of the well, and perforating its sides occasionally throughout its length, to admit gas and liquid to the pump, substantially as shown and described.

Third, I also claim bringing the lower part of the piston, below the seat of its valve, to a sharp edge, substantially as and for the purpose above described.

Fourth, I also claim the arrangement of the hollow piston rod, piston valves, and cylinder, constructed and operating as described, so that the upward and lifting and downward and discharging actions and operations are alternate and distinct.

50,933.—Cooking Range.—Maurice C. Hull, New York City:

I claim, First, In the plate, q, introduced in the air space around the ash pit and fire pot, in combination with the deflecting plates, s s, to cause the air to circulate through said space, in the manner and for the purposes set forth.

Second, I claim the openings, 3 and 4, at the bottom of and in combination with the flue, n, substantially as and for the purposes set forth.

Third, I claim forming the water heater lower at the front portion, as seen at w, in combination with the feeding chute, x, as and for the purposes specified.

Fourth, I claim the flue pipe, u, passing from the ash pit up through the hot-air space and plate, h, in combination with the regulating damper, v, at the upper end, for the purposes and as set forth.

Fifth, I claim the ascending flue, n, between the oven, i, and the fire receiving the products of combustion from the flue at the bottom of the oven and conveying the same away by the escape, n', at the back, as set forth.

Sixth, I claim the flue, n, in combination with the oven, i, and air space, o, around the fire pot, whereby the air to be heated is prevented from cooling the oven, as set forth.

50,934.—Device for Opening Artesian Wells.—Edgar Huson, Ithaca, N. Y.:

I claim a tube, E, in combination with an opening point, A, to which a grooved shank, F, is attached, provided with a slot, C, all arranged and operating in the manner described.

50,935.—Apparatus for Evaporating Liquids.—James J. Johnston, Alleghany City, Pa. Antedated Nov. 2, 1865:

I claim, First, Applying heat by means of steam or heated air, separately or combined, to the upper and lower surfaces of oil or other liquid, substantially in the manner and by the means herein described and for the purpose set forth.

Second, The use of the adjustable diaphragm, r, in combination with the still, e, and pipe, n, said diaphragm, still, and pipe being constructed, arranged and operating substantially as herein described and for the purpose set forth.

50,936.—Process for Tanning.—John Jay Johnson, Kalamazoo, Mich., and E. J. Murray, Wyoming, N. Y.:

We claim the successive compositions of ingredients used in the liquors for soaking, removing the hair or wool when required, bating, and the tanning oozes, in the proportions and manner substantially as herein specified, to compose one complete tanning process.

We also claim specifically the use of oatmeal, or its equivalent of starch, in the compositions and proportions of ingredients, substantially as herein set forth.

50,937.—Puddling Furnace.—Philip Keenan, Chartier Township, Pa., and Edward O'Connor, West Pittsburgh, Pa. Antedated Aug. 26, 1865:

We claim the use of the ingredients herein named, when prepared and used in connection with puddling or boiling furnaces, for the manufacture of iron, substantially as described and for the purpose set forth.

50,938.—Burner for Gas Stoves.—Thomas J. Kelly, New York City:

I claim the combination of a vertically arranged diaphragm, d, with the external annular opening, h, as herein shown.

50,939.—Extension Sofa Bedstead.—John Kena, Brooklyn, N. Y.

I claim the arrangement of the hinged slats, H H, as a movable bedstead, with the grooved bars, C C', when in combination with the sofa, substantially as described and for the purpose set forth.

50,940.—Fertilizer.—Orazio Lugo, New York City:

I claim the fertilizer herein described, consisting of leather treated with sulphuric or other acids, boiled, ground and afterward treated with urate of ammonia, substantially as herein specified.

50,941.—Planking Clamp.—Joseph Macotter, Baltimore, Md.:

I claim, in a clamp for planking vessels, the arrangement of the strain bar, A, hooks, B B, knee, C, and screw, D, when constructed and operating substantially as described.

50,942.—Plowshare.—Anton Maschka, Chicago, Ill.:

I claim, in combination with the mold-board, O, stand, a, and brace, d, the root-cutter, c, when constructed in the manner herein set forth.

50,943.—Mechanical Movement.—Silas C. Matteson, Osceola, Wis.

First, I claim the combination with the double rack bar, A, of the lever, B, formed with the beveled opening, B', adapted for the purpose explained.

Second, I claim the adjustable guides, E E, for steadying the rack bar, drawing its movement, substantially as described.

Third, I claim graduating the lever, B, for the purposes herein specified.

50,944.—Water Elevator.—H. H. May, Galesburg, Ill.:

I claim a conic water-tight wheel, p, casing, g, and outer casing, z, as constructed and arranged substantially in the manner and for the purpose herein described.

Second, In combination therewith, the spiral position of paddles or buckets, as secured to the wheel by means of stays or plates, B and C, substantially in the manner and for the purpose herein set forth.

Third, The gate, f, lever, f', and pins, f'', and the holes, E'' E'', for adjusting the quantity of water in its passage to the wheel, substantially as described.

Fourth, The air passages, g'' g'', as arranged in relation to the conic wheel, substantially in the manner and for the purpose described.

Fifth, Flume or tunnel, D, with its enlarged area for the gates, and the gates, E'' E'', as constructed and arranged, substantially in the manner and for the purpose set forth.

Sixth, Cog gearing, E, F and g', in combination with the gate, f, and holes, E, for a better adjustment of the quantity of water in its passage to the wheel, substantially in the manner as set forth.

