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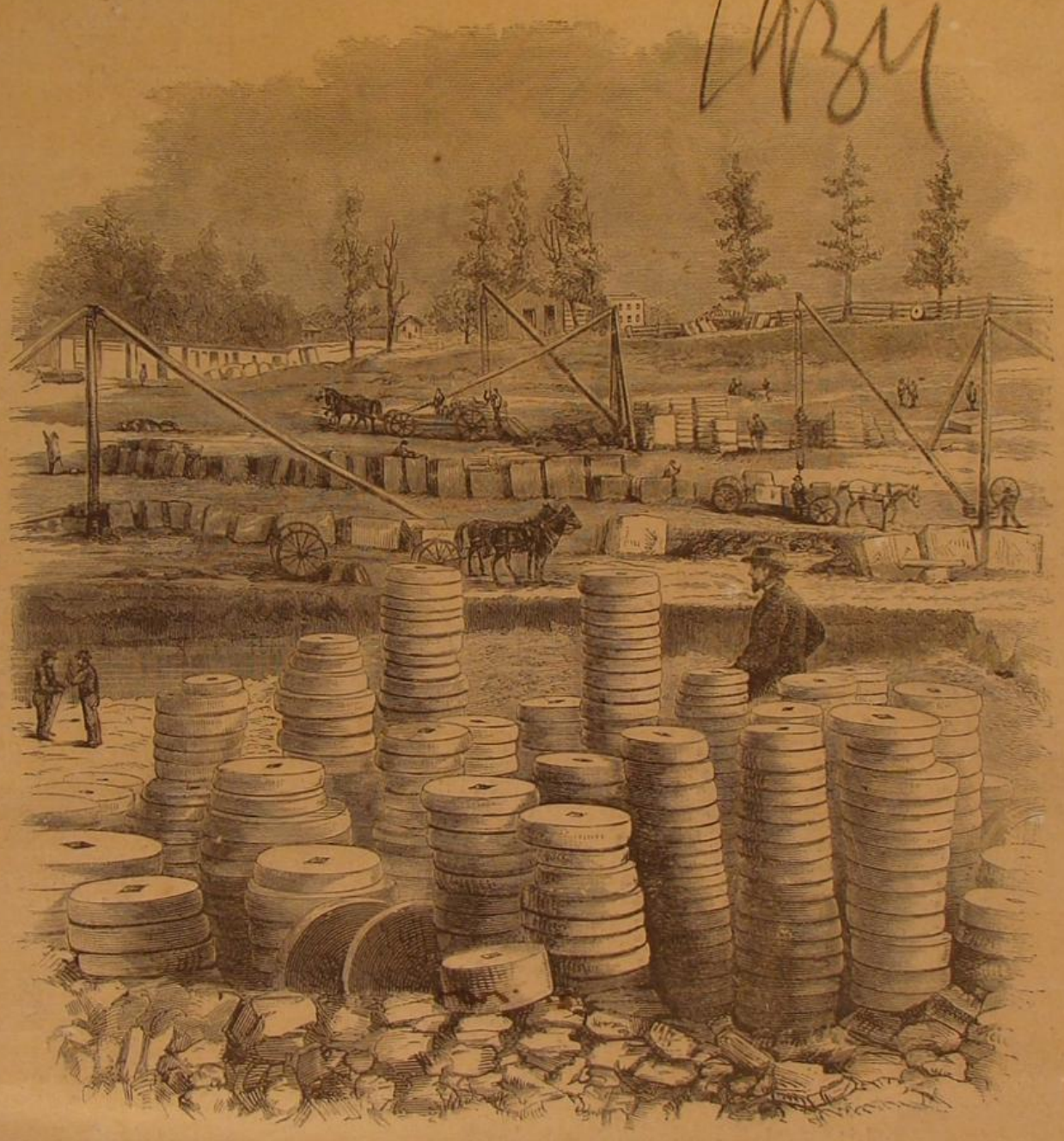
GRINDSTONES.

What should we do without grindstones in the manufacturing arts? The dependence on them is so great that if the supply were stopped a cry would go up from the workshops far and near. From the cutlers' shops, from the grinders of axes, and the armories; from those who make scissors, and from the glass cutters' shops, where the crystal goblets gleam like jewels; from the mechanic who has only a chisel to sharpen, and the housewife whose knife is dull; from the farmer who is waiting in the field where the harvest is white for the sickle. These all would cry out if they were suddenly deprived of grindstones.

In view of their utility, their history from the rise and progress of the stone—from the deposit in the quarry to the finished state—will be interesting; and such an account is here presented.

Grindstones are procured in many places; they are imported from France, England, and Nova Scotia; they are also made on the shores of Lake Huron. But the largest and by far the most extensive quarries are in the State of Ohio.

The principal illustration at the head of this article gives a view of the works of F. M. Stearns & Co., Berea, Cuyahoga County, Ohio, twelve miles from Cleveland, on the Cleveland, Columbus and Cincinnati Railroad. It will give the reader a good idea of the extent of the business. Like stacks of cheeses the stones are piled tier on tier; and in the distance may be seen workmen getting out others. The subordinate illustrations show clearly how the several operations are carried on. As, for instance, in Figure 2, the workmen are in the act of quarrying. The huge slabs or layers may be cut of any length, either 20 or 200 feet long, and 6 inches or 6 feet thick, to suit circumstances. The method of quarrying such a block is as follows:—



GRINDSTONE WORKS AT BEREA, OHIO.

The surface dirt having been removed, trenches or channels are cut at each end of the piece to be quarried; after this, small holes 12 inches apart in a parallel line, 12 feet from the face, are made. In these holes iron wedges, one and a half inches square by six inches long, are placed and struck heavily with a sledge. The layers, in the natural state, are piled one upon the other, extending back we know not how far, and are seldom found joined together. The piece is then separated into small blocks of 50 or 5,000 pounds weight, according to the size of the stone required.

Another workman is shown in Fig. 2 in the act of splitting these blocks with wedges, at the same time gazing at the reader—being attracted, probably, by the proceedings of the photographer at the moment these views were taken. Having shaped the stone partially it is then necessary to chip off the square corners so that it becomes octagonal; this having been done a workman proceeds to put an eye in by picking it out. This may seem paradoxical, but is strictly the case, as will be seen by referring to Fig. 3. Here another workman, also looking at the reader instead of his work, has the stone before him on a block, and with a sharp steel pick is making a square hole in the center. It is then taken away to be turned off true. This is done on a rude sort of lathe, but quite sufficient for the purpose. It consists of a revolving mandrel, square at the part to receive the stone, which is then tightly keyed to the mandrel through a hole in the end. Two men then apply rods of Swedish iron to the revolving stone. These rods are five feet long, one and a half inches wide, and five-eighths of an inch thick, tapered to a point by the blacksmith and afterward hammered to a hooked point by the workmen. The



QUARRYING THE STONE.



MAKING THE EYE.

stone runs about 125 revolutions per minute. The men are able to turn about 100 to 200 in ten hours—varying in size from 50 to 200 pounds in weight. Large and small sizes are turned in the same way.

Back of the stone is an exhaust fan, which sucks off all the dust as fast as it is made, so that the room is free from fine particles which are very injurious to the lungs. This dust is carried to the top of the building, and from thence scattered to the four winds of heaven to fall on the just and unjust.

And this is the way grindstones are made.

Besides grindstones, Messrs. Stearns & Co. prepare other articles, such as block stone for ornamental buildings, flagging, well covers, saw grinders for gumming saws, ash houses, cisterns, currier blocks for tanners' use, also ax bitts, scythe-stones, shoemakers' and kitchen sandstones. The latter are made by breaking the stone into the proper size, and are subsequently ground to the required form.



TURNING THE STONES.



PACKING THE STONES.

The machine for grinding these stones into the desired shape, consists of an upright shaft on which a wooden head is fastened and filled with scraps of nail plate. Sand and water are used in the same manner as on cast-iron plates in marble manufactories. The advantage that such a rubber has over a cast-iron plate is, that it will cut more than three times as fast. For where the nails are driven in the wood being softer, wears away more rapidly and leaves a constant cutting edge, which may be felt by pressing the finger upon the rubber. The stone to be ground is held in the hands of the workman, and by skillful practice he is able to give it the desired form.

Those grindstones that are to be shipped to a great distance must be securely packed. This is accomplished by a peculiar invention, patented by F. M. Stearns, June 20, 1865, and shown in Fig. 5. A number of stones are placed in a row, and at each end is a wooden head, about the size of the stone, through which a wooden shaft and an iron rod is pushed through the eyes of the stones, and the whole are bound firmly together with a nut and screw. Slats are then fastened across the stone from one head to the other, and hooped to prevent them from being knocked off; so that if their destination be California, or some foreign country, they will arrive in good condition.

Small stones for mechanics, farmers, and general purposes, are made and mounted. The eye is made to fit any desired size of shaft, and an adjustable rest for grinding mowing machine knives, or any other tools that require special angles, is attached. This fixture was patented by F. M. Stearns, Dec. 27, 1864.

Besides these, a stone of 18 inches in diameter, in wooden troughs, for ship and store use, and stones from 6 to 12 inches for kitchen use, are made. These are fitted with iron troughs from castings made at their works.

The shoe stone are sold in cases of 75 pounds, scythe stones in quarter-gross boxes; and ax bitts, oil stones, and kitchen sand stones, in 10-pound boxes.

Grindstones are universally abused by persons who should know better. They are not only exposed to all kinds of weather, but they are also left in water, and otherwise damaged. Such abuses should not be practiced. When not wanted they should be kept out of water and under cover.

The capacity of the works is about twenty tuns of grindstones and from ten to fifteen car loads of flagging, building, and other miscellaneous stone—when in full operation—per day. They are shipped by rail direct from the quarry of F. M. Stearns & Co., Berea, Ohio, without change of cars, to Cincinnati, St. Louis, Chicago, Pittsburg, Buffalo, New York, Boston, and all intermediate places; and, by lake, to Canada, and foreign countries via the Welland canal.

SUSPENSION BRIDGES OF THE WORLD.

The Menai Bridge, constructed by Thomas Telford, Esq., was at the time of its erection regarded as one of the wonders of the world. Its complete success gave a great impulse to the erection of bridges on the same principle, and though its dimensions have since been far surpassed, if it be considered with reference to the then state of bridge engineering, the genius of its designer will still command deserved admiration.

The Fribourg Suspension Bridge is a wire bridge, and crosses the Sarine at a hight of 167 feet. The span from pier to pier is 870 feet, and the deflection of the cables 55 feet. These cables are four in in number, and are suspended in pairs at each side, the cables of each pair being close together, in order to support double hooks which rest upon and embrace both cables. To the center stems of these hooks are attached the suspenders, which thus hang down between the two cables of each pair.

The cables are formed of iron wire about one-twelfth of an inch in diameter. Each cable consists of 15 strands containing 80 wires each, which are not twisted as in a rope, but go straight from end to end, being retained in a cylindrical form by soft wire, which is wound round them at intervals of two or three feet.

La Roche Bernard, a town in the north west of France, possessed a few years since a fine wire suspension bridge. An elaborate description of it was published in 1841 by M. Leblanc, from which it appears that the span was 650 feet, and the deflection of the cables 50 feet, and that it crossed the Vilaine 108 feet above high water. Further description is needless, the bridge having since fallen. This catastrophe appears to have occurred from the usual causes —too great lightness and flexibility.

The St. John's Bridge, New Brunswick, was also originally constructed by Colonel Serrel, but having since fallen, has been replaced by a stronger structure erected under the superintendence of Mr Roebling. The span was 630 feet, and is about the same now.

The St. John's Bridge is remarkable, and is more especially mentioned here, for the picturesque beauty of its situation, in which respect it has been compared with the Clifton Bridge in England. It is however inferior to it, not only in hight above the water, but in general effect.

The Wheeling Suspension Bridge, across the Ohio, was erected in 1848 by the Hon. Charles Ellet. The span from center to center was 1,010 feet, and the actual platform 960 feet. The roadway was 26 feet wide, and was suspended from twelve wire cables about one-tenth of an inch in diameter.

This bridge "obtained considerable noteriety from the litigation it caused; strenuous and long-continued efforts having been made during its continuance to obtain its removal on account of the alleged injury to navigation." All disputes were, however, set at rest on May 17, 1854, when the structure was completely destroyed by a high wind.

The fall of this bridge is the greatest disaster of the kind on record, and had great influence in bringing wire bridges into disrepute. That it cannot, however, be attributed merely to the use of wire as a material, is proved by experience in other cases; and the real cause appears to have been the too great lightness of the structure altogether. The Wheeling Bridge only weighed 450 tuns in all; it had very little trussing, and no stays either under or over the floor. Eye-witnesses of the catastrophe describe the vertical oscillation of the platform just before the final crash as absolutely terrific: one spectator estimated it at twenty feet, an amount almost incredible, and which should, by proper precautions, have been rendered impossible. Without provision to secure stiffness as well as strength, no suspension bridge built with any material can be considered safe.

The Queenston Bridge was erected in 1852 by Lieut-colonel E. W. Serrel. It crossed the Niagara about six miles below the railway bridge, connecting Queenston and Lewiston. The span from center to center was 1,040 feet and the width of the platform 22 feet. The cost was under $50,000, or about £10,000.

While this bridge remained it was much admired for its immense span—"the longest in the world." After suffering severe damage on a previous occasion, however, it finally fell during a severe storm in Jan., 1862, and has not been rebuilt, the traffic being insufficient to defray the expense.

This disaster also is plainly attributable to the great lightness and want of stability of the bridge, which rendered it unable to withstand the heavy gales which blow up the river from the lower lake. The platform was only suspended from two wire cables about four inches diameter—quite insufficient for such an exposed situation. The immense span of course increased the danger, which ought to have been provided for by increased precautions to secure strength and rigidity.

The Niagara Railway Bridge, was erected under the superintendence of Mr. John A. Roebling. It was commenced in September, 1852, and opened for railway traffic on March 18, 1855. The lower floor, for common travel, was in use the previous year.

The span of the bridge is 821 feet 4 inches from center to center, and the length of suspended platform exactly 800 feet.

The bridge consists of two floors, one 19 feet above the other, leaving 15 feet clear between them. The lower floor is appropriated to ordinary traffic, while the upper is used for railway business, and "sidewalks." The top floor measures 25 feet 4 inches across outside the railings; the bottom floor is a foot narrower. The railway track is 245 feet above the river.

Each floor is attached, by separate suspenders, to a separate pair of cables; though, of course, by means of trusses and other connections, any load is mutually borne by all the cables. The cables are, therefore four in number; each cable is 10¼ inches in diameter, and composed of 3,640 wires about one-tenth of an inch in diameter. These wires are made up into seven strands of 520 wires each, which are bound round at intervals to keep them in their places. The strength of all the cables is calculated at 12,000 tuns, each wire being able to bear 1,648 lbs. without breaking. The total length of the top cables is 1,261 feet and of the bottom cables 1,194 feet. The cables supporting the lower floor descend 10 feet lower than the top pair, the deflection from a straight line being 54 and 64 feet respectively.

The suspenders are 624 in number, placed 5 feet apart.

The structure is remarkably steady and free from vibration; to secure which desirable object various means have been employed.

The principal cause of the stiffness of the bridge is the system of trussing adopted. On each side of the bridge the upper and lower floors are connected by wooden posts, arranged in pairs side by side, just sufficiently apart to allow the diagonal truss rods crosing between them. These truss rods are of wrought iron an inch in diameter, and extend at an angle of 45 deg. from the bottom of one pair of posts to the top of the fourth pair from it. As the posts are 5 feet apart, like the suspenders, the pressure above any pair of posts is by these truss rods spread over a space of forty feet. The truss rods are screwed at the ends; and thus, if the timber should shrink at any time, all can be made right again by simply tightening the nuts on the truss rods, which braces all tight up together again. In short the two floors, connected by the system of posts and trusses here described, give much of the rigidity of a tubular bridge, with only perhaps a tenth of its weight.

There are also a number of diagonal wire stays, extending from the top of each tower. These stays are 64 in number, and though they do not bear much of the weight of the bridge, Mr. Roebling believes them to gnard it considerably against vertical oscillation. A number of smaller stays are also attached to the underside of the structure, and anchored to the rocks below.

The inclination of the upper cables also greatly guards the bridge against horizontal vibration. The centers of the towers are 39 feet apart; but instead of hanging straight from tower to tower, the top cables are brought in the middle to within 13 feet of each other. The suspenders are also inclined inward; and the whole arrangement, though it puts a very slight additional strain upon the cables, tends greatly to maintain the steadiness of the structure.

The construction of the masonry is one cause of the economy of the bridge. Instead of a massive tower on each pier, as in most European examples, there are two towers one for each pair of cables, so slender that they look like mere chimneys, yet abundantly sufficient for the purpose. The basement is a mass of masonry 60 feet by 20 feet, pierced by an arch 19 feet wide, which forms the entrance to the lower floor at each end. Above this are built two towers, each 60 feet above the arch, 15 feet square at the base, and 8 feet square at the top. By this 'light construction' without incurring any risk, much masonry and money is saved.—*Lewis Wright.*

The Cattle Plague.

Our last accounts of the cattle plague in England show that up to the 3d of March, during the six months in which the epidemic has so far prevailed, 187,059 cattle have been infected, of which 117,654 have died directly from the disease, and 26,135 have been killed by way of preventing its spread. But this statement is only the Inspector's report, and does not pretend to give the whole number of cattle which have perished since the beginning of the pest in the latter days of August.

It appears that the general epidemic had increased steadily up to the latest mail from England, every step of its march becoming more alarming. The number of deaths, which averaged a thousand or more per week in September, increased from 1,700 to 2,000 in October. Up to November, 17,673 animals had been attacked, of which only 848 could recover or would be allowed to recover. By the middle of November, 20,000 (or as was stated), one in a thousand had perished; and up to December, 40,000 had caught the disease. By the 1st of January the number reached 73,549; 7,683 dying in one week; and in the last week of January, 9,243. By the middle of January, 107,098 had been attacked, only 15,527 remaining under treatment. The February papers picture the plague as positively awful in the country, and by the middle of the month, 150,000 cattle had become infected, and all but 40,000 had died.—*Tribune.*

[The number of deaths in a week, 9,243, is equal to 1,320 a day, 55 an hour, and very nearly one a minute. As the cattle of England are generally of fine quality and great value, this is a rapid destruction of property.

MARKETS FOR THE MONTH.

The prominent event in business matters during the month of March is the fluctuation in the price of gold, which fell from 140½ to 124⅞, and afteward rose to 128¼. Of course, it is not gold that fluctuates but our paper money; when gold is quoted at 140, it is equivalent to saying that bank notes and Government legal tenders are worth 71 cents in the dollar; while gold at 128 means that the value of a paper dollar is 78 cents. These fluctuations in the legal measure of values create disturbances in business matters.

	Price Feb. 27.	Price Mar. 28.
Coal (Anth.) ℔ 2,000 lb.	$11 50 @12 00	$9 00 @10 00
Coffee (Java) ℔ lb.	27½@ 28½	27 @ 28
Copper (Am. Ingot) ℔ lb.	35½@ 36½	30 @ 31
Cotton (middling) ℔ lb.	44½@ 46	40 @ 42
Flour (State) ℔ bbl.	$6 60 @ 8 40	6 60 @ 8 25
Wheat ℔ bush.	2 20 @ 2 80	1 75 @ 2 90
Hay ℔ 100 lb.	80 @ 85	65 @ 70
Hemp (Am. drs'd) ℔ tun.	325 00@335 00	325 00@335 00
Hides (city slaughter) ℔ lb.	12½@ 13	10½@ 11
India-rubber ℔ lb.	75 @ 1 00	60 @ 85
Iron (American pig)	48 00 @50 00	43 00 @45 00
Iron (English and American refined bar)	100 00@110 00	117 50@122 50
Lead (Am.) ℔ 100 lb.	9 00 @ 9 12½	8 32 @ 8 55
Nails ℔ 100 lb.	7 50	7 @ 7 25
Petroleum (crude) ℔ gal.	27½@ 28½	25
Beef (mess) ℔ bbl.	16 00 @24 00	15 00 @24 00
Saltpeter ℔ lb.	22	20
Spelter (plates)	9¾@ 11½	9 @ 11½
Steel (Am. cast) ℔ lb.	13 @ 22	12 @ 21
Sugar (brown) ℔ lb	9 @ 16	9 @ 15
Wool (American Saxony fleece) ℔ lb.	72 @ 75	70 @ 80
Zinc ℔ lb.	14 @ 15	13 @ 13½
Gold	1 38	1 28¼
Interest (loans on call)	7	5 @ 6

Nitrous-oxide as an Anæsthetic.

The use of nitrous-oxide gas in the experience o J. M. Carnochan, M. D., of New York, as mentioned in his interesting article in the *Reporter* of Jan. 6th would seem to be preferable to the use of ether or chloroform.

It is preferable on account of its producing sound anæsthetic sleep in three-fourths of a minute, its administration being attended with no danger, whilst nausea and vomiting are never produced.

We have found it easy to prepare nitrous-oxide gas (NO) by heating nitrate of ammonia (NH4 O NO5), but the use of the present unwieldy bags, the heat, and nitrate of ammonia, will probably prevent the gas from coming into general use among practitioners.

If some apparatus can be devised, whereby nitrous-oxide gas can be administered as expeditiously and economically as chloroform on a hankerchief, then it is probable nitrous-oxide gas would come into general use as an anæsthetic. W. H. White, M. D.

Norfolk, Va., Jan. 1866.

[*Medical and Surgical Reporter.*

Statistics of Ohio.

The Toledo *Blade* publishes an abstract of the annual report of the State Commisioner of Statistics of Ohio, from which we extract the following summary:—

"The amount of land cultivated in 1864 was 700,000 acres less than in 1862. Machinery did the work of 50,000 persons while the men were at war. The average production in 1865 of crops was up to the average of a series of preceding years. The crop of oats was estimated at 18,000,000 of bushels; corn, 90,000,000 of bushels, and hay 2,000,000 of tuns. From nine counties in the State was grown an aggregate of 13,144,779 pounds of tobacco.

"The destruction of almost the entire fruit crop of 1865 was traceable to the ice storms of winter, and the extraordinary humidity of the atmosphere in April, May and June.

"There are 3,340 miles of railroad in the State, with a paid up capital of $77,694,737, and an indebtedness of $58,931,686.

"The production of maple sugar, sorghum sugar, maple molasses, and sorghum molasses was, in total, sugar, 5,239,729 lbs.,; molasses, 2,933,697 gallons.

NEW PUBLICATIONS.

General Notions of Chemistry—By J. Pelouze and E. F. Fremy. Translated from the French by mund C. Evans, M. D. T. Philadelphia. Lippincott, Grambo & Co.

This is a small volume of 439 pages illustrated by 27 lithograph engravings, and from the high character of the authors, is, of course, trustworthy authority. It is intended for beginners, and the authors hoped to make it more easy and acceptable by omitting symbols, and, of course, any explanation of the atomic theory and equivalent proportions. We have no doubt that this is a mistake; the shortest, as well as the easiest and most agreeable road, to a knowledge of chemistry, is the mastery of Dalton's atomic theory. This is the key that unlocks the mysteries of the science.

Experiment with Traction Engines.

Messrs. Aveling & Porter, a firm of steam engine builders in England, who are making a good many traction engines, recently tried an experiment to ascertain the cost of transporting goods by steam engines on common roads—that is English common roads, which are macadamized turnpikes. The editor of the London *Engineer* was invited to take notes of the trial, and he gives the results on his own authority. The work performed consisted in hauling three wagons, loaded with 15 tuns of lime, stone, and coal, 26 miles; the whole weight of the train being 21 tuns. The train started at 5:55 A. M., and arrived at 6:30 P. M., occuping 12 hours and 30 minutes in the journey, including 33 minutes spent in trying to stop "a leak between cylinder cover and valve box cover." This is a speed of 2:8 hours per mile. The coal consumed was 23 cwt and the expenses of the journey reduced to dollars and cents were as follows:—Tolls, $10 54; coal, 5 57; oil and waste, 84 cts. labor, $3 12; wear and tear and interest, $2 94; $23 01.

This is equal to $1 53 per tun for the 26 miles, and 6 cents per tun per mile; to which must be added the cost of loading and unloading. Our readers will not fail to observe that the tolls for this 26 miles of turnpike amounted to ten and a half dollars.

Hub, Spoke, and Felly Machinery.—We have constant inquiries for this class of machinery, from readers in all parts of the country. As we always refer such inquirers to those who advertise in our columns, we think that manufacturers will do well to advertise constantly in the Scientific American. The profits from a single advertisement will sometimes pay the expense of advertising for an entire year.

Portraits on Watches.—A novel idea was recently carried out by an individual in Philadelphia. Desiring to have a picture of his father constantly before him, he took his watch to a jeweler had the dial removed, and the likeness photographed upon it. Porcelain pictures have been taken for some time, but this is a new phase of them.

Trussed Connecting rods for Locomotives.—On some of the New Jersey Transporation Company's locomotives, trussed parallel rods have been applied. These rods are much lighter and stiffer than straight solid ones or should be if properly proportioned, and are therefore preferable. Such rods have been used on steamboat engines for some time, but not on locomotives.

Knitting Machines.—We are frequently written to from various parts of the country asking where the best of the above machines can be had. Makers will do well to keep an advertisement in the Scientific American.

Manufacture in the West.—A large woolen factory is going up at Warsaw, Illinois. It is to cost $150,000, and will employ one hundred operatives.

Collection of Projectiles.

A correspondent residing in Washington sends us a slip that contains the following facts in regard to a collection:—

A collection embracing all the different varieties of projectiles used during the war of the Rebellion, which has been made at the United States arsenal in this city, and systematically arranged in an apartment in one of the arsenal buildings specially fitted up for the purpose. Shelves are ranged completely round the room, while the center is occupied by two stands, upon which the shells and other projectiles are placed in regular order. In addition to all the projectiles used by the Union forces, the collection includes a great variety of shells, solid shot, etc., many of English manufacture, which have been captured from the Rebels. Among those used by the Union forces we observed the James projectile, which was used to great advantage in the reduction of Fort Pulaski, in the earlier days of the Rebellion. The inventor unfortunately lost his life while engaged in exhibiting his shells to several foreign officers and others. It appears that a workman attempted to remove a cap from a shell with a pair of pliers, when it exploded instantly killing the workman and General James, who was assisting him, and severely injuring several of the bystanders.

Several ingeniously constructed torpedoes, designed to be used in destroying the vessels of a blockading squadron, are suspended from the ceiling. Three of the torpedoes, taken from the James River, are constructed of common casks with conical floats attached to each end. They were to be allowed to float down the stream with the current, until they arrived in close proximity to the Federal ship-of-war, and were then to be exploded by means of a cord attached.

Upon one of the shelves we observed a number of singularly-shaped projectiles termed darts, invented by Floyd when Secretary of War, and by him forwarded to the arsenal for trial.

A collection of hand grenades of different patterns will engage the attention of visitors to the model room. One grenade is in the form of a hollow sphere designed to be filled with powder. From the outer surface a number of common gun nipples project, upon which percussion caps are placed. The grenades are to be used to repel an assault of an enemy upon a fortification, and as they explode with but slight concussion, they would undoubtedly prove exceedingly destructive to the assaulting party. The Adams grenade is made in a similer shape, only differing in the manner in which it is exploded. It is the invention of a private in the army, who had observed that the hand grenades in general use frequently failed to explode. The hollow globe contains the explosive matter and a common fuse, over which is placed a friction primer. To the primer a lanyard several yards in length is attached, one extremity of which is securely held in the hand of the person using the grenade. The projectile is thrown in any desired direction, and when it reaches the end of its lanyard, the friction-primer is suddenly jerked out igniting the fulminating powder in the fuse, and consequently exploding the grenade.

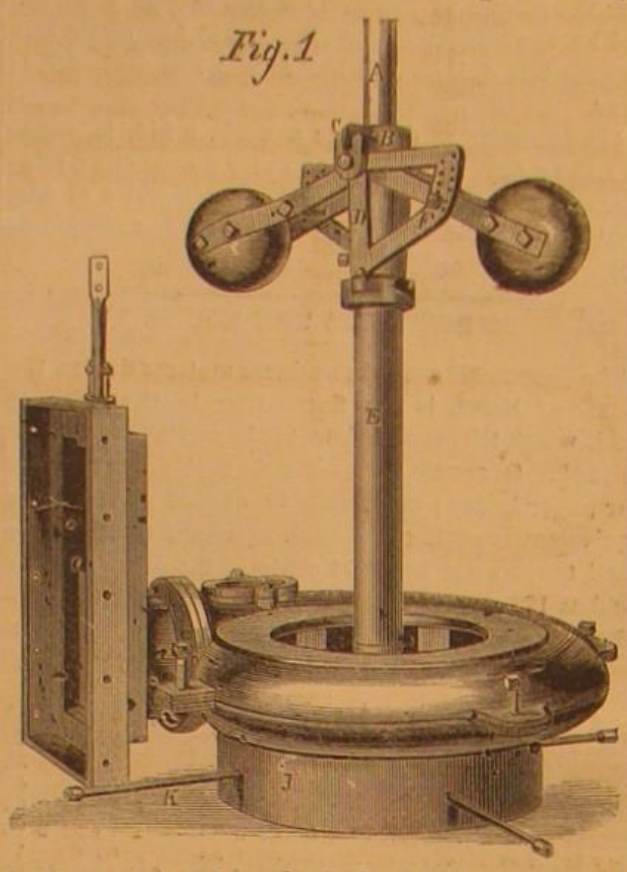
The collection contains a single specimen of a fire-ball, composed of highly combustible materials, which, when ignited, produce a powerful white light. It takes fire when discharged from the cannon, and is intended to be thrown in the direction of any point where the enemy are supposed to be engaged in throwing up intrenchments at night, in order that their correct position and the number of troops engaged in building them may be ascertained. The collection also contains a number of Hale's war rockets, which were extensively used in McClellan's Army during the disastrous campaign on the Peninsula.

The model room has been fitted up, and the shells and other projectiles carefully arranged under the supervision of Thomas Taylor, Esq., of the rifle-shell department. Every article in the collection is numbered, and Mr. Taylor is at present engaged in compiling a descriptive book to contain the names, distinguishing features, history, etc., of each individual shell or other projectile in the collection. We are informed that similar collections are being made at the Ordnance Department and Navy Yard, which will undoubtedly prove of immense benefit to army officers and scientific men interested in the matter.

LAKIN'S WATER-WHEEL REGULATOR.

Manufacturers who use water power know that it is as unsteady in action as any other motor, and the quantity admitted to the wheel must be governed by

Fig. 1

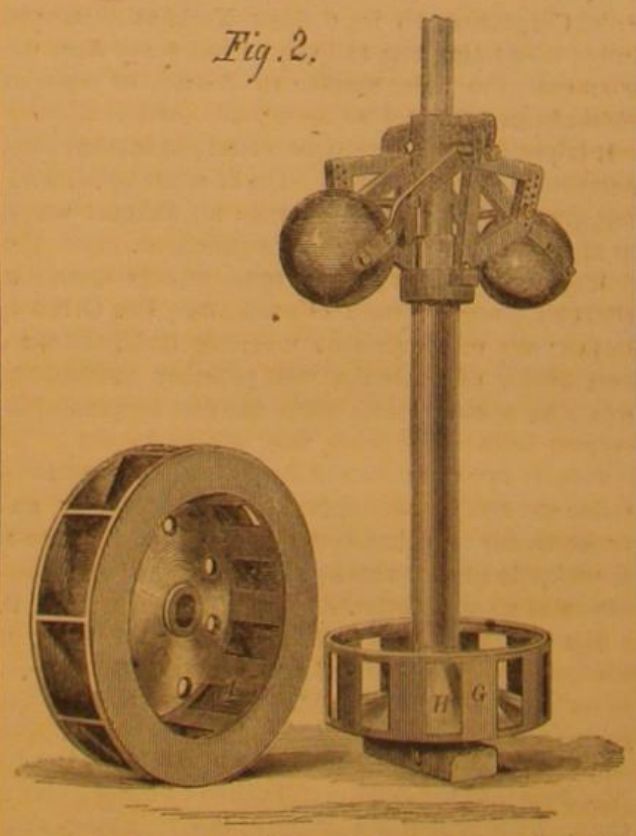


the duty to be performed at the moment, otherwise irregularities are manifest. This must be done by the wheel itself, automatically. It cannot be done by hand, for no human intelligence could foresee the precise moment when a machine was about to put on or off in the mill.

The apparatus here shown is to be attached to a central vent wheel, and controls the velocity of the same by obstructing or enlarging the issues. It also obviates in a measure, excessive weight and labor on the step, and instead of increasing the strain, diminises it. This end is attained in the following manner:—

The upright shaft, A, of the wheel has a collar, B, on it, with two projecting arms, C. To these the upper end of the governor levers are jointed, and also

Fig. 2.



the end of a bell crank, D. The other end of the same connects with a coller on a cast-iron sleeve, E, fitting over the main shaft, and the governor levers also connect with it through the medium of a bolt, F. The sleeve, E, connects at the bottom of a regulator valve, G, Fig. 2.

It is easy to see that, as the main shaft revolves, the governor will also, and that an increase or decrease of velocity will act on the balls and cause them to rise or fall, thereby affecting the position of the valve and its openings, H, with reference to the wheel and its issues, I. Any given velocity may be obtained for the main wheel by simply rasing the balls in the bell crank, D. The higher the point they are set at the greater velocity will be required in the wheel to raise them yet further.

Below the wheel is a water chamber, J, which has limited issues, as in the pipes, K. Upon this water, the result of leakage through the edges of the wheel and the scroll, the wheel and shaft rest in a measure, or in such a degree that great wear is obviated on the step.

A patent was issued on this governor to T. D. Lakin, on Oct. 13, 1863. This governor is manufactured by G. W. Davis & Co., Nashua, N. H., whom address for further information.

VAN KANEL'S CHERRY STONER.

This is a little machine designed to remove the pits from cherries that are to be preserved with sugar or dried. It is difficult to give a clear representation of this machine, owing to the nature of the framing, which is so open and light that the working parts become confused with it. In effect the work is done by turning a wheel, A. This has a pin in it which works a slide, B, inside the main frame. This slide rises and falls vertically by the action of the pin in the slot, C, and there is a fork, D, attached to it which receives the same motion; besides that, it ha



a movement on the center, E, very much like that given a paddle in moving a boat.

To stone the cherries they are taken by the stems and laid inside the trough, F, through notches in the edge. A little pull detaches them, and they roll down on to a table, G, which rises and falls alternately and throws one at a time under the fork, D; as it descends it pierces the cherry and pushes the stone out through the bottom, as at H, and by a dexterous flirt, throws the fruit out at one side into a vessel, completely pitted.

Rights for sale. For further information address Joseph Beare, Chester, Ill. Parties in Ohio and vicinity can address Babbitt, Harkness & Co., Nos. 18 and 19 Public Landing, Cincinnati, Ohio.

SPECIAL NOTICES.

Samuel Nye Miller, of West Roxbury, Mass., has petitioned for the extension of a patent granted to him on the 29th day of June, 1852, for an improvement in compound anchors.

Parties wishing to oppose the above extension must appear and show cause on the 11th day of June next, at 12 o'clock, M., when the petition will be heard.

Christopher C. Brand, formerly of New London, Conn., but now of Norwich, Conn., has petitioned for the extension of a patent granted to him on the 22d day of June, 1852, for an improvement in bomb lances for killing whales.

Parties wishing to oppose the above extension must appear and show cause on the 4th day of June next, at 12 o'clock, M., when the petition will be heard.

Back Numbers.—New subscribers are informed that the back numbers of the present volume are out of print. Subscriptions are entered from the date of their receipt.

Notes and Queries

C. L. R., of Tenn.—Good dipping acid for cast brass, is sulphuric acid, 1 qt.; niter, 1 qt.; water, 1 qt.; a little muriatic acid may be added or omitted. A lacquer is 95-100ths alcohol 2 gallons; seedlac, 1 lb.; gum copal, 1 oz.; Eng. saffron, 1 oz.; anatto, 1 oz.

W. Y. G., Ky.—We have read your communication in relation to the safety valve and its proper control or removal from liability of being tampered with by locking it up. In some parts of the country they are now used but that does not prevent explosions. If all the safety valves were taken off we sometimes think it would be a good idea, for then engineers would examine their boilers oftener and depend upon their own brains for safety, not on the mechanical action of a brass disk and a 90-pound ball on the end of a bar four feet long.

G. C., of N. Y.—We are much obliged to you for writing us such a long letter on gears, but we are sorry to say it is almost undecipherable. Few compositors could make it out.

D. A., of Mo.—It seems to be a general law that all metallic surfaces will weld or adhere together if brought in sufficiently close contact in a perfectly pure, bright state. Steel tubes have been welded together cold by drawing them through a die which reduced their size, and the plating of copper with silver by passing sheets of the two metals through rolls, has been extensively practiced. The interposition of any substance, whether fluid or solid, would prevent the welding.

L. E. B., of N. Y.—A balloon filled with hydrogen gas must have a capacity of about 14 cubic feet to lift one pound, and 2,000 feet to lift a man—equal to a tank 10 feet square and 20 feet deep.

T. A. M., of N. Y.—To get the solid contents of a cylinder, multiply the area of its cross section by its length; the area is obtained by multiplying the square of the diameter by 0·7854. A United States gallon contains 231 cubic inches.

J. T. E., of Mich.—Kerosene lamp wicks are made of the length which is supposed to be most convenient and acceptable to those who use them. If made longer they would fill the lamp too much.

W. W., of R. I.—To filter water in its passage from one cistern to another, let it pass through porous earthen ware.

J. C. R., of N. Y.—In the case of two siphons of the same size and having the ends of their longer legs at the same level, the one rising 5 feet above the surface will draw off water faster than the one rising 20 feet; in consequence of the greater friction of the fluid in its passage through the longer pipe. Immersing the lower end of the longer leg in water will not stop the flow.

W. M. J, of——.—Broom corn is bleached by spreading it on the grass. It could doubtless be bleached, like other vegetable substance, with sulphurous acid or chlorine. Hang it in a close cask or chamber and burn sulphur in the chamber, or treat it with bleaching powder.

H. C R., of Ill.—In the common cheap spiral spring scales, the indicator in fact travels over less space in the last pound than in the first, but so little that no compensating arrangement is necessary.

T. W. P., of N. Y.—A large portion of the heat is carried out the chimney—the proportion varying very widely in boilers of different construction. A plan for entirely preventing this loss, which has received much attention, is to work the products of combustion through the cylinder—as in Roper's air engine.

S. H. W., of Del.—Many gases will extinguish fires provided the fires are in air-tight rooms where the gas may be kept in contact with them. The idea of using any gas practically for extinguishing fires in the open air is ridiculous, as it is manifestly impossible to confine the gas so as to smother the fire. Water is absolutely perfect as a material for putting out fires, as it can be easily thrown upon the fire, and by its great absorption of heat it cools the burning body below the temperature at which combustion takes place.

J. U. R., of Ill.—Water will flow more rapidly through a half inch hole in the bottom of a tub than through a half inch pipe four feet long. The friction of pipes very materially obstructs the flow of water. We know of a man this winter laying down a half inch pipe quarter of a mile long, and he got so little water through it, that he took it up and laid an inch pipe in its place.

Temperature, of N. Y.—A new work on vapors by Regnault is announced in France.

H. M., of C. W.—We advise you to purchase a good filter already made. Perhaps a fine flannel at the bottom of your filter would have prevented the passage of the charcoal. Porous earthenware makes an excellent filter.

A. F., of C. W. and H. B. S., of Wis.—For comments on Danford's boiler, see page 387 of our last volume.

A. O. S., of N. Y.—Iron is coated with silver by the electroplating process.

J. P., of Iowa.—Makin's Metallurgy treats of refining gold. Apply to Henry Carey Baird, of Philadelphia for it.

A. P., of Ky.—The specimen is iron pyrites—sulphide of iron.

A. O. B., of Vt.—The notion that water wheels run faster by night than by day is the result of careless observation; it has been ascertained by accurate measurement that they run no faster.

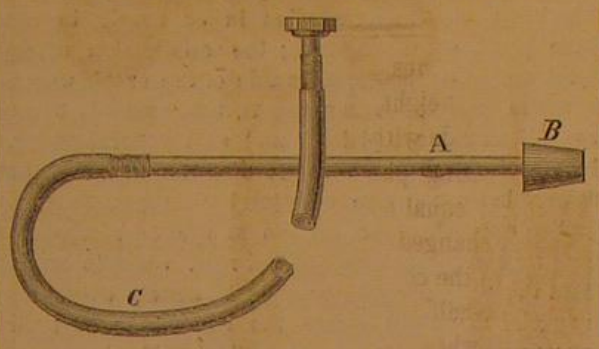
J. P., of N. Y.—Certainly, you are right; "I done" is not grammatical; your friend should say, "I did."

H. R., Ohio.—There is no current that will hold vulcanized rubber to iron so that will not come off.

Correspondence

Cleaning Boiler Tubes.

Messrs. Editors:—Upon seeing in your issue of the 17th inst., a description of a recently patented "device for cleaning tubes of boilers," I am induced to describe to you, and, by your permission, to your readers, one substantially equivalent—though more simple—which has to my personal knowledge been in regular use in one establishment in this city, for more than two years. In the engraving, A, is a piece



of one-inch gas pipe some three and one-half feet long. It serves, when grasped with a stout pair of gloves or other protection for the hands, as a handle to direct the nozzle, B, which is simply a conical piece of wood driven on the pipe into the ends of the flues. To A is attached some six feet of heavy rubber hose, C, which terminates in a union coupling, whereby it is readily attached for use to a small branch steam pipe, which is controled by an ordinary globe valve. Further explanation is needless.

I may remark that the boiler to which this is attached has been in constant use, carries eighty pounds steam, has fifty-seven three-inch return tubes fifteen feet long, and burns almost entirely bituminous coal. With this fuel, the tubes of such a boiler, of course, require very frequent cleaning, yet no part of the above-mentioned apparatus has required the slightest repairs during the time named.

The question, "Is the true pitch of a gear an arc of a circle, or the chord of that arc?" may seem to you and your readers to have been worn threadbare. But I have not yet seen the subject approached from the point of view which seems to me the clearest and most conclusive. The original conception of a pair of spur gears is tangibly expressed by two cylinders, rolling in contact, without slipping. And if it were practicable to produce sufficient friction for ordinary purposes, the case would end there, the motion would be perfect, and no one would doubt that their respective diameters must be exactly in inverse proportion to their required velocities of revolution. But simple friction is not sufficient. It is necessary to place a regular series of projections upon the rolling surfaces, and of course to cut corresponding alternate indentations below them. The original surfaces are thus lost, but are represented by imaginary lines called pitch circles. These projections, with the material left between the indentations, become teeth; and when they are so formed as to transmit precisely such a motion as the original cylinders would have done (with the least lateral pressure, and the greatest attainable strength consistent with such a form), the conditions of the case are satisfied, and not otherwise. Now, if we imagine a pair of cylinders, say as 2 : 1, properly placed in contact, and suppose one-half their width (or face) to be left cylindrical, and teeth to be formed on the remaining half, it seems needless to require any demonstration beyond that of the trained common sense of any intelligent mechanic, that the wheel must have precisely twice as many teeth as the pinion, and that the true pitch is the arc of a circle measured on the original surface of contact (or pitch line), and will subtend precisely twice as great an angle in the pinion as in the wheel.

Callipers.

Worcester, March 19, 1866.

Large and Small Pulleys.

Messrs. Editors:—I notice in your paper a little controversy in regard to the power of different size pulleys. In getting up an improved hoisting machine lately, I made an experiment that may throw a little light on the subject. I found that when two equal weights were suspended across a pulley, say, for instance, two 50lb-weights across a one-foot pulley, it took a certain amount of weight on either side to make either preponderate. If the pulley was doubled in size—made two feet—it would take just one-half the amount that it did before to make one go down.

Now, suppose that you have two pulleys geared together on two parallel shafts; one pulley is ten times the diameter of the other; suppose that two weights are suspended from either pulley to make the balance—one would have to be ten times the weight of the other. Now suppose that one ounce laid on the light weight would cause it to go down, would it not take ten ounces on the heavy weight to make it do the same (supposing that the one ounce is taken off). This, I think, is the correct theory of the matter. But would it not, if the difference was much greater in the weights, take more weight or power on the light weight to make it go down from increased friction on the bearings of the pulley attached to the heavy weight?

Geo. Brownlee.

Princeton, Ind., March 15, 1866.

[We should think not; as the light weight would be applied to the longer arm of a lever, and could thus overcome more friction.—Eds.

Dead Surface on Silver.

Messrs. Editors:—Will you please inform me how the very white surface, seen on the inside of silver mugs and goblets, is produced? Will it bear much rubbing, without becoming polished?

C. Washburn.

Bridgewater, March 26, 1866.

[Even what is called pure silver ware is made from silver coin which contains a small proportion of copper. If the ware is heated red hot in contact with the atmosphere, the copper at the surface is oxoxydized, and the oxide may be dissolved in dilute sulphuric acid. The usual method of heating the ware is to place the vessel on a slowly-revolving turntable, and subject it to the action of a flame formed by two currents—one of illuminating gas, and the other of atmospheric air—caused to mingle as they issue from the jet. The current of air is driven through its pipe by a fan, and produces a flaring flame a foot or more in length. After the heating, the vessel is placed in a bath of warm diluted sulphuric acid, which dissolves the little particles of oxide of copper, and leaves the silver surface a pure and beautiful lusterless white. It is easily polished by being rubbed with a tool of steel or bloodstone.—Eds.

The Solubility of Salt.

Messrs Editors:—Will you please answer, in your paper, two questions which puzzle me, but which may be very simple. The first is, "Why does salt not dissolve in hot water in larger quantities than in cold?" All *other* soluble substances dissolve more readily in warm than in cold water, and the explanation is that in warm water the particles are further apart, owing to the expansion by heat, thus allowing more of the particles of the soluble substances in the interstices. Why does this not apply to salt?

F. T. E.

Boston, March 15, 1866.

[We must leave to our correspondent the task of reconciling his explanation with the facts. For our own part, the power of one substance to dissolve another is an unfathomable mystery, for which we have never seen any satisfactory explanation. According to Poggiale, 100 parts of water dissolve 35·52 of salt at 32°, 36·98 at 122°, and 39·61 at 212°; showing salt to be slightly more soluble in hot than in cold water. Sugar, however, is more soluble in cold than in hot alcohol.—Eds.

Formation of Anchor Ice.

Messrs. Editors:—In reading your valuable paper of 17th ult, lately, my attention was directed particularly to the article "Water freezing at a depth of twenty-five feet" at the water works of Chicago, and the explanation of the cause of the phenomenon and remedy proposed by Professor Douglass, of Michigan University. The Professor may be correct, but I have a case similar in some respects, that I think cannot be explained on the principle of radiation.

I procure the water for my steam mill through lead

pipes, from a large stream. Above my mill one-half mile is a dam, four hundred yards below my feed pipe is a riffle, and at low water my pipe is about two feet and a half under water. In January, 1856, the river was very low, and we had a remarkably cold snap that froze the river over nearly solid at the riffle. The mill above run by heads part of the time; the ice formed over my pipe twelve inches, and while running my pumps stopped. Upon cutting away the ice, I found the end of the pipe closed with ice in the form of wool or mush ice, and when removed from the end of the pipe, it seemed to be heavier than the water. Along the pipe, on the bottom, ice had formed notwithstanding the water was from twelve to eighteen inches deep. After clearing the ice away, I put on the pumps again but with the same result, and I was in consequence compelled to stop my mill until the weather moderated.

DAVID MCCURRY.

Ottawa, Putnam Co., Ohio, March 18, 1866.

[Water, like other substances, expands when heated, and contracts when cooled; but this law does not hold at all temperatures. The maximum density of water is at 39.2° Fah. (39.85° according to some authorities). If cooled below this temperature it expands down to the temperature 32°, when it crystallizes, and in crystallizing it expands about one-ninth of its volume; the specific gravity of ice being 0·925 to 0·950. If water continued to contract by being cooled down to the freezing point, lakes and ponds would be frozen solid to the bottom, but as the greatest density is at 39.2° when it has all been cooled to that temperature the vertical circulation ceases, that at the surface only is cooled to 32°, and is frozen, while the principal portion remains at a temperature of 39·2°.

In the case cited by our correspondent the whole mass was mingled together by the broken current, and was thus all cooled down to the freezing point or probably below, as water, like other fluids, does not crystalize when in violent motion. It froze first on the bottom because the water was stiller there, and because crystals of ice, like other crystals, are apt to attach themselves to some solid substance. It would be more likely to freeze upon the lead pipe because lead is a good conductor of heat, and would convey away more rapidly the 140° of latent heat released in the act of crystalization. Anchor ice generally forms, as in this case, either in rapids or at the lower end of rapids, where the water by being tumbled and mingled is all brought to the surface, and, therefore, all cooled as low or lower than the freezing point.

In the case of the Detroit water works this condition does not obtain. It seems to us that that case requires further and more careful observation to unfold its true explanation.—EDS.

The Way to Make Magnets.

MESSRS. EDITORS:—Can you give me the process of making cast iron magnets? N. H.

Lowel, Mass., March 19, 1866.

[To make a cast iron magnet, take a smooth bar of cast iron, place the middle of it on the north pole of a magnet, and draw it to the end, repeating the stroke always from the middle to the end, that is rubbing the same way every time. Then place the middle of the bar on the south pole of the magnet and rub it to the opposite end of the bar, repeating as before. Instead of a straight bar you make it in the form of a horse shoe, or in the form of a star with six rays. You may make it of hard steel or cast iron. When made, lay it on the table, spread a smooth sheet of writing paper over it, and sprinkle clean iron filings on the paper. In the case of a star magnet the figures are very curious.—EDS.

Counter-weighting Machinery.

MESSRS. EDITORS:—I have read with interest an interesting article on counter-weighting machinery in your issue of the 27th inst., and as experiments upon the effects of counterbalancing are somewhat rare, and many erroneous ideas exist about this matter, I have thought best to communicate the result of some experiments in this line made in 1863 upon a scroll saw. The reciprocating parts of the machine weighing from 2 to 6 lbs. were connected by a rod some 15 inches in length to the crank wheel—speed of the machines was from 1,000 to 1,500 revolutions per minute, with a stroke of from 3 to 5 inches. When the mills were run without a counter-weight, the plan of vibration was formed to coincide with the line of the connection and reciprocating parts. The application of a counter-weight equal to the weight of the connection, slides, etc., changed the vibration to a right angle with the line of the connection and slides, while weight equal to one-half the reciprocating parts applied to the crank wheel was found to neutralize one-half the vibration in the line of the connection and communicate it in the other direction, or, in other words, to remedy the matter one-half, from which I make the following deductions: The reciprocating parts of steam engines, saw mills, scroll saws, etc., can only be balanced by bodies of equal weight having a coincident movement applied in or nearly in the same plane of movements; the application of an equal weight to the opposite side of the crank wheel, is worse than no counter-weight, the "remedy being worse than the complaint," and as a general thing, the vibration is thrown in the direction in which the framing is least able to withstand it—a half balance applied opposite the crank pin is the best compromise we can make as a general rule, while in many cases the difficulty may be almost entirely overcome in special machines where the conditions of their arrangement is known to the builder. For instance, a crank shaft with its bearings bolted down upon masonry can withstand the want of balance in a vertical direction. The same conditions apply to the locomotive driver, the weight of the engine neutralizing the effect, while in floors their strength and capacity to resist the effects of vibration and jar is in a horizontal direction.

By carefully observing these conditions, reciprocating machinery may be driven at a high speed without injury to buildings and inconvenience from jar and vibration communicated to floors.

J. RICHARDS.

Columbus, Ohio, March 23, 1866.

The Truth in Regard to Witch Hazel.

MESSRS. EDITORS:—It is strange to see with what tenacity mankind are prone to hold on to old superstitions. The most absurd ideas find defenders sometimes in those who profess to be learned. The witch hazel is a case at hand. Your correspondent, "C. M. S." undestakes to enlighten you upon the subject in a kind of a two-fold manner, partly scientific, partly something else. He tells you of the infallible certainty of the rod to turn at the right spot when in the hands of properly constituted operators, which operators are qualified either "electrically magnetically or otherwise," thus insinuating that a common person would not succeed. There is considerable policy in this; for if at any time an operator should fail, the plea could be set up that he was not properly constituted—or in plain English, that he was not a "Water Witch."

But he tries to explain the scientific part of the operation upon the strength of fluid attraction, yet he says that the rod after bending to the earth, [why does it not stop there?] resumes its upright position. A strange attraction indeed, that will attract a thing to the earth and then attracts it away again.

Certainly any one who has ever tried the operation without prejudice, will come to the conclusion at once that it is the position in which the rod is held that causes it to turn. There is a certain point at which not only the rod, but also the muscle of the arms are subjected to the least strain, and this is the point where the rod invariably stops. This point may be found by keeping the elbows close to the sides and holding the rod in such a position that it points directly toward the eyes of the operator. Water witches hold the rod in a perpendicular position, from whence it revolves until it reaches the point; but let them put the rod in this position at first and they may stand till doomsday before it will turn.

This is the point at which your correspondent says the rod has expended its electrical or other force in the vibrations—vibrations caused by the straining of the rod and the twitching of the nerves in an unnatural position.

But let him (perhaps he is not qualified) try it with the rod a few inches below this position—or positively downward—even half way round; nay let him lie down on his back, and he will find that the rod will invariably stop when it comes to this point—the point where there is naturally the least strain. Nor is hazel the only wood that will do. You may take a hazel or any other kind of a twig prepared in a certain way or not prepared at all—hold it over the Atlantic ocean, the result will ever be the same. If you hold it in the proper manner it will turn, if you don't it will not. PROGRESS.

Fairfield, Iowa, March 15, 1866.

Probable Existence of a Great Cavern Under Lancaster, Pa.

MESSRS. EDITORS.—It is a well settled belief among many of our most intelligent residents, that underneath the city of Lancaster and vicinity their exists a vast cavern. Many facts are recited giving extreme plausibility to this theory, the most important of which may be briefly stated, as follows:—

The city is located within the great limestone belt extending across the south-eastern part of the State, and of all the geological formations limestone the most abounds in caverns, many of which are known to be of vast extent. In sinking wells in certain parts of the city, the bottom crust breaks through before reaching water, and the pump is suspended from above by chains.

There have been several well authenticated cases in the vicinity of the city, of the crust of the earth breaking and engulfing farm animals. In two instances men engaged in plowing, saw their teams disappear beneath the surface and only a funnel-shaped cavity remained to mark the spot.

The earthquake of Sept. 29, as well as several lighter shocks, may be very reasonably accounted for by this theory. Huge masses of rock breaking from the roof of the cavern and falling into the depths beneath may cause such a quaking of the upper crust and dull rumbling noise as that which astonished the inhabitants on that day.

One of the most convincing proofs of the existence of this subterranean cavity is the discovery of an eyeless catfish in the waters of the Conestoga, a stream flowing past the city and supposed to connect with the hidden waters beneath. This fish is entirely destitute of organs of sight, having only small spots in place thereof.

In a celebrated grotto of Italy eyeless fish have been found, and it is inferred that the eyeless catfish of the Conestoga must originate in a similar underground locality and escape through the fissures of the rocks. I have endeavored to present as concisely as possible the principal facts bearing on the theory, and leave it for others to elaborate. WALTER SCOTT.

Columbia, Pa. March, 20, 1866.

Where the Day Changes.

MESSRS. EDITORS:—Where does a day begin? For instance, to day, March 12th, 12 M., at New York, it is 12 midnight at the point on the other side of the world; and at one o'clock, P. M., at New York, is it one o'clock March 13th or March 12th A. M. there? That is, are they a half a day ahead or behind New York. F. T. E.

Boston, March 15, 1866.

[The reckoning of time has been carried from the civilized nations of Europe in both directions—eastward across the continent of Asia, and westward nearly across the Pacific ocean. At all points east of Greenwich, it is later in the same day, and at all points west it is earlier in the same day. The place of meeting is in the Pacific ocean just off the eastern coast of Asia. It is Sunday on one island at the same time that it is Saturday on another island a short distance to the eastward.—EDS.

THE ORCHESTRION.—This is the name of an automatic instrument brought to this city from Germany and intended to imitate a band of music. The general construction is similar to the organ, with cylinders and tangents to supply the place of the manuals. Trumpets, drums and cymbals predominate, however, in many of the pieces. It was exhibited at the great Fondon exhibition of 1862, and has been till recently the property of the Grand Duke of Baden. It is a most ingenious piece of mechanism, but it is stated would be much improved with larger cylinders, whereby something more than the mere skeleton of an overture could be performed on it.

IMPROVEMENTS IN GOLD AND SILVER AMALGAMATING.

BY THOMAS BETTY

One of the difficulties met with in the extraction of gold and silver from their matrices by amalgamation is what is known among miners as the sickening and flouring of the mercury used for that purpose. In this state the mercury is tarnished on the surface, its amalgamating action is greatly reduced, and when triturated in the amalgamating machines it breaks up into minute particles, which will not again unite, and are carried off with the slimes, so that with many ores the loss of mercury forms a considerable item in the cost of extracting the precious metals. Mr. Crookes, F. R. S., the editor of the *Chemical News*, has, however, recently made a discovery which promises to obviate this difficulty, and prevent this great loss, and which will make his name as well known among the mining public as it has long been in the scientific world for his chemical researches, and especially for his discovery of thallium. It is, that by the simple addition of a small quantity of the metal sodium, the sickening of mercury is entirely prevented. floured mercury immediately brought together again, and the amalgamating action of ordinary mercury vastly increased. It is found that a surprisingly small amount of sodium is sufficient to effect the clearing of fouled mercury. It will require a longer series of experiments than there has yet been time to carry out, to determine the smallest effectual proportion, but it has already been proved that one twenty-thousandth part of sodium, added to the mercury, is amply sufficient, so that this discovery has the great advantage of cheapness to recommend it. Sodium may even now be obtained in large quantities for five shillings per pound, and if a demand were to spring up for it, its price would be greatly reduced; but, calculating at the present price of the metal, and using the quantity that experiments have proved to be amply sufficient for any description of ore, the cost is a mere trifle, in comparison with the advantages gained. With the ordinary amalgamating troughs in gold mining, one hundred and twenty pounds of mercury are used to each set of four stamps, reducing four tuns of quartz in twelve hours; and supposing the supply of sodium to be renewed every twelve hours, the cost would be less than one penny per tun of quartz treated, which would certainly be more than covered by the loss of mercury prevented, without reference to the greater quantity of gold obtained, in consequence of the improved condition of the mercury.

Mr. Readwin, in a series of experiments at Gwynfyndd and Castell Carn Dochan Gold Mines, in North Wales, has found that when sodium is added in excess, its effect is injurious instead of beneficial. Some sodium having been placed in my hands for trial, by the discoverer of its new use, I have been able to ascertain its effect upon mercury, and also upon the different minerals usually associated with gold in lodes, and the results obtained throw considerable light upon its action, and seem to account both for its beneficial effect in small, and its prejudicial effect in large, quantities. They can, however, only be considered approximate, and more suggestive than decisive, but they are sufficient to show the great value of the use of sodium in the amalgamation of the precious metals, and indicate its probable action. The experiments were made with mercury containing one per cent of sodium.

1. When a little of the sodium amalgam was added to ordinary mercury, the affinity of the latter for gold was greatly increased, so that when pieces of gold were dipped into it they were instantly covered with mercury, although when dipped into mercury to which no sodium had been added, amalgamation was very slow and difficult to obtain.

2. Floured mercury immediately ran together into a single globule on the addition of a little sodium amalgam.

3. When the iron pyrites (bisulphuret of iron), magnetic iron pyrites (sulphuret of iron), or copper pyrites (sulphuret of copper and iron), were triturated with sodium amalgam, the pyrites were decomposed, and on the addition of water, a black precipitate of sulphuret of iron was obtained.

4. Triturated with sodium amalgam: *a*. Arsenical pyrites were decomposed and arsenic amalgam formed; *b*. Galena (sulphuret of lead) was decomposed, and lead amalgam formed; *c*. Blende (sulphuret of zinc) was decomposed, and zinc amalgam formed; *d*. Litharge (oxide of lead) and white lead (carbonate of lead) were decomposed, and lead amalgam formed.

From these experiments it appears that sodium amalgam has an energetic action upon both the oxides and sulphurets, reducing both; and as the sickening and flouring of mercury is supposed to be due to the formation of the protoxide and the sulphuret of mercury, its beneficial effect appears to lie in the reduction of these; but if added in excess, it will, after effecting this operation, attack the ores of the baser metals, and with many of them form amalgams. The mercury then becomes loaded with the baser metals, and its action upon silver and gold is greatly reduced. When arsenical pyrites are contained in the ore treated, the arsenic amalgam formed by the action of the excess of sodium floats on the surface of the mercury, and prevents the gold from coming in contact with it. It is thus seen that only sufficient sodium should be added to reduce any mineralized mercury, and to keep it in an efficient state. The quantity added, and the duration of its effect, will vary with different kinds of ore treated, as it is well known that some minerals sicken and flour the mercury much more quickly than others. The whole question of the fouling of mercury when used for amalgamation requires a much more careful chemical examination than it has yet received, and it is a matter of great importance to miners that the attention of so able a chemist as Mr. Crookes has been directed to the subject. Already a discovery of unquestionably great value has been made, which will soon be taken advantage of wherever gold is extracted from its matrix, and we can only hope that the discoverer will participate largely in the profits which will be realized by the use of his discovery.—*London Mining Journal.*

The Earth as Seen from the Moon.

The inhabitants of the moon perceive in their sky a gigantic star, constantly immovable at the same hight. To their eyes this globe is twelve times as large as the sun, but it differs from all the stars in being always suspended in the same place over their heads. It presents phases to them as the moon does to us, passing through all the gradations of new and full earth. This star, as we have just said, is the earth we inhabit.

Those who dwell in the center of the lunar disk behold our globe suspended from their zenith, hovering eternally in the midst of the starry skies. Others see it at 70 deg. of elevation, others at 45 deg., as they inhabit spots more or less removed from the center of the visible hemisphere. Those who live near the border of this hemisphere, see our globe on their horizon resting on the mountains. A little further on only half the earth is discernible, and in passing to another hemisphere the view vanishes for ever.

If we except the determination of longitudes, the earth is more beautiful and useful to the moon than the moon is to the earth; and if the Selinites, or inhabitants of the moon, rolling underneath us, interpret the law of final causes with as much partiality as we do, they will have a right apparently superior to our own for regarding creation, the earth included, as especially made for the Selinian race.

The earth is a gigantic globe, sending them thirteen times more light than the full moon transmits to us. It revolves on its axis in twenty-four hours, and during this period exhibits all portions of its surface, being thus more generous than the moon, which always conceals one hemisphere from our view. In consequence of this motion, the Selinite finds himself in an observatory magnificently situated for viewing the terrestrial disk, and his position is preferable to that of the inhabitants of the first four moons of Saturn, who can never see the whole of that planet; and they can see the earth better than we see any planet.

The earth generally presents to them a greenish hue, in consequence of the immense quantity of water by which its surface is covered, of the forests of the new world, and of its plains, and also on account of the tint of its atmosphere. From time to time, however, large gray or yellow spots divide the sphere. To the east of the terrestrial disk appear the lofty Cordilleras, marked by a long indented line just as we see in the lunar Carpathians, to the west of the Sea of Storms. Opposite this ridge, a shady green spot of great extent unfolds itself for many hours; this is the great ocean. Next comes two gray patches, which look like one elongated; these are the two isles of New Zealand. Then appears the fine continent of Australia, tinted with a thousand colors, and accompanied by New Guinea, Borneo, Java, and the Philippines. At the same time the gray country of Asia is unrolled, and extends to the white steppes of the pole. Africa then comes in view, divided by its milky way of sand. To the north of the great Sahara, appears a little green spot torn in all directions and full of ramifications; this is the Mediterranean; above which those who have good eyesight will discern little, and almost invisible, France (!) Then the dry land will disappear, and the great dark spot of the Atlantic will follow the same revolving course. The Selinites who carlessly contemplate in tranquil nights the green and gray divisions of the earth, will have no idea of the contests in which the distant nationalities are involved.

The earth is a permanent clock to the inhabitants of the moon, and this is not its least utility. By reason of its invariable movements, the fixed points which mark the different longitudes will be the hours on the meridian of the moon. Each country of the globe has its peculiar aspect, and may serve for point of departure.

The phases the earth presents to the moon will, in the same manner, serve as an almanac, and we may believe they form its chief foundation. These phases are complementary to those which the moon presents to us: when it is full moon to us, it is new earth for the Selinites; and when they give us a new moon, we offer them a full earth. No reciprocity can be more perfect and constant.

But the phases of the earth differ essentially from those of the moon, inasmuch as their intensity, not their magnitude, changes perpetually. Thi sphenomenon is very terrestrial, and we may be sure the Selinites have judged us by it long ago. While with them all is calm, identical, constant; with us everything changes. Besides the different luster of different parts of the terrestrial spheres—green continents, blue seas, yellow deserts, white poles, and gray lands—our atmosphere is in perpetual commotion. One day it is covered with clouds, and transmits to the moon a uniform white light; the day after it is of limpid transparency, and allows the solar light to fall upon absorbent green surfaces. All of a sudden it will be varied with flocculent mountains and varied mosaics. Thus the light the Selinites receive from the earth—the light which we call "ashy," and which we only perceive in the moon's early days—varies continually in intensity.

This mobility, this perpetual variation in the aspect of the earth, will have made the Selinites believe that the earth is uninhabited. But on what grounds would they form opinions unfavorable to its habitability? They live on a solid and staple sphere, and can see nothing like it on earth. Can any rational creature live upon that permanent atmospheric layer which covers all the earth? A Selinite who fell into it would be drowned. Can it be on that sheet of green that washes the greater portion of the earth? Can it be on those clouds that appear and disappear a hundred times a day? And then the earth turns with such velocity, it is subject to so much elemental instability! Moreover, can we belive that its inhabitants are people without weight, preserving, no one knows how, a mean position between the fixed and mobile elements? How can such existeuces be believed?—*Cosmos.*

The hospital records show the enormous aggregate of 253,000 Union soldiers to have died on battle-fields and in hospitals during the war, to suppress the Rebellion. This does not include those who died at their homes of lingering disease contracted in the service.

It has been ascertained that sheet iron may be protected from oxidation by coating it with a thin fused layer of magnetic oxide. For this purpose it is embedded in native oxide of iron in a state of powder, and kept at a red heat some hours.

Improved Scroll Saw.

Very many ingenious contrivances for operating scroll saws have been invented, and the work is done by them accurately and speedily.

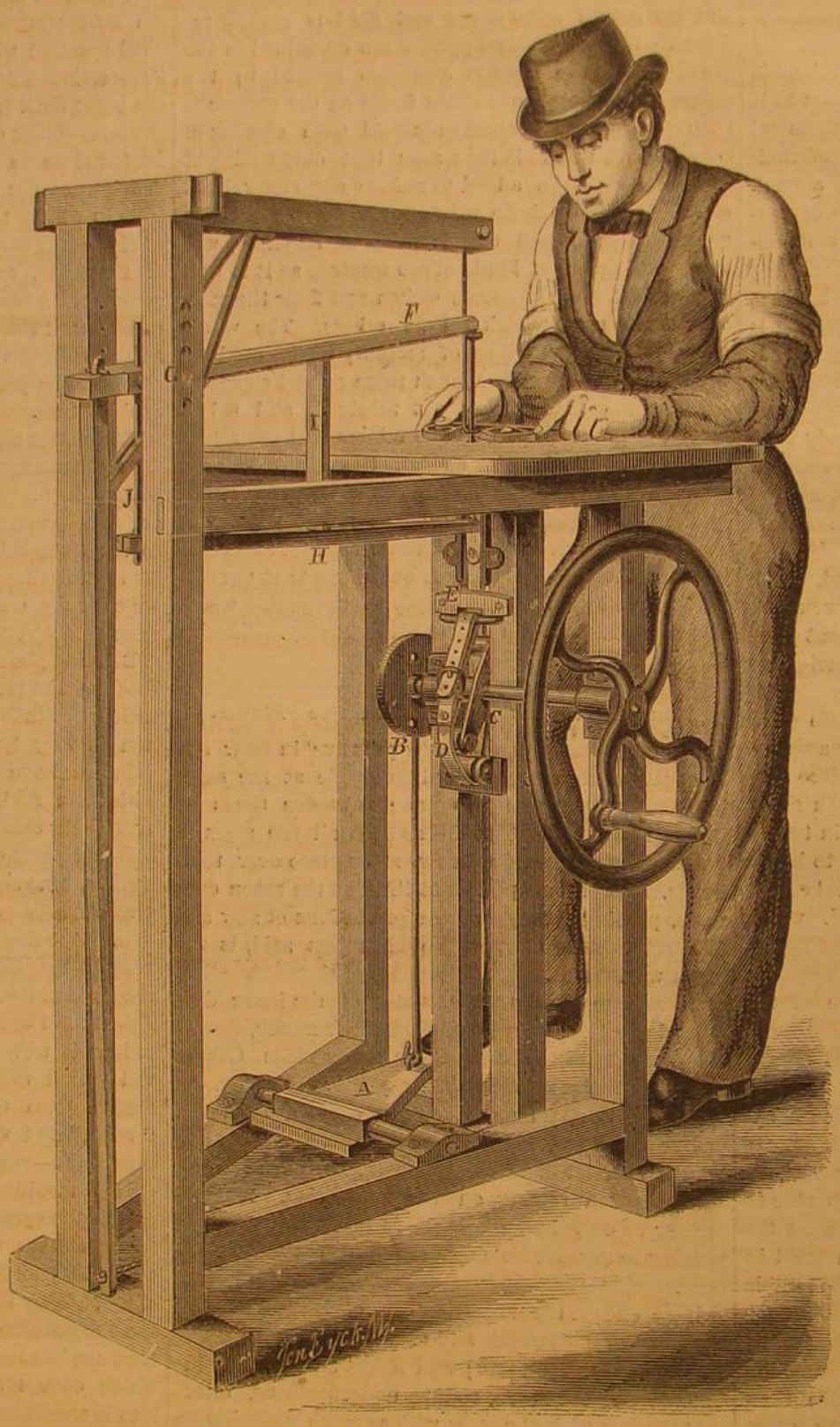
We illustrate herewith a device for changing the rotary motion of the treadle into a reciprocating movement, applicable to a jig saw, and that by a few parts which work with little friction.