Seventh, Sprouts, a'' c'', and opening, from a' to a'', as constructed substantially in the manner and for the purpose set forth.

Eighth, The hinged gate, c, hinged apron, c, and movable portion of casing, as constructed, arranged, and operating in the manner and for the purpose herein set forth.

50,945.—Tanning.—John M. Muller, North Becket, Mass.:

First, I claim a tanning ooze which is made from the ingredients herein mentioned, and combined in about the proportions set forth.

Second, Subjecting stuffed or unstuffed skins, after they have been tanned, to the action of steam, substantially as described.

50,946.—Signal.—Albert J. Myer, Washington, D. C.:

I claim the within-described system of signaling, which is controlled by means of letters, numerals or other characters, upon disks that are put together in such manner that the relative positions of such characters can be changed at pleasure, substantially as set forth.

50,947.—Splint Plane.—Harrison Ogborn, Richmond, Ind.:

First, I claim the arrangement in a splint plane of the plate, K, bit, D, and one or more splitting knives, and guide, C, all constructed and combined substantially as and for the purposes set forth.

Second, I claim the arrangement in a splint plane of the plate, K, bit, D, beveled guide, C, and one or more bent knives, I, all constructed and combined substantially as and for the purpose set forth.

Third, The combination of the plane stock, A, and adjustable handle, B, so constructed with the rod, M, and spring, G and G', as to be capable of being arranged perpendicularly to two faces of the plane, substantially as described.

50,948.—Journal Box for Land Carriages.—Ebenezer P. Palmer, Milton, Del.:

I claim constructing the box, A, with a number of partitions, C, so as to shorten the rollers and prevent their jamming when the said box is used in combination with the rollers, D, and journal, E, substantially as described and for the purposes set forth.

50,949.—Mode of Sinking and Tubing Wells.—G. D. Pettingill and L. H. Mericle, Cortland, N. Y.:

I claim, First, The combination of the tube, A C, with the boring tool, B, the operating rod, F, and the cap, D, in the manner and for the purpose substantially as shown and described.

Second, The combination of the strainer, E, with the boring tool, B, the operating rod, F, and the pipe, A C, in the manner and for the purposes substantially as shown and described.

50,950.—Condensing Milk.—Julius R. Pond, New Hartford, Conn.:

I claim employing oleine, or its equivalent, for the purpose of putting the interior surface of a vessel used for condensing milk, whether the milk is or is not heated preparatory to running it into such vessel, into the condition above described, so that after such condition is attained, daily applications of oleine are not required, substantially as and for the purposes set forth

50,951.—Knife Sharpener.—D'Arcy Porter, Cleveland, Ohio:

I claim the arrangement of the plates or cutters, b b, in combination with the button, D, and block, A, in the manner and for the purpose substantially as set forth.

50,952.—Horse-shoe Calks.—Isaac R. Potter, Dartmouth, Mass.:

I claim the wedge-shaped calks, in combination with the tapering sockets, in the auxiliary shoe, substantially as described.

50,953.—Coal Scuttle.—Henry S. Pratt, Hartford, Conn.:

I claim as a new improved article of manufacture, a coal scuttle, the combination of the base, D, rim, E, and body, A, constructed substantially as described.

50,954.—Grain Planter.—Neal H. Purcell, Avon, N. Y.:

First, I claim the beam, e, or beams, e e, with their attached drill plows and shares, and hole or orifice for the passage of the tube, l, when the said beam is adjustable laterally and vertically, substantially in the manner set forth.

Second, I claim the movable grain-box, K K, in combination with the diaphragms, m m, and tubes or pipes, l l, when constructed and arranged substantially as described.

Third, I claim the adjustability of these boxes transversely to the line of motion of the machine or planter, in combination with the lateral adjustability of the beams, e e, as set forth, for the purpose of regulating the width of the drills from each other.

50,955.—Machine for Making Chair Seats.—Ezra Ransom, Flint, Mich.:

In a machine for making chair seats, I claim the arrangement consisting of the parallel formers, N N, actuating vertically one side of the carriage, C, upon the axis formed in the slideway, B', the carriage motion being derived from a feed screw, M, traversing in the sectional nut, G, which is released by the contact of the lever, F, with the adjustable stop, I, as described and represented.

50,956.—Harvester.—Samuel Ray and Eli Grant, Alliance, Ohio:

We claim the link, P, and lever, R, in combination with the rods, m n, and shoe, G, substantially as and for the purpose set forth.

Second, We claim the adjustable brace, D, in combination with the shoe, constructed and arranged as and for the purpose set forth.

Third, We claim the sleeve, B, and brace, D, in combination with the shaft, C, and arm, F, constructed and arranged substantially as and for the purpose set forth.

50,957.—Mold for Enema Syringes.—Francis B. Richardson, Boston, Mass.:

I claim, in molds for making elastic bulbs of enema syringes, etc., the use of a core or mandrel having a firm and permanent bearing therein, so as to insure the formation of a true and symmetrical neck and orifice to the bulb, as set forth.

50,958.—Malting Apparatus.—Michael Riley, Morrow, Ohio:

First, I claim the arrangement of vat, A, steam space, D, and agitator, J R R', or their equivalent, for the purpose set forth.

Second, The arrangement of adjustable feathering blades, K K K', for the purpose set forth.

50,959.—Harvester.—E. P. Russell, Manlius, N. Y.:

First, I claim the angular diagonal spring draw-bar, D e, serving as a hinge for the cutting apparatus to turn on, as a flexible brace and support for said apparatus to rest and move upon bodily, and also as a draw bar, substantially as and for the purpose set forth.