By referring to the engraving it will be seen that the treadle, A, connects to a crank wheel, B. On the halt which carries this wheel there is an arm, C, with rollers fitted to the ends. This arm revolves within a strap or endless belt, D, one end of which is fastened to the frame below and the other attached to the sash, E, of the saw. These are the principal details.

The operation is as follows:—The saw is attached to a lever, F, which works between the upright timbers, G. At the other end of the lever, or part projecting from the fulcrum, there is a piece of wood formed into a spring, or so connected to the bottom of the frame by a cord that the elasticity of the wood answers the purpose mentioned. This always keeps the saw strained tight and brings both parts of the strap, D, together. Now, as the arm, C, revolves, it pushes this belt apart and thereby brings the saw down, the spring before mentioned immediately returning it, or keeping such a strain upon it that the belt is drawn straight again in readiness for another stroke. The action of this machine is very easy and without jerks, which tend to bend and break saws of this kind, especially when working in short curves. It is very easily got at to clean or oil, and is without intricate parts to clog with sawdust or get out of order. Saws of different lengths are easily and quickly strained between the upper lever, F, and the lower bar, H. Between these two there is a vertical brace, I, which fits into shallow notches in each; at the upright timbers there is a rod, J, with holes in it. This rod is let out or taken up to accommodate saws of any length.

The stroke of the saw is also quickly adjusted to suit different kinds of work by altering the length of the belt through the agency of the buckle, and a quick motion can be given by altering the throw of the crank in the wheel, several holes being provided at different distances from the center, to screw the pin in, this causes the treadle to raise more or less, which, in turn, affects the velocity of the wheel.

Patented through the Scientific American Patent Agency on Dec, 26, 1865, by Jos. A. Talpey; for further information address Wm. H. Hoag & Brother, sole manufacturers, and agents No. 222 Pearl street New York, where the machine can be seen in operation.



TALPEY'S SCROLL SAW.

Aeronautical Society of Great Britain.

This is a new Society recently formed in England, by the exertions principally of Mr. F. W. Brearey. On the 28th of February a meeting of the council was held at the residence of the Duke of Sutherland, when Mr. Brear read a paper in which he gives this account of the formation of the Society:—

Impressed greatly with the belief that, holding moderate views, an aeronautical society would be supported even by those who made all preceding attempts a subject of ridicule, I went down to Birmingham, by the advice of Mr. Glaisher to make certain simple suggestions, and at that meeting the nucleus of that society was formed.

Mr. Fairbairn, when asked to join the council, expressed an opinion that the objects of the society were Utopian, but upon repeating to him the substance of the suggestions made at Birmingham, he consented to act. Those suggestions were founded simply upon the accomplished results of a machine capable of floating in the atmosphere, whose course was guided entirely by the direction of the wind, and the well-known fact that different currents are met with at uncertain elevations, and even to the extent of opposite points of the compass. To make our floating machine more useful, it is necessary to invent some plan by which it may ascend and descend without loss of gas or ballast, and so move into those currents which are favorable to the desired course.

Those currents may possibly be found more regular than is imagined, and it is only by repeated ascents with that object in view that the truth can be ascertained. No elaborate or expensive machinery will be required for the object advocated, and its successfull achievement will economize the consumption of gas, and save the great weight of ballast otherwise necessary to take up.

To aid this object there will naturally follow improvements in the varnish for balloons, so as to render them impervious to the gas, as also a mode of fastening down the balloon to the ground in a manner least resistant to the wind when it should become necessary to anchor.

In the French war balloons a cover was thrown over all and strongly fastened to the ground, so that, in fact, an inclined surface was presented to the force of the wind in every direction.

The present plan for lowering a balloon in the air, is to open a valve in the top and let out a portion of the gas; while the balloon is made to ascend by throwing overboard some ballast. Mr. Brearey proposes to carry a quantity of liquified gas to supply the place of that which is allowed to escape; he also proposes to raise and lower the balloon by beating the air with wings, by means of the muscular force of the aeronauts. This might work if the air was of the same density at all altitudes, but the density of the air varies so much with the altitude, that he will be able to move his balloon by muscular force a short distance only from the stratum of air with which it coincides in specific gravity.

Industrial Activity at Pittsburg.—There are now over 500 large manufacturing establishments in Pittsburg suburbs, among which are 50 glass factories, 58 oil refineries, 31 rolling mills, 48 iron founderies, 33 machine shops, 12 boiler works, 6 large steel works, 10 brass founderies, 16 potteries, 5 cotton mills, 9 plow works, 10 establishments for heavy forging; also a number of extensive white-lead factories, chemical works, saw, ax, copper and other manufactories of only the great staples of trade, turning out nearly $100,000,000 in value of her own manufactures—making it the largest manufacturing city of the West.

The Foulness of Court Houses.

At a recent meeting of the Manchester Literary and Philosophical Society, a paper was read by the President, R. Angus Smith, Ph. D., F.R.S., etc., "On Air from off the Atlantic, and from some London Law Courts." The specimens of air collected by Mr. Fryer, when on his way to the West Indies, and those collected in Antigua, are worth remarking, as the first agrees with the figures obtained previously when examining air on the shore and open heaths of Scotland, where the highest average was obtained, and the second agrees with the numbers obtained in more inhabited but not closely inhabited places. Those from a law court are interesting; they are the most deficient in oxygen of any specimens found by me during the day in inhabited places above ground. The first is almost exactly the same as the average found in the currents of galleries in metalliferous mines; that from the lantern is nearly the same as the specimens found close to the shafts of the same mines, meaning of course the average of many specimens. I have not known any mills or workshops so deficient in air. I consider a room bad when it loses 1,000, and workshops very bad when they lose 2,000 of oxygen out of a million parts; here the loss is actually 5,000 less than the parks of London. The circumstance is strange, and I hope unusual. A scientific friend happened to call my attention to it and wished me to examine the air. The moisture from the window was collected and there were several ounces obtained, and more might have been easily found. It was perspiration in great part, the smell of it was distinct. It it putrefying, and decolorizes more permanganate now than it did it first.

Mere change of air will not purify a room like this—a current must pass through it for a long time until complete oxidation takes place.

European Pocket Timekeeper.

A correspondent sends us a sample of article bearing the above extended title, which is now being extensively advertised and sold for the *very low* price of $1. The manufacturers state that the patent was applied for June 29, 1865. No patent has been obtained—nor can a patent be obtained—for this device, which consists of a piece of pasteboard, upon which is printed a few figures representing a sun dial, to which is also attached a string pendulum. The whole affair could not cost to exceed two cents; and, so far as its utility is concerned, it would be dear at that price. It appears to us to be a small swindle under a high-sounding title.

According to a return just issued by the Minister of Public Works the total length of railways at work throughout France on the 31st December last was 8,473 miles, against 8,158 miles at the close of 1864.

The thickness of the film of a soap bubble has been ascertained to vary from 1-19,000th to 1-35,000th of an inch.

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SOLID FLOATING ON MOLTEN IRON.

The facts and principles in regard to this matter are few and simple. Iron, like water, in changing from the liquid to the solid state expands. Solid iron floats on molten iron for the simple reason that a cubic foot of solid iron is lighter than a cubic foot of molten iron. The reason why a pattern must be made larger than the desired casting is, that the iron hardens while it is very hot, and then in cooling it shrinks. Careful experiments have shown that ice also contracts by reduction of temperature.

Iron and water are not the only substances that expand in changing from the liquid to the solid state; it may be a general law applicable to all substances. It has long been known that water, iron, and antimony have this property; and Dr. Rowell, of this city, has observed it in the case of at least six other substances, namely, lead, zinc, tin, resin, wax, and tallow. The expansion of some of these substances is much more than that of others; the expansion of zinc approaches that of iron, while lead expands so very little that unless the temperature of the solid portion is almost as high as that of the melted portion, the solid will sink in the molten mass. This condition may be obtained by filling an iron vessel with molten lead, and after the lead has hardened, placing the vessel over a fire; the lead will, of course, melt first on the outside, and the temperature of the central lump will be at the same time raised nearly as high as that of the melted portion; in these circumstances the solid will float just at the surface of the melted mass.

VELOCITY OF MECHANISM.

Fan blowers are frequently run with a velocity of 3,000 turns per minute, while the usual velocity of cotton spindles is between 6,000 and 7,000 turns per minute. These are the highest rotary velocities with which we are acquainted in ordinary mechanism, but M. Arago, in measuring the difference in the velocity of light while passing through air and through water, wished to give a revolving mirror a velocity of 8,000 rotations per second. This he was unable to do; with the most delicate and perfect arrangement of cog wheels he was able to impart only 1,000 revolutions per second to his mirror. M. Foucault, by substituting for cog wheels a delicate turbine acted on by a steam jet, raised the velocity to 1,500 turns per second. M. Arago by removing the mirror and turning the spindle alone, achieved a velocity even by means of cog wheels, of 8,000 turns per second—equal to 480,000 turns per minute.

That spindle, therefore, turned 80 times while an ordinary cotton spindle is turning once! This is the highest rotary velocity of which we have any account.

BOILER EXPLOSIONS ON WESTERN WATERS.

The boiler explosions on the Western waters seem to occur as frequently as ever, but public indignation is aroused only where tubular boilers are the cause.

The inspectors in New Orleans have given public notice that after certain dates they will condemn all boats having tubular boilers, and a recent paragraph in one of our exchanges, stated that a number of engineers in Louisville, Ky., had left the boats because the proprietors persisted in retaining tubular boilers; as if boilers could be taken out and set ashore like trunks.

If such foolish prejudices are allowed to rule, a new generation would seem to be required; not wise after its own conceit, but skilled in the management of modern steam engines and boilers.

Very little attention seems to have been directed to remedying the evils complained of except by the summary action alluded to, but a great deal of useless denunciation is indulged in. Occasionally, however, we find men with sensible ideas who think, not unreasonably, there are remedies for all diseases, and that tubular boilers can be as well run on Western rivers as in other parts of the world.

Mr. John Schaffer writes a long letter to a St. Louis paper, setting forth the fact that the boilers on Western steamboats are very badly designed. He says the steam room is so small and the point at which the steam pipe leaves the boiler so little above the water, that constant priming takes place, and that he has seen the water pass out of the exhaust pipe in a perfect flood.

We give his own words:—

From my own observation, corroborated by the experience of other engineers of opportunities, the recent explosions were caused by a want of water in the boilers, and that the water was in every instance drawn from the boilers without the knowledge of the engineer on watch at the time of the explosion. I have seen the water in boilers escape through the cylinder of the engine with such velocity as to have emptied the boilers in two or three minutes, if not checked, and this occurs frequently on our high pressure boats, and in my judgment the failure to detect the escape of water in that way, from the boilers through the engine and out at the escape pipe, has caused the late as well as disasters in former years.

The boilers upon our boats are set higher than the cylinder of the engine. The steampipe leading from the boilers to the cylinder is generally somewhat in the form of a siphon, sufficiently so, if once started to draw the water from the boilers, and that the water does frequently so start to flow, every engineer of experience knows to be the case. The main difficulty is to know the exact time and the cause of the water starting to flow out of the boiler through the cylinder and escape pipe. This generally happens when the water is high in the boiler, with a low pressure, or ordinary pressure, of steam. The space for steam is occupied by water so as to leave small steam room, not sufficient to supply the cylinder, which may be making from 12 to 15 revolutions per minute.

Now the proof of this theory is to be found in the facts that most of the recent explosions as well as those in former years have happened to boats in about one to one and a half of an hour after they had started from some point where the fires had been cleaned out and the water was known to have been full in the boilers. The first boat in which my attention was called to this, as the cause of the explosion, was the steamer *Metropolis*, which exploded one of her boilers on the Ohio river about eleven years ago. The boat was new and on her first trip. The captain, who was on the upper deck, discovered the water going out through the escape pipe, so as to literally flood the deck. He called to the first engineer, who was in bed, to know what was the matter; stated that the water was coming out of the escape pipe. The engineer immediately discovered that water was flowing with the steam through the cylinder and escape pipe. He examined the state of steam and found 120 lbs. Before he could reach the boilers one of them blew up; two or three sheets had given way over the hottest part of the fire. The same happened to the steamer *John J. Roe*, in 1861. The boat had made a landing, and started out with full water in the boilers. Shortly before the accident the water was discovered by the pilot going out of the scape-pipe. The steamer *Princess* blew up in 1860. This boat had started from the landing at Baton Rouge with full water. The engineer stopped the doctor; the water began to fall on deck from the escape-pipe, and in a little time two boilers exploded. The engineer on duty was killed. The *St. Nicholas* blew up near Helena about eight years ago. This boat had the water to escape through the engine before the accident, on several occasions, but the engineer had discovered it and shut down the valve at two or three different times. The steamer *Sultana*, which exploded three of her boilers in April last, had left the coal yard above Memphis about one hour before. The engineer lived long enough to state that all the machinery was working well, and that there was sufficient water in the boilers as indicated a few minutes before. The escapement was in the chimneys, and could not, of course, be detected by the escape pipe.

Numerous other instances are cited by Mr. Schaffer, but we have no room for them.

Of the gun boats built at St. Louis in 1861, seven of them had to be altered after they got to Cairo. It was found that owing to the construction of the steam drum and pipes, the water went out through the engines and escape pipes.

It seems incredible to us that such things could be and pass unnoticed, but Mr. Schaffer speaks from experience, and therefore knows.

The remedies are plain, and some very good common-sense alterations are recommended. It is not uncommon for boilers to prime. Even our marine boilers do it, especially those in ships which run in both salt and fresh water; but when we find that such a state of things exists we take means to stop it. We open the doors and close the throttle partially, and if we have a variable cut-off, run it down so as to follow short. We put on all the feed so as to lower the temperature in the boiler, but our engineers do not find it necessary to run away from the boat or the inspectors, to denounce the boilers as dangerous.

"Eternal vigilance is the price of liberty," and it is also the price of safety and economy in the use of steam power.

THE PROPER TEMPERATURE FOR CHURNING BUTTER.

For a few weeks past the Farmers' Club has devoted considerable time to the discussion of butter making, and much difference of opinion was elicited in regard to the proper temperature for churning butter.

It has long been known that the churning of butter is simply a mechanical operation, working no chemical change in the constituents of the cream. The butter exists in the milk, forming 4½ to 5½ per cent of its weight, but each little globule is inclosed in an exceedingly delicate membrane, which prevents the several globules from adhering together. By the process of churning these membranes are worn or broken, thus allowing the several globules to come together in a single mass. At a temperature below about 60° this union will not take place, while at a few degrees higher temperature the casein of the milk will mingle with the butter, giving the butter a white color and the flavor of cheese. The best butter is obtained at the lowest temperature at which the butter will come, and this is variously stated at from 55° to 66°. This difference of opinion may result from difference in the samples of milk tried by different observers, or it may be due to the fact that in some cases the temperature was observed before the churning commenced, and then the temperature was raised several degrees by the churning. It was stated in a recent number of the *Mechanics' Magazine*, that Mr. Rennie raised the temperature of water, by simply churning it, to the boiling point. While engaged in experimenting on the evolution of heat by the agitation of water, he put ten pounds of water into a churn which revolved at the rate of 232 revolutions per minute; the temperature of the water rose to the boiling point, and an egg was boiled hard in it in six minutes.

If the farmers throughout the country would buy thermometers for the purpose, and would always have their cream at 60° to 66° temperature when they churn it, the average quality of our butter would be very greatly improved, and an immense amount of labor in churning would be saved. Thermometers without cases are most suitable for measuring the temperature of liquids, as they may be easily cleaned after immersion.

Great Plan for a Steam Railroad Around New York.

At the last meeting of the Polytechnic Association, Mrs. Wilson read a paper prepared by her husband, Mr. H. B. Wilson, in which elaborate details were given of a plan for a railroad around Manhattan Island, to be sunk in a dry canal 40 feet wide, and deep enough to run the cars beneath bridges at the surface. It was proposed to build the road along the edge of the water, and to have a double track for freight, and another double track for passengers. Mr. Wilson's idea was to have this road in addition to a subterranean road beneath Broadway.

CARELESSNESS is half way between accident and intention.



ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING MARCH 27, 1866.

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.

53,389.—Hinge.—John W. Allen, Newark, N. J.:

I claim the construction and arrangement of the notched hinge butt, I, catch lever, r, with its knob or handle, u, and the guide or clasp, i, of the swinging leaf when combined and operating as and for the purpose specified.

53,390.—Stopper for Ink Bottles.—Martin Ames, New Ipswich, N. H.:

I claim the fixed catch, B, connected with the collar, a, in combination with the lid or cap, C, provided with an internal flange, c, having a hole, d, in it, or any other equivalent means for the catch, B, to engage with, and also provided with a pressure stopper, e, said lid or cap being connected with the collar, a, by a hinge, b, arranged with a spring, j, to admit of a lateral movement or adjustment of the lid or cap, substantially as and for the purpose set forth.

53,391.—Door Spring.—B. F. Barker, San Francisco, Cal.:

I claim the combination of the spiral spring, C, pivoted arm, E, bracket, F, groove, b, and recess c, when constructed, arranged and employed in the manner and for the purposes specified.

53,392.—Vegetable Cutter.—C. F. A. Bander, Newark, N. J.:

I claim a vegetable cutter made of a piece of sheet metal, A, which is slotted so as to form a series of strips, b, with double cutting edges, substantially in the manner herein set forth.

53,393.—Head Block for Saw Mills.—D. C. Baughman, Fort Seneca, Ohio:

I claim the application to the shaft, D, of a ratchet gage wheel, K, having upon its circumference two sets of teeth varying in number, in combination with the lever, G, and reversible pawl, j, substantially as described.

53,394.—Fence Gate.—Julius S. Benedict, Bedford, Ohio:

I claim the strip, B', hinge or center pin, E, and roller, b, in combination with the gate when arranged in the manner and for the purposes set forth.

53,395.—Filter.—Benjamin Best, Dayton, Ohio:

I claim the combination of the sand box, D, and filtering box, C, provided with sponge tubes, a and c, with the vessels, A and B, substantially as described.

53,396.—Valve for Pumps.—Henry P. M. Birkinbine, Philadelphia, Pa.:

First, I claim the valves and valve seats of a pump so constructed as to form a water cushion, substantially in the manner and for the purpose set forth.

Second. The combination of the double-faced valve, F F', with the valve, G, having cups for forming a water cushion, the whole being constructed and arranged substantially as and for the purposes set forth.

Third, The arrangement of the valve, G, seats, F, stems, H H', H'', and yoke, I, all constructed and combined, substantially as and for the purpose set forth.

53,397.—Protracting Bevel.—W. W. Branch Jr., Madison, Ohio:

I claim the combination of the protractor, a, margin edges, b b, extension blades, C, stock, D, and index, E, arranged and operating in the manner and for the purpose herein specified.

53,398.—Hand Loom.—James L. Branson, Cincinnati, Ohio.

First, I claim the combination of sleeve, H, provided with the inclines or cams on its end, ratchet wheel, i, pinion, G, and wheel, C', provided with the pawl, h, arranged to operate as and for the purpose set forth.

Second, The sleeve, H, provided with the cams on its end as described, in combination with the sliding rod, K, and cam, I, arranged to operate substantially as herein shown and described.

Third, The cam, I, constructed as shown and described, and arranged to move laterally on the shaft, C, in combination with the treadles, k, whereby one cam is made to operate all the treadles, and also to keep the treadle depressed during nearly the entire revolution of the cam, as and for the purpose set forth.

Fourth, I claim the combination and arrangement of shaft, n, provided with the crank, c, and wheel, b, with a shaft, d, provided with the wheels b' and e when arranged to operate in connection with wheel, i, on the shaft, C, as shown and described for the purpose of enabling the attendant to stand facing her work.

53,399.—Steam Generator.—Geo. B. Brayton, Boston, Mass.:

I claim a steam generating apparatus composed of compartments constructed and arranged substantially as described.

And I also claim the use of a vessel for the generation of steam made with openings, a a a, and partitions surrounding the same, substantially as described for the purpose specified.

53,400.—Machine for Boring Hubs.—D. C. Breed, Lyndonville, N. Y.:

I claim the combination and arrangement of the annular plate, L, adjustable connecting plates, n n, supporting arms, J J', and adjusting screws, M N, in connection with the spiral grooved chuck plate, K, and cog bars, m m, substantially as herein specified, whereby the centralizing longitudinal and annular adjustments of the hub are effected together, as set forth

I also claim the combination of the adjustment of the cross bar, H, by the longitudinal scale, x, and the transfer adjustment of the mandrel bearing, I, by the scale, i, with the adjustment of the chuck plates, K L, to suit hubs of different length, for the purpose of directly determining the required taper of the holes to be bored in the hubs, substantially as herein described.

53,401.—Machine for Ironing Hats.—William Best, Newark, N. J.:

I claim, First, The vertically sliding frame, D, carrying the smoothing irons, E F G, the said smoothing irons having a sliding movement with regard to the said frame and being arranged with reference to a rotary hat block, substantially as herein set forth for the purpose specified.

Second, The many sided smoothing irons arranged in relation with a rotating hat block, substantially as set forth for the purpose specified

Third, The inverted conical or taper blocks, H, acting upon the bars, n'', and sliding blocks, n, to spread apart the smoothing irons, substantially as set forth.

Fourth, The sliding blocks, n, and the bars, n', arranged with reference to the partitions, m'', with their oblong vertical holes in such a way as to allow the smoothing irons a limited rocking movement, substantially as herein set forth for the purpose specified

Fifth, The arrangement of the staples, v', and slide, v, for securing the hat block upon the table, substantially as herein set forth.

Sixth, The catch, b, belt slipper, d'', and table, B, arranged with reference to each other and to the hat block and smoothing irons, substantially as set forth for the purpose specified.

Seventh, The clamp composed of two halves, q, sliding in the base, t, and operated by a screw, t', when provided with a flange, m3, and used in connection with a rotating table and suitable smoothing irons, substantially as herein set forth for the purpose specified.

Eighth, The annular plate, m4, placed upon the flange, m3, of the clamp underneath the hat brim, when used in connection with suitable smoothing irons, substantially as herein set forth for the purpose specified

Ninth, The elliptical plate or guide, 83, secured upon the hat block and guiding the iron, F, when smoothing the underside of the brim, substantially as herein set forth.

Tenth, The horizontal bars, m, adjustable in the lower ends of vertical bars, m', arranged in relation to smoothing irons, substantially as herein set forth for the purpose specified.

Eleventh, The arrangement of the lining cloth on the end of an elastic bar or spring attached to the same shaft as one of the smoothing irons, substantially as set forth for the purpose specified.

53,402.—Wooden Pin Machine.—Nelson W. Brewer, Williamsport, Pa.:

I claim, First, in combination with the stationary cutters, the vertically reciprocating block carrier for cutting off the pins from the wood and holding them ready for being pointed, substantially as herein described.

I also claim in combination with the stationary cutters and reciprocating pointing tools, the traveling followers, for forcing the pins against the pointing tools, substantially as and for the purpose described.

I also claim in combination with the stationary cutters, and reciprocating block carrier and followers, the vibrating guide board, which is moved aside by the followers as they are approaching the cutters, and returns after the followers are withdrawn to receive the finished pins and carry them out of the machine, substantially as described.

53,403.—Wick Trimmer.—William B. Brooks, Boston, Mass.:

I claim the combination of the frame a b, lever, c g, spring, o, and knife, b, when said knife is attached directly to the lever and all arranged to operate as and for the purposes herein specified.

53,404.—Burner for Gas Stoves.—T. H. Brymer, New York City.:

I claim the box, B, perforated at its sides as shown at b, and provided with the vertical tubes, C, in combination with the button or deflector, D, air opening, a*, in the top of the box, B, and the tube, A, with or without the perforated disk, G, all arranged substantially as and for the purpose herein set forth.

53,405.—Lathe Chuck.—James A. Bunce, East Berlin, Conn.:

I claim the combination of the sliding bars, C, with the jaws, B sheath, D, and stock, A, substantially in the manner as and for the purpose described.

53,406.—Ventilator for Hats.—Benajah J. Burnett, Mount Vernon, N. Y.:

I claim, First. A hat provided with a ventilator consisting of the series of air deflecting and conducting passages, a' g, arranged with reference to each other, and projecting outwardly from and inwardly through the crown of the hat, substantially as set forth for the purpose specified.

Second, The ventilator consisting of plates, a m b, and flanges d' b', united by a screw e, whereby they are secured in the hat, substantially as herein specified.

53,407.—Method of Treating Cholera.—Alexander Collins Campbell, Mount Morris, N. Y.:

I claim, First, The preventive medicine composed of the several ingredients, and in substantially the proportions as described, under the head of the first part of my method of treatment.

Second, I claim the same compound with the addition of laudanum, tincture of cayenne pepper, and pepperine, in substantially the proportions described, as a remedy in the diarrhœal stages of cholera, as set forth.

Third, I also claim the external application, composed of unguentum hydrargyrum and iodine, in combination with the internal remedies above named, in the diarrhœal stage of cholera, as described.

Fourth, I claim injecting oxygen gas into the tissues of the body, through perforations made in the skin, for the purpose of vitalizing the sub-oxydized blood in the capillary vessels and small arteries and veins, and producing warmth of the surface, substantially as described.

Fifth, I claim injecting oxygen gas into the tissues of the body in combination with the injection of artificial serum into the veins, for restoring the fluidity to the blood, and arterializing it in the small vessels remote from the heart and lungs, substantially as and for the purposes set forth.

Sixth, I claim as a whole, the within described method of treating cholera, substantially as set forth.

53,408.—Cultivator.—James Canfield, Washington, Iowa, and Charles Hess, Lyons, Iowa.:

First, We claim the combination and arrangement of the inner beams, F F, the slotted hangers, H H, pivoted to the cross bar, C, and the regulating bar, I operating as and for the purposes specified.

Second, We claim the combination and arrangement of the plow beams, E F, the hangers, G H, the levers, L L, cross bar, C, chains, a b, arranged and operating as and for the purposes described.

53,409.—Harvester.—J. M. Canfield, A. T. Still and E. P. Wheeler, Lawrence, Kansas.

We claim the arrangement of the grain receptacle, D, the handle, E, and standard, F, when constructed and operated substantially as and for the purposes specified and shown.

53,410.—Balance Valve for Steam Engines.—John W. Carhart, Troy, N. Y.:

I claim, First, The recess, i, in their end of the plug valve, A, constructed and operating substantially as and for the purpose described.

Second, The arrangement of the screw, m, yoke, n, set screw, r, and cross bar, q, with the plug valve, A, and shell, B, constructed and operating substantially as and for the purpose set forth.

53,411.—Water Drawer.—H. P. Castle, Ashtabula, Ohio:

I claim the clamp, E, provided with an arm, H, and lug, I, in combination with the shaft, B, and forked crank, constructed and arranged as and for the purpose set forth.

53,412.—Window Blind.—L. W. Chase, Galion, Ohio:

I claim the arrangement of the handle, l, single strip, G, and crank arms, h, in combination with the slats, b, and tenons, c, operating in the manner and for the purpose herein specified.

I also claim the combination of the latch, m, and strip, g, in the manner and for the purpose herein specified.

53,413.—Apparatus for Crimping Hair.—H. Christian, New York City:

I claim a crimping apparatus adapted for use in connection with hot water as a medium of supplying heat to the surface or surfaces brought into contact with the hair, substantially as hereinbefore set forth.

53,414.—Skate.—Hiram Clark, Jordan, N. Y.:

I claim the post, p, having a stud, d, at the top to enter the foot plate, B, and an opening at the bottom in combination with diagonal brace bars, b, which are secured to the foot plate by screw or otherwise, substantially as and for the purpose set forth.

53,415.—Floor Attachment for Furniture.—Harrison Cole, Cincinnati, Ohio:

I claim the furniture floor fastening, consisting of the dovetailed tenons, C C', and rockets, E E', having one or more binding or locking tongues, F, substantially as herein set forth.

53,416.—Straw Cutter.—Munson Cole, Colebrook, Conn.:

I claim the V, or concave bottom of the receiving box and my method of arranging the operating parts of the straw cutting machine, as herein set forth.

53,417.—Apparatus for Receiving and Delivering Mail Bags.—John J. Cooper, Olmsted Ohio.:

First, I claim the arms, A', pivoted to the frame, A, in combination with the catch, B', and spring, c'', in the manner and for the purpose substantially as set forth.

Second, The arms, A', and hanger, C, in combination with the springs, c and b, substantially as and for the purpose described.

53,418.—Fence.—Elias Cozad, East Cleveland, Ohio:

I claim the arrangement of wires or rods, C, with the spiral turns, B', in combination with the pots, A, slots, a, and keys, c, in the manner and for the purpose set forth.

53,419.—Carriage Curtain Fastener.—Elmer Crawford and James H. Birch, Burlington, N. J.:

We claim the binding of the eyelets of carriage window curtains by means of metallic plates riveted together, held fast to the frame by hooking on revolving knob screws applied to and in combination with carriage window curtains, in the manner and for the purpose above set forth, using, to obtain the said effect, any metal, as brass, silver, galvanized iron, or any suitable material substantially equivalent or which will produce the intended effect.

53,420.—Instrument for Measuring Distances.—John J. Daly, New Orleans, La.:

I claim the arrangement of the scale, A, index, B, thumb screw, D, and clamp screw, E, in combination with the rod, F, and eye piece, G.

53,421.—Boiler for Culinary Purposes.—F. W. Dembois, East Saginaw, Mich.:

I claim the combination with any vessel suitable for containing liquid to be boiled, of a cover, B, consisting of the parts substantially as herein described.

53,422.—Adjuster for Evaporators.—J. A. DeTar, Lanesfield, Kansas:

I claim the frame, or its equivalent, with an adjusting screw depending therefrom and attached to the end of the rocker pan, substantially as and for the purpose described.

53,423.—Roller Temple for Looms.—Warren W. Dutcher, Milford, Mass.:

I claim my improved application or arrangement of the headed spindle and its fastening screw, with reference to the cap extension and the standards, E, for supporting the cap, C the spindle under such application being screwed into one, and being free to move lengthwise in the other of such parts at E, while the fastening screw is in the act of being set up, the whole being so that there may be no such force exerted by the spindle on the extension of the cap as will operate to draw the cap and spindle out of parallelism with the trough.

53,424.—Gang Plow.—John H. Eckert, Lebanon, Ill.:

First, I claim the arrangement of the plow beams, E E, lever, M, adjustable bars, G*, adjustable guide, H, rod, F, screw rods, G G, in combination with the standards, J, rods, K, sockets, f, plows, I, and braces, L, constructed and operating in the manner and for the purpose herein specified.

Second, The combination of the lever, N, cross bar, o, notched plate, p, and frame, C, constructed and arranged to operate in the manner and for the purpose herein specified,

53,425.—Sheep Shearing Table.—W. R. Elder and O. T. Baker, Huntington, Ohio:

I claim the arrangement of the braces, C' C', and D' D', in combination with the adjustable pivoted legs, A B, straps, c, and elastic holder, D, constructed in the manner and for the purpose substantially as set forth.

53,426.—Telegraph Insulator.—Alfred B. Ely, Newton, Mass.:

I claim the rubber belt and disk, attached to the shank, in combination with the pin hook, when constructed and arranged substantially as described.

I also claim as articles of manufacture the rubber belt chambered pin hooks as described.

53,427.—Telegraph Insulators.—A. B. Ely, Newton, Mass.:

I claim as an article of manufacture, the rubber screw covered pin hook with rubber disk attached, as described,

53,428.—Cravat.—Otto Ernst, New York City. Antedated March 23, 1866:

First I claim a sheet metal frame for a cravat, formed with an opening or openings for attaching the bow at the front portion and retaining it in place, as specified.

Second, I claim a loop or fastening on the inside of the sheet metal frame of the cravat at the front part thereof, to connect the same to the shirt collar, as specified.

Third, I claim forming the sheet metal for the cravat frame with a curved edge at the part which comes below the chin, as and for the purpose specified.

Fourth, I claim a cravat frame enameled, or coated with a color to imitate a woven fabric on those portions of the frame that are visible when in use, as set forth.

53,429.—Egg Beater.—Henry D. Felthouse and John H. Felthouse, Philadelphia, Pa.:

I claim constructing a series of beaters, c, substantially as described, and combining them with a closed vessel, A, so that the eggs shall be cut up, shaking the vessel back and forth, the apparatus being constructed and operating substantially in the manner hereinbefore described and for the purposes specified.

53,430.—Telegraph Cable.—Samuel T. Field, St. Louis, Mo.:

First, I claim an elastic cable cord, A, conducting medium or wires, C, substantially as described and for the purposes set forth.

Second, The elastic cable composed of parts, A and B, combined with the non-conducting and yielding cover, D.

53,431.—Artificial Fuel.—Randall Fish, Washington, D. C.:

I claim a composition of matter for use as a fuel, compounded and prepared substantially in the manner set forth, from the ingredients named or their equivalents.

53,432.—Churn.—D. A. Fiske, Delavan, Wis.:

I claim a churn dash provided with hinged or jointed flaps when the same are hung as shown, so as to have an inclined position when closed against the frame of the dash, and one flap having a reverse inclined position to that of the other, substantially as and for the purpose set forth.

I also claim the chamber, H, applied to the under side of the lid or cover of the churn, substantially as and for the purpose set forth.

53,433.—Scraper and Knife and Fork Cleaner.—Nathaniel W. Foye, Cambridge, Mass.:

I claim the within described implement, consisting of a scraper having one or more flexible edges, combined with a knife and fork cleaner, operating substantially as described.

53,434.—Balance Beam for Boring Oil Wells.—John Bodine Frazier and Homer Wickes, Conneantville, Pa.:

We claim the weight box, E F, with the straps, G, key, H, and rollers, 1 and 2, in combination with the beam, B C, constructed as described, and for the purposes set forth.

53,435.—Amalgamator.—Henry A. Gaston, Austin, Nevada:

First, I claim the rotating screw, C, operating within a cylinder or case, D, situated within the amalgamating pan, B, substantially as herein described for the purpose specified.

Second, The inclined partitions, n, arranged between the case, D, and the amalgamating pan, B, and with reference to the openings, S, substantially as herein set forth for the purpose specified.

53,436.—Whiffletree.—Arrington Gibson, Riverfalls, and William M. Newcomb, Clifton, Wis.:

We claim the bands, P, with the lips, C, bent lever, D, in combination with the pin H, spring, f, or its equivalent rod, K, and strap, N, constructed substantially as and for the purpose specified

53,437.—Crate for Carrying Fruit.—William Gilbert, Catskill, N. Y.:

I claim the combination of front, rear, end, and bottom frames, formed and arranged as described with a solid or frame work top or lid, to form crates, for the holding and carrying of fruits or vegetables or similar articles, in the manner as set forth in the within specification.

53,438.—Evaporator.—L. R. Gleason.—Dundee, N. Y.:

First, I claim the channeling of tables, which allows of using broad tables.

Second, The use of faucets to feed the brine upon the first table, and to regulate the feeding according to the condition of the atmosphere.

Third, The depending points in combination with projecting

ends of tables for directing the drip from one table to another correctly.

Fourth, The movable pins or their equivalent for the purpose specified.

53,439.—Garden Roller for Destroying Insects.—Harman Gray, Sugar Creek, Wis.:

I claim the guide wheel A', scraper, B, and ridged roller, C, all constructed and arranged to operate substantially as described.

53,440.—Furnace for Treating Auriferous Ores.—Amos E. Griffiths, Philadelphia, Pa.

First, I claim the arrangement of a cupola immediately over a water cistern for the treatment of metal bearing minerals, substantially as set forth.

Second, In combination with a cupola, C, and chimney, F, I claim the reversed pipe, D2 and suction fan, E, substantially as set forth.

Third, I claim passing the fumes from heated metallic ores on mineral bearing metals, over wet blankets or other porous substances, for the purpose of condensing such fumes and depositing the metals suspended in them.

Fourth, I claim the arrangement of the chimney, F, pipe, G, branch pipes, G1 G2 G3 G4, with the sluice boxes, L and H, substantially as set forth.

53,441.—Rack and Stove Shelf.—John Gulliford, Girard, Pa.:

I claim the rack frame, H, brackets, B F, in combination with the shelves, H F, and pipe, A, arranged as and for the purpose substantially as set forth.

53,442.—Valve Gear for Steam Hammers.—Hugh Hamilton, Newburgh, N. Y.:

I claim the arrangement of levers, L and N, in combination with link, K, and ram, A, for one, and with rod, u u, lever, W, and the slide valve for the other lever, which enables the blacksmith to work single acting and double acting steam hammers in the easiest possible manner, as described.

53,443.—Gang Plow.—A. Hammond, Jacksonville, Ill.:

I claim, First, Providing for adjsuting the two supporting wheels, A and F, simultaneously, by means of a rack and screw, or their equivalents, substantially as described

Second, Connecting the landside wheel, F, to a spring or yielding lever, G, substantially as described.

Third, Connecting the rear supporting wheel, J, to a spring or yielding lever, H, substantially as described.

Fourth, Providing for adjusting the spring, v', of the lever H, substantially as described.

Fifth, Pivoting the axle bars of the rear supporting wheels, F, and J, to oscillating segments, substantially as described.

53,444.—Process of Reducing Refractory Gold Silver, and Copper Ores.—Charles W. Harvey, Buffalo, N. Y.:

I claim the reduction of refractory gold, silver, and copper ores, in common blast furnaces to the degree of obtaining pigs or bars of white metal therefrom, by combining and smelting therewith, either the carbonate of lime, soda, muriate of soda, or other alkali or slag, substantially as described.

53,445.—Cultivator.—Paul Hildreth, Beloit, Wis.:

I claim the adjustable cultivator bars, F F, the bed pieces, H H, the adjustable brackets, w w, the movable gages, e e, and the scrapers, q q, when constructed substantially as herein set forth and described, for the purposes specified.

53,446.—Cultivator.—Charles Holman, Cameron, Ill.:

I claim the buttons, H' H', secured to the upper ends of the rods, G G, in combination with the bar, J, provided with the recesses, h h, and the springs, g, on the rods, G, all arranged substantially as and for the purpose specified.

53,447.—Cotton Picker.—George A. Howe, Brooklyn, N. Y.:

I claim the arrangement of stripper fans in respect to the shaft on which they revolve, as tangents thereto, substantially as described.

53,448.—Centrifugal Machine.—Harvey Hunt, Oskaloosa, Iowa:

I claim the construction of a centrifugal sugar separating screen, with a conical floor or deflector, substantially as and for the purpose set forth.

53,449.—Flyer for Spinning Machinery.—Charles Hyde, North Chelmsford, Mass.:

I claim as my invention the combination of the projection, B, socketed at the ends, with the flyer, A, and the wire or guard, C, applied so as to extend either above or below, or both above and below the projection, as specified.

I also claim the socketed projection as made with a groove, f, going either wholly or partially around it, substantially as and for the purpose hereinbefore set forth.

53,450.—Harvester Rake.—J. Herva Jones, Rockford, Ill.:

I claim, First, The combination of the turning and oscillating rake post, with the cam groove located upon the grain side of the main frame, when constructed, arranged and operating substantially in the manner described for the purposes set forth.

Second, The combination of the platform, the divider, and the wing board with the rake, substantially as and for the purpose described.

Third, The arrangement of the platform, the driving shaft, and the rake, substantially for the purpose set forth.

Fourth, The combination of the driving shaft, the swiveling socket, the cam groove, and the rake, when arranged for joint operation, substantially as described.

Fifth, The combination of a rake-post with a swiveling socket and a sliding fulcrum, substantially as and for the purpose described.

Sixth, The combination of the driving shaft, the swiveling socket, and the hemispherical cam groove, arranged and operating as described.

Seventh, The combination of the rake post, fulcrum pin, and guide socket, as and for the purpose described.

Eighth, Uniting the rake post and arm when located as described at an acute angle, substantially as described for the purpose set forth.

53,451.—Portable Tank for Oil, Etc.—Joel F. Keeler, Pittsburg, Pa.:

I claim, First, The hatchway, h h, in combination with the steam pipe, d, or their equivalents, in the construction and use of portable tanks.

Second, The hollow cover, f, constructed and used substantially in the manner and for the purpose described.

53,452.—Broom Head.—Abraham B. King, Seven Mile, Ohio:

I claim, First, A broom head composed of a wooden abutment, C, and one or more wooden clamps, D and E, all arranged and operating substantially as described.

Second, The flange plates, H a b', and I i b', or their equivalents, in combination with the clamps, D E, as set forth.

53,453.—Sawing Machine.—Joseph Kunz, Bay City, Mich.:

I claim the arrangement of the saw, c, adjustable pivoted to the swinging weighted frame, g, which vibrates upon pivots in the supporting frame, m n, substantially as described and represented.

53,454.—Match Compound.—Louis Lanszweert, San Francisco, Cal.:

I claim the within-described match compound made of the ingredients above set forth, free from phosphorus and sulphur, substantially as specified.

53,455.—Paper Shirt Bosom.—Charles M. Lee, Springfield, Mass.:

I claim the button hole strip or loop, e, when attached to the upper edge of the bosom by the continuous ornamental stitching upon the outer edges of the imitation plaits, substantially as and for the purpose set forth.

53,456.—Heating Shade for Gas Burners and Lamps.—Augustus H. Lochman, York, Pa.:

I claim the combination of a fixed or adjustable heater, B, with a gas or lamp shade, A, substantially as described.

I also claim the construction of the hollow heater, B B a C, substantially as and for the purpose set forth.

53,457.—Sulkey Plow.—Samuel M. Lockwood, Chicago, Ill.:

I claim the arrangement substantially as described of the part, P, or its equivalent in construction with the pole, A, and the clamp, D, or its equivalent, substantially as above described, by means of which a change of direction is obtained, substantially as set forth.

Second, The arrangement of the braces, R and R, in manner substantially as set forth with the corn plows or their equivalent, so that the same can be pointed as one may desire, in order to plow deeper or otherwise, as one may wish.

Third, The method of raising and lowering the plows by the arrangement of the levers, J and J', in connection with the braces, E and G, running from cross bar to cross bar, as above described, or their equivalent, substantially as above set forth, with the seat, k, and in connection with the axle, L, substantially as described, the cross bar, C, with the arms, I and I, or their equivalent, in connection with the shanks m and M, substantially as set forth, and the cross piece, H, or its equivalent, substantially as set forth.

Fourth, The arrangement of corn plows in any and all of the ways substantially as set forth, in combination with a frame work with wheels, and constructed substantially as set forth.

53,458.—Wind Mill.—Philipp Loffler, Milwaukee, Wis.:

I claim the guide rods, s, having the stop pins, o o, and operated by the lever arm, l, constructed and operated as described and arranged in relation to the arms and paddles, substantially as set forth

53,459.—Corn Planter.—David and D. F. Luse, Spring Mill, Pa.:

First, We claim the bail, L, provided with the attaching and adjusting flanch, t, and angle adjusting rod, M, for mounting the drill tooth upon, substantially as and for the purposes herein specified.

Second, We also claim the double share and double mold board furrow clearing plow, N, in combination with the drill tooth, I, substantially as and for the purposes herein set forth.

53,460.—Composition for Core Powder.—William B. Lupton, Pittsburg, Pa.:

I claim a compound made of the ingredients herein specified, to be used in combination with sand in the process of forming sand cores, as set forth.

53,461.—Collapsible Float for Boats.—J. MacDonough, New York City:

I claim the combination and arrangement of the collapsible covering, F, hoops, A A, guard rope, C, and valve, D G, constructed and operating in the manner as herein described.

Second, I claim the combination of the adjustable reversible brackets, m, studs, a, and floats, F, arranged and operating as herein described.

Third, I claim the combination of the collapsible floats, F, hoops, a, guard rope, C, valve box, D G, adjustable brackets, m, studs, a, string pieces, B B, constructed and arranged relatively to each other and the boat, p, in the manner and for the purpose herein specified.

Fourth, I claim the string piece, B B, in combination with the hoops, A A, and flexible covering, F F, substantially in the manner and for the purpose specified.

53,462.—Men's Collars.—D. Mackay, U. S. Army:

I claim a cemented covering adapted for application to the frame of a collar or analogous article of wearing apparel, substantially as set forth.

53,463.—Centrifugal Machine.—Alexander Mackey, New York City, and Eberhardt Miller, Williamsburg, N. Y.:

First, We claim the inner cylinder, m, applied to the main cylinder of a centrifugal machine, substantially as set forth for the purpose specified.

Second, The circular platform, S, and lid, R, arranged with reference to the partition, m, substantially as set forth for the purpose specified.

53,464.—Machine for Raking and Loading Hay.—W. L. Mayfield, Ashley, Ill.:

I claim the manner of giving the up and down motion to the teeth of the rake, H, to wit: by means of the pendent rod, l, notched pivoted plates, K K', the projection, o, and pin, p, all arranged substantially as set forth.

53,465.—Manufacture of Dressing Rolls.—Charles McBurney, Roxbury, Mass.:

I claim the covering of metal rolls with a semi-elastic vulcanized rubber compound for dresser rolls and for similar purposes, as set forth.

I also claim as a new article of manufacture, rolls for dressing yarn and other like purposes, composed of a metal shaft or roll covered with a semi-elastic vulcanized compound having the properties requisite to operate as hereinbefore set forth.

53,466.—Planing Machine.—Wm. B. McIver, Worcester, Mass.:

First, I claim the combination with the feed rolls of a planing machine or machine for working lumber of the bevel gearing, F V H U, and sliding shaft, G, substantially as and for the purposes described,

Second, The combination with the feed rolls in a planing machine of mechanism for operating both rolls upon their axes, and for elevating and lowering the top feed roll, substantially as herein described.

Third, Supporting the gear end of the feed roll, and the upper end of the vertical shaft, in the same stand or bearing piece, substantially in the manner and for the purposes stated.

Fourth, Supporting the upper end of the vertical shaft as described, in combination with giving its lower end play, as and for the purposes set forth.

53,467.—Pump.—Jacob Michel, Rochester, N. Y.:

I claim the combination and arrangement of the valve seat, D, made to adjust lower or higher to give greater or less play to the valve, the valve, E, provided with the flange, l, and water-packing grooves, m m, and the piston rim, C, made in a single piece, the whole operating substantially as and for the purposes herein set forth.

53,468.—Table Napkin.—Albert L. Munson, New Haven, Conn.:

First, I claim a paper and cloth napkin, substantially as described.

Second, A paper and cloth napkin when embossed or printed or perforated, substantially as described.

53,469.—Steam Water Elevator.—David Myers and L. H. Noble, Chicago, Ill.:

First, We claim the combination of the reservoir, A, the induction and eduction pipes, C and D, and steam pipe, E, provided with the valves, c b a, respectively arranged and operating substantially as and for the purpose specified.

Second, We claim in combination with said reservoir, A, and pipes, C D E, the shaft, G and J, and lever, I, for the purpose of opening and closing the valves, a b, simultaneously, for the purposes described.

53,470.—Hay Loader.—Oliver F. Nanny, Mamarkaten, N. Y.:

I claim the tubular post, B, with its rings, E E, in combination with the crane, D, the hay fork, G, and bifurcated spring catch, F, for the purposes described.

53,471.—Button.—Frederick I. Palmer, Springfield, Mass.:

I claim the combination of the stud, B, notched as described, with the spring, C, and the other parts of the button, substantially as herein set forth,

53,472.—Fastening for Garments.—Frederick Ingersoll Palmer, Springfield, Mass.:

I claim the attachment of fastening composed of the springs and the pin or studs, substantially as herein shown and described.

53,473.—Combined Pistol and Pocket Knife.—A. J. Peavey, South Montville, Maine.:

First, I claim so hanging the barrel of a pistol within the casing or handle of a pocket knife that its breech end can swing out of it or into the same, substantially as described and for the purpose specified.

Second, The combination of the hook end or arm, G, of the pistol barrel with the spring catch, F, of the breech piece, O, of the knife handle arranged, together and operating as and for the purpose described.

53,474.—Seat Desk for Schools.—Isaac Newton Pierce, Philadelphia, Pa.:

I claim the application of a crane movement by which a chair may be attached to its own desk and yet have a free movement, as substantially set forth.

53,475.—Beehive.—T. W. Pierce, Minneapolis, Minn.:

I claim a beehive constructed of corn cobs, substantially as shown and described.

53,476.—Manufacture of Sheet Iron.—Charles H. Perkins, Providence, R. I.:

I claim preparing plates of sheet iron, whether for receiving a coating of zinc or other metal preparatory for polishing and coloring in imitation of Russia iron, by the application of the decarbonizing process, substantially as described.

And I also claim preparing plates of sheet iron for coloring in imitation of Russia iron by first decarbonizing them and then rolling them, substantially as described.

53,477.—Box for Propagating Plants and Vines.—F. L. Perry, Canandaigua, N. Y.:

I claim a box for the propagation of plants or cuttings, constructed with movable or detachable sides and partitions, substantially in the manner herein set forth.

53,478.—Pole and Thill for Carriages, Etc.—John G. Perry, Kingston, R. I.:

First, I claim the convertible pole and thills, k k, in combination with the adjustable cross plates, a b, constructed as herein described and for the purpose set forth.

Second I claim in combination with the foregoing the use of the projections, l l, to connect the pole and thills to the machines and carriages, substantially as herein described.

53,479.—Railroad Rail.—D. C. Pierce, Clayton, N. Y.:

I claim the combination of the upper or cap rail with lateral flanges, the in erposed elastic material and the lower continuous bearing rail supported upon the road bed either immediately or by intervening chairs or sleepers.

53,480.—Hub or Spool for Curtain Rollers.—Frederick Pilling, Washington, D. C.:

I claim a cup or hub for the rollers of window shades, curtains, or other similar purposes cast in one piece, and comprising within itself a flange, pulley, journal and screw for securing it to the roller, substantially as described.

53,481.—Apparatus for Carbureting Air.—E. A. Pond and M. S. Richardson, Rutland, Vt.:

First, We claim the improved gas machine substantially as herein described, the same consisting of one or more coils of pipes so combined with a fluid vessel and air-forcing apparatus that the said coil or coils shall be constantly supplied with fluid by the action of the blast and hydrostatic pressure, and a continuous circulation of fluid maintained therein as set forth.

Second, The arrangement of the coil in relation to the fluid reservoir so that the air shall be discharged from the coil above the level of the fluid in the reservoir, substantially as herein shown and described.

Third, The arrangement of the air supply pipes relatively to the coil and the fluid reservoir, substantially as herein shown and described, so that the current of air shall be impelled upwardly and along the tubular coil, as set forth.

Fourth, The method herein described of combining the air supply pipe with vaporizing coil by inserting the contracted end of the former into the larger tube of the latter for operation as an injector, substantially as set forth.

Fifth, The employment in connection with a communicating pipe or coil extension under the bottom of the fluid, of a stopper of bamboo or other porous material, as and for the purposes set forth.

Sixth, The use in combination with a fluid vessel and a coil of a perforated diaphragm or dome for returning the fluid ejected from the coil in spray-like form to the reservoir, and thus fill the gas collecting chamber with hydrocarbon vapor, as set forth.

53,482.—Gas Apparatus.—E. A. Pond and M. S. Richardson, Rutland, Vt.:

First, We claim in combination with an apparatus for charging atmospheric air with the vapor of hydro-carbon fluid, the method of utilizing steam from available sources, substantially as is herein described for forcing the air through hydro-carbon liquid or vapor.

Second, The construction of the air pipe with branches, and providing the same with stop cocks so as to supply the vaporizer with hot or cold air at pleasure substantially as set forth.

Third, Generating illuminating gas by means of an apparatus consisting of the combination with a vaporizer of an air pump driven by a gas engine which receives its supply of gas from the gas generator, substantially as herein described.

53,483.—Gaiter Shoe.—Amaziah M. Preble, Lynn Mass.:

I claim the fly as made with the elastic gore arranged in it, as described.

I also claim the combination and arrangement of the ply and its buttons with the instep opening, or the same and its lacing and lacing holes, the whole being substantially as hereinbefore described.

53,484.—Churn Attachment.—William M. Pyle, Greensburgh, Ind.:

I claim the combination with the gearing, J K, crank, p, crank wheel, L, frame, g, h, and dasher shaft, f, of the detachable supplementary lid or cover, C, hooks, D, and pins, e, substantially as and for the purpose specified.

53,485.—Boring Machine.—Emmett Quinn, Washington, D. C.:

I claim the employment in a machine for boring wooden tubes of one or more pipes conveying water to the cutters, whereby the chips made by the cutters are discharged from the machine by the force of the water when constructed and operating substantially as described.

53,486.—Tool for Turning Wood.—Emmett Quinn, Washington, D. C.:

I claim a hollow cutter stock and its cutter, when constructed as described, in combination with a hollow tube supporting said cutter stock and a discharge pipe, arranged to operate substantially as described and for the purposes set forth.

53,487.—Churn.—L. B. Randall, West Glover, Vt.:

I claim hinging or pivoting the frame or upright, D, which supports the gearing for operating the churn in such a manner that it may be folded, substantially as specified.

I also claim the rack, L, in combination with the bar, K, and hinged upright, D, substantially as specified.

53,488.—Urinal.—Andrew Rankin, New York City:

I claim a urinal in which a deodorizing agent is applied around an eduction tube arranged in relation to the vessel, as herein shown and described.

53,489.—Mop Wringer.—Foster Rhines, Watertown, N. Y.:

I claim the combination of the roller, C, with fixed bearings, the roller, D, applied to the arms, b b, of the treadle, G, the spring or springs, E E, and the pail, A, substantially as described.

53,490.—Metallic Cartridge for Loose Ammunition.—W. H. Risley, Berlin, Conn.:

I claim the cylinder, A, made substantially as described, with a fixed partition to divide it into a shot or ball and a powder chamber, being of a diameter about equal to the bore of the gun with which it is to be used so that the wad can be used to shut the chambers, and with means for removing the wad at pleasure, substantially as described.

53,491.—Plow Point.—Cyrus W. Saladee and Thomas Simpson, Newark, Ohio:

First, We claim imbedding the point, A1, in the top surface of the share, B, in the manner and for the purpose substantially as shown and described.

Second, We claim the stud, C1, figure 3, or its equivalent, in combination with the point, A A1, indentation, F, and slot, H, as and for the purpose substantially as set forth.

Third, We claim the beveled lips, E, of the point, A, figure 3, in combination with the corresponding lips, E, figure 2, substantially as and for the purpose shown and described

Fourth, We claim the short wedge, D, figure 3, in combination with the stud, C1, and slot, H, in the manner and for the purpose substantially as shown and described.

53,492.—Bed Bottom.—Charles A. Scott, Aurora, Ill.:

I claim the herein described mode of securing the ends of the elastic straps in and to the said blocks and slats by means of the pins, a c, as and for the purposes described.

53493.—Steam, Generator.—Henry C. Sergeant, New York City:

I claim, first, A tube with a partition in it, when so arranged that the fire will operate with the greatest intensity on one side of the tube, so as to cause a circulation of the water in opposite directions in the tube.

Second, I claim the combination and arrangement of the above described tubes with the inclined water leg and plate for holding the outer ends of tubes in position, substantially as shown and described.

53,494.—Soda-water Apparatus.—Charles C. Sheldrake and Joseph Bready, Philadelphia, Pa.:

We claim the cup or concave-shaped bottom, B, as constructed and applied in combination with the fountain, A, substantially in the manner and for the purpose as herein set forth.

The application of the cup or bottom plate, B, in its connection with the fountain by means of the screw threads, a, substantially in the manner and for the purpose as herein set forth.

53,495.—Slate Frame.—Francis Shenton, Statington, Pa.:

I claim a slate frame when constructed with a miter joint, tongue, and groove and secret dowel pin, substantially as described.

53,496.—Milling Tool.—John T. Smith, Middletown, Conn.:

I claim a cutter or milling tool made in two parts of irregular shape, substantially such as herein described, so that by interposing disks of paper or other suitable material the cutting face of the tool can be adjusted for slots or grooves of different width.

53,497.—Cooking Stove.—James Spear, Philadelphia, Pa Antedated Jan. 10, 1866:

First, I claim the application of an inclined sieve when applied within the limits of a stove or range, as shown and described.

Second, I claim the sieve, B, the doors, D, the hearth plate, A, the partition plate, G, and frame, L, arranged and combined substantially as described.

Third, I claim the bottom plate, I and L, when arranged in combination with the partition plate, G, and hearth plate, A, as shown and described.

Fourth, I claim the inclosed sifting pan, B, capable of being vibrated in combination with the ash pan, O, when both are applied to a stove or range, as shown and described.

53,498.—Condenser.—James F. Spence, Williamsburgh, N. Y.:

I claim the pipe or pipes, D, which connect with the exhaust pipe of a steamboat engine, in combination with the paddle wheel or wheels, B, substantially as and for the purpose described.

53,499.—Foot Press.—N. C. Stiles, West Meriden, Conn.:

First, I claim the segmental cams, G H, in combination with the working lever, F, punch, E, and foot lever, I, constructed and operating substantially as and for the purpose set forth.

Second, Providing the segmental cams with cogs on the sides of their working faces, substantially as and for the purpose described.

Third, The arrangement of clutches, K, or other equivalent devices, in combination with the cams, G H, lever, F, and punch, E, constructed and operating substantially as and for the purpose set forth.

53,500.—Milk Shelf.—D. B. Sturdevant, W. C. Parsons, and Freeland Wheeler, Clifton Springs, N. Y.:

We claim the combined construction and arrangement of the series of independently revolving skeleton shelves, D D, friction rollers, K K, and portable frame, A B, the whole admitting a free circulation of air and operating substantially as and for the purpose herein set forth.

53,501.—Priming Cartridge.—Thomas L. Sturtevant Boston, Mass.:

I claim a percussion cap plunger or discharger as made with a cap entrance stopper, b, and with a cap carrier, a, arranged and designed to operate therewith, as and for the purposes set forth.

I also claim the combination of the shoulder, n, arranged at the top of the stopper, with the said stopper, b, applied to the cap discharger, for the purpose set forth.

53,502.—Machine for Cleaning Grain, Etc.—E. Sweetland, South Bend, Ind.:

I claim the arrangement of the radial and inclined wings, D and E, case, A, in combination with the shaft, B', crank, C, and screw, D', in the manner and for the purpose set forth.

53,503.—Attachment for Cooking Stoves.—Joseph A. Talpey, Somerville, Mass.:

I claim the cooking stove attachment herein described, arranged in the place of the pipe elbow, as and for the purpose set forth.

53,504.—Apparatus for Carbureting Air.—Wm. Thompson, Cleveland, Ohio:

I claim the curved tapering chamber, b, pipes, c, and cylinder, D', in combination with the cylinder, C, pipe, S, chamber, p, and pipe, u, arranged in the manner and for the purpose described.

Second, The float, P', crank, J, rod, k, and lever, r, in combination with the rod, P, valve, l, and pipe, I, arranged in the manner and for the purpose set forth.

Third, The radiating perforated pipes, h', annular chamber, f, and opening, o, in combination with the pipe, I, and cylinder, A, arranged and for the purpose set forth.

Fourth, The arrangement of the perforated cylindrical chambers, E F, and spaces or straining chambers, z, in combination with the gears, a a', shaft, e, and cylinder, A, operating in the manner and for the purpose set forth.

Fifth, The purifying box, N, in combination with the cylinder, A, and its internal devices, and for the purpose set forth.

53,505.—Water Elevator.—John Tilley, West Troy, N. Y.:

I claim, first, The arrangement of the slide or slides, b b, guide or guides, d d, link or links, c c, combined door and spout or doors and spouts, B C a, and valved bucket or buckets, E E', all constructed and operating substantially in the manner and for the purpose described.

Second, The arrangement of the valved buckets, combined door and spout, and the slide, b, substantially as described.

Third, The construction of the windlass, G, of two sections, m n, in combination with a provision for keying the section to its shaft, substantially as described.

53,506.—Lamp.—Charles N. Tyler, Buffalo, N. Y.:

I claim, first, The wick, W X, as shown in figures 2 and 3, substantially as and for the purposes set forth.

Second, The divided wick, substantially as and for the purposes set forth.

Third, The wick supporter, c, substantially as and for the purposes set forth.

Fourth, The wick supporter, c, in combination with a wick tube larger than the wick, substantially as, and for the purpose set forth.

Fifth, The wick tube, C, as shown in fig. 4, substantially as and for the purpose set forth.

Sixth, The wick tube, G, as shown in figure 5, substantially as and for the purposes set forth.

Seventh, The grooved wick tube, as shown in figure 7, or its equivalent, substantially as and for the purposes set forth.

Eight, The wick tube used with the loose wick, when provided with opening, o, as in figure 9, substantially as and for the purposes set forth.

Ninth, The closed vapor chamber, G, in combination with the wick, W X, substantially as and for the purposes set forth.

Tenth, The cap, D, in combination with wick, W X, substantially as and for the purposes set forth.

Eleventh, The cap, D in combination with the small wick, substantially as and for the purpose set forth.

Twelfth, The cap, D, as shown in figure 6, substantially as and for the purposes set forth.

Thirteenth, The cap, D, with openings, o, as shown in figure 13, substantially as and for the purposes set forth.

Fourteenth, The valve chamber, V, provided with a valve, v, and opening, s, substantially as and for the purposes set forth.

53,507.—Iron Railway Sleeper.—Franz Vester, Newark, N. J.:

I claim the herein described iron railroad tie, constructed in the manner substantially as set forth, as a new article of manufacture.

53,508.—Crimping Boots.—O: J. Warren, New York City:

First, I claim the lining of the bar, o, with india-rubber, Q, when the same is made to serve the office of a holder, and is used in connection with a form, F, applied to the rubber through the medium of a yoke, N, or its equivalent, substantially as and for the purpose herein set forth.

Second, The nut, K, on the screen, k, of shaft, B, connected with the yoke, N, through the medium of the collar, N, for the purpose of allowing the yoke to be turned independently of the nut, for the purpose specified.

Third, The sleeve, F, on shaft, B, provided with a projection, i, in combination with the notched hub, G, collar, H, and spring, I, substantially as and for the purpose set forth.

Fourth, The coupling by which the shaft, B, is attached to the bench, the same being composed of a plate, C, secured to the bench by a screw, D, and provided with a socket, a, to receive a pintle, b, of a fork, C, which is secured to the sleeve, F, by pivots, e e, when said coupling thus constructed, is used in connection with the boot crimping apparatus attached to shaft, B, and for the purpose specified.

53,509.—Water Meter.—Charles Weed, Boston, Mass., assignor to himself and J. S. Shaller, of Roxbury, Mass.:

I claim the arrangement of the primary and auxiliary cylinders and valves by which the main piston driven by the pressure of the water operates the valve of the auxiliary cylinders, and brings it into position to cause the pressure of water to operate, alternately, the pistons of the auxiliary cylinders which, in turn, operate the valve of the main cylinder, substantially as described.

53,510.—Last.—William Wells, South Danvers, Mass.:

I claim the two-part last herein described, divided horizontally near its lower surface and otherwise adapted for use in the manner and for the purposes specified.

53,511.—Dish-washing Machine.—Jonathan Wheeler, Athol, Mass.:

First, I claim the combination in a dish-washing machine of an ordinary force pump, E G H, and flexible discharge pipes, M, with each other and with the box or tank, A, substantially as described and for the purpose set forth.

Second, The combination in a dish-washing machine of the box or tank, A, with one or more horizontal partitions or troughs, B C, so constructed and arranged that the same water may be forced upon the dishes any consecutive number of times, substantially as described and for the purpose set forth.

53,512.—Churn.—James White, Cleveland, Ohio:

I claim the tubes, h h, dasher, F, and case, A, in combination with the pendulum, C, gearing, D e, and levers, d, substantially as and for the purpose set forth

53,513.—Truss.—Lewis B. White, Moscow, N. Y. Antedated Sept. 27, 1865:

I claim the two pivot bearings, o o, arranged at an angle to the end of the bow, in relation to the bow and pad lever, substantially as and for the purposes herein specified.

53,514.—Feeding Device for Sewing Machines.—John Williams, Troy, N. Y.:

First, I claim attaching to the feed point or part of a serving machine which carries the feeding surface, an adjustable removable steel plate, or its equivalent, to receive the wear from the action of the part of the machine which raises it, substantially as above set forth

Second, I also claim attaching to the feed bar of a sewing machine an adjustable removable steel plate, or its equivalent, to receive the wear from the parts of a sewing machine which acts against it, substantially as described.

53,515.—Machine for Swaging Sheet Metal Spouts.—S. F. Woodworth, Iowa Falls, Iowa:

First, I claim the arrangement of said dies, B C, in a standard, A, so constructed as to fit the square holes usually formed in a tinsmith's work bench.

Second, The dies, B C, in connection with the lever, D, provided with the arm, f, and eccentric projection, e, substantially as set forth.

Third, The gages, b, in connection with the dies, B C, and lever, D, for the purpose specified.

Fourth, Having the upper surface of the die, B, in an inclined position to facilitate the adjustment of the blanks thereon, as set forth.

53,516.—Dairy House.—Silas D. Yerkes, Downington, Pa.:

I claim the frame, A, provided with suitable openings or holders for cans or pans containing milk or cream, or both, and constructed and arranged substantially as described for the purpose specified.

53,517.—Sealing Boxes, Etc.—Robert M. Bartlett (assignor to Sarah T. Bartlett), Cincinnati, Ohio:

First, I claim the mode or method of sealing boxes, substantially as set forth.

Second, A grooved and indented packing box, either of wood or other suitable material, substantially as and for the purpose set forth.

53,518.—Machine for Ironing Hats.—William Best and Mahlon S. Drake (assignor to William Best), Newark, N. J.:

First, We claim controlling the movements of the smoothing iron, in the manner described, by means of guides, s s, and latches, v v, arranged substantially as herein set forth.

Second, The pulley, f, with its crank wheel, r, the pitman, i, vibrating arm, u, and pawl, z, arranged with reference to each other and with the ratchet wheel, x, spur wheels, g and d, and table, A, substantially as herein set forth, for the purpose specified.

53,519.—Bed Bottom.—Calvin M. Brown (assignor to David B. Turnbull), Aurora, Ill.:

First, I claim the combination of the wedge shaped block, D, the elastic strap, E, and the slats, G, arranged and operating substantially as and for the purposes specified.

Second, I claim securing the elastic strap, E, to the wedge-shaped block, D, by passing the strap through the mortise in said block, in the manner shown and described.

53,520.—Clasp for Pocket-books.—J. Warren Brown and Eliakim Rice (assignors to J. Warren Brown), New York City:

I claim the lid, and nicks, e, in combination with the swivel button, b, and slotted plate, c, constructed and operating, substantially as and for the purpose set forth.

53,521.—Churn.—James E. Casey (assignor to himself and Richard Lambert), Courtland Village, N. Y.:

I claim a device for communicating a reciprocating rotary motion to a supplementary dasher of a churn, substantially in the manner and for the purpose set forth.

53,522.—Breech-loading Fire-arms.—Francis Clark, Auburn, Mass., assignor to himself and Thomas H. Dodge, Worcester, Mass.:

First, I claim making block D, in two parts, substantially as set forth.

Second, Making the circular part, D', open as at h, as and for the purpose set forth.

Third, The combination of the parts, E and F, substantially as set forth, whereby end, e, projects past the end of F, and prevents any joint in the block where it comes in contact with the rear of the cartridge.

53,523.—Water-proof Soles.—John W. Coburn (assignor to Oliver F. Case), New Haven, Conn.:

I claim coating the inside of the sole for boots and shoes with rubber or any of its allied gums, when prepared and united substantially in the manner and for the purpose herein set forth.

53,524.—Trammel for Ellipses.—Charles Crow (assignor to himself and James Hollingsworth), Onargo, Ill.:

I claim the making of five or more holes in the elliptical trammel sweep and graduating the same as above described, for the purpose of striking ellipses of different relative diameters, as set forth.

35,525.—Cultivator and Seeding Machine.—Charles Denton, Pekin Ill., assignor to himself, Samuel E. Barber, Samuel F. Hawley, Decatur, Ill.:

First, I claim the plow frame consisting of the two oblique bars, c c, connected together as shown and connected to the bars, D D, of the main frame by means of the joints, b, for the purpose of raising the plows out of the ground when desired.

Second, The pivoted draft pole, O, in combination with the pivoted plow standards, K K, arranged substantially as and for the purpose specified.

Third, The main frame consisting of the bar, C, with slide bars, D D, attached when used in combination with the plow frame composed of the oblique bars, c c, and all arranged substantially as described.

53,526.—Knob Latch.—Henry H. Elwell (assignor to the Norwalk Lock Company), Norwalk, Conn.:

First, I claim the connecting of the slide latch, D, with the arm, a', of the lever, B, by means of the recess, c, and rocket, d, of said arm and the curcular end, e, of the slide latch and the notches or recesses, g g, in the top and bottom edges of the same, substantially as shown and described.