Second, The V spring, E E2, constructed and applied to the harvester frame and cutting apparatus, substantially as and for the purpose set forth.

Third, The combination and arrangement of the spring, E E2, angular hinging and bracing spring draw-bar, and the cutting apparatus of the harvester, substantially as and for the purpose set forth.

Fourth, The combination of the bar, H, arranged and operating as described, with the cutting apparatus and devices upon which said apparatus is suspended, substantially as and for the purpose set forth.

Fifth, The bar, H, attached to the hinge of the cutting apparatus by one of its ends and fitted to a slotted plate, J, by its other end, and operating in the manner described, all for the purpose set forth.

50,960.—Apparatus for Ventilating Railroad Cars.—Thomas H. B. Sanders, Pittsburgh, Pa.:

I claim creating a current of air in railroad cars, for the purpose of ventilation, by means of a fan placed in a case or box and operated by a vane, substantially in the manner herein before described.

Also the combination of a fan blower, operated by a vane in the manner substantially as hereinbefore described, with a stove, for the purpose of causing a circulation of warm air in railroad cars.

50,961.—Wool Washing Machine.—Charles G. Sargent, Graniteville, Mass.:

I claim in connection with the squeeze rollers of wool washing machines first, in combination with the top roll of the pair, a revolving beater for knocking off any wool that may adhere thereto, substantially as described.

I also claim the combination and connection of the beater and top yielding roll with the frame, and with the weighted levers, E, as and for the purpose substantially, as herein described.

I also claim in combination with the squeeze rolls and beater, arranged and operating substantially as herein described, the upward inclining apron, as and for the purpose described.

50,962.—Tobacco Pipe.—Frederick Shulte, Philadelphia, Pa.:

I claim, First, The detachable corks or plugs, i, and i', combined with the stem of a pipe and adapted to longitudinal openings, e e' and e'', in the same, substantially as described.

Second, Corrugating the interior of a pipe stem, for the purpose set forth.

50,963.—Churn.—R. L. Shute, Philadelphia, Pa.:

I claim the combination with the box, B, of the churn, of the beaters, C C, perforated near the outer edges, and the beater, A, loaded at its outer edge and perforated near its shaft, the said beaters, C C and A, being arranged radially upon a horizontal shaft, substantially as above described.

50,964.—Family Laundry.—Hamilton E. Smith, Cincinnati, Ohio:

First, Ventilating a dry house or chamber from the bottom, substantially in the manner and for the purpose specified.

Second, The drying chamber, B, having a smoke flue, C, and a descending vapor duct or passage, E, which flue and duct discharge into common chimney, D.

Third, Heating the drying chamber and the wash water by a single furnace, A, in the manner substantially as set forth.

50,965.—Process for Preserving Animal and Vegetable Substances—Francis Stabler, Baltimore, Md.:

I claim preserving animal or vegetable substances used for food when wholly or partially dessicated by sealing it up in air tight vessels, and expelling the air by the substitution of gas that will not support combustion, substantially as described.

50,966.—Valve Gear for Steam Engine.—Wm. H. Stanton and A. D. Spencer, Dunmore, Pa.:

First, We claim the rocker arm, G, applied and operating in combination with the valve, substantially as and for the purposes set forth.

Also the combination of a supplementary crank, a, with the rocker arm, G, main crank, F, and valve rod, e, substantially as and for the purpose described.

[This invention consists in the employment or use of a slotted rocker arm, being connected either to the main rod, parallel rod or crank, in combination with a rod which forms the connection between a slide moving in the slot of the rocker arm and between the valve rod, in such a manner that by adjusting said slide in the rocker arm the motion of the valve is regulated and that the valve at each end of its stroke remains stationary for a short space of time, giving a full head of steam as the crank passes the half centers.]

50,967.—Method of Sinking Wells.—R. H. St. John, Bellefontaine, Ohio:

I claim the construction of the boring device, B a b, and tube, A c, substantially as described, and also in such manner that the two parts are permanently connected together, and the tube constitutes both the penstock and the stem, substantially in the manner and for the purpose set forth.

50,968.—Clothes Dryer.—George F. Tilton, Salem, Mass. Antedated, Nov. 1, 1865:

I claim a clothes drier to be attached to the wall of a room, consisting of a semicircle of radial arms, e, semicircular blocks, C and D braces, f, and upright, B, substantially as and for the purpose described.

50,969.—Gearing for Harvester.—Alanson Warner, Ontario, N. Y.:

I claim the separate or independent axles, C C, provided with the bevel wheels, D D, in connection with the wheel, E, placed loosely on said axles and provided with two or more bevel pinions, F, into which the bevel wheels, D, gear, substantially as and for the pose set forth.

50,970.—Tatting Shuttle.—Joel Sylvester Warner, Ogdensburg, N. Y.:

I claim the tatting shuttle, as described and represented, as an article of manufacture.

50,971.—Cotton Press.—Isaac J. Way, Memphis, Tenn.:

I claim the cotton press constructed, arranged, and operating as and for the purposes set forth.

50,972.—Railroad Switch.—Albert Watson and George W. Miller, Springfield, Mass.:

First, We claim the sliding piece, B, when used in combination with a chair, A, and the rails, m m' m'', substantially in the manner and for the purpose set forth.

Second, The combination of the shaft, D, and pinion, C, with the block, A, and slide, B, substantially in the manner, and for the purpose set forth.