Second, In combination with the connection above specified, the pins, i, on the slide latch and the slide, E, substantially as and for purpose specified.

Third, The cylindrical collar, k, on the side latch in combination with the pins, i, and the slide, E, substantially as and for the purpose set forth.

53,527.—Thread Tension for Sewing Machines.—Pitt Evens, Jr., Cincinnati, Ohio, assignor to to the Florence Sewing Machine Company, Florence, Mass.:

I claim making and regulating tension in sewing machines by giving the thread a sigzag direction in its turns around the tension wheel, substantially as and for the purpose described.

53,528.—Condenser.—J. H. Fairchild, Highgate, Vermont, assignor to himself and Andrew Parker, Cleveland, Ohio:

First, I claim the basin, A, and perforated condensing pipe, F, in combination with the water pipe, H, and vapor pipe, E, as and for the purpose set forth.

Second, I claim the receiver, B, pipe, H, and pipe or spout, G, in combination with the pipe, F, and basin, A, as described.

Third, I claim the employment of a current of cold water, introduced through the pipe, C, so as to condense the vapor passing through the pipe, F, into oil in the receiver, B, as specified.

53,529.—Manufactue of Table Cutlery.—J. W. Gardner (assignor to the Lampson Goodnow Manufacturing Company), Shelburne Falls, Mass.:

I claim the combination of the pronged bolster and blade, forged in one piece, with a solid handle, all constructed in the manner herein represented and described.

53,530.—Knitting Machine.—Joseph Goodman (assignor to himself and Richard W. Reynolds), Pawtucket, R. I.:

First, I claim the combination of a set of stationary needles, n, having a triple motion, a rising and falling, an oscillating and a transversely-sliding motion, substantially as and for the purpose set forth.

Second, The transversely sliding carriage, K, in combination with the guide bar, t, adjustable rod, d', lever, f', and ratchet wheel, k, constructed and operating substantially as and for the purpose described.

Third, The carriage, K, and guide bar, t, in combination with the oscillating lever, l, and adjustable standard, q, substantially as and for the purpose set forth.

Fourth, The carriage, K, and guide bar, t, in combination with the slotted levers, v, and cams, a' a*, constructed and operating substantially as and for the purpose described.

Fifth, the double-flanged cams, o', worm wheel, n', and serrated wheel, k', in combination with the pawl, j', levers, f', and carriage, K, constructed and operating substantially as and for the purposes set forth.

Sixth, The rock shaft, i, with levers, l h, in combination with the standard, q, and carriage, K, and with the spring pawl, g, ratchet wheel, f, and feed rollers, F, constructed and operating substantially as and for the purpose described,

53,531.—Machine for Making Bolts.—Chas. Hall and Emil Hubner, New York City, assignors by mesne assignments of Chas. Hall and J. D. Van Voorhis:

First, We claim the combination of the preparing dies and finishing die with the tubular die and carriage, substantially as set forth.

Second, The combination of the subject matter of the first part of the invention with the carriage of the machine, and with the cam shaft of the dies, for forming both the preparatory and finished head in such manner that the carriage is moved intermittently, thus affording periods of rest during which the preparatory and finishing dies are operated substantially as set forth.

Third, The combination of the subject matter of the first part of the invention with the movable gage, substantially as set forth.

Fourth, The combination of the subject matter of the first part of the invention, and the carriage of the machine with a stop operated by a cam to hold the carriage at rest while the bolt blank is successively in the proper position to be acted upon by the several dies, substantially as set forth.

Fifth, The combination of the first part of my invention with the movable gage of the tubular die and with a cam by whose action the gage is caused to expel the bolt blank, substantially as described.

53,532.—Pump Valve.—A. M. Hansen (assignor to William Higby), Stockton, Cal.:

I claim a pump valve constructed in such a manner and so arranged relatively to its seat that the liquid shall be allowed to discharge both at the center and around the periphery of the valve, substantially as and for the purpose set forth.

Second, I claim the plate, C, formed with the channels, 7 8 9 10 11 and 12, adapted to communicate respectively with the chambers, 1 2 3 4 5 and 6, and so arranged that all may be closed or opened to the external air by the adjustment of the valve, K, or an equivalent closing device.

Third, In combination with the valve chamber, A, I claim the detachable plate, B, formed with the channels, B' B', as and for the purpose specified.

53,533.—Invalid Bedstead.—Warren S. Hill (assignor to C. S. Baker, Manchester), N. H.:

I claim the combination of the rack, c, segment, D, cog-wheel, E, shaft, G, wheels, H, jointed arm, K, and feet, A', constructed and arranged relatively to each other, and operating in the manner and for the purpose herein specified.

53,534.—Cleansing Animal Charcoal.—Gustavus A. Jasper (assignor to The Union Sugar Refinery), Charlestown, Mass.:

I claim the new or improved process substantially as hereinbefore described, for treating charcoal, either after or before use in a filter for the cleansing of a saccharine or other liquid, the same consisting in boiling the charcoal in an acid solution and washing it, the while being essentially as specified.

53,535.—Tweer.—Robert D. Kincaid (assignor to himself and Hall & Speer), Pittsburgh, Pa.:

First, I claim in combination with a water box or reservoir, and a blast or air pipe passing through it, the sleeve jacket or pipe surrounding said air pipe and open to and communicating with the water in the water box for the triple purpose of surrounding said blast with water, and for allowing for a free circulation of the water, and to prevent any sediment from clogging or lodging therein, substantially as and for the purpose described.

Second, I also claim in combination with an air passing through the water box, horizontally, and capable of being attached or connected with a bellows, a vertical branch pipe rising up within the box for the purpose of being connected with a fan blower, both or either to be used, substantially as described.

53,536.—Drill-feed for Artesian Wells.—Thomas J. Lovegroove (assignor to himself and Henry Baldwin, Jr.), Philadelphia, Pa.:

First, I claim feeding the drill-rope from the bull-wheel over the end of the walking beam through a series or system of pulleys, substantially in the manner described.

Second, I also claim the combination with the bull-wheel and the pulley, H, on top of the derrick of the pulleys, I J K, or their equivalent, substantially as and for the purposes set forth.

53,537.—Spring Punch.—John Lyle (assignor to himself and C. H. Allen), Newark, N. J.:

I claim the combination of the double spring, D, with the arms, A and B, of the punch, and with the thumb catch, E, substantially as described and for the purpose set forth.

Second, The combination of the thumb catch, E, with the spring, D, the arm, A, and the revolving cylinder, F, substantially as described and for the purpose set forth.

Third, The combination of the revolving cylinder, F, with the arm, A, and the thumb catch, substantially as described, and for the purpose set forth.

Fourth, The construction of the arm, a, and its combination with the arm, B, substantially as described, and for the purpose set forth.

53,538.—Machine for Preparing Peat for Fuel.—Samuel Marden (assignor to himself and Wm. H. Allen, A. P. Trott, and Cyrus Cobb Jr.), Newton, Mass.:

First, I claim the combination of the triturating mechanism, the follower, and the molds, when arranged to operate substantially as described.

Second, I claim also the employment of the cleavers, in combination with the follower and double set of mold boxes, substantially as shown and described.

Third, Also the arrangement or combination of mechanism for actuating the follower and clearers, substantially as shown.

Fourth, Also the mechanism for imparting the reciprocating lateral movements to the mold box, substantially as set forth.

53,539.—Revolving Fire-arm.—William Mason (assignor to E. Remington & Sons), Ilion, N. Y.:

First, I claim in combination with a revolving cylinder fire-arm a pivoted and hooked cartridge case extractor, arranged to operate in connection therewith, substantially in the manner herein described.

Second, I also claim in combination with a hook upon the extractor, the beveling of the rear end of the cylinder so as to insure the entrance of the hook between the flange of the cartridge and the cylinder, substantially as described.

Third, I also claim the recess, f, in the face of the extractor for allowing the cartridge case to turn or move while it is drawn out in a curved line from a straight chamber, substantially as described.

53,540.—Frame for Securing Liquor and Other Bottles.—Frederick J. Miller (assignor to William J. Miller), Brooklyn, N. Y.:

I claim a frame for holding and locking up bottles by means of a movable locking device, substantially as specified, applied to retain the bottles and stoppers, as set forth

53,541.—Clothes Drier.—Samuel Parker (assignor to Elton Ward), Forest Grove, N. Y.:

First, I claim a clothes frame sliding on guide ways, for the purpose of receiving the clothes within a room, and carrying them out into the open air when arranged, and to expand and contract as herein described.

Second, I further claim the levers, I I' P, with the hanging cords for contracting the apparatus, to pass through a door or window, and expanding it for use, as explained.

53,542.—Piston Rod Packing.—Edward T. Prindle (assignor to Self and James Walker), Aurora, Ill.:

I claim, First, The combination of the perforated cap, c, for the admission of steam or other elastic agent, with the conical packing, d, substantially as and for the purpose set forth.

Second, The combination of the perforated cap, c, springs, e, bearing ring, i, and the sectional conical packing, a, substantially as described.

53,543.—Breech Loading Fire-arms.—Joseph Rider, Newark, Ohio, assignor to Self and E. Remington & Sons, Ilion, N. Y.:

I claim in combination with an under hung hammer, such as described, a combined half and full cock, trigger, d e, pivoted to the frame and to each other, and acting in connection with the tail, b, so that the hammer may be securely held at half cock, and operate in the usual well-known manner at full cock, thus making the arm perfectly safe to carry when loaded, substantially as described.

53,544.—Car Brake.—Daniel T. Robinson, Boston, Mass., assignor to Self and Lorin L. Fuller, Malden, Mass. Antedated March 21, 1866:

I claim the application and arrangement of the lever, D, or its equivalent device, substantially in manner and to operate as above described, and in combination with said lever, I claim the employment of the auxiliary rope or chain, b', essentially in manner and to operate as hereinbefore set forth.

53,545.—Soldering Iron.—John H. Trowbridge, (assignor to Self and Daniel Fuller), New Haven, Conn.:

I claim a soldering iron constructed in the manner substantially as herein described, as a new article of manufacture.

53,546.—Metallic Handle for Cutlery.—Leroy S. White (assignor to Self, Rogers & Brother, and Green Hendrick), Waterbury, Conn.:

First, The method of effecting the soldering of the tang of table and other cutlery, in tubular metallic handles by inserting the solder at or through the rear open end of the latter, substantially as described.

Second, Constructing and applying the cap, D, as described.

53,547.—Apparatus for Preparing Peat.—Henry Youle Hind, Fredericton, N. B:

First, I claim the method herein described of drying peat, and preparing it for immediate use as fuel, by exhausting the moisture and compressing the peat substantially as and for the purpose set forth.

Second, I claim the conical or funnel-shaped perforated bottom, B, with the interposed layer or filling of canvas, or its equivalent, as and for the purpose described.

Third, I claim the combination of the cylinder, A, perforated bottom, B, and chamber, C, as and for the purpose set forth.

Fourth, I claim the combination of the cylinder, A, perforated bottom, B, chamber, C, and the air-exhausting apparatus, as and for the purpose set forth.

Fifth, I also claim the combination of the cylinder, A, provided with the false bottom, B, and air space, C, with the heating apparatus, S, and its connecting pipe, T, substantially as and for the purpose described.

53,548.—Revolving Fire-arm.—Prosper Polain, Brussels, Belgium:

First, I claim the combination of the following elements: I claim a revolving cylinder, whose chambers are provided with lateral openings and countersunk grooves, as set forth.

Second, A cluster of charge tubes capable of revolution with the revolving cylinder, and of sliding on its axis, as herein described, the whole operating so that the fire-arm may be loaded or the charges withdrawn without disengaging the sliding charge tubes from their respective cylinder chambers.

53,549.—Substitute for Leather.—Philipp Wenzel, Mayence, in the Grand Duchy of Hesse Darmstadt (assignor to Simpson K. Urbino), Boston Mass.:

I claim the composition made substantially as described.

53,550.—Apparatus for Disengaging Boats from Davits.—Edward Oliver & George Myers, Rotherham, England. Patented in England September 9, 1863:

First, We claim the tube, A, inclosing the rod, B, formed with right-handed and left-handed screws, a and b, with their screwed threaded nut, recessed to receive the pointed ends of the hooks, E E, and handle or hand-wheel, C, the braces, D, with their weighted hooks, E E, and the locking catch, m, the whole being arranged substantially in the manner and for the purposes hereinbefore described and set forth.

Second, The double-barreled windlass, with its weighted lever brake, K, substantially in the manner and for the purposes hereinbefore described and set forth.

Third, The two rods, a a, with their curved inner ends, b b, and furnished with a rack, the teeth of the said rack gearing into the pinion, c, which is caused to rotate from the outside by the weighted lever or hand wheel, d, the whole being operated substantially in the manner and for the purpose hereinbefore described and set forth.

And, Lastly, Forming the lower ends of the brace pieces, D D, with the jaw pieces, e, e, for inserting the ring or hooks by which the boat is suspended, And passing the rods, a a, through the hoooks or the eye of the rings by which the boat is suspended, the same being operated substantially in the manner and for the purpose hereinbefore set forth.

53,551.—Dropper for Harvesters.—Jacob Miller, Canton, Ohio:

I claim a flexible dropper for catching, holding and delivering grain as it comes from the cutters, constructed and operating in the manner and for the purpose substantially as described.

REISSUES.

2,209.—Lamp Trimmers and Shears.—William B. Barnard, Waterbury, Conn. Patented December 27 1864:

I claim the construction of shears or lamp-trimmers substantially in the manner herein set forth.

2,210.—Sewing Machine.—Joseph W. Bartlett, New York City. Patented January 31, 1865:

First, I claim imparting to the looper rod the rocking and sliding motions described, when the parts for giving these motions are arranged and operated substantially as and for the purposes described

Second, The adjustable sleeve, o, constructed and operated substantially as and for the purposes set forth.

Third, In combination the rocking and sliding rod, e, sleeve, o, cam, u, and feed bar, s, constructed and operating substantially as described.

Fourth, The combination and arrangement of the rotating cam, g, on the driving shaft, with the connecting rod, h, rocking shaft, i, cam, u, and feed bar, s, operating as and for the purposes set forth.

Fifth, The presser foot, e, cam, x, shown in figure 7, and sliding and rocking rod, i, when combined and operating substantially as described.

2,211.—Revolving Fire-arm.—John Webster Cochran, New York City. Patented November 10, 1863:

First, I claim the unloading and cartridge shell expelling piston or plunger, d^2, attached to the frame of the fire-arm so as to work through the recoil shield, substantially as and for the purpose herein specified.

Second, The unloading piston or plunger, d^1, and loading rammer, d, connected by a bar or yoke, e, to operate substantially as and for the purpose herein specified.

2,212.—Insulating Telegraph Wires.—Alfred B. Ely, Newton, Mass. Patented January 9, 1866:

First, I claim insulating telegraph wires and conductors, or their supports, with the material described substantially as set forth.

Second, The new article of manufacture described, constituting an insulated wire, made substantially as set forth.

2,213.—Machine for Oiling Wool.—George S. Harwood and George H. Quincy, Boston, Mass. Patented October 7, 1862. Reissued September 13, 1864:

First, We claim the oiling or lubricating of wool or other fibrous material, by means of a pressure roller imprinting and diffusing the oil or lubricating mixture which shall have been supplied in requisite quantity to the roller in the manner substantially as set forth.

Second, A machine or apparatus for oiling wool, consisting of the following elements combined:

1st, One or more reservoirs for containing the oil or oleaginous mixture. 2d, A dipper or dippers and a brush or brushes, the former to convey and the latter to receive the determinate and requisite quantity of oil or oleaginous mixture. 3d, A distributor or distributors, receiving oil or oleaginous mixture from the brush or brushes and transferring it to the wool, substantially as set forth.

Third, In automatic wool-oiling machinery, we claim the combination of a tank or reservoir with a dipper or equivalent mechanism for performing the double function of stirring or agitating the oil or lubricating matter in the tank, and of lifting therefrom at each action a quantity of oil or lubricating matter requisite for one oiling operation, and this is claimed only when arranged for operation as described—that is to say, so that the said dipper shall come in contact with the wool, substantially as set forth.

Fourth, In automatic wool-oiling machinery we further claim, combining with an oil tank, a dipper, constructed substantially as described, for the more perfect agitation of the liquid, substantially as set forth.

Fifth, In automatic wool-oiling machinery we also claim the combination of an oil tank, with a dipper constructed substantially as described, so that the requisite quantity of oil for each operation shall be lifted and conveyed from the tank by adhesion of the oil or lubricating matter to the dipper, substantially as set forth.

Sixth, The combination with an oil reservoir and intermediate dipper and brush, or other equivalent device for conveying oil in requisite quantities to the distributor of a pressure roller arranged immediately in front of the feed roller above the feed apron of carding or other wool-preparing machinery, substantially as set forth.

Seventh, In a wool-oiling apparatus, in which the wool is oiled by imprinting the oil as described, we claim, in combination with a pressure roller or the equivalent thereof, a brush or brushes charged with oil by means of one or more dipping plates, substantially as set forth.

Eighth, The combination with one or more oil reservoirs and traveling brush or brushes of a plate or plates for changing the said brush or brushes with the requisite amount of oil, and when arranged for action so as to properly agitate the oil or oleaginous mixture, substantially as set forth.

Ninth, In combination with a distributing pressure roller, we claim a brush traveling diagonally over the said roller—that is to say, at an angle with the axis of, but in a plane tangent to, the roller, substantially as and for the purposes set forth.

2,214.—Improved Blasting Compound.—Louis Ludovice and Louis Ludovice, Jr., New York, City, assignees of Moriz Nowark, of Williamsburgh, N. Y. Patented May 24, 1864. Antedated March 18, 1863:

First, I claim the combination of chlorate of potash, nitrate of potash, and ferrocyanate of potash with each other, and with a substance capable of evolving gases, such as carbon or equivalent materials, substantially as and for the purpose described,

Second, The combination of chlorate of potash, nitrate of potash and ferrocyanate of potash with binoxide of manganese, substantially as and for the purpose set forth.

Third, The use of bicromate of potash, in combination with chlorate of potash and nitrate of potash and ferrocyanate of potash, substantially as and for the purpose described.

Fourth, The application of a solution of chlorate of potash, nitrate of potash and ferrocyanate of potash to paper or other vegetable materials capable of being formed into cartridges and protected by some water-tight compound, such, for instance, as those above specified, for the purpose set forth.

2,215.—Improved Cement for Slate Roofing.—Charles Wanzer, of New York City. Patented June 24, 1862:

I claim a compound to be used as a cement, composed of grease, pitch or tar, and quick lime, hydrate of lime, chloride of lime or bleaching powder, or any equivalent thereof, either with or without linseed or other oil, and venetian red or other ochre, substantially as described.

2,216.—Improved Method of Starting Street Railway Cars.—Thomas R. Sinclaire, of New York City. Patented December 19, 1865:

First, I claim, in the application of car starters and brakes to railroad cars, the suspending of the frame, C, in which a portion of the operating machenism is placed directly on the axles, D D, of the car, the axles passing loosely through said frame, substantially as shown and described.

Second, The arrangement, a spring or a series of springs, working conjointly or in unison, and constituting the motor of a car starter and brake, with the operating mechanism in such a manner that the motor may be applied to either axle of a car, and the spring or springs wound up from either axle, substantially as shown and described.

Third, The sliding clutch, F, in connection with the gears, E I, when arranged with a spring or springs, J, substantially as and for the purpose herein set forth.

Fourth, The levers, G G, connected with the clutch, F, and applies to the truck substantially as described, when used in connection with the gearing and spring or springs, as and for the purpose set forth.

DESIGNS.

2,284.—Coffin Handle.—P. Bradford (assignor to Sargent & Company), New Haven Conn.

2,285—Floor Oil Cloth.—Charles T. Meyer Bergen, N. J.

2,286.—Tobacco Pipe.—Louis Laarback, Philadelphia, Pa.

2,287.—Plate of a Cook Stove.—Garretson Smith & Henry Brown, (assignors to Abbot & Noble), Philadelphia, Pa.

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5. It is so simple in its construction that any person can adjust it and direct its operations without previous experience.
6. It is not liable to get out of repair.
7. It uses clay directly from the bank, water being used if the clay be not sufficiently moist.
8. The Machine tempers its own clay, presses it into molds, strikes the brick, lifts them from the molds, and turns them on edge ready for removal.
9. The clay is used so stiff, and under pressure so great, that the brick can be hacked ten high directly from the Machine, all risk of destruction by rain being entirely obviated.
10. All the labor required in making brick by this Machine is to shovel in the clay, and to remove the brick for hacking as they issue from the molds.
11. It requires one man to shovel the clay, one boy to remove the brick to the truck, one boy to run off the truck, and one man to hack the brick.
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"One *desideratum* Gard's Machine possesses over competitors, is that the clay is moist enough to allow the particles to be well tempered, so as to thoroughly unite and cement together, while on the other hand it is sufficiently stiff and is pressed so well that the brick can be hacked eight or ten high directly from the machine. It is truly a great labor saver, and I cheerfully recommend it to all brick-makers G. W. DUNLAP."

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TO ENGINEERS.—INCRUSTATION REMOVED AND PREVENTED.—Baird's Patent Incrustation Preventer and Remover, for Steam Boilers, in either Salt or Fresh Water. No invention connected with steam power combines so many advantages as this. The economy in fuel alone, from its use, repays the cost of the preventive.
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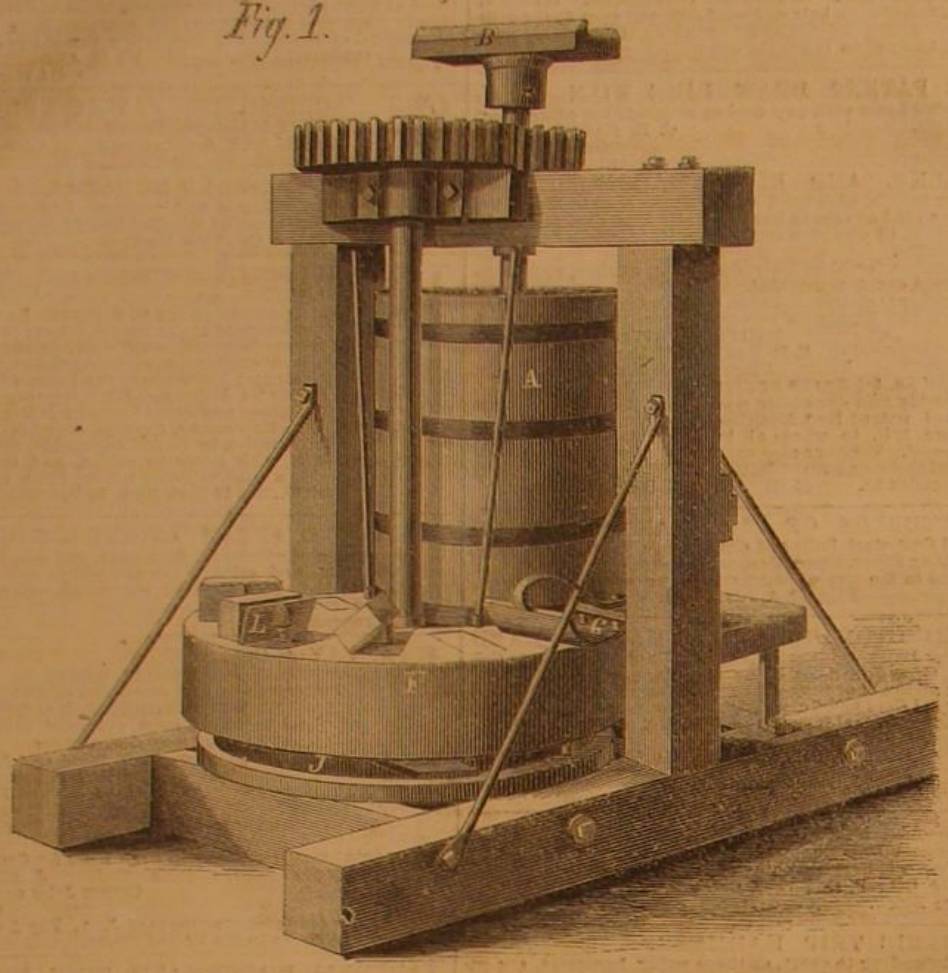
Improved Brick Machine.

These engravings represent a new brick machine which has some points of novelty. It is of that class where bricks are molded direct from the pug mill or chamber where the clay is tempered, without passing through other processes. It is extremely compact in form, and has but few details and those not of a complicated character.

Fig. 1 is a perspective view; Fig. 2 is a section through the machine, and Fig. 3 is a view of the aperture through which the clay passes into the mold.

The clay is placed in the chamber, A, and the mill

Fig. 1.



GARD'S BRICK MACHINE.

set in motion by the action of a sweep in the head, B. This pulverizes and intimately mixes the clay by the beaters, C, on the main shaft. These have a twist in them which causes the clay to be forced down to the bottom of the chamber. Here there is a spiral blade, D, whose office is to force the clay into the mold boxes, which are shown at E. These are ranged in rows about the circumference of a circular table, F, which revolves through the action of gearing, in a direction contrary to the blade, D, so that as the

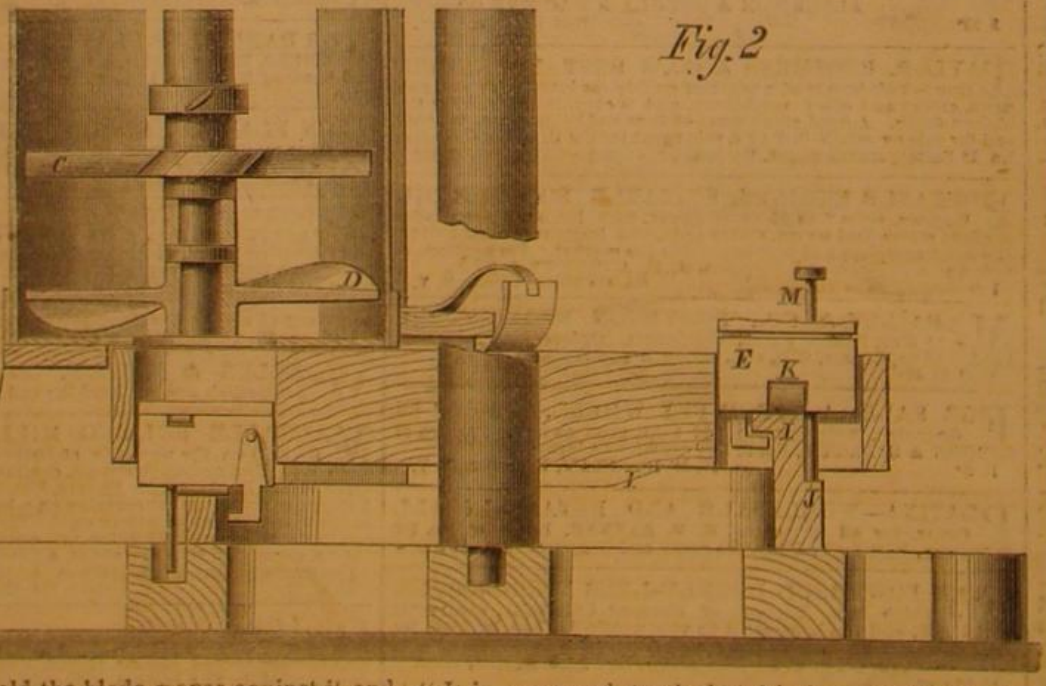


Fig. 2

clay enters the mold the blade moves against it and crowds it down compactly in the corners. As the table, F, continues its motion, the brick is carried with it, and the superfluous clay cut off by a slide, G, Fig. 3. This is retained in place by two stout wooden plugs, H, which are strong enough for ordinary purposes; should any stone accidentally get in the clay and come in contact with the slide and the edge of the mold, the plugs will break and thus allow it to yield, thereby saving more important parts of the machinery from injury. The bricks are now formed and in the boxes; it remains to get them out. This is done in a novel manner. The reader will see two inclined planes—one at I, in Fig. 2, and another at J, Fig. 2. The former raises the box by the aid of a roller, K, and the latter throws the brick out. This is done by having a false top, L, exactly like a box cover with hinges. There is a short shaft, M, Fig. 2, which projects through the mold box and rests at bottom on the inclined plane, J, as clearly shown in Figs. 1 and 2. As the table runs round them, these planes push up the box, and one acting a little after the other, tip the brick out on the table, from whence it is afterward removed. These are the details, and in the model they work well.

Patents were issued Nov. 25 and Dec. 5, 1865. A patent is also pending on the machine through the Scientific American Patent Agency. For further information address E. R. Gard, No. 102 Lake street, Chicago, Ill. [See advertisement on another page.]

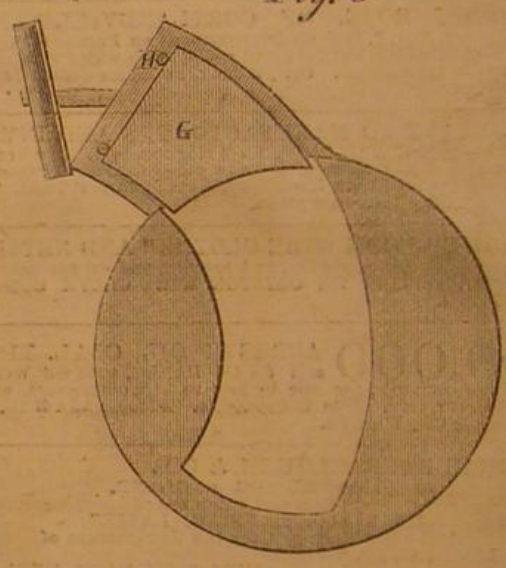
Electricity in a Cotton Mill.

The Lowell (Mass.) *Courier* of March 23, says:—

"It is a general truth that friction developes electricity, and most workmen know that a macine belt at high speed by its friction with the air is highly electrified. It has for years been a common experiment for a workman to light gas burners by holding one hand to a fast-going belt and the other to the open burner. This matter was curiously demonstrated in the Appleton Mills of this city on Wednesday. A strong smell of fire being noticed, the premises were carefully searched, and a small quantity of cotton lint inside a belt casing, was found on fire. The lint lay upon a beam which was within four inches of a belt some fifteen inches wide and moving two hundred and twenty revolutions a minute. In the beam was an iron bolt, the head of which was toward the belt. From the belt to the bolt was passing a stream of electric sparks, which had set the cotton lint on fire. After attending to this case Mr. Motley, the agent, opened the casing of a similar belt in another mill. The beam in this case was fourteen inches from the belt, but the stream of electric sparks was at once seen jumping across the beam although it had not set fire to anything. Perhaps some of the cases of fire from supposed 'spontaneous combustion' are due to electricity from machinery. The subject is an interesting one for investigation, and probably a profitable one."

Valentine found that the whole quantity lost by exhalation from the cutaneous and respiratory surfaces of a healthy man, who consumed daily 40,000 grains of food and drink, to be 19,000 grains, or three and one-half pounds.

Fig. 3



It has been ascertained by means of the Sirene that the wings of the mosquito vibrate at the rate of 15,000 times a second.

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

Vol. XIV.—No. 16. (NEW SERIES.) | NEW YORK, APRIL 14, 1866. | $3 PER ANNUM IN ADVANCE.

Improved Hot-air Furnace.

It is a well known fact to all who have given attention to economy in burning fuel that it is used to great disadvantage in ordinary stoves and ranges. In cooking stoves particularly the spaces are so cramped and the passages so contracted that the products of combustion, smoke and gas, completely choke them, so that all the draft that can be obtained is required to have an energetic fire.

A great deal of attention can be profitably bestowed on the common cooking stoves, for they are by no means economical, or so efficient, as they should be for the coal consumed.

The furnace here shown is intended for heating purposes. It is a moist hot-air furnace; so arranged that the air is charged with steam or moisture, as it passes into the apartments to be warmed, and deprived of the dryness which is so distressing to many and so apt to induce diseases of the throat.

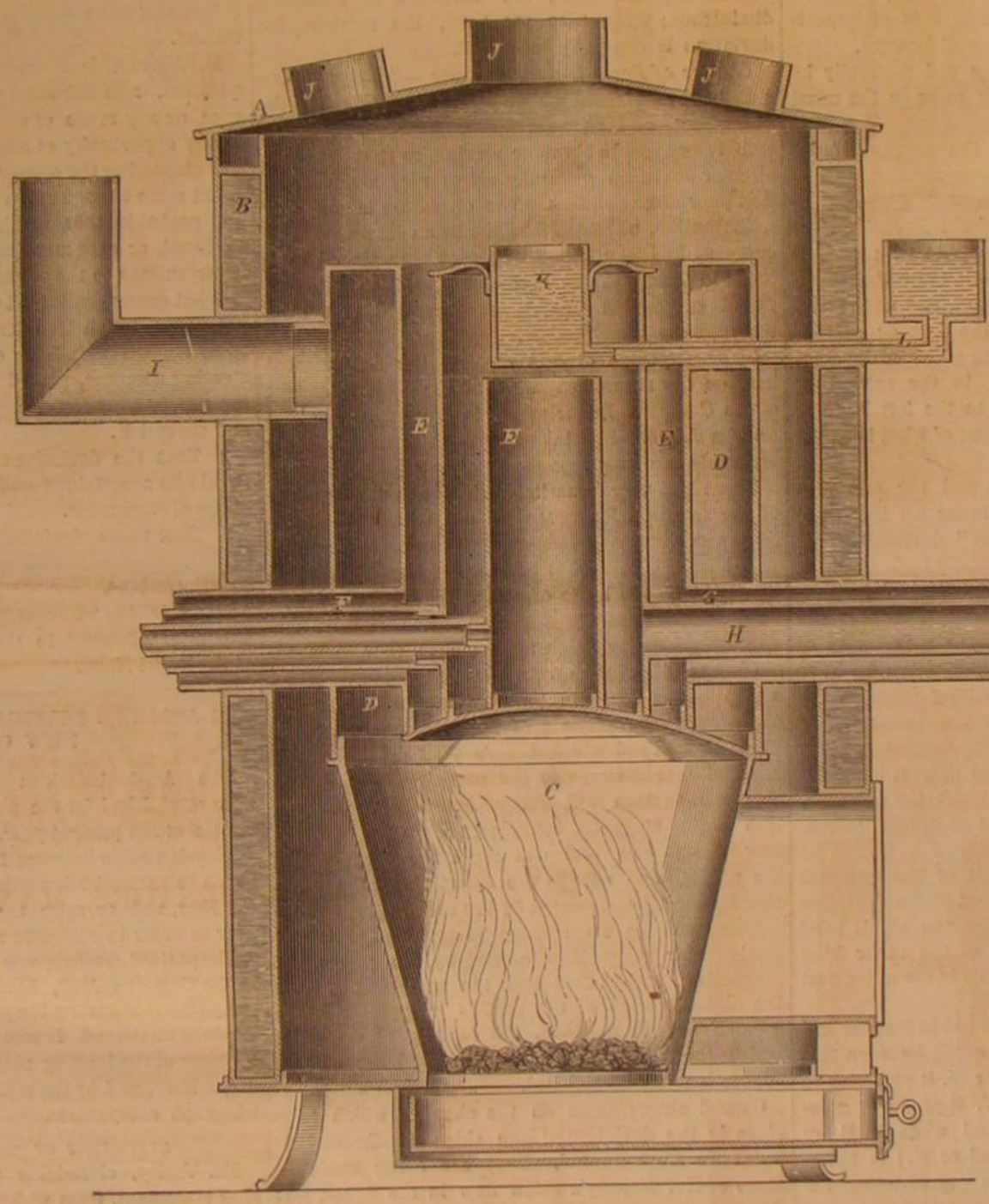
In construction this furnace is simple. It is easily cleaned when foul, and requires no complicated array of dampers to render it effective. It is only necessary to build the fire and keep it burning, and the rest of the duty is done by the furnace itself.

In detail it is a structure, A, filled in with non-conducting material, B, so as to confine the heat in the center and prevent it from radiating. At the bottom of the furnace is the fire-pot, C, communicating with the combustion chamber, D, by segmental openings in its upper part. Above this fire-pot are the hot-air passages, E, surrounding one another and fitted with pipes, F G H, to convey cold air as fast as that already heated escapes.

The smoke-pipe is at I, and the hot air is distributed about the building from the openings, J.

A supply of water is maintained in the central vessel, K, through the tank and pipe, L. This being kept full continually insures the proper degree of moisture in the heated air. These are the principal parts.

This furnace seems to be very well designed for its purpose. The chamber wherein the products of combustion unite is large and roomy and is directly exposed to a high heat from the fire-pot crown. It is necessary that this should be so to insure ignition, or at least combustion of the smoke and gas. It should prove economical and efficient. A patent pending through the Scientific American Patent Agency. For further information address H. G. Dayton, Spencer House, Cincinnati, Ohio.



DAYTON'S MOIST HOT-AIR FURNACE

DEVIATION OF THE COMPASS IN IRON SHIPS.

At a meeting of the Royal Institution of Great Britain on the 9th of February a paper, by Archibald Smith, Esq., M.A., F.R.S., was read, "On the Deviation of the Compass in Iron Ships."

The deviation of the compass is a subject of great and increasing importance, owing to the great and increasing amount of iron used in the construction of vessels, and the consequent increase in the amount of the deviation and in the apparent irregularity of its laws.

On the present occasion it will be necessary for me to omit altogether some of the most important and most interesting parts of the subject, viz., first, the mathematical part, including algebraical formulæ, arithmetical processes, and graphic constructions of great interest and utility; and secondly, the numerical results for different ships and classes of ships which have been obtained from the reduction and discussion of observations made in a large number of ships in the Royal Navy. I must confine myself to an attempt to explain the principles on which the forces which cause the deviation act, and the principles on which the deviations produced can be reduced to law, and to stating generally what has been accomplished, and what remains to be accomplished.

General Considerations.—1. A magnet is a bar of steel, the ends of which have opposite properties; they are generally marked N. and S. (north and south), but to avoid the confusion which would be occasioned by speaking of the magnetism of the north end of the needle or of the north end of the earth as south magnetism, it is convenient to distinguish them as red and blue (which may be remembered from R occurring in north and U occurring in south.)

The property is that the red end of one magnet attracts the blue end, and repels the red end of another magnet, and *vice versa*.

If we lay two magnets at a little distance in the same line with unlike poles turned to each other, and lay a soft iron rod in the interval between them, the soft iron rod will be magnetized by induction; the end next the blue pole of one magnet will become red, the end next the red end of the other magnet will become blue. If we turn the rod about its center, it will gradually lose its magnetism, till, when at right angles to the line of magnetization, it will be neutral, and if we turn it further, it will become magnetized in the opposite way.

The earth is a magnet, having a blue pole in latitude 70° N., long. 96° W., and a red pole in lat. 75° S., and long. 154° E. The direction of the magnetic force in London at present is the same as if there were a blue pole 20½° to the west of north, and 68° below the horizon, and a red pole 20½° to the east of south, and 68° above the horizon. This direction is called the line of force, or the line of "dip." If we hold a soft iron rod in the line of dip, it becomes instantly magnetized, the north or lower end becoming red, the south or upper end becoming blue. If we hold the rod vertically, the lower end will still be red, but of less intensity, the upper end blue, also of less intensity. If we hold the rod horizontally north and south, the north end will be red, but of still lower intensity. If we now turn the rod in the same horizontal plane, its magnetism will diminish till it becomes east and west, when it will be neutral, and if we turn it still further, the magnetism will be reversed; the amount

of the changes will be greatly increased by hammering the rod in each position. In a rod which I used, the effect was increased by hammering from 12 to 80, or between six and seven-fold. If the iron had been perfectly soft, it results from the experiments of Weber and Thalen that the effect would have been about 36.

A sphere of soft iron will be magnetized in the same way however held. The diameter in the line of dip will be the axis of magnetism, and the lower and north half of the surface will be red, the upper and south half blue.

In bodies of any other shape the effect will be similar, though less regular, if the shape be irregular.

In an iron ship, on the stocks, intense magnetism is developed by the process of hammering; red magnetism being developed in the part of the ship which is below and toward the north, and blue magnetism in the part which is above and toward the south.

As the usual position of the compass is near the stern, it follows that in the case of ships built head north, the compass is in a position where there is an intense blue magnetism drawing the north end of the compass strongly to the stern and downward, and generally producing a very large deviation, besides a large heeling error. In such ships it is of importance to have a standard compass well forward.

In ships built head south, there will generally be less deviation and little heeling error in the usual position of the compass.

In ships built east and west, the amount of deviation is generally small, but is less regular than in ships built head south.

Theoretical Representation of the Deviation.—If we place a magnet before the compass with its blue end turned to the compass, it will draw the north end of the needle to the ship's head, and as the ship turns round, there will be, in the first or eastern semicircle, a deviation of the north point of the compass to the right hand or east, in the second or western semicircle, a deviation to the left hand or west. This would produce one part of what is called the "semicircular" deviation.

The effect of the two magnets and the one iron rod, which we have considered, make up the whole of what is called the "semicircular" deviation.

If we place a soft iron rod vertically in front of the compass, with its upper end at the level of the compass, this end, which will be blue, will attract the north end of the needle, and produce a deviation of exactly the same kind as the magnet which we have considered. It will, therefore, simply increase the semicircular deviation caused by the first magnet. If the red end of the imaginary magnet, or the lower end of the imaginary rod, be nearest the compass, or if the magnet or rod be abaft the compass, an effect of the same kind, but in an opposite direction, will be produced.

A magnet to starboard or port of the compass will produce a similar effect, except that a deviation of one kind will be produced when the ship's head is on the north semicircle, and of the other kind when on the south semicircle. This is the other part of the "semicircular" deviation.

If we lay a horizontal soft iron rod in front of and directed to the compass, it will easily be seen that when the ship's head is N. S. E. or W. it produces no deviation. When N. E. and S. W. it produces a deviation to the right hand or E. and when S. E. or N. W. a deviation to the left hand or W.; it therefore produces what is called the "quadrantal" deviation.

A horizontal soft iron rod directed to the compass, but placed to the starboard or port, will produce an effect of exactly the opposite kind, and would correct that produced by the first rod; but if the second rod, instead of being on one side, passes, as it were, through the compass, it will produce exactly the same effect as the first rod. The two rods will then conspire to produce the quadrantal deviation.

A quadrantal deviation of the same kind will be produced if the first rod instead of being on one side of the compass passes through it, provided always that its force is less than that of the transverse rod.

The magnets and soft iron rods we have imagined must not be considered as mere possible cases, but as representing truly the actual case in all ships. They are, in fact, the physical interpretation of Poisson's general formulæ for the action of induced magnetism, which interpreted amount to this—that the effect of the iron of any body, however irregular, on a magnetic particle, is exactly the same as that of nine soft iron rods and three magnets. When the iron is symmetrically distributed, as in a ship, the rods are reduced five in number, viz., the four we have considered, and the fifth lying fore and aft, with one below the compass, which would make the heeling error greater or less with the ship's head north than it is with the ship's head south, but this is not an effect of much importance.

Effect in Particular Ships.—In wooden ships the semicircular deviation is represented by the effect of a single vertical rod of soft iron in front of the compass, and the quadrantal deviation is very small.

In iron ships the semicircular deviation is generally represented by the effect of a magnet at the part of the ship which was south in building, with its blue end turned to the compass.

Armor-plated ships are generally plated after launching; the semicircular magnetism is greatly affected by the position in which they are plated. If they are plated in the direction opposite to that in which they are built, the deviation is generally diminished; when they are built, the semicircular deviation is generally increased.

Change of Deviation from Time.—What we have called the permanent magnetism is in truth only subpermanent, and changes much, particularly if the ship is exposed to blows or strains, so that the semicircular deviation generally alters very much in the first year after building. The alteration is generally a diminution, although it might be an increase if the compass had by accident or choice been placed in a position where the semicircular deviation from induced magnetism exactly counteracted that from the permanent magnetism.

In consequence of this change the Government has, on the recommendation of the Superintendent of the Compass Department, laid down a rule that no iron ship shall be taken up as a transport till it has made one long voyage.

There is a very remarkable change in the capacity of the soft iron for receiving magnetism by induction, which seems to indicate some molecular change in the iron, viz., that it becomes less susceptible of induction by the lapse of time. The effect of this on the strength of the iron is one of the most important points to which attention is now directed.

Change of Deviation from Change of Place.—When a ship sailing south reaches the magnetic equator, the earth's magnetism acts horizontally. The vertical soft iron rod which I have imagined will then have no magnetism, and the semicircular deviation arising therefrom will disappear. When she goes into south magnetic latitudes, the upper end will now become red, and will repel the north end of the needle, and change the direction of the semicircular magnetism caused by the rod.

There will be no corresponding change in the semicircular magnetism caused by the permanent magnetism, except that near the magnetic equator the directive force of the earth's magnetism being greater than in England, the amount of deviation which the same disturbing force produces will be proportionately diminished.

Careful observations on the changes which take place in the deviation of iron ships in different latitudes are much wanted. They are being made in some of Her Majesty's ships now in the South, but there are no means of procuring such observations from merchant ships.

No change is produced in the quadrantal deviation by a change of the ship's geographical position.

Effects of Special Arrangements of Iron.—The upper or lower ends of all vertical masses of iron produce powerful effects on the needle.

The stern post, iron stanchions, funnels, gun turrets, generally produce large deviations, but if the place of the compass is judiciously selected, they or some of them may be used as correctors.

Horizontal masses of iron, such as deck-beams, produce a great effect, generally increasing the quadrantal deviation and diminishing the directive force. Both causes of error may be reduced by having as little iron as possible immediately below the compass, or within a cone traced out by a line passing through the compass, and making an angle of 54° 45 with the vertical.

DESIDERATA.

I. *Royal Navy.*—The only desiderata seem to be that greater attention should be paid to the preparing a place for the standard compass, and to the position of the ship in building and plating. The position of the standard compass should be shown in the drawings of every ship, which, before being finally settled, should be submitted for the observations and suggestions of the Superintendent of the Compass Department.

Ships should be built as much as possible head south, and should be plated in the opposite direction to that of the building.

Careful recommendation as to the special points to be attended to have been submitted to the Admiralty by the present Superintendent of the Compass Department, and we may hope that much benefit will be derived from them.

A proof of what may be effected in this way, has already been given in the case of several of the ships of the Imperial Russian Navy, in which the arrangements made under the superintendence of Captain Belavenetz have greatly reduced the amount of deviation.

II. *Mercantile Marine.*—This is a more difficult question, from the want of any general superintendence, or any mode of establishing a uniform system, or any opportunity of receiving, recording, reducing, and discussing the observations made.

Till some change takes place in this respect, it is not probable that much improvement will be introduced, or that merchant ships will make their due contributions to the advancement of science.

What seems desirable is—

1. That in all iron steam passenger ships there should be a standard compass distinct from the steering compass, placed in a position selected from the small and uniform amount of the deviation at and around it.

2. That the deviations by the standard compass should be ascertained and returned to a department of the Government.

3. That these deviations should be carefully recorded, reduced, and discussed by a competent superintendent.

Many indirect advantages might be expected to flow from following, in these respects, the example of the Royal Navy.

THE ATLANTIC TELEGRAPH---MEETING OF THE NEW COMPANY.

The Anglo-American Telegraph Company has been established for the purpose of executing, in the course of the present year, the enterprise of laying a submarine cable between Ireland and Newfoundland, so as to connect telegraphically the Old World and the New, and to raise the cable partially laid last year in order to complete a second line to America. An important meeting was held on the 14th of March, in the Common Hall, Hackin's hey, Liverpool, for the purpose of having the prospects of the undertaking fully explained. It was very numerously attended by some of the leading ship owners and merchants of the town, and by the representatives of the various telegraph companies.

STATEMENT OF THE ELECTRICIAN.

Mr. Varley, electrician to the company, made a long statement, from which we extract the most interesting portions. He said that Prof. Wm. Thomson, professor of natural philosophy at the University of Glasgow, who was second to none in mathematical engineering, had gone very carefully into the question relating to the effect of the water upon the operation of laying and recovering cables. And from the fact that the strain on the cable was only fourteen hundred weight during the operation of paying out, he was enabled to calculate precisely what was the action of the water during the operation of submersion; and he had found that the cable from the ship, owing to its light specific gravity, and the resistance which it experienced in passing through the water, sank so slowly that the cable from the stern of the vessel to where it touched the ground followed an incline extending over a distance of no less than seventeen miles from the stern of the vessel; in other

words the cable was nearly three hours in going to the bottom of the water. From that he had calculated what would be the amount of friction in lifting the cable through the water from the bottom. The cable was paid out at the rate of six knots an hour and the operation of receiving would not be performed at a greater rate than one knot an hour, and at this latter speed the friction upon the cable from the bottom—a distance of two miles—the weight of the cable would be about 28 cwt., making a total of about 30 cwt.; and, as the breaking strain of the cable was 7 tuns 15 cwt., it would at once be seen that there was a large margin of strength. The new cable was found to lift a tun more weight than the old one. This would lift over 8 tuns without any fear, and, in addition, this cable instead of being 34 cwt. to the knot was only 31 cwt. Captain Anderson and Mr. Canning made a suggestion last autumn, which had been acted upon, which was of the utmost moment coupled with the fact which Prof. Thomson has brought to light, that the cable was 17 miles behind the ship before it reached the bottom. Their suggestion was this, that should anything happen to the cable the ship would be stopped, and the picking up would instantly commence; and should the fault be overboard, the paying out machinery could be reversed so that the cable could be picked up from the stern of the vessel without transferring the cable from the stern to the bow. That difficulty would be got over in the new machinery, and that great source of risk and delay entirely obviated.

PROSPECT OF RAISING THE OLD CABLE.

Mr. Gill said they had a great deal of this property at the present moment at the bottom of the Atlantic, and he would like to hear from Mr. Canning whether, if it was in a proper conducting electrical state, it could be used hereafter for a cable.

Mr. Canning would refer Mr. Gill to Mr. Varley. He could only say that from the tests they had read, the cable was in the same condition it was in when it was made.

Mr. Varley said since the cable was submerged it had been continually tested from Valentia, and it showed no change whatever. It insulated about four times as well as when it left the Medway in the *Great Eastern*.

Mr. Pickering asked if Mr. Canning would tell them if there was any chance of getting hold of the cable again?

Mr. Canning replied that he believed they would certainly get the cable again. When they unfortunately lost the end on the 22d August last, they all naturally thought it had gone from them for ever. They were not, however, to be beaten by such a thought as that; and although they had not appliances at the time sufficient for grappling and bringing to the bight of the cable from a depth of 2,000 fathoms, they had sufficient buoy rope to buoy it up, and if obliged to leave the buoys from stress of weather they could find these again. After a consultation upon grappling for it, they had no difficulty in finding the cable, and in hooking. In their very first attempt they met with the greatest success; and although they had at first great doubts about ever knowing when they hooked the cable, from the weight of the *Great Eastern*, the great depth of water, and their cable only bearing the weight of seven tuns, they thought they should not have the knowledge indicated on board when the cable was hooked. To their great supprise, when they came to the cable, the *Great Eastern* began to swing round to it, and there was no doubt they had hooked something at the bottom. (Hear, hear). They commenced lifting seven hundred fathoms from the bottom, when the swivel parted with it. Now, it was an indicated fact that they lifted the cable seven hundred fathoms from the bottom of the Atlantic; and he said if they could lift it through a space of seven hundred fathoms there was no doubt whatever that with stronger ropes and power of machinery for lifting they could get the cable of 1865 again, and put it in good working order during the ensuing summer. (Hear, hear). It was only a question of strength of materials for lifting the cable. (Hear, hear). They would have three good ships for cutting grapnels and holding grapnels, so that they could buoy and lift the cable in three parts.

Mr. C. E. Rawlins, Jr., remarked that there were certain buoys laid for marking the places where the cable was lost. Were these buoys in existence?

Mr. Canning replied that the buoys were moored quite as a temporary means, but he thought they were floating about.

Mr. C. E. Rawlins, Jr., asked if Mr. Canning was perfectly certain he could go to the place where the cable was lost.

Captain Anderson said the real object of the buoys was not so much to mark the place where the ship was at the time the cable was lost as where it was drifting. It was just as easy to find the end of the cable as it was to sail to Sandy Hook or Cape Clear. It was a matter of common nautical astronomy. (Hear, hear).

Mr. Varley said in the attempt to grapple the cable on the last occasion, they were near to the end of the cable in order to save it; but supposing any difficulty was experienced in that depth of water, they had only to run into 500 fathoms shallower water, so that it would be unnecessary to grapple two miles deep. He firmly believed that no difficulty would be experienced in getting at it from that depth, but if there should, they could run nearer to Ireland. (Hear, hear).

Mr. King—Would there be more risk in underrunning it than bringing it up?

Mr. Canning said that if they could only get the bight they would splice on a run to America. He would not think for a moment of stopping the expedition to complete the cable; he would leave another ship besides the *Great Eastern*, which would be with them to do that work. (Hear, hear).

THE WAY THE OLD CABLE IS TO BE RAISED.

At a meeting in Manchester on March 15th, the Chairman asked what means would be taken for the recovery of the old cable.

Mr. Canning said that after laying the cable of 1866 they would return to pick up the cable of 1865. Three ships would be used, the *Great Eastern* and another, which would be a chartered vessel, and a government ship fitted out with machinery for hauling up, the same as the other vessels. In lifting, the ships would be grappling at the same time, at certain intervals apart, from two to three miles. The one to the west would put the greatest strain upon the cable, while the other two ships gently lifted it to the surface. The rope employed would bear a breaking strain of twenty-nine to thirty tuns; the swivels would be tested up to twenty-five tuns, and the grapnels would be tested up to the same; and therefore, he thought, with this strain, they would have an ample margin of strength. If the western ship, by hauling, should part the cable, there would then be other two ships with the bight on their grapnels, and by so doing, if the western ship should part it, that would materially lessen the strain upon the middle ship and also on the one to the eastward. If the ship to the west did not break it, and they wished to make an end, they could always do that by using the cutting or jamb grapnel which would so damage the cable by the strain put on it that it would break it and make an end. They could also adopt another mode—by lifting the cable up to a certain extent, and then buoying it, going further again, so as to get up the greater length from the ground, and get more slack, for the purpose of lessening the strain upon the cable. He thought that by these modes there was no doubt that they would be successful in recovering the lost cable. Mr. Fairbairn had gone into the calculations and agreed with him in every respect.

The Chairman said he had some doubts some time ago, but Captain Anderson had so explained the principle he intended to act upon with regard to the recovery of the cable that he had no doubt, if it was done with care, so as not to throw any severe strain upon the cable, instead of having one new cable in operation they would shortly have two cables.

Mr. Canning said he thought the fact that the directors of the Telegraph Construction and Maintenance Company had subscribed as much money as £100,000 toward this new attempt, proved the great confidence which they had in its success. Besides this, eight of these gentlemen had each subscribed £10,000 to the new company, and Mr. Cyrus Field had taken a like amount of stock in the new company.

WILL THE TELEGRAPH PAY?

At the Manchester meeting, Mr. Varley, the electrician, said, it was a significant fact that they had no instance on record of a cable that has been properly laid failing in deep water—all the failures had been in shallow water, or were due to faults that had existed in the cable prior to its being laid. There was no reason to fear, if this cable were properly laid, that it would fail for fifty or a hundred years, because the heavy shore ends would reach into deep water of one hundred fathoms. The question of success had been spoken to by Captain Anderson, Mr. Canning and Mr. Field. Therefore he would at once pass to the question of remuneration. It was at first proposed that only five shillings a word should be charged for the transmission of messages to America. But at the present moment there are thirty-one electric wires working between Europe and Great Britain, which were somewhere about half full—say about fifteen wires working continuously. What, then, would be the effect of one single wire connecting not only Great Britain and Europe, but Africa and Asia, with that tremendous telegraph system which had grown up in America and Canada? It was perfectly clear that one wire could in no way cope with the amount of work that would pass between the two countries, unless a high rate were charged to keep down the traffic. In the first instance, the government offered a subsidy to the Atlantic Telegraph Company of eight per cent. so long as the cable worked, and nothing the moment it stopped. That subsidy was useless, because if the cable worked at all it would earn a vast deal more than eight per cent. The government wished to limit the price to 2s 6d a word. The consequence would have been so enormous an influx of messages that before the second day's messagas could be transmitted to New York the mail packet would have arrived there. (Mr. Field—That agreement is now cancelled). There was only one legitimate way in which they could limit the traffic, and that was to augment the price. The line from San Francisco to New York, which was a very costly line, passing twice up into perpetual snow and down again, charged for a message of ten words somewhere about £3, and had paid, ever since it had been in operation, from ninety to considerably over one hundred per cent per annum on the original cost. The Persian Gulf line, badly managed as the feeders to it were, paid £95,000 a year. The Malta and Alexandria line took £100,000 a year simply between Egypt and Europe. If, then, one Atlantic cable took no more messages than the Malta and Alexandria line, or the Persian Gulf line, and charged only six times the rate charged by those lines, their receipts would amount to over half a million. He had been watching the progress of telegraphy for the last nineteen years, and he was certain that the demand upon their line would be much greater than that. He did not believe that less than 20s per word would keep their line free for the first twelve months; and after the first twelve months a higher rate still would be necessary in order to limit the traffic sufficiently. He thought £1,000,000 per annum was a very moderate estimate of the earnings of the cable.

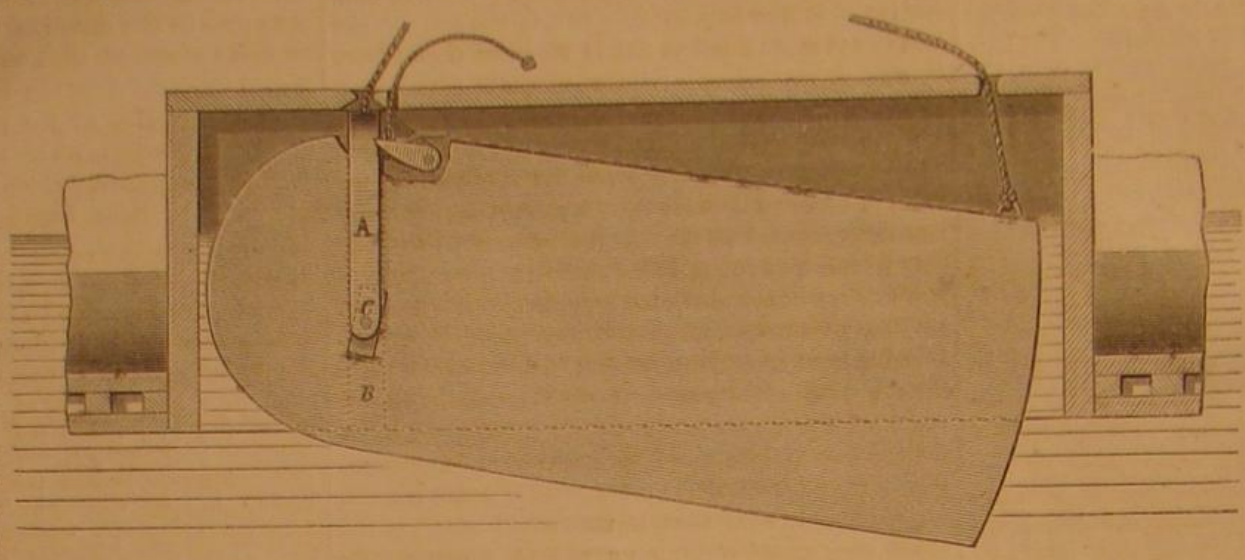
THE extremely thin sheets of iron which may now be obtained, some of them weighing no more than 0·36 gr. per square inch, and being not more than the 4,800th of an inch in thickness, have been noticed as possessing to an extraordinary degree the power of resisting oxidation. This is doubtless attributable to a fused layer of magnetic oxide, with which they are always covered; and the fact has been applied to the protection of articles of wrought iron. The latter are embedded in a pulverized layer of native oxide of iron—hematite, for instance—and kept at a full red heat for several hours, after which they are allowed to cool gradually. Plates treated in this way are perfectly covered with the oxide, and are well suited for ship-building. A combination of the oxides of zinc and iron, formed by the use of oxide of zinc also gives rise to a black coating, which is, perhaps, even more effective.

THE barque *Truelove* is a ship of the old school, recently sailed from Hull, England, being the only vessel dispatched this year from Hull to the Davis Straits whale fisheries. The *Truelove* is one of the oldest vessels afloat. She was built in Philadelphia, in the year 1764, and is consequently 102 years old.

Improved Center-board.

The subject of this invention is a new method of hanging center boards used on small vessels. By an improved method of hanging them the vessel is controlled with much more ease and certainty on rough water and may be run in shallower water than with the old style of board.

The inventor provides a yoke, A, which slides in a groove in the casing, B, straddles the center-board and is confined by a bolt, C. The usual tackle is fastened to the upper end of this yoke and another line to the rear of the board. It is easy to see, therefore, that by lowering either one or the other of these lines, or both at the same time, a greater or less amount of the center-board surface will be below the vessel, and that it is capable of being placed on line with the heel when desirable. These fixtures can be applied to boards now in use, and any change may be made in the shape of the upper end of the yoke so as to use different kinds of tackle, according to the weight and size of the board.



HALL'S CENTER-BOARD.

A patent was obtained on this invention through the Scientific American Patent Agency on Feb. 20, 1866, by J. F. Hall, of Westerly, R. I., whom address for further information.

Periodic Phenomena.

Considerable interest attaches to what may be termed the "periodic phenomena" of nature. Of such a character are the appearance and disappearance of animals, as bats and badgers, which conceal themselves during the winter, and pass through a period of hibernation; the change of dress at different seasons by the ermine, the stoat, and their allies; the coming and going of the regular winter or summer migratory birds; the retirement and hibernation of reptiles; the movements of certain fish up and down stream for the purpose of spawning; the appearance, transformations, and disappearance of insects; the leafing of trees; the flowering of plants; the ripening of seeds; the fall of leaves—all these, and more, are worthy of the attention of the lover of nature, and not beneath the dignity of man. Linnæus constructed for himself a floral clock, in which the periods of time were indicated by the opening or closing of certain flowers. Gilbert White, and others since his time, not disdaining to be his disciples in such a work, constructed a calendar, of which periodic phenomena presented themselves to their notice. Humboldt observes of the insects of the tropics, that they everywhere follow a certain standard in the periods at which they alternately arrive and disappear. At fixed and invariable hours, in the same season, and the same latitude, the air is peopled with new inhabitants; and in a zone where the barometer becomes a clock (by the extreme regularity of the horary variations of the atmospheric pressure) where everything proceeds with such admirable regularity, we might guess blindfold the hour of the day or night by the hum of the insects, and by their stings, the pain of which differs according to the nature of the poison that each insect deposits in the wound. And the Rev. Leonard Jenyns, the naturalist, remarks:—"If an observant naturalist, who had been long shut in darkness and solitude, without any measure of time, were suddenly brought blindfolded into the open fields and woods, he might gather with considerable accuracy from the various notes and noises which struck his ears, what the exact period of the year might be.

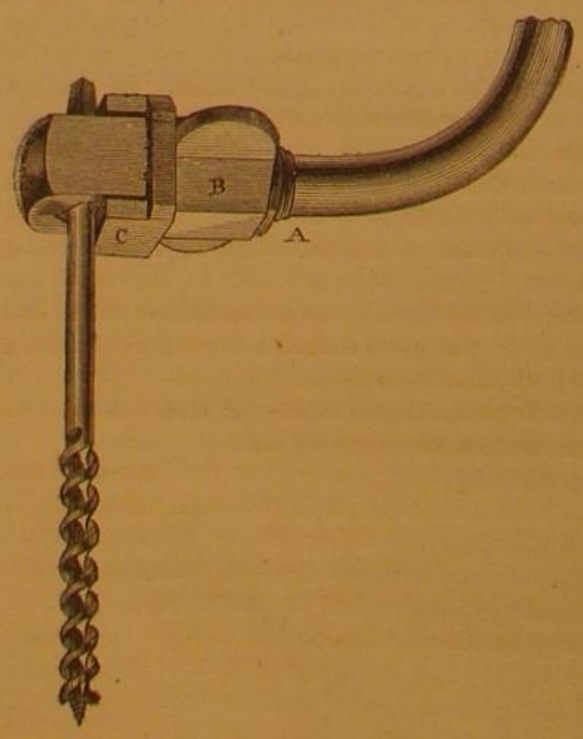
All such observation as we have alluded to are easily made and as easily recorded, and of all, none are of more interest than the migratory movements of birds. We know that some visit us in the spring and abide during the summer; others direct their flight hither late in the autumn, and spend with us their winter. But why this change, whence do they come, and whither do they go? We can partly answer this question, but only partially. We may declare, in general terms, that self-preservation and the perpetuation of the species, is the great moving cause. That the journey is undertaken in search of food, or a milder climate, or both, as a consequence the former of the latter, or in search of suitable conditions for rearing their young; yet there are many special circumstances in which this answer is inapplicable or insufficient."

Knapp, in his "Journal of a Naturalist," remarks of the willow wren:—"It is a difficult matter satisfactorily to comprehend the object of these birds in quitting another region, and passing into our island. These little creatures, whose food is solely insects, could assuredly find a sufficient supply of such diet during the summer months in the woods and thickets of those mild regions where they passed the season of winter, and every bank and unfrequented wild would furnish a secure asylum for them and their offspring during the period of incubation. The passage to our shores is a long and dangerous one, and some imperative motive for it must exist; and, until facts manifest the reason, we may, perhaps, without injury to the cause of research, conjecture for what object these perilous transits are made."

The record of periodic phenomena made in the same district over a series of years is always of interest; but contemporaneous records made at numerous stations distant from each other, and in which the same kind of observations are made, would be of more interest still. Take, for instance, the first appearance of a swift for ten successive years in twenty stations between the Isle of Wight and Caithness; or the last note of the cuckoo heard between the Land's End and the Tweed. Many such trifles, apparently insignificant in themselves, become of importance when carefully and faithfully recorded, and such a work may be accomplished by those who make no pretensions to be men of science, but are content to call themselves "lovers of nature."
—*Scientific Gossip.*

GORDON'S BIT FASTENING.

Every trade has some special annoyance or vexation appertaining to it which tries the temper and delays the workman, and we are sure that many can bear witness to one trial carpenters and joiners have to bear; that is, when withdrawing a bit from a hole just bored, to have it part company with the brace and fall out. This does not matter much where there is but one hole to be made, but when there are many the evil is a serious one.



The reader will see in this engraving a remedy for it. The shank of the brace is provided with a screw thread, A, and nut, B. This nut, when screwed up, forces a jaw, C, up to the protruding end of the bit, and also against the body of it below, so that it is firmly held in place beyond the possibility of accidental detachment.

Besides the sense of security thus given, the bit bores better and straighter. Sometimes the shanks of the bits do not fit the squared socket in the brace, and they wabble about. With this fastening any bit can be securely held.

Patented through the Scientific American Patent Agency on Jan. 16, 1866, by J. P. Gordon, whom address at West Garland, Me., for further information.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

INFLUENCE OF INVENTIONS ON CIVILIZATION.

Dr. R. P. Stevens read a long paper on the "Influence of Inventions on Civilization." The paper was mostly made up of statements of facts showing the wonderful effect of different inventions in increasing the rewards of labor and improving the condition of mankind. The most impressive of these statements was one made to illustrate the effect of railroads. "When Queen Elizabeth moved her court, 24,000 horses were called into requisition, and the consumption of provisions was sufficient to support 100,000 men. The royal progress was more dreaded than the march of an invading army, and the region through which it passed was reduced to famine from which it required years to recover. When Queen Victoria visits Scotland, she is carried in a special train at an expense of about $5,000."

EXPERIMENT TO ILLUSTRATE THE ACTION OF WATER IN BOILERS.

Mr. Norman Wiard presented an apparatus to illustrate the sudden rise and fall of water in steam boilers. He had a cylindrical glass beaker, about four inches in diameter and twelve inches in hight, divided by ten tin diaphragms half an inch apart. The lower diaphragm had an inch hole through the center, and the one next above four half-inch holes near the periphery, and all the diaphragms were punched in the same alternate manner, about one-seventh of the area being removed. The object of these diaphragms was to obstruct the escape of bubbles of steam which were formed at the bottom of the beaker. The vessel was filled with water to a level with the diaphragm next to the upper one, and the water was made to boil by a spirit lamp under the beaker. So soon as ebullition commenced, the surface of the water rose about an inch and a half; the action being manifestly due to an increase of volume by so large a portion of the space being occupied by bubbles of steam. On injecting a very little cold water, which was led by a pipe to the bottom of the beaker, the boiling was stopped, bubbles of steam ceased to be formed, and the surface of the water instantly fell to its first level.

The experiment was designed to illustrate the cause of the sudden fall of water in boilers on the cessation of ebullition—a phenomenon that has been frequently observed by engineers, especially in boilers having narrow water spaces, where the free rise of bubbles of steam to the surface is obstructed. The boiling may be stopped either by opening the furnace doors, or by starting the feed pump, or by closing the safety valve.

STREET RAILROADS.

The regular subject of the evening was "Means of transit between different parts of New York City," but the discussion consisted principally of expressions of individual opinion in regard to the various schemes which have been elaborately described in our columns. The weight of opinion seemed to be in favor of a road built in an open, dry canal, just deep enough to run the cars below bridges laid at the surface, and passing through the middle of the block west of Fourth Avenue and Broadway. It was suggested that there might also be a similar road on the east of Broadway.

PROFESSOR JOY ON CROWDED CARS.