Third, The combination of the shaft, F, cam, G, pin, H, with the block, A, and slide, B, substantially in the manner and for the purpose described.

50,973.—Washing Machine.—John Welding, Cincinnati, Ohio:

I claim the swinging semicylindrical tub, A, hung eccentrically as a, and having journaled slightly within and concentric with its concavity a series of rollers, E, the same being combined with the stationary pendant rubber, C, covers, F F, and projections, f f, substantially as set forth.

50,974.—Composition for Buttons.—Elonzo S. Wheeler, Westport, Conn.:

I claim a new composition of shellac and barytes, in such proportions as will produce buttons and other articles with a high degree of polish, substantially as described.

50,975.—Quartz Crusher.—James D. Whelpley, and Jacob J. Storer, Boston, Mass.:

We claim, First, The fixed disk, K, between the revolving part of the mill and the exit side of the case, substantially as set forth and for the purpose described.

Second, The radial partitions, L, in the space, W, between the disk, K, and the side of the mill, substantially as and for the purpose described, with or without the plate or disk named in the first claim.

50,976.—Process for Uniting Cast Steel or Cast Iron with Wrought or Cast Iron Surfaces.—James D. Whelpley and Jacob J. Storer, Boston, Mass.:

We claim, First, Covering with some metal not easily oxidized, iron cores, either wrought or cast perforated plates, wire or brass, when it is desirable to coat such cores with or firmly attach them to castiron or steel, previous to pouring upon the molten metal, and for the purpose of permanently and solidly connecting wrought or cast iron cores with cast iron or cast steel, substantially as and for the purpose described.

Second, The use of glycerine solutions of cyanide or chloride of copper or silver, rendered alkaline by alkaline cyanides and chlorides and of chemically analagous solutions of tin and other metals for the purpose of depositing the tin, not easily oxidizable metallic film required in this process.

Third, The alloy of franklinite metal, itself an alloy of zinc, manganese and iron, with common cast iron in the proportions of from ten to twenty per cent of the former to eighty or ninety per cent, of the latter, also similar alloys of iron with zinc molybdenum tungsten, titanium, manganese and other metals when the proportions of manganese indicated in the above alloy, are placed by equivalent proportions of metals of like properties in their alloys with iron.

Fourth, We claim the construction of the wearing parts of pulverizing mills and quartz crushers of cast metal attached to wrought iron by the above process.

Fifth, We claim the connecting of cast steel, semi steel and Bessemer steel, so called, to wrought iron surfaces, by use of the process described.

50,977.—Range.—Edward Whiteley, Cambridge, Mass.:

I claim an over flue of an undulating or wave-like form, substantially as described for the purpose set forth.

I also claim the arrangement and application of the fire pot, A, having a portion of that side contiguous to the oven left open for the reception of a lining of fire brick, or its equivalent, and constructed substantially as set forth.

50,978.—Cane Mill.—O. E. Woodbury, Madison, Wis.:

I claim, First, The combination of the levers, J, stirrups, O, and links, N, connected to the standards, D, as and for the purpose described

Second, The arrangement of the rollers, A B, with their respective gear wheels, F G, and side levers, J J, forming by means of tension links, N, and the improvement of the rollers, B C, a crushing weight upon the cane between the rollers, B C.

Third, I claim attaching the journals of the roller, B, by the stirrups, O, to the levers, J, at a point between vertical lines passing through the axes of the rollers, B C.

Fourth, The arrangement of the rollers, A B, upon the levers, J J, which are connected by links, N N, to the standards concentrically with the axes of the roller, C, permitting the revolution of the levers, J, and their attached rollers backwardly, as and for the purpose described.

Fifth, The combination of the roller, B, with a connecting stirrup rod or frame upon whose pivoted point it has a vibratory motion.

50,979.—Trace Buckle.—H. S. Woodruff, Janesville, Wis.:

I claim the trace buckle herein described, the same consisting of the circular hinged plate or bar having a tongue or pin, and arranged with regard to the buckle frame attached to the hame strap, substantially as and for the purposes specified.

50,980.—Parallel Ruler.—W. L. Woods, Washington, D. C.:

I claim as my invention, the box or frame, A, the cylinders or rollers, F, and the index finger, L, with their constituent parts, in combination substantially and for the uses and purpose as above described.

50,981.—Photographic Bath.—Nelson Wright, New York City:

I claim the rubber packing, D, constructed and operating substantially as shown for the purpose specified.

50,982.—Railway Journal Box.—Ranson C. Wright, Mead Township, Pa.:

I claim, First, The bearing, B, with its projection, h, and pocket, b, all substantially as and for the purposes set forth.

Second, The bar or support, m, with its pockets, K K, in combination with the bearing, B, and projection, h, all substantially as and for the purposes set forth.

[This invention relates to a new and improved axle box which it is believed possesses several advantages over those in common use.]

50,983.—Steam Engine.—George Yellott, Baltimore County, Md.:

I claim, First, The cylinder constructed as above described, in two sections of unequal diameter, each section being one-half the whole length of the cylinder, with the end of the section of larger diameter open, and the end of section of smaller diameter closed, with a piston fitted air tight and steam tight in each section, and the two pistons connected by a piston rod; so that when steam is admitted into the smaller section and acts against the piston in that section, the other piston in the larger section may be driven out against the resistance of the atmosphere and the reactive pressure of the steam on the closed end of the smaller section of said cylinder occasioned by said resistance, may be used as the motive power of the engine in the manner and for the purposes set forth in this specification.

Second, I also claim the cylinder as above described in combination with and placed horizontally on the platform, supported at its outward edge by the wheel resting on the circular rail, and attached to and revolving with the vertical shaft, with the upper and lower extremities of said shaft working steam tight in the two steam tight boxes, and with the hollow spaces in the upper and lower portions of said shaft for the admission of steam from the boiler and the escape of the exhaust steam; said cylinder being placed on said platform, with the closed end of the smaller section perpendicular to the center of motion of said vertical shaft, and firmly attached to said platform, so that it can be made to revolve with it in the manner and for the purpose set forth in this specification.

Third, I also claim said cylinder in combination with the said platform and vertical shaft with all their appendages as above described, but with said cylinder placed horizontally on said platform and firmly attached thereto with the closed end of the smaller section of said cylinder at a right angle with the radius of the circle made by said shaft in its revolution, in the manner and for the purposes set forth in the reference to drawing, E, in the drawings accompanying this specification.

Fourth, I also claim said cylinder, in combination with the two pistons connected by the piston rod, with the hollow tube in the center of said rod extending through the smaller piston, and connected with hollow spaces in the pistons, said hollow spaces in the pistons being open at the bottom and closed at the top in the manner and for the purposes set forth in the reference to drawing, F, in the drawings accompanying and making part of this specification.

50,984.—Meat Cutter.—David Bearly (assignor to James J. Hamilton), Newcastle, Ind.:

I claim, First, The combination of the case, A A', and vertical shaft, I, substantially as described and for the purposes specified.

Second, The combination of the funnel shaped mouth, B, and propeller shaped screw, F, with its sharp cutting edges, K, substantially as described and for the purpose indicated.

Third, The combination of the propeller-shaped screw, F, the vertical screw-shaped shaft, I, the washers, E, knives, G, projections, H, substantially as described and for the purposes indicated.

50,985.—Drilling Machine.—Jesse Button (assignor to himself and R. F. Hawkins), Springfield, Mass.:

I claim, First, The lightener, consisting of the combination of the springs, A B, and beam, C, with the drill shaft, E, substantially in the manner and for the purpose described.

Second, The automatic feed motion, when constructed and applied to a drilling machine, in the manner and for the purpose herein set forth.

50,986.—Deep-well Elevator.—Thomas Bryne (assignor to himself and S. S. Smoot), New York City:

I claim, First, The method, substantially as herein described, of accomplishing the two-fold function of elevating the oil and melting the paraffin, by means of air, as set forth.

Second, Constructing the valve seat so that they answer the two-fold purpose of a seat for the valve, and also as a valve, substantially as and for the purpose described.

Third, The connection between the conical valve seats of the various valves and the discharge pipe, substantially as and for the purpose described.

Fourth, An elevator, constructed with one or more valved chambers, and with an outer and inner tube, substantially as described, in combination with a vacuum apparatus and a forcing apparatus, substantially as and for the purposes set forth.

Fifth, The combination of the compressed air chamber and the vaccuum chamber, with the elevator, which has one or more working chambers, substantially in the manner herein described and for the purpose set forth.

Sixth, The arrangement of a series of elevators, acting within each other in such a manner that each can act independently of the other, and so that the liquid in each will be acted on by a vacuum and pressure at the same time, substantially as described.

Seventh, So arranging the several independent elevators within one another that all the stuffing boxes may be above the level of the earth's surface, substantially as described.

Eighth, Applying pressure to the top of the column of oil within the outer or main tube of the elevator, and, at the same time, subjecting it to the lifting action of a vacuum, by means of an apparatus, constructed and operating substantially as described.

50,987.—Apparatus for Carbureting Air.—John Chase (assignor to S. E. Horton), Windsor Locks, Conn.:

I claim, First, Entirely surrounding or covering the open ends of the wheel chambers or compartments with a sheet or sheets of wire gauze, or other suitable open and perforated or porous substance, or material, for the purpose specified.

Second, Regulating the amount of gas or other vapor generated or collected by the operation of the chambered wheel, B, as described, by means of any suitable arrangement of devices, connected at one end with the driving shaft of the said wheel, and at the other with the reservoirs or pipe containing such gas or vapor, and operating substantially in the manner specified.

Third, Passing the gas or other vapor, after being generated or collected, and previous to its being burned or otherwise employed, through wire gauze or any other suitable open and porous material, substantially as and for the purpose described.

50,988.—Button Fastening.—Florian Dahis (assignor to himself and Francis Thill, assignor to said Dahis and H. B. Voss), Brooklyn, N. Y.:

I claim a fastening for garments, composed of the parts, a and d, held together by the spring, f, taking a notch in the perforater, b, as set forth.

50,989.—Sewing Machine for Working Button-holes, Etc.—James Emerson, Lowell, Mass., assignor to himself and C. D. McDonald, Ellsworth, Me.:

I claim, First, The arrangement of the screw, N, and half nut, P, on the lever, M, when constructed substantially as described, for the purpose of equalizing the movement of the arm, D, with the loss of thread each stitch.

Second, I claim the looper, G, when constructed substantially as described, for making a loop in the thread, so that by passing the needle through it, as described, the hand button-hole stitch is produced.

Third, I claim the method of feeding the work to the needle, by the irregular gear, g, made in the form of a button-hole, in combination with suitable device for passing the needle entirely through the cloth, and then through the button-hole, as in hand sewing.

Fourth, I claim the lateral motion of the table, B, in combination with the arrangement of the needle carrier, E and D, and looper, G, when constructed substantially as described.