Professor Charles Joy, of Columbia College, remarked that the engineering problems involved were not in the line of his studies or of his knowledge, but the social or humanitarian side of the question, which had been broached, was of interest to every citizen. He wondered that the people of New York city did not rise in their majesty and put an end to the abuses of our horse-railroad system. He had traveled during the last year 6,000 miles in Europe —just 6,000. Five hundred of this was by other means than steam, 5,500 by steam. He had rode in first, second, third, and fourth class cars, he had traveled under ground and above ground, on water and land, and he had never experienced discomfort which approached that to which he had been subjected that evening in coming down from Forty-ninth street to the Cooper Institute. He had come directly from his laboratory, but he never had in his laboratory odors so vile—his science was not able to produce so foul a compound of stenches as filled the car in which he rode. If the railroad companies treat us thus above ground, what will they do when they get us into subterranean tunnels? He thought that the principal care of the citizens should be to see that, in the granting of franchises, ample provision is made for the protection of the community from imposition.

THE CURRENCY DELUSION.

Money continues to get closer as our government contracts the currency. By drawing off the currency the common people are oppressed, and the interest of the money lender is enhanced. In creating the interest-bearing United States bonds was legislation enough in favor of the capitalists for one generation.

If forty-five years' experience in mercantile, manufacturing and farming business has taught me anything, it is that men prosper best when money is most plenty; and always run down, become poor, or break down when money is scarce. In this I find but one exception, and that is the money lender. We need $1,100,000,000 of currency to do the business of the country this year, and as fast as the United States interest-bearing bonds fall due pay them also off in legal tenders, together with the premium on gold, if need be; and induce the capital now hoarded in bonds, by a suitable permanent protective tariff, to go into manufactures, and to developing the vast resources of our country. H. H. M.

Galesburg, Ill., March 20, 1866.

[It is a curious fact that while no one pretends to understand geometry, or chemistry, or geology, without a methodical mastery of the several problems in their natural order, most people suppose that they are masters of political economy without any study of it whatever

To give a complete answer to our correspondent it would be necessary to write a treatise on the science of political economy. In the limited space at our command we must content ourselves with reminding him that capital is not the same thing as money. The capital at interest in the country is twenty or thirty times greater than the amount of all the money in the country. Capital consists of horses, sheep, swine, corn, wheat, sugar, plows, steam engines, cloth, and all those forms of wealth which are employed in the production of more wealth. If we had $1,100,000,000 of currency in the country—if it was in the form of gold, we should send all but 200,000,000 of it abroad, and exchange it for iron, copper, tin, cordage, and other kinds of capital that would be more useful to us than an excess of currency; if it was in the form of paper notes, it would be worth not more than 20 cents in the dollar, and would go no further in accommodating any man with the kind of capital that he needs in his business than $200,000,000 of currency would. The use of currency is to effect the exchange of commodities, and the same dollar is used over a great many times; $100 of money may be employed in loaning $1,000, or $10,000 worth of capital. The rate of interest depends upon the supply of the aggregate capital in all its varied forms, in relation to the demand—not to the desire, but to the commercial demand—by those who not only desire more capital, but who are also able to give satisfactory security for its repayment. In the year 1850 the people of California had more money in proportion to the population than any other community ever had, but the aggregate capital was so small in proportion to the demand, that the regular rate of interest on perfect security was ten per cent a month.

The money of this country is not more than two or three per cent of our aggregate wealth, but it is a very important part, for it is the general measure of values, and therefore, an element in all pecuniary transactions. Every man in the community is interested in having this measure always of the same capacity. The fluctuations inseparable from an inflated paper currency are disastrous in a thousand ways—they impair the obligations of contracts, they rob the workman of his wages, they check the growth of our towns and cities, they infuse uncertainty and distrust into all business relations, and they materially diminish the production of wealth. The tendency of an inflation of the currency is to increase the difficulty of hiring money, and to raise the rate of interest on all ordinary securities.

The most disastrous measure that Congress ever adopted was the inflation of the currency, and every month's continuance of that inflation is costing the people of this country untold millions of dollars.

Application of Electricity to Paddle Engines.

General the Count de Molin, an Italian nobleman, has constructed and patented a paddle engine, working by electricity, to be adapted to a small boat, christened *L'Electricite*, destined to ply on the large lake of the Bois de Boulogne. The working parts are thus composed:—There are two upright hoops, about two feet and six inches in diameter, placed three inches apart, in the periphery of each of which are encased sixteen electro-magnets, placed opposite each other. Between these there is another hoop or wheel, of soft iron, of the same diameter as the others, and so articulated as to receive, when alternately attracted by the magnets at each side in succession, a sort of rolling from side to side, or "waddling" motion. To this wheel is fixed an axis about seven feet long, which constitutes the prime moving shaft of the machine. When the wheel between the magnets takes its rolling motion it causes the ends of this axis to describe circles; one end turns the crank of a fly wheel, while the other end is adapted to a framework, on the same principle as the pentagraph, which enlarges the motion received from the central disk, and communicates it in the form of a stroke by a connecting rod to a crank on the paddle shaft. This end of the moving bar also sets to work the distributors for alternately establishing and cutting off the electric communication between the magnets and the battery. There will be in all sixteen elements of Bunsen's. The force of the machine while at work with four elements was found to be one quarter man power, so that with sixteen cells the power will be about that of a man. The paddle wheels are two feet and six inches in diameter.

The Iron Clad Monadnock.

The Navy Department has received intelligence of the arrival of the double-turreted iron-clad steamer *Monadnock* at Montevideo on the 17th of January, after a passage of five and a half days from Rio de Janeiro.

The average knots an hour run by the *Monadnock* was 7·37; the greatest distance run in 24 hours was 184·2; the least distance, 173·6.

The following is a detailed statement of the time under way, coal consumed, etc.:—

		Days.	Hours.
Total time under way		5	18
	Tuns.	cwt.	lbs.
Total amount of coal consumed	168	17	67
Average per day	29	7	16
		Starboard	Port
Total revolutions of engines		519,367	522,093
Average per minute		62·7	63
Greatest number per minute		66	66

SAW manufacturers will find it profitable to advertise in the SCIENTIFIC AMERICAN constantly. Our readers are frequently writing to us for the above articles.

MISCELLANEOUS SUMMARY.

CURIOUS COUNTER-CURRENT IN LAKE ERIE.—The Cleveland *Herald*, of a recent date, notices a phenomenon in Lake Erie. Many persons gathered along the banks of the Cuyahoga river to see the water flowing toward the source whence it came, carrying with it logs, blocks, and other floating material. In the afternoon the river rose about two feet, being at its highest stage about four o'clock, when from some cause the water began to flow in an opposite direction from the lake. The wind was blowing a stiff breeze from the south, which makes the matter more singular.

THE consumption of coal, including waste, in the United Kingdom, amounts to three times the quantity expended in 1845. In the year 1845 the consumption in Great Britain, for domestic and all manufacturing purposes, was 31,800,000 tuns, and there were exported in the same year, 1,800,000 tuns. In 1865, however, there were consumed for domestic and all purposes of manufacture 87,000,000 tuns, 9,000,000 tuns being exported.

THE greatest pressure of wind ever registered at Glasgow Observatory, was 55 lb. per foot. Professor Airy, however, states that it may reach 80 lb. per foot in this country, while Mr. Scott Russell asserts that 40 lb. per foot is about the maximum force which it is necessary to reckon upon in constructing roofs, etc. This is identical with the maximum registered at Menai Bridge.—*Engineer.*

RECENT accounts from Leghorn state that there is a rise in the price of petroleum, of which the consumption is said to be so large in Italy that the supply is not equal to the demand. The price has so much increased lately that companies have been formed at Turin and Genoa for working and purifying the produce of the petroleum springs which exist in Parma and Calabria.

MAKERS of clothes-wringing machines will do well to advertise in the SCIENTIFIC AMERICAN. We have constant inquiries from all parts of the country. A short advertisement constantly published in our paper would doubtless prove profitable to the manufacturer and convenient to readers.

IT appears from a number of experiments that the bronze of which the ancients formed their weapons and other articles, was composed of 88 parts of copper to 12 parts of tin. It is remarkable that the same mixture has been employed by nations very remote from each other.

IN the year 1541 the deviation of the magnetic needle from the meridian at Paris, was found to be from seven to eight degrees to the east; in 1,550 from eight to nine degrees, and in 1,580 eleven degrees and a half to the east.

AN American student, Francis A. Channing, of Boston, has lately taken the Arnold prize at Oxford, Eng., for an English essay. The prize amounts to two hundred and ten dollars, and is open to all Oxford graduates of less than eight years' standing.

THE French ordnance committee have come to the conclusion, first, that breech-loaders are a mistake for large calibers; and that for rifled guns, throwing heavy shot, the Whitworth gun is the best. The only thing against it is its cost.

PUGET succeeded in adjusting the eye of a flea so that by the use of the microscope he was enabled to see objects through it. It multiplied and diminished every object. Thus a soldier appeared like an army of pigmies.

PATENT EXCHANGE.—We are requested to state that in consequence of the destruction by fire of building No. 229 Broadway, Mr. Orwig's patent sale exchange has been located at No. 111 Fulton street.

IT HAS been estimated that a tun and a-half of water falling one foot per minute, will grind and dress a bushel of wheat per hour.

IF hydrogen gas be breathed for a few moments it has the curious effect of changing the voice. The effect very soon disappears.

13,392 tuns of water are every day converted into steam and discharged into the air from locomotive engines alone in Great Britain.

AS MANY as 12,500 facets have been counted in the eye of a dragon-fly.

Notes and Queries

A., of Md.—Carbolic acid is composed of carbon, hydrogen, and oxygen with the formula according to the old atomic weights—

$$C_{12}\ H_6\ O_2.$$

which gives the proportion carbon 62 pounds, to hydrogen 6, and oxygen 16. It is one of the constituents of coal tar, and is separated first by fractional distillation, then by agitating the oil which comes over between 300 deg. and 400 deg. with a solution of potash, and saturating the watery portion with hydrochloric acid.

C. R. J., of N. Y.—The notion that there is any more power in a long screw driver than in a short one—the handles of the two being of the same size—is the result of careless observation.

E. K. C., of Me.—An index plate for a small gear cutter can be purchased in this city for about $17.

G., Ind.—Machinists' tools can be had in all tool stores.

H. O., of——.—Recipes for dressing furs cheaply and quickly, can be found on page 326 Vol. XI.

L. S. B., of S. C.—Your notion that the attraction of the earth is due to magnetism instead of gravitation would be overthrown by a consideration of some obvious facts—for instance of the fact that the earth attracts all bodies alike in proportion to their mass, while magnetism does not attract any two substances with the same force, and some it does not attract at all. If you try the experiment you will find that a coin weighs more than a feather in a vacuum.

A. & G. W., of Pa.—The officers of the Government usually express the amount of the public debt in figures, leaving readers to call the amount thousands of millions or billions, to suit their own fancy.

A. A. R., of Pa.—The picture that you send us is a wood cut printed from three blocks. One block is cut to print the blue, another to print the yellow, and a third the purple; and the paper is pressed successively on each block.

A. G. M., of Min.—To get the circumference of a circle multiply its diameter by 3·1416. Multiply the circumference of a reel by its revolutions per minute, and you will have the length of line that it will wind in a minute.

D. R. T., of Va.—The sketch of the governor you send us is novel, but there are others so much better that we do not advise you to proceed with it. You will find directions for making artificial ivory on page 198 Vol. X.

H. B. S., of Pa.—We never heard that the injector had any effect whatever on the slide valve. Your question is so put that no other answer will apply to

H. R., of Ohio.—There is no cement that will hold vulcanized rubber to iron so that it will not come off.

G. S., of Pa.—If there is no pressure from below, you must calculate the pressure on the whole upper area of the valve. The address of the party you require is New York City.

W. F. S., of Md.—Your case is that of many others. You have an invention and wish to bring it before the public, but have no friends to whom you could confide the secret of it to introduce for you. Your only course is to take out a patent for it, when if it is really useful you will find plenty of persons who will buy it.

F. Olneyville, Box 129.—We have no idea what the question was that you sent us $1 for and that you only received "a three cent book for." If you will send your question again we will endeavor to answer it satisfactorily.

B. W. R., says:—"I am the manufacturer of a known chemical combination, but having made several improvements in it lately, have as yet taken no patent. Should I die could my heirs take a patent out for the same?"—Yes.

H. A G., of N. Y.—The "shiny black paint" used on fancy iron castings, is japan varnish sold by all wholesale paint dealers. It is applied cold, and baked in an oven at a moderate heat for some hours.

T. R. N. Y.—You require to know whether the recipe for welding cast steel, recently published in the Scientific American, will unite wrought iron and steel. It seems that you might put a piece of each in your fire and try it, and so find out in the most satisfactory manner. No water must be added to sal ammoniac in melting it. It is the water of crystallization that is to be driven off.

B. & Co., Ohio.—In philosophical terms, a pulley on a vertical shaft rotates in a horizontal plane; in popular language it may said to run horizontally.

H. C. B., N. H.—Our information in regard to the state of the cabinet business in Iowa, is at present so limited that we could not advise you with any degree of accuracy.

Worcester Rule Co.—We have never had the pleasure of reading your pamphlet, but will give attention to any article you may forward us.

C. W., N. Y.—The eccentric on a horizontal engine is nearly at right angles with the crank; whatever the lap and lead is will change the angle that a line through the center of the eccentric forms with a line drawn through the center of the crank. If the engine runs backward, that is, toward the cylinder and the connection is direct from the eccentric to the valve stem, the eccentric will be on the upper side when the crack is on the forward center. Agents who sell our paper have no right to collect postage, they get their papers by express.

E. A. W., Ohio.—Green hide is generally applied as a cushion to receive the edges of knives in straw cutters. On paper cutters a piece of maple wood is used.

Correspondence

Machine Taps--Steam in Cemented Cisterns.

Messrs. Editors:—In a recent number of the Scientific American, "Apprentice" asks for some information about the best mode of filing taps. Your answer to him is correct, and agrees with my experience, as far as the filing of the flutes is concerned. I call the attention of your readers, however, to another very important point which is generally overlooked by mechanics making the taps.

Taps for use in machines are now made almost universally straight; that means, the part on which the thread is cut is turned of even diameter, and after the thread is chased, a portion of it is turned off tapering toward the end. To make a tap of this kind to cut free and without much heating, the tail stock of the lathe should be set to on side, enough to turn the tap on the end which enters the nut first, about 0 15 larger, then the required finished size of the other end of the thread; on large taps even ·02 is not too much.

Taps, particularly thin ones, will spring considerably in turning, and more so by chasing (unless a steady rest is used), which causes the tap to be of a larger diameter toward the left end of the thread. It is evident from the nature or curve of the thread, that the sides of the same cannot cut and present a smooth surface to the iron in contact with them. It is further evident that the friction on the sides causes the tap to expand, and also the nut; if the tap is larger toward the finishing part, the friction is greatly increased, and heating and breaking of the taps is generally the consequence. On the other hand, a tap made according to the above direction will always cut free and without perceptible heating. The tapered part forms a series of cutters, and none will cut more than its projection above another; the expansion of the nut will always correspond with the diminished size of the tap, so will the strain and power required for cutting as the width of the cutting edge decreases.

The taps in use at the place I have charge of, have all three semicircular flutes, the thread on the tapered-off portion is slightly filed off to the edge, to reduce the friction, and to allow the teeth to cut free, and not to squeeze. Our 1·25 tap is 14 inches long, the thread part 4 inches, the tapered part 3 inches. The machine is not stopped for taking off nuts, the tap is simply taken out of the socket into which the shank is fitted. The shank is turned down to the bottom of the thread the whole length, which gives room for 7 nuts to remain on it. Our $\frac{3}{8}$ tap is 7 inches long, thread part 2 inches, tapered part 1·5. These taps have been used for five successive hours, without heating materially, if oil is regularly supplied. Such taps, if dull, can be sharpened up very easily on the grindstone.

In your "Notes and Queries" you express the wish of learning the result of exhausting steam into a cemented cistern. We have one at this place, into which the steam of a 65 horse-power engine is exhausted during winter only, for the last 10 years, and we never experienced any difficulty. Yet I am of opinion that it will injure the cistern sooner or later. Another very serious objection against this practice is, it keeps the water in constant agitation, and prevents the settling of its impurities, and as we draw our feed water from this cistern, dirt will be deposited in the boilers. There is one reason, however, why we continue to do it; rain water falling on all our large buildings in the yard is conducted through pipes into this cistern, and the hot steam keeps these pipes and conductors all the time open and prevents them from freezing in cold weather. The water gets very hot, particularly when the supply gets low, and under such circumstances we find it it very injurious to the packing of the feed-water pump. M. N.

Alleghany, Pa., March 22, 1866.

[We cannot agree with our correspondent about the feasibility of grinding taps. Few grindstones run true enough to do it properly, and few men, especially bolt cutters, have skill enough to grind a tap without some rest. It would pay in all machine shops to have a solid emery wheel of fine grade to sharpen special tools on, together with rests suited to different work.—Eds.

Projectiles Used During the Crimean War

Messrs. Editors:—I take great pleasure in communicating to you the following extract from official documents in my possession, and which may be read with interest by your numerous readers:—

Number of projectiles used:—French, 29,460,363; English, 15,000,000; Piedmontese, 50,000; Turks, 50,000; Naval Forces (Allied), 35,000; Russian, 45,000,000. Total, 89,595,363.

Killed and wounded by these projectiles:—French, 50,836; English, 91,038; Piedmontese, 183; Turks, 1,000; Naval Forces (Allied), 2,000; Russian, 100-000. Total, 175,057. Lionel d'Epineuil.

Philadelphia, March 21, 1866.

[It will be seen that only one projectile in 512 did any execution.—Eds.

A Crystalline Car Axle.

Messrs. Editors:—The accompanying metal, just as it is, was taken off a broken axle of a freight car on the Pittsburg and Erie R. R. on March 20, 1866. The axle was broken near the hub of the wheel and both parts had the same appearance. The yellow is not rust as there is no crack in the axle to let moisture in, and it is in the same condition as when I broke it off. Being a passenger train and being detained by this break is the manner in which I got it. Sizer & Co. was on the wheel, but nothing else, no location or any thing to know where it was made.

I may not be a judge of iron for car axles, but it seems to me this is very poor material.

G. M. M.

Oil City, Pa., March 26, 1866.

[The specimen is a mixture, in about equal proportions, of peroxide of iron and bright crystals of iron. It is manifestly very brittle, and wholly unfit for use as a car axle.—Eds.

The Cascade of Light in Boston, Mass.

Messrs. Editors:—In remarking upon an article in your paper of the 24th inst., entitled "Light in a Bowl of Water," you say, "One of the most brilliant experiments ever exhibited in a lecture room, is the throwing of the electric light upon a column of falling water." Never was a remark more true, as all can testify who were so fortunate as to be present at Prof. Lovering's lecture in this city last Friday evening, before the Lowell Institute.

With the aid of a very powerful Rumkoff coil, a stream of falling water was made to produce, as you say, "precisely the effect of a cascade of light."

The object of this note is, with your permission, to say that, "this dazzling experiment has been exhibited" most successfully in this country as well as in England. J. A. D.

Boston, March 26, 1866.

Electricity from Combing the Hair.

Messrs. Editors:—I would like very much to see explained in your interesting paper, the following fact that occurred to me some nights ago. While I was combing my hair, using an india-rubber comb, I remarked that every time that I passed the comb through my hair, there was a crackling noise like the explosion of sparks of electricity. Rather astonished at this, I put out the gas light, and effectively I perceived in the looking glass before me, the bright sparks shining and disappearing in the obscurity.

As I am not acquainted with the mysterious ways of electricity, I would feel obliged to you for an explanation. A Subscriber.

New York, March 30, 1866.

[A common phenomenon. Electricity is produced by friction, and one of the very best electrics is hard india rubber.—Eds.

Strength of Ice.

Messrs. Editors:—Your statement in your last number, as to the strength of ice, is calculated to mislead, and any officer trusting to it in moving a body of men would be very apt to give them a cold bath. Two inches of good ice will bear a man, but not a number of men. In deep water it will always crack a little even with one man's weight, and would very soon be weakened. Four inches will scarcely bear a horse. You could not invent a more perfect ice breaker than a horse's sharp shoe. All his weight

son two feet, and the sharp caulkers do not give one inch surface for it. Ice also is very different in its strength when formed in excessively cold weather; it is then flinty and brittle, cracks easily and requires some days of milder weather to make it bear well. This is one of the mysteries of the formation of ice. I have resided many years on Newburgh bay, and the matter of crossing it in winter either for business or pleasure is of some importance. Six inches of good ice is safe for a tun load on a sleigh, and for a few days safe for a wagon. A valuable team of horses was lost last winter with a load of 1,500 lbs. of coal on a wagon. The ice was six and one-half inches. A drove of cattle running too much together broke through ice measuring ten and one-fourth inches, in 1864. In very cold weather the water, where ice is formed, goes down to thirty-two and one-fourth degrees and is the same temperature at any depth. This year I have not seen it lower than thirty-two and one-half. When it rises to thirty-three the ice melts rapidly. Many years since a heavy gun was run over from West Point to Cold Spring, and the thickness of ice was published, I think, in the *Franklin Journal*. I have made many experiments on the ice and temperature of the water, and if interesting to your readers, will be pleased to give them to you. W. H. Denning.

Fishkill, N. Y., March 27, 1866.

[Definite information like this is always acceptable to us, and we are obliged to our correspondent. As the maximum density of water is 39·2°, we think it must be in exceptional cases only that it will be found at 32·25° at all depths.—Eds.

The Cigar Steamer.

Messrs. Editors:—In No. 13, current volume, of the Scientific American, you comment upon the form of Winan's cigar steamer as follows:—"If the vessel was to be wholly submerged, the form would be excellent; but as she is to float at the surface, the submerged portion only will act upon the water, and it seems to us that the form of that portion is very badly calculated to overcome the resistance of the water."

May I trouble you for an answer to a question, relative to the same? If that form of hull is excellent when submerged, and subject to increased resistance from the water, why should it not be excellent when only half submerged with less resistance?

All aquatic fowls when swimming have an unequal immersion of body. No person will deny that their buoyancy is perfect, and speed very great, comparatively. R. B. S.

Sing Sing, N. Y., March 22, 1866.

[If the cigar steamer was cut in two at the surface of the water, is it not plain that the lower slice—the submerged portion—would have a form entirely different from that of the whole vessel? If this submerged portion had a square house built on it, or a cabin with vertical sides, or any other form of superstructure, its power, in a smooth sea, of overcoming the resistance of the water, would be just the same as with its present spindle-shaped upper works. The best form for pushing the water aside is a wedge with a vertical edge; and the sharper the wedge the better. In the cigar model the several wedges that make up the bow under water, have rounded ends, and they are not so acute in proportion to the relative length and width of the vessel as in ships of ordinary construction.—Eds.

Cold Cast Iron on Melted Cast Iron.

Messrs. Editors:—I have noticed the question repeatedly, why cold cast iron will float in liquid or melted cast iron.

I tried one experiment on the same by taking probably a pound, filed it bright, and removed all the sand and scale, and it sank like a stone in water. Shrinkage is about an eighth of an inch per foot, consequently sand and scale is buoyant enough on small castings to float. Daniel Zuern.

Shamokin, Pa., March 28, 1866.

[Was not the piece of iron dropped from a considerable hight, so that the momentum carried it under, and did it not rise immediately to the surface? Dr. Parmelee, of this city, tried a piece weiging thirty pounds, made perfectly clean, and it floated. —Eds.

Lottery and Gift Swindles.

Messrs. Editors:—Does it not become your duty, through your widely-circulating journal, to give the public warning against the fraud and deception now being perpetrated by a company or companies of lottery dealers in your city? Honest, hard-working, poor men are becoming the dupes of their nefarious swindling. The agents of these lottery managers send out their circulars and list of prizes to be drawn in their "scheme," to individuals whom they designate as chosen by them to aid in their enterprise, offering them a carefully selected package for ten dollars, and binding themselves to pay two thousand dollars to the individual should his prizes fail to draw that amount. Who would refuse so good an offer from responsible men doing an honest business? The writer has received such a circular and proposition, but has not yet sent the ten dollars. Shall I send?

Respectfully, J. C. R.

Grand Rapids, Mich., April 2, 1866.

[We answer, yes—send on your ten dollars. If you have not good sense enough to discover the cheat, after you have sent the ten dollars you will find out by experience what you may never learn from the advice of others.

We are constantly receiving inquiries similar to the above, and with a view to see what could be done to break up such frauds upon honest and unsuspecting people we called upon Mayor Hoffman, who assured us that he had done all in his power to suppress them, and had warned the public through the newspapers to take no notice of such circulars when received. In spite, however, of every effort these lottery and gift swindles still flourish, and always will flourish until people learn the common-sense fact that when an advertiser promises to return two dollars for one, he simply means to swindle. If people will be galled by such transparent frauds, there is no hope of our enlightening them upon the subject. The carefully-selected package to which our correspondent refers as being offered for ten dollars, in all probability could be purchased for a dollar of any honest tradesman, of which class there are thousands in this city. But swindles take better with some people than honest dealing, there seems to be a sort of charm about these bogus operations.—Eds.

A Sawyer Answered.

Messrs. Editors:—Having had some experience in making and running circular sawmills, I should answer the questions of "F. M. E." in the following manner:—Place the saw from the center forward parallel with the carriage, provided that does not throw it off more than one-thirty-second of an inch on the back side. Give the mandrel one-sixteenth-inch end play, and do not try to run the saw at a speed much above what you can maintain through the log, carrying from three-fourths to one and one-half inch feed. Place the guides as high as they can be. Now take hold of the pulley and pull the mandrel endwise until the collar strikes the box; then set up the guide on that side so as to crowd the saw a little; then pull the mandrel the other way, and set up the other guide the same. Have the play between the guides less than the end play of the mandrel. To joint the saw use a piece of grindstone, and run the saw fast; then it will not saw into the grindstone. I always leave just a shade of this jointing on the points of the saw-teeth. File the teeth about one and three-fourth inch long on the under side, and have that side on a line that would cut off one-fifth of the saw. File the top of the tooth one and three-fourth inch from the point on a line to strike the point of the next tooth behind. I use an upsetting tooth to bring out the corners of the teeth as they wear off. Each side of the saw needs to be exactly alike, both as to set and angle of filing. Do most of the filing on the under side, and never turn a feather edge; better leave the tooth a little dull; the saw will not run so long, and soon gets out of round. Push the file the whole length with a straight and strong but slow motion. Any cutting edge on hardened steel cannot stand much speed. Taylor D. Lakin.

Hancock, N. H., April 2, 1866.

[What is the object of giving end play to the mandrel? Where it is done the saw has to do what the shoulders of the mandrel should.—Eds.

A Magnetic Safe.

Messrs. Editors:—Please explain the following phenomena, and thereby arrest an argument, which the parties seem determined to fight out all summer.

Take a mariner's compass in one hand, a bar of iron in the other. Hold the bar vertical on the north of the compass. Bring the two in contact at the upper end of the bar. Gradually push the compass down to the lower end, and note how the needle has been reversed. Reverse the bar, put the compass on the north, hold the bar horizontal, and account for the various positions taken by the needle.

Try the experiment on the iron safe which is in your office, with this modification. Do not hold it in your hand. R. B. Stuart.

Ossining, N. Y., March 30, 1866.

[The north pole of one magnet will attract the south pole of another. Almost any bar or mass of iron that is kept for a long time in a vertical position, or in a north and south position, becomes a magnet; and then one end will attract the north pole of a mariner's compass, and the other the south pole. We have repeatedly tried shovels, tongs, safes, and other pieces of old iron with a compass, and we have never found one that was not a magnet. Of course, if such a bar of iron could be poised with sufficient delicacy, it would point north and south, and thus serve as a compass.—Eds.

Melting-pots.

Messrs Editors:—A branch of the government may require melting-pots made of crucible clay. Should any maker advertise in your paper, I will write to him and will order through the proper office. D. C.

Washington, March 28, 1866.

To Prevent the Loss of Aroma in Roasting Coffee.

The berries of coffee once roasted, lose every hour somewhat of their aroma, in consequence of the influence of the oxygen of the air, which owing to the porosity of the roasted berries, it can easily penetrate.

This pernicious change may best be avoided by strewing over the berries, when the roasting is completed, and while the vessel in which it has been done is still hot some powdered white or brown sugar (half an ounce to one pound of coffee is sufficient). The sugar melts immediately, and by well shaking or turning the roaster quickly, it spreads over all the berries and gives each one a fine glaze, impervious to the atmosphere. They have then a shining appearance, as though covered with a varnish, and they in consequence lose their smell entirely, which, however, returns in a high degree as soon as they are ground.

After this operation, they are to be shaken out rapidly from the roaster and spread out on a cold plate of iron, so that they may cool as soon as possible. If the hot berries are allowed to remain heaped together, they begin to sweat, and when the quantity is large, the heating process, by the influence of air, increases to such a degree that at last they take fire spontaneously. The roasted and glazed berries should be kept in a dry place, because the covering of sugar attracts moisture.

For special cases, such as journeys and marches, where it is impossible to be burdened with the necessary machines for roasting and grinding, coffee may be carried in a powdered form, and its aromatic properties preserved by the following process:—One pound of the roasted berries are reduced to powder, and immediately wetted with a sirup of sugar, obtained by pouring on three ounces of sugar two ounces of water, letting them stand a few minutes. When the powder is thoroughly wetted with the sirup, two ounces of finely-powdered sugar are to be added, mixed well with it, and the whole is then to be spread out in the air to dry. The sugar locks up the volatile parts of the coffee, so that when it is dry they cannot escape. If coffee is now to be made, cold water is to be poured over a certain quantity of the powder, and made to boil. Ground coffee prepared in this way, and which lay exposed to the air for one month, yielded on being boiled, as good a beverage as one made of freshly-roasted berries.—*Liebig.*

Mr. O. C. Crane, of No. 330 Delancy street, has shown us a long cut taken from a piece of round steel, two and one half inches diameter, which is sixty-eight feet long in one continuous piece.

Improved Sawing Machine.

This machine is principally intended to to cut down standing timber, but is so designed that it may be used subsequently to cut the wood up into lengths for any purpose, but more especially for firewood. Full views are given in the accompanying engravings of it in both positions as it appears at work. In order to facilitate its transportation to various localities, or from one point to another when in use, the machine is set upon wheels.

In detail it consists of a frame, A, carrying a crank shaft, B, on the front end. The shaft, being driven by the crank wheel, C, imparts motion to the saw through the agency of a lever, D, jointed to a curved support, E, the saw being attached to the lever below the frame. Guides, F, are provided which serve to keep it straight and prevent buckling when at work. Where the machine is used to cut down trees the saw is above the frame and works horizontally, as shown, instead of vertically. A bolster, G, is also provided as a guide, in which there is a mortise through which the saw passes, and a gib, H, is fitted to this mortise against which the back of the saw works. This gib has a long surface and presses the saw, or feeds it up to the tree, through the agency of a weight, I.

The hind end of the frame, where it bears on the axle, at J, is rounded off so that the machine may accommodate itself to inequalities of surface. By these several parts and the arrangement of them the inventor claims to have invented a useful machine which can be applied to the purpose set forth. The reader will understand that there is but one machine which is capable of being used on different kinds of work.

For further information address Jas. R. Logan, Bellmore, Ind., by whom a patent was obtained Dec. 19, 1865, through Scientific American Patent Agency.

Fig. 1.

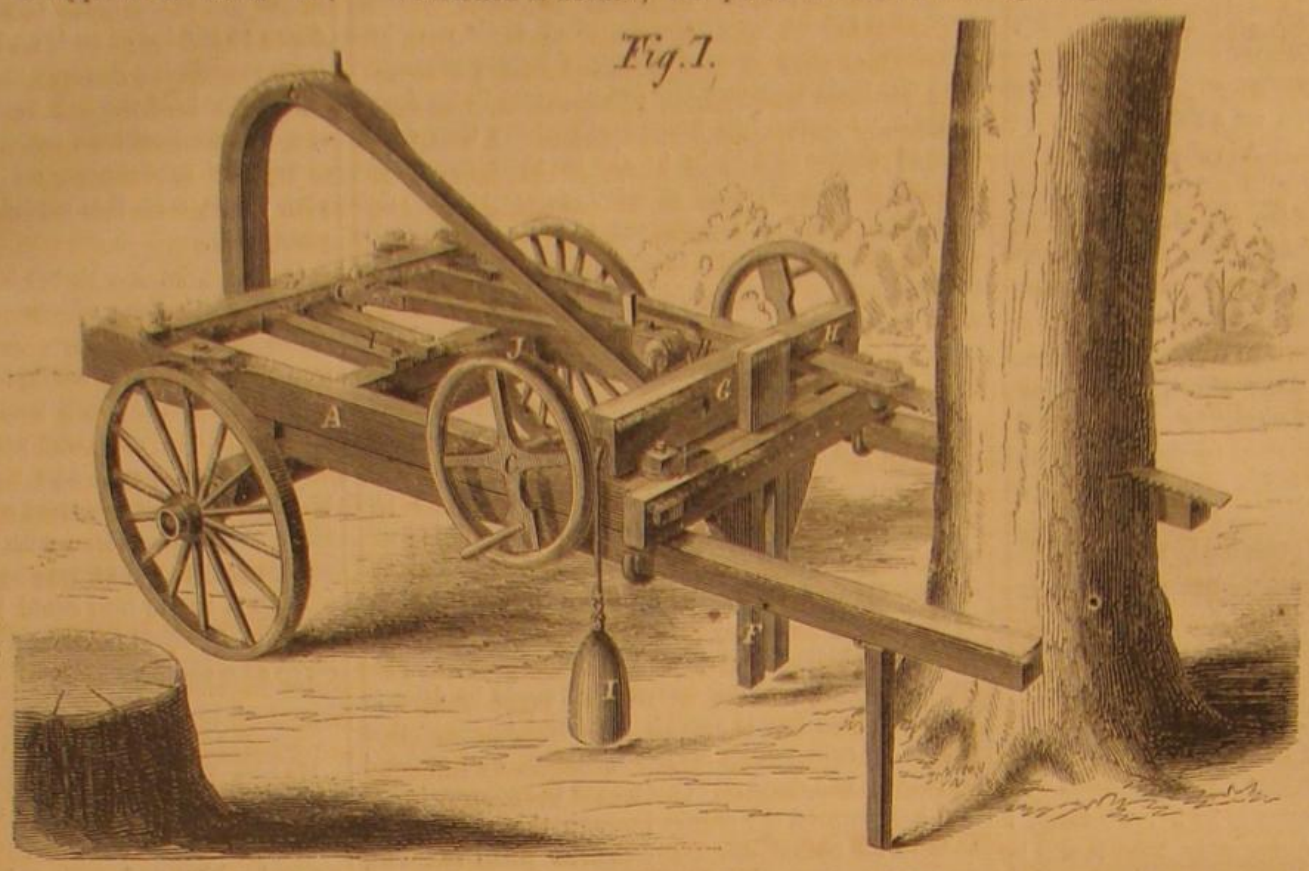
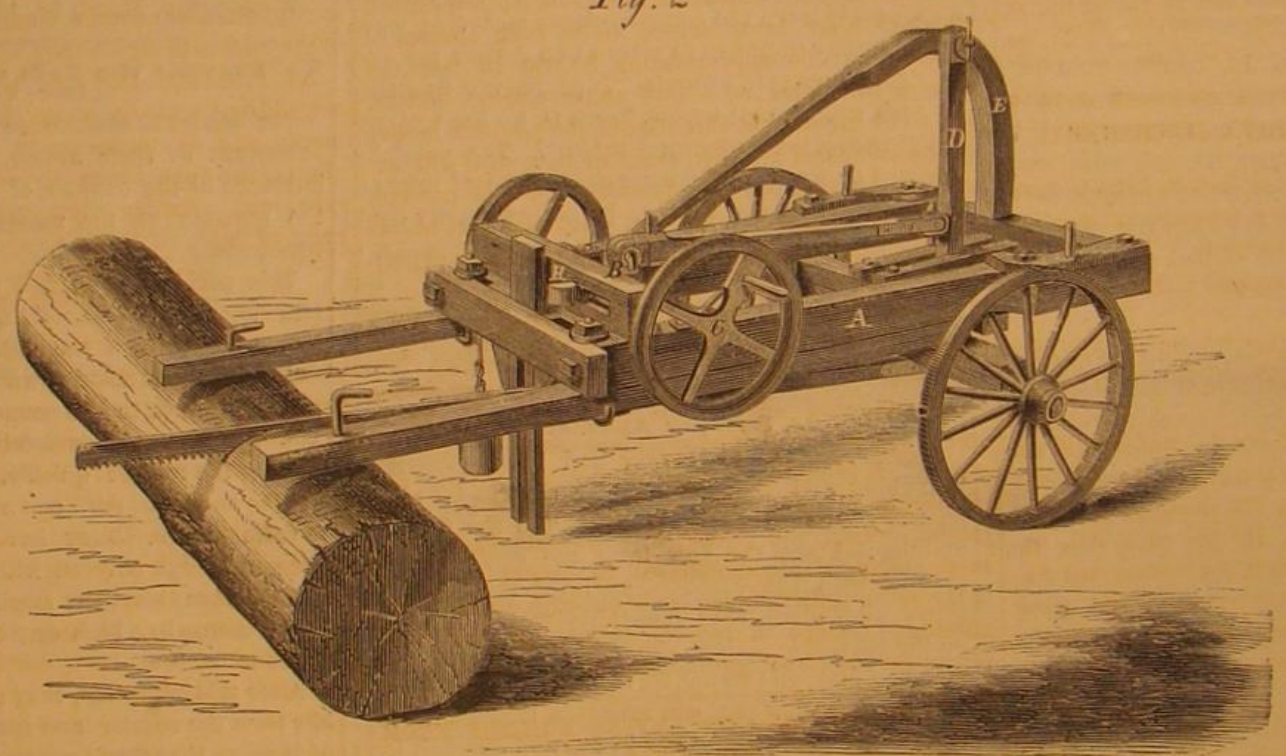


Fig. 2



LOGAN'S SAWING MACHINE.