Fifth, I claim the segment, W, when made with a V-shaped groove, the sides of which are lined with cloth, to prevent the thread from kinking.

50,990.—Loom for Cross-weaving.—Conrad Roder (assignor to M. Landenberger), Philadelphia, Pa.:

First, The within-described combination of a shuttle, the handle frame, O, with its eye-pointed guides, n, which carry a portion of the warp threads, and the frame, N, with its eye-pointed guides, n', which carry the remainder of the warp threads, when both a vertical and lateral motion is imparted to each frame by the devices herein described, or their equivalents, for the purpose specified.

Second, The combination of the said treadle frames, the levers, L and M, and shaft, P, with its projection, i, the whole being arranged and operating substantially as and for the purpose herein described.

50,991.—Steam Gage.—Christian C. Schmidt (assignor to Schmidt and Brothers), New York City:

I claim the combination and arrangement of spring, E, with the intervening spring, F, connecting rod, G, and segment rack, K, substantially upon the principle and in the manner as hereinbefore set forth.

50,992.—Buckle.—C. S. Stearns and Thomas Corey (assignors to themselves and Samuel Boyd), Marlboro', Mass.:

We claim our improved buckle, made substantially as described; that is to say, with its body constructed with the recess and holding lip, and with the tongue formed as a bent lever, in manner and applied to the body, and arranged in such recess, and with respect to the holding lip, in manner so as to operate as specified.

50,993.—Jacquard Apparatus for Looms.—L. D. Valeton (assignor to himself and H. W. Hensel), Philadelphia, Pa.:

I claim the adjustable arms, M M', with their projections, n n', combined with the card shaft, G, substantially as and for the purpose specified.

50,994.—Car Coupling.—E. W. Wilson and J. E. Erwin, Springfield, Mass., assignor to E. W. Wilson:

First, We claim a car coupling of one rigid, semi-bell shaped jaw, a a b b, provided with a cavity, C, and lip, d, combined with a vertically yielding semi-bell shaped jaw, K K, having an extended lever-like end, m, the said jaws, when together, forming an inclosed cavity, C, and bell-shaped entrance, C U V, Figs. 1 2 3 4 and 5, substantially as shown and described.

Second, We claim, in combination with the bell-shaped jaws, a a K, a movable detachable bolt, g g, inserted transversely through the upper jaw, a a, as shown in Fig. 4, substantially as and for the purpose set forth.

Third, We claim, in combination with the bell-shaped jaw coupling, a a K, the fork-like hooked lifting device, p p, and the link, r, having two hooking ends, s s, substantially as set forth, shown, and described.

50,995.—Sewing Machine.—John Keats and William Stephens Clark, Street, Eng. Patented in England April 14, 1863:

We claim, First, The combination in a sewing machine of the following instrumentalities, viz., a table on which the material rests and is supported; a reciprocating feeding instrument, to move the material along said table, and a hook, rotating guide, and shuttle to produce a lock stitch with two threads, all operating in combination, substantially as set forth.

Second, The combination in a machine for making a lock-stitch of a shuttle and hook, both arranged on the upper side of the table, substantially in the manner described.

Third, The arrangement of the shuttle and shuttle race of the sewing machine above the table or surface on which the material to be sewed rests.

Fourth, The arrangement of the apparatus herein described for operating a hook, a shuttle, and a feeder from eccentrics in one needle box, as above described.

Fifth, The arrangement of the apparatus herein described, for dividing the loop of thread that is drawn up by the hook, and for spreading the loop over the shuttle.

Sixth, The arrangement of the apparatus herein described for shortening or lengthening the stitch, and for feeding the work in different directions, in the manner above described.

50,996.—Furnace Grate.—Eugene Langen, Cologne, Prussia:

I claim a grate, composed of three or more tiers, in combination with a fire-box and trap grate, constructed and operating substantially as and for the purpose set forth.

[The grate which forms the subject matter of this present invention is so constructed that the fuel is introduced from behind or under the incandescent mass, already in the grate, and, consequently, the gases arising from the fresh fuel cannot escape unconsumed, and the air requisite for the purpose of supporting combustion passes through the cold fuel to the incandescent mass, and no portion of the fuel is wasted.]

50,997.—Machinery for Making Fluted Rollers.—William Weild, Manchester, Eng.:

I claim so constructing and arranging the machine as to give the roller which is being fluted both a rotary and a vibratory motion, by the devices herein described and for the purpose described.

REISSUES.

2,103.—Condensing Milk.—Gail Borden, America, N. Y. Patented, August 19, 1856. Reissued May 13, 1862. Again reissued Feb. 10, 1863:

I claim, First, The within-described process or method of operation for concentrating and preserving milk, by means of coagulating and rearranging the albuminous particles in combination with the evaporation of the fluid in vacuo.

Second, The preparatory coagulating and rearranging of the albuminous particles, when this is done as a part of the operation of making concentrated or condensed milk.

2,104.—Self-centering Chuck.—George H. and John T. Clark, Meriden, Conn., assignees by mesne assignments of Edgar B. Beach. Dated Sept. 6, 1864:

We claim forming the guides for the longitudinally sliding-jaws in that part of the chuck by the turning of which the closing of the jaws is produced, substantially in the manner herein set forth.

Second, The inclined converging guide ways, c, in combination with the jaws, C, head, D, and screw spindle, A, constructed and operating in the manner and for the purposes substantially as herein shown and described.

2,105.—Baling Press.—Charles H. Robinson, Bath, Me. Patented January 10, 1865:

I claim as my invention and improvements in toggle lever presses, fixing the first of the three pivots of the toggle levers or links at, to, or near the platen; the second pivot to the follower, and moving the second pivot toward the first, and vibrating the third pivot so as to bring the toggle links or levers nearly or quite parallel in pressing the bale.

Second, I claim working or operating the follower of the press, at the beginning of the pressing operation, and while the cotton or hay is comparatively but little compressed by the direct action of the rope and pulleys, in combination with the subsequent working or operating of the follower, by the toggle links or levers to complete the pressing of the bale or bundle.

Third, I claim working the toggle links or levers by a rope or chain, arranged to run around pulleys at or in the opposite ends of the levers or links which carry the follower.

2,106.—Flour Sifter.—Howard Tilden, Boston, Mass. Patented, May 16, 1865:

I claim, First, A hemispherical or concave sieve, provided with a case frame or other proper support, for the purpose set forth.

Second, In combination with a concave sieve, I claim a rotating stirrer for agitating the flour and forcing it through the sieve.

Third, In combination with a concave sieve, I claim a rotary stirrer, armed and provided with flexible edges or scrapers adapted to press the flour through the sieve of the sifter.

2,107.—Shingle Machine.—W. P. Valentine, Fond du Lac, Wis. Patented March 22, 1859:

First, I claim the carriages, P and P, connected by the spring, L, and arranged to operate as and for the purpose herein set forth.

Second, I claim giving to the carriages of a shingle machine a variable feed, substantially as and for the purpose set forth.

Third, I claim the dogs, e c, arranged to operate in connection with the spring, i, and lever, s, or their equivalent, for the purpose of automatically locking and unlocking the block, as described.

Fourth, I claim the tilting platform, f, in combination with the shaft, r, provided with the projections, m, arragged to operate as shown, for the purpose of presenting the block to the saw in such a manner as to cut the but alternately from opposite ends of the block.

Fifth, I claim the ratchet wheel, N, arranged to operate in connection with the pawl, t, of the carriage, as shown and described, for the purpose of imparting motion to the shaft, r, and thereby tilt the platform or frame, f, as and for the purpose set forth.

Sixth, I claim the double inclined ways, in combination with the carriages, P and P', when the latter are arranged to operate alternately on opposite sides of a single saw, as herein shown and described.

DESIGN.

2,220.—Trade Mark.—Martin Leippe, Lancaster, Pa.

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Evansville, Ind.
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TO INVENTORS.—THE ADVERTISER WILL MANUFACTURE or introduce a new and useful article or manufacturing process—simple and staple articles preferred. Address immediately A. B. HOLMES, No. 133 Fulton street, New York. 22 2*

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Rochester, Sept. 20, 1865.

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Address Douglas, same place. 21 3*

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CHIEF QUARTERMASTER'S OFFICE, U. S. M. R. R.,
NASHVILLE, TENN., October 31, 1865.

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Two Flat Cars, 5½ feet gage.
On November 25, 1865, at the yard of the Jeffersonville Railroad Company, Jeffersonville, Ind.,
Nine Flat Cars—Gage, 4 feet 8½ inches.
On November 27, 1865, at Louisville, Ky.,

311 Car Wheels,	43 pairs Wheels and Axles,
217 Old Axles,	1 Tender,
1 Smoke Stack,	1 Engine Truck,
1 Pair Drivers,	4 Springs,
1 Parallel Rod,	1 Bell and Frame,
4 Hand Cars,	14 Truck Cars,

50,000 Pounds of Scrap Iron.
On December 1, 1865, at Memphis, Tenn., the entire stock of the U. S. Military Railroad Supplies remaining on hand at that place, consisting in part as follows:—
Eighty tuns Assorted Iron,
Eight hundred tuns Scrap Iron,
Eight tuns Assorted Steel,
One tun Pig Lead.
And a general assortment of Small Stores, suitable for railroads.
On December 11, 1865, at Nashville, Tenn., the entire stock of new and serviceable Stores of the U. S. Military Railroad remaining on hand at the General Supply Store, consisting in part as follows:—
Twenty thousand Axes,
One thousand tuns Assorted Bar Iron, round, square, hfrd., Angle,
Eighty tuns Boiler and Tank Iron,
Thirty-five tuns Assorted Steel,
Three hundred tuns Scrap Iron, wrought and cast,
Twenty five thousand pounds Engine Brass Castings,

Gas Pipe,	Heating Stoves,
Brass Pipe,	Gas Fixtures of all kinds,
Spring Balances,	Oil Cups,
Shovels,	Brass Cocks of every description,
Hatchets,	Globe Valves, all sizes,
Nuts,	Claw, Lining, and Tamping Bars,
Washers, wrought and cast,	Iron and Copper Rivets and Burrs,
Nails and Spikes,	Sheet Copper and Brass,
Mallets,	Chains and Rope of all sizes,
Sash, Glass and Paint of all kinds,	Blocks, Tackle and Snatch,
Railroad Lamps,	Kelly's Head Lights,

Cooking Stoves and Fixtures.
Full Sets of Carpenters, Blacksmiths, and Saddlers' Tools, Rubber Car Springs, Belting Gum, and Leather, Files, Buts, and Screws, Tinware of all kinds; and almost every article suitable for railroad operations; all of the very best quality. Also,
Three Large Lathes, Stevens & Bro. manufacturers,
Two Planers, Sellers & Co. manufacturers,
One Bolt Cutter and 1 Gear Cutter, Gould & Bro. manufacturers,
One Axle Cut-off Lathe, Warner & Whitney,
Two Fan Blowers, medium,
One Upright Engine, 8 horse-power,
One Trip Hammer and Engine, Howell's patent,
One Broomfield Steam Hammer,
One Sellers' Steam Hammer.
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Terms Cash, in Government funds.
Catalogues of the materials to be sold in Nashville can be obtained by application to Capt. S. R. Hamill, A. Q. M., and at Memphis on application to Capt. John Parks, A. Q. M.
The attention of dealers and Railroad Companies is particularly invited to this sale.
Sales will commence at 9 o'clock, A. M., on each day, and continue daily until all the property is disposed of. F. J. CRILLY,
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It consists of a leather flap, A, sewed to each side of the shoe, as clearly depicted in the engraving. By this plan the shoe is rendered more sightly—more comfortable to the wearer, and excludes dust and wet much more effectually than the common tongue. This lining can be applied either in front, at the side, or in the rear of the shoe, and can be ornamentally stitched or embossed in any manner to suit prevailing fashions. It is a useful improvement and should become popular.

It was patented through the Scientific American Patent Agency on Sept. 19, 1865, by Thomas Powell. For further information concerning the sale of State rights, or entire patent, address him at Richland, Indiana.

POWELL'S IMPROVED GAITER.

AMERICAN TORPEDOES IN ENGLAND.

Our old friend, G. W. Beardslee, is making a great noise in England with torpedoes for blowing up vessels. It has been well known since the time of Fulton that there is no difficulty in blowing up any vessel by placing a sufficient quantity of gunpowder beneath her keel, and setting fire to it; the only difficulty is in getting the vessel just over the powder, and then setting the powder on fire. The most approved method of firing the powder is by electricity. Two insulated copper wires are lead from a galvanic battery—one from each pole—into the mass of powder, and their ends are connected by a smaller piece of platinum wire. This platinum wire, being a poorer conductor of electricity, refuses to carry all the current, and, as Tyndall would say, a portion of the electricity is converted into heat—at all events, the platinum wire becomes red hot and fires the powder. This was employed a number of years ago by Prof. Maillefert in blowing up the rocks in this harbor and Hell Gate. Mr. Beardslee's improvement consists in substituting a fine line of plumbago for the platinum wire, which enables a much feebler current of electricity to be employed. He inserts the ends of the two copper wires into a cork about half an inch apart, and marks the cork between the two with a lead pencil; on establishing the electric current the pencil mark is heated, and the gunpowder fired. Before Mr. Beardslee left for England, he said that he had, by this arrangement, fired a torpedo in Washington with electricity generated by a machine situated in New York.

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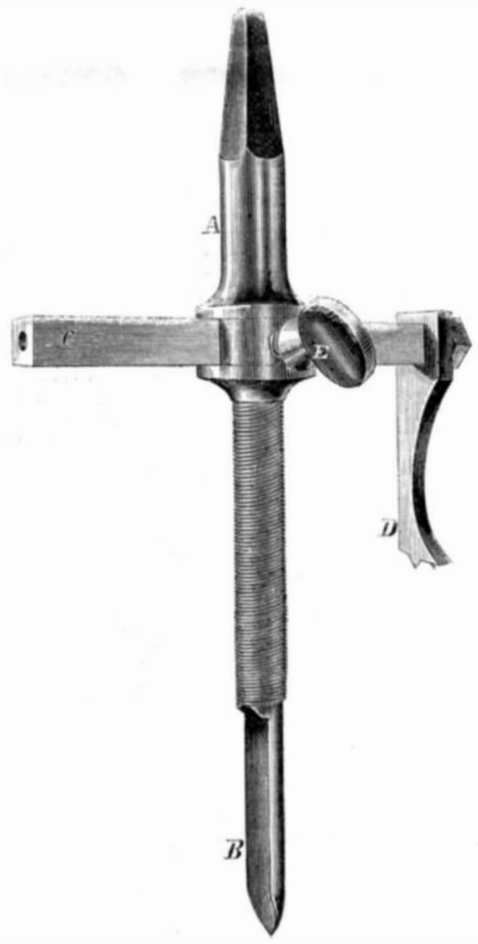
BRODHEAD'S BORING TOOL.

Wood workers and others often find it necessary to make holes of large diameter in their work. To do this a bit is commonly used, a number of small holes being bored around the circumference of the circle, and the segment left afterward removed by a chisel or saw. This process is not only slow but very rude, for it is impossible to make a true hole by the plan mentioned except at the expense of time.

With the tool here shown, a perfect circle can be easily made, and the hole handsomely finished at one job.

The details are simply a rod, A, furnished with a fine threaded screw, and formed into a boring bit, B, at the end; also a crossbar, C, sliding in a mortise in the rod, A. The crossbar carries the cutting tool, D, which can be set at any distance from the center within its range and held there by the thumbscrew, E. The operation is too obvious to require explanation. It is used with an ordinary brace, or may be attached to a lathe, and the cut is made continuous by the fine feed screw on the shank of the rod, A.



This desirable and efficient tool was invented and patented on August 8, 1865, by Wessel Brodhead, of Rondout, N. Y., and assigned to C. L. Edmonds, of the same place, all through the Scientific American Patent Agency. For further information address Mr. Edmonds as above.

THE receipts of the Government from internal revenue, since June 30th last amount to $137,365,382.

FROM THE STEAM PRESS OF JOHN A. GRAY AND GREEN