Ready Mode of Amalgamating Zinc Plates.

Mr. B. Gibsone writes to the editor of the *Chemical News* and says:—"I venture to send you a method of almost instantaneously amalgamating corroded zinc battery plates, which occurred to me recently, after some twenty years' trial of different plans; perhaps economy of time in even humble matters of detail may be worth record where the process is of repeated occurrence.

"The following treatment in the case of thickly oxidized plates will yield in speed and effectiveness to few:—Place in a flat dish two ounces of common hydrochloric acid, one drachm of a saturated solution of bichloride of mercury (corrosive sublimate), and half an ounce of the latter metal; lay the zinc without previous scouring, in the liquid mixture, and gently smear the mercury over the surface of the plate with a tooth brush; the mercury will readily and thoroughly adhere to each portion of the surface as the oxide is rapidly dissolved by the HCl.

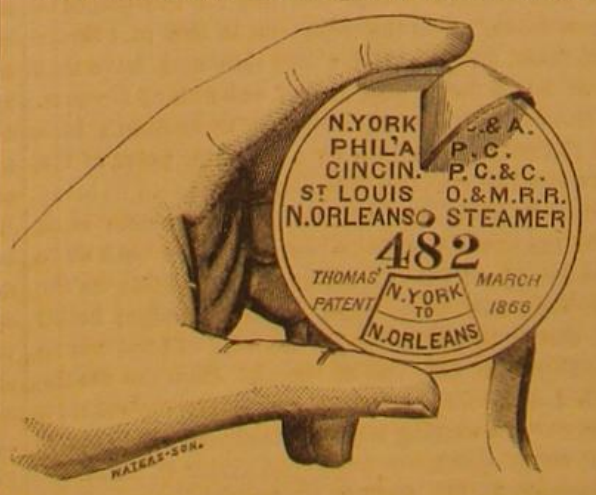
"As a means of comparing speed, in seventy seconds, I completely coated inside and out a cylindrical plate of forty square inch surface, whose interior was rather inaccessible and very corroded.

"A set of six cylindrical cells of Greves' battery were thus, with the same materials, amalgamated, equipped, and primed for action in a quarter of an hour.

"No friction is needed; the plates should be well drained from excess of mercury, lest they become brittle, though this danger is lessened by the rapidity of the process."

THOMAS'S RAILWAY CHECK.

A novel check for use on railway trains has been lately invented, and we here give a representation of



it. It consists of two brass disks, one inside the other, held in the proper position by the strap. The outer one may have the names of any roads engraved thereon, while the inner one contains the principal cities and towns along the route. This check is set, at the beginning of the journey, at the place the traveler starts from and the one he is going to, so the baggage master, or others in authority, can see, at any station, exactly where the trunk has come from and how far it has to go, a little opening in the outer disk enabling the direction to be read, as may be seen in the engraving, where the check reads from New York to New Orleans.

A very important consideration in reference to the through route check is, that one check will take the place of twenty-five checks, and can be constantly used on the different routes of travel, and also serves as an advertisement in keeping the name of the route which the traveler is passing over continually before him. Immediately upon the arrival of the baggage with the check attached to it at any station, the baggage agent can, in one moment of time, remove the check from the baggage just arrived, and return it with other baggage to any of the several points named on the check.

This is also a local check which serves to answer the purpose of some two or three hundred checks. It represents one hundred stations by its peculiar construction, so arranged as to be kept constantly traveling to and fro from one end of the line to the other. As we have stated, they require but one minute's time for a person of the most ordinary capacity and intelligence to become acquainted with the manner of changing their destinations. They are in no way, manner, or form, complicated. No springs or anything connected with them which render them liable to get out of order; and their cost, comparatively speaking, is from two to three hundred per cent. less than the checks at this time in use, thereby the means of saving hundreds and thousands of dollars to railroad companies. For further information address G. F. Thomas, Nos. 443 and 445 Broadway, New York City.

Simple Process for Silvering.

An employee of the Bavarian Mint has published an improved process for silvering copper, brass, and other alloys by means of a solution of silver in cyanide of potassium; the difference from the usual method consists in the use of zinc-filings, with which the objects are coated; when the silvering solution is applied, an immediate deposition of a much more durable character taking place. The filings are easily removed by rinsing in water, and may be used repeatedly for the same purpose. Metallic iron may be coated with copper in the same manner, by substituting for the silver, a solution of copper in cyanide; and over this copper deposit a coating of silver may be applied.

It is suggested in the London *Chemist and Druggist* that chloroform is an excellent medium for the removal of stains of paint from clothes, etc. It is found that portions of dry white paint, which resisted the action of ether, benzole, and bisulphide of carbon, are at once dissolved by chloroform.

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NEW YORK, SATURDAY, APRIL 14, 1866.

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POWER REQUIRED TO DRIVE MACHINERY.

"How many pounds of steam does it take to turn your engine over without the machinery at work?" said one engineer to another recently.

"Well I don't know," he replied; "about ten, I suppose."

"I will wager," said the other, "you cannot pass the center with less than thirty."

He looked incredulous.

"To-morrow morning I will try it," and he did so.

He opened the throttle when the gage showed fifteen pounds and the crank was on the dead half center, but the wheels never stirred. He waited a little until the cylinder got hot; he blew the condensed water out and tried it again at twenty, but the crank never moved. At twenty-five pounds it made half a stroke but stopped on the center, and at thirty it barely turned over.

"I wouldn't have believed it," he said to himself.

This was a high pressure engine, 11 1-2-inch cylinder and 32-inch stroke, working at a boiler pressure of fifty-five and sixty pounds to the square inch. Nearly two-thirds of the pressure was absorbed in the friction of the belts, shafting, and machinery. This is not an isolated case. It is quite common, and few engineers are aware of the great loss daily incurred by simple neglect.

It is not difficult to account for it when we reflect that in many shops it is accounted of no importance if shafting is out of line, or belts laced up so tight that bearings heat; that it is of no moment whether the separate machines are in good order or not, and that one kind of oil is thought as good as another. To us it seems strange that men should be willing to pay tithes to carelessness—to waste means on nothing when money is so hard to get. It is certainly a small thing to line up shafting and to look after the other details. In the matter of oil, it is a well settled fact that the purest is the best, and that the use of cheap lubricants (so called) is a mistake. Shafting that is in line will work without any binders on the bearings, for the belts serve the same purpose, and no cap is needed except a slight cover to keep dust out.

By actual test with a dynamometer Bourne gives the following work done by an engine of 23 1-2 horse-power: Two pair of stones, 4 feet 8 inches diameter, grinding wheat; two of the same size grinding oatmeal; one dressing machine; one fanner; one dust screen, and one sifter. One set runs 85 revolutions per minute, the other 90. The oatmeal stones run 120 and 140 revolutions per minute.

He also instances a cotton mill of 2,562 spindles, each making 2,200 revolutions per minute. The bobbins were $1\frac{7}{8}$ long, the thread portion being $2\frac{3}{16}$ long; there were also five turning lathes, three polishing lathes, two bobbin machines, two saws, one 22 inch, the other 14, and 24 bobbin heads. When all the machines were off except the spindles, the actual power required was that of 21 horses, so that each horse-power drives nearly 123 spindles. A small engine of 10-inch bore and 4-feet stroke, making 35 revolutions, with steam at 90 pounds, drove two muley saws of 34-inch stroke, cutting 30 feet of yellow pine per minute, 18 inches thick.

The friction of a steam engine in good order is variously estimated at from five to eight pounds to the square inch. Of course the proper way to find out the actual figures is to take a diagram with the engine and shafting in motion, and another with the engine alone—the difference of the two showing the effective pressure. Very few persons are willing to take the trouble to do this, but go on grumbling at the high price of coal and of the waste of fuel, when they alone are to blame.

If we are to have any radical change in the waste of power in manufacture, we must begin at the details. We have spoken of this so much that we fear our readers are almost as tired of it as we are, but when we reflect upon the immense losses through simple and sheer neglect, we cannot keep silent.

PETROLEUM AS FUEL FOR STEAM ENGINES TO BE TESTED.

Among the amendments to the Naval Appropriation bill which have been agreed to by both Houses of Congress, is one appropriating $5,000 to test the value of petroleum as a fuel under marine boilers. It is to be hoped that this slice of the people's money will be entrusted to the hands of men who will expend it for the people's benefit—who will conduct their experiments in a fair and open manner, allowing all their steps to be made public as the experiments proceed.

There has been very general complaint among the engineers of the country, and manufacturers who are using steam power, that the costly experiments which are being made at the Novelty Iron Works, to test the economy of expansion, are withheld from the public. It is hinted that the conductors of these experiments, in forbidding the press access to the trial, intend to keep the public, who pay the expense of these costly private exhibitions, in blissful ignorance of the result until they can come out with a ponderous gilt-edged volume of reports, at another heavy expense, for their own glorification.

ZINC PLATES FOR PRESERVING BOILERS FROM CORROSION.

The statement seems incredible, that for forty-two years science has been in possession of cheap and simple means for completely protecting steam boilers from rust, and yet these means have never been made use of in the arts. The great Collins steamer *Baltic* is now lying in the East river, and on the wharf by her side is an enormous pile of iron rust, that formerly made up the tubes and tube sheets of her boilers. These boilers cost many thousands of dollars, and their condition is similar to that of hundreds of other boilers in this and other countries. Can it be that a few plates of zinc soldered to these boilers would have preserved them entirely from this decay? There is every reason, short of extensive practical trial, to suppose that they would.

In the year 1824, Sir Humphrey Davy announced his discovery that if a metal which is corroded in salt water is placed in contact with a second metal that is more easily corroded, the action is confined to the second metal, and the first is perfectly preserved. This principle is not limited to the action of salt water, but holds in regard to all corrosive fluids; the most easily corroded metal is called the positive, and the protected one the negative.

Sir Humphrey Davy proposed to protect the copper sheathing of ships from corrosion by attaching to it pieces of zinc, but the plan did not prove a practical success. It has been generally understood that the cause of the failure was the perfection with which the copper was preserved—it was said that the copper was kept so bright that barnacles adhered to it, a slight coating of the poisonous oxide of copper being supposed necessary to drive these shell fish away. M. Becquerel says that this impression of Davy's was erroneous, that neither barnacles nor seaweed adhere to bright copper, but that the real cause of the failure of Davy's process was the erroneous theory adopted by its author. Davy supposed that the mere contact of the two metals was sufficient, while the fact is, the protection is due to the chemical action going on between the more easily corroded metal and the liquid. A coating of oxide or other salt soon forms on the surface of this metal, and stops the action, when the protection ceases. To continue the protection, therefore, it is necessary that this coating should be constantly, or frequently, removed.

There is a limit to the area of iron surface which a piece of zinc will protect, though it is very large. A few small pieces of zinc would probably protect the largest boiler; they should be soldered to the iron, and should be so situated that their surfaces could be frequently scoured or scraped.

A BRILLIANT SERIES OF EXPERIMENTS.

Arrangements have been made for a course of three lectures at the Academy of Music, in Brooklyn, by R. Ogden Doremus, M. D., Professor of Chemistry and Toxicology in the Bellevue Hospital Medical College, and Professor of Chemistry and Physics in the Free Academy, on "Views of Life through the Medium of Natural Science." It is stated that "efforts will be made to demonstrate the recent discoveries in science, especially in the departments of heat, light, electricity, magnetism, eleotro-magnetism, thermo-electricity, etc., on a scale commensurate with the size of the edifice in which they will be exhibited."

As Professor Doremus is distinguished for the magnificent scale on which he conducts his experiments, and as these are to surpass all his former efforts, the opportunity to witness them must be a rare treat. Among them will be exhibited the cascade of light, of which we spoke in a recent issue.

THE ENGLISH IRON CLADS.

One of the latest English iron-clads, the *Bellerophon*, is only half clad. That is, for a portion of 160 feet on each side, she is entirely without protection. The central armor is only 100 feet in length, but an iron-plated bulk head $5\frac{1}{2}$ inches thick incloses and protects the battery. All the forward part of the ship is vulnerable to shells, and may therefore be blown to splinters. Possibly the battery and the iron bulk head $5\frac{1}{2}$ inches thick, the engines and boiler possess sufficient buoyancy to keep the frigate afloat after one-half of her has been destroyed. It is said that broadside vessels cannot be completely protected and retain their speed; in other words, that fine models cannot carry the weight of armor necessary to render them invulnerable, but one of our ship builders has shown in the *Re D, Italia*, that a vessel of 285 feet in length, and 50 feet beam, $4\frac{3}{4}$ inches of armor all round, can cross the Atlantic fully equipped at the average speed of 11 knots, without in the least straining herself or even opening the seams in her armor.

NEW PUBLICATIONS.

AMERICAN JOURNAL OF MINING.—This is a neat well-printed journal, lately started, and devoted, as its title indicates to mining and kindred matters. It is illustrated and contains full reports of the condition and prospects of the mines in Colorado, California, and other territories. It is published by Western & Co., 37 Park Row, at $4 a year.

THE MOTHER'S ASSISTANT AND THE HOME MONTHLY.—These are two different publications issued from the same house, and are calculated to elevate the taste and morals of families. Select tales of an unexceptional character, together with music of a devotional nature, are given in each number. Besides there are poetry and pictures, so that all tastes are likely to be suited. C. H. Pearson & Co., Boston Mass., and American News Co., New York.

STEEL MARKING STAMPS.—Our readers frequently inquire for the above tools, especially patentees who wish to stamp the date of patent upon their inventions, upon brass or iron. Makers of dies would do well to keep a short standing advertisement in the SCIENTIFIC AMERICAN.

Patent Claims

ISSUED FROM THE U. S. PATENT OFFICE
FOR THE WEEK ENDING APRIL 3, 1866.
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.

53,552.—Quartz Crusher.—S. F. Ambler, Tuolumne Co., Cal.:

I claim the strip or flange, c, attached to the mortar box, A, of a float quartz battery, substantially as shown, for the purposes set forth.

53,553.—Weighing and Measuring Grain.—D. D. Armes, Decorah, Iowa:

First, I claim the combination of the measuring boxes, C D, slides, R' R', and bales, d d, and arms, e e, substantially as and for the purpose set forth.

Second, The self-emptying cups, m' n', in combination with the rods, r' r', and links, s s, substantially as and for the purpose set forth.

Third, The arrangement of the shoes, M N, links, s s, and rods, r' r', in combintion with the cups, m' n', rods l l, bar, K, and boxes, C D, substantially as and for the purpose set forth.

53,554.—Safeguard for Watches.—Eugene F. Badgley, Brooklyn, N. Y.:

First, I claim the attachment to a watch or locket case of a clamp or ring, when constructed in the manner and for the purpose as described.

Second, I also claim the strap or its equivalent, when attached to a watch or locket case by a clamp or ring, in the manner and for the purpose as described.

53,555.—Gage Cock.—Phinehas Ball, Worcester Mass.:

First, I claim the combination and arrangement within the chamber, V, of the filter, S, with the water way, I, and port, n, as and for the purposes stated.

Second, The combination of the coupling, B, with body, K, having a water way, I, and port, m, arranged and operating substantially as set forth.

Third, The combination with the plug, P, of the ports, m, n and t, arranged and operating substantially as set forth.

53,556.—Carriage Spring, etc.—M. L. Ballard, Canton, Ohio:

I claim the uniting and holding the ends or plates of a spring by means of an independent cap, and bolt or rivet made and applied, substantially in the manner and for the purpose described.

53,557.—Street Sprinkler.—L. F. Bancroft, Worcester, Mass.:

I claim making the upper part of the water reservoir, A, circular, and the bottom flat, in combination with the use of the clamping bands, L, and tightening nuts, f.

53,558.—Tool for Trimming Boot and Shoe Heels.—S. C. Bedell, Red Bank, N. J. Antedated March 30, 1866:

I claim a tool for trimming boot or shoe heels, having the general construction and arrangement herein described, and either with or without an adjustable cutter stock, operated as specified.

53,559.—Plows.—Alonzo T. Boon, Galesburg, Ill.:

First, I claim the spiral cam, C, in connection with the shaft, c, for operating either a mole or subsoil plow, substantially in the manner and for the purpose herein set forth.

Second, The standards, B B, either of the subsoil or mole plow, having a series of notches or teeth, b, as arranged and used in their connection with the spiral cam and groove of the beam, A, substantially in the manner and for the purpose as herein set forth.

Third, The arrangement of the brace bar, E, in its relation to the standards, with shackle bar and connecting rod, d, attached to the beam of the plow, substantially in the manner and for the purpose as herein set forth.

Fourth, The arrangement of the mold board, F, with the subsoil plow, substantially in the manner and for the purposes as herein set forth.

53,560.—Car Coupling.—John W. Boughton, Appleton, Wis.:

I claim the combination of the shouldered tumbler, obliquely set coupling pin and corresponding opening, operating substantially as described and represented.

53,561.—Social Game.—Milton Bradley, Springfield, Mass. Antedated March 30, 1866:

I claim as an article of manufacture, the social game, substantially as herein set forth.

53,562.—Letter Boxes.—W. H. Bramble, Decatur, Ill. Antedated March 30, 1866:

I claim the use of hinged or adjustable doors or lights for post office boxes, when said doors or lights are operated from the inside of the office or box for the purpose of facilitating the delivery of letters, as herein specified.

53,563.—Manufacture of Bronze Powder.—Leopold Brandeis, Brooklyn, N. Y.:

I claim the production of grains, scrapings, filings, shavings or borings from copper, tin, etc., their alloys by proper tools, like a turning lathe or other tool; to flatten these particles of metal by means of rollers or stampers with polished steel or chilled surface, for the purpose of getting them bright and brilliant to manufacture therefrom bronze powder in any way used for the purpose of reducing these small flat fragments to still finer ones, always offering a bright surface, just the same as if the metal had passed previous through all the processes of repeated hammerings, annealings, rollings, beatings, etc., etc.

53,564.—Drill Cable Meters.—L. C. Bristol, Victor, N. Y.:

I claim in combination with the drill cable or its equivalent, of well boring apparatus, a meter having a traction wheel or pulley, substantially as shown, for the purposes herein set forth.

53,565.—Plowshare.—P. H. Bronson, East Avon, N. Y.:

I claim securing the detachable false point, P, to the shares of plows, by means of the screw bolt, S, and the dove-tail locking lips, a b and c, substantially in the manner and for the purposes herein set forth.

53,566.—Step Ladder.—Charles W. Brown, Newark, N. J.:

I claim the arched brace of wood in one piece, spanning the ladder frame, substantially as specified.

53,567.—Corn Sheller.—William R. Burns, Lancaster, Pa.:

I claim the combination of the adjustable shelling bar, with its slots, I I I, and the concave, double-inclined bottom, P1 P2, with its opening, V, under the spiked cylinder, G, together with the vibrating sieve, S, shaking attachment, L m K and D, fan, B, and flue, C, when these several parts are arranged and operated substantially in the manner described for the purpose specified.

53,568.—Carriage.—Clarke T. Bush, Rensselaerville, N. Y.:

I claim the arrangement and combination of the side springs, e e, yielding perch, f, diagonal braces, h h', slot or loop, i, hinges, p p, substantially as and for the purposes set forth.

53,569.—Method of Extracting Gold and Silver from Ores.—Charles F. Carpenter, Louisville, Ky.:

I claim the manner of using atmospheric air for the purpose of facilitating the extraction of gold and silver from ores, causing a separation between gold or silver and the ores of baser metals, and consists in introducing the said atmospheric air between the flame of a reverberating furnace and the ores containing gold or silver which are spread upon the hearth of the furnace.

53,570.—Valve Gear for Oscillating Engines.—Henry T. Carter, Portland, Me.:

I claim the rocking valve stem, S, arm, a, in combination with a slotted link upon the trunnion box cap, in the manner and for the purpose herein set forth.

53,571.—Means for Attaching Legs to Music Stools.—Elijah D. Castelow, Meriden, Conn.:

I claim the combination of the pillar, A B, with the blocks or pieces, C, the legs, D, and disc, d, when the dovetails are made to fit, and the disc to hold, substantially as herein described.

53,572.—Spring Power for Propelling Carriages.—Wm. K. Chase, Charlestown, Mass.:

I claim the springs, K K, one or more, applied to a drum, I, placed loosely on a shaft, E, to which wheels, F F, are attached, in connection with the pinions, D, on the hubs, a, of the hind wheels of the wagon, the ratchets, H H and J, on drum, I, the yokes, L L, lever, M, and sliding rod, N, and the pawls, b b, on the wheels, G G, of shaft, E, all arranged and applied to operate, in the manner substantially as and for the purpose specified.

I further claim arranging the shaft, E, so that it will have a forward and backward movement in its bearing to admit of the wheels, F, being moved in and out of gear with the pinions, D, when said shaft, thus arranged, is used in connection with keys, d d, of the levers, P, and the springs, K K, with their outer ends attached to the frame, A, or to a fixture thereof, substantially as described.

53,573.—Stair Carpet Pad.—George W. Chipman, Melrose, Mass.:

I claim as a new article of manufacture, the stair carpet pad constructed of one or more layers, consisting of fibrous matter covered on each side with sheets of paper and enveloped in a closed case of textile material, when the whole is quilted at several points through all the materials composing the pad.

53,574.—Railway Car Coupling.—Thomas J. Christy, Noblesville, Ind.:

I claim the drop latch, L, when the same is constructed substantially as shown, with pivoted slot, p, and inclines, d and i, each performing the offices described, all constituting a self-acting car coupling, as set forth in the foregoing specification.

53,575.—Grain Drier.—George Clark, Buffalo, N. Y.:

First, I claim a closed or air-tight grain drying kiln or chamber, combined and operating in connection with air-heating furnaces, and blowing air pumps or fans, for the purpose and in the manner substantially as described.

Second, In the combination with said air-tight grain drying kiln or chamber, of an exhausting air pump or fan, operating in the manner and for the purpose set forth.

Third, Providing said air-tight grain drying kiln or chamber, having an exhausting air pump combined therewith, with valves or doors, which may be opened to admit cold air therein, for the purpose set forth.

Fourth, The combination with said air-tight drying kiln or chamber of one or more evaporation escape valves, G, or other equivalent device, operating in the manner and for the purpose substantially as herein described.

Fifth, In the combination with said air-tight drying kiln or chamber, or with an auxiliary cooling chamber, of a cold air inlet valve or valves, H, or other equivalent device, operating in the manner and for the purpose substantially as herein described.

53,576.—Broom Head.—James O. Clay, Hudson, Wis.:

First, I claim a broom head or frame consisting of the piece, B, having the socket formed thereon, and the piece, A, provided with the arms, a and d, fitting in the openings in said socket, said piece being hinged at b, as shown and described.

Second, Securing the handle in place by means of the projection, c, and the groove, l and e, arranged and operating as set forth.

Third, I claim the central strip, F, in combination with the parts, A and B, when constructed and arranged as herein shown and described.

Fourth, I claim forming the teeth on bars, C and D, with their faces standing diagonally, as and for the purpose set forth.

53,577.—Rotary Plows.—Levi H. Colborn, Chicago, Ill.:

First, I claim giving the helical or screw plow blades of a rotary plow, in addition to their screw form, an additional curvature from the periphery toward the centre, beginning at or near the entering edge, and gradually increasing toward the leaving edge, the same being a development of the mold board of the common plow around an axis of revolution.

Second, Attaching to a rotary plow blade at any suitable place thereon, a horizontally projecting cutter in order to give a horizontal slicing undercut to the furrow, substantially as set forth.

Third, Making rotary plow blades adjustable on their propelling shaft, so that they may be set to cut furrows of different widths by attaching two, three or more blades to the shaft, as set forth.

Fourth, Connecting the plow blades to the plow shaft, so that their delivery end shall project in rear of the shaft, and be left free and unobstructed, substantially as described

Fifth, Connecting the plow shaft to the axle of the driving wheels by a loose journal, D, so as to allow the plow to vibrate in order to pass small stones and other light obstructions, substantially as set forth.

53,578.—Gig Tree.—Edward A. Cooper, Lancaster, N. Y.:

First, The square raised shank, C', on the check hook, E, and corresponding mortise in the tree plate, in combination with a binding screw or bolt, as described.

Second, The grooved contle, b', and sliding back plate, F, combined and operating in the manner and for the purpose set forth.

Third, The terret nuts, H, with end lips, b', and notches, i2, in combination with the end tits, i, cast on the tree plate, as and for the purpose set forth.

Fourth, Riveting the flaps, M, to the tree plate on each side of the back straps, L, as set forth.

Fifth, The tongue, K, cast on the back side of the tree plate to secure and hold the pad, in the manner described.

53,579.—Bed Spring.—Delos V. Crandall, Canton, Iowa:

I claim inserting the coiled wire in the aperture, C, of the slat B, and fastening it by the stopper, D, as herein described and for the purposes set forth.

53,580.—Mangle and Wringer.—David Cumming, Jr., New York City:

I claim the use of the abutments, g g, in combination with two or more rollers, arranged substantially as described and for the purposes set forth.

53,581.—Apparatus for Distilling Spirits.—H. G. Dayton, Maysville, Ky.:

First, the evaporating pan, E, with a steam jacket, d, in combination with rose, H, coil, F, steam drum, B, and still, A, constructed and operating substantially as and for the purpose described.

Second, The annular steam chambers, C D, one or more in combination with the evaporating pan, E, steam jacket, d, still, A, and drum, B, constructed and operating substantially as and for the purpose set forth.

53,582.—Bullets for Small Arms.—John G. De Coursey, Philadelphia, Pa.:

I claim the within-described projectile for small arms, the same being composed of the central tubular lining of tinned iron, round and to which is cast a leaden exterior, tapering in front as described, in combination with a hard metal washer, B, bearing against the rear of the said tube, the whole being otherwise constructed as set forth, for the purpose specified.

53,583.—Manufacture of White Lead.—Clarence Delafield, Factoryville, N. Y.:

I claim, First, Uniting or combining a solution of the nitrate of lead or its equivalent for this purpose, made substantially as described, with a solution of the carbonate of potash, or its equivalent for this purpose, made substantially as described for the purpose of producing the white lead of commerce.

Second, Uniting or combining a hot solution of the carbonate of potash, or its equivalent for this purpose, with a hot solution of the nitrate of lead, or its equivalent for this purpose, without regard to the proportions in which the two solutions are made, for the purpose of producing the white lead of commerce.

53,584.—Reservoir for Wells.—R. H. Dewey and E. M Tillotson, Pittsfield, Mass.:

We claim in its application as a buried water reservoir in the bottom of a well, the filtering chamber consisting of a perforated cylinder whose intervening spaces are filled with filtering material, the central space forming a chamber from which the water supply is drawn by an ordinary elevating device, as described.

53,585.—Door Latch.—Henry L. De Zeng, Geneva, N. Y.:

I claim, First, The sliding latch, A, and bolt, B, constructed substantially as specified.

Second, The check latch, F, in combination with the cleat, D, and latch, A, and bolt, B, all being constructed and arranged substantially as set forth.

53,586.—Rock Drill.—Julius C. Dickey, New York City:

I claim the central drill bit, B, made to answer the purpose of a reamer, in combination with the drill bits, A and C, substantially as set forth.

53,587.—Typographic Printing.—John Donlevy, New York City:

I claim, First, The utilizing the spaces between the letters and lines of text, left blank in ordinary printing, by filling such spaces, by means of utilizing lines, with a pictorial back ground, divided into sections and adapted to arrange, alternately or otherwise, with the lines of text, spaces, quadrats, etc., substantially as and for the purposes set forth.

Second, The use and application of improved intaglio type, with plain surfaces, which adapt such type to artistically unite with type high spaces, quadrats, and utilizing lines, corresponding to, and when set up on a level, with the surface of the type, for the purpose of producing stereotype plates adapted for subsequent ornamentation.

Third, The combination of the type previously described as bas-relief type, with plain surface intaglio type, for the purpose of producing illuminated and polychromatic effect.

Fourth, I claim the combination of plain-surface intaglio types with figured-surface utilizing lines, or figured-surface intaglio types with ornamented utilizing lines, by which is produced a new and useful style of contrast-tint typography, substantially as and for the purposes set forth.

Fifth, I claim the artistic dissection of any pictorial or decorative subject in spaces, quadrats and utilizing lines, and their combination with each other and with letters or lines of letters or texts, so as to reproduced from the whole a typo-pictorial subject, substantially as and for the purposes set forth.

53,588.—Axle Box.—D. H. Dotterer, Philadelphia, Pa.:

I claim, First, Fitting the sections of packing of a journal box in such manner that they may be adjusted from the outside of the box, substantially as described.

Second, Constructing a sectional packing, C D, so that the section, D, may move within the section, t c, in combination with a bridge support, E, and springs, which are so applied as to keep such packing in place, substantially as described.

53,589.—Pen for Weaning Calves.—J. B. Dow, Davenport, Iowa:

I claim the calf-weaning and stall-feeding pen, constructed as herein described.

53,590.—Process for Amalgamating Gold, Etc.—F. N. Du Bois, Black Hawk, Colorado:

I claim the use of an amalgam of gold and mercury, substantially of such consistency as to render it adaptable for the purpose set forth.

53,591.—Churn.—Daniel Dunton, Brooklyn, N. Y.:

I claim the rotary dasher, B, constructed with an open center, substantially as shown, in combination with the plates or gatherers, e e, all arranged substantially in the manner as and for the purpose specified.

53,592.—Cultivator.—Solomon Dwight, Rockford, Ill.:

I claim the combination of the rigid tongue, the curved side pieces, the adjustable rear and middle cross beams, the adjustable handles, the swivelling plows, and the yielding-spring corn guard, when constructed, arranged, and operating as described.

53,593.—Railway Switch.—Stephen A. Emery and Frederick A. Prince, Portland, Maine:

We claim, First, The peculiar construction of the lever, d, with wings, in manner above described, or their equivalents.

Second, The peculiar construction of lever, f, and its adjustment in connection with shoulder, r, and key, g, and drop levers, e e, in manner above described, or their equivalents.

Third, the combination and use of lever, D, with lever, f, in conjunction with the wheel of a car or locomotive operating in the manner above described.

53,594.—Apparatus for Draining Cellars.—Augustus F. Erich, Baltimore, Md.:

I claim, First, The combination with the stationary vessel, A, provided with a pipe leading from the hydrant or other water supply, and with a discharge pipe, of the air-conducting pipe, E, vessel, G, discharge pipe or pipes, H H', and float, I, substantially as and for the purposes set forth.

Second, I claim the combination of the spring, K, with the cocks of the supply and discharge pipes of the vessel, A, and the collars, F, for giving a positive and distinct motion to the vessel, G, when the cocks are reversed, as explained.

53,595.—Medicine.—W. H. Farnham, Sparta, Wis.:

I claim the medical compound of the several ingredients mixed together or in about the proportions stated, and for the purpose specified.

53,596.—Steam Engine.—Isaac Ferris, Cincinnati, Ohio:

I claim, First, The open-ended cylinders, A A' B B' C C', and pistons, D D' E E', arranged, connected and operating substantially in the manner, and for the purpose set forth.

Second, In this connection the arrangement of the parts, N R R' and S S', for operating the valves, P Q, substantially as described.

53,597.—Mash Machine.—Jacob T. Forrer, Peoria, Ill.:

First, I claim the combination of the shaft, G, and post, D, with the tub, A, substantially as described and for the purpose set forth.

Second, The combination of the shaft, B, with the shaft, G, post, D, and tub, A, substantially as described and for the purpose set forth.

Third, The combination of the shovels, C, and arms, E, with the shaft, B, and tub, A, substantially as described and for the purpose set forth.

Fourth, The combination of the cap or casing, o, with the shafts, G and B, and with the post, D, substantially as described and for the purpose set forth.

53,598.—Grinding Cylinders of Paper Engines.—Clinton T. Frost, Medfield, Mass.:

I claim the application of the grinding plates, a, to the cylinder of paper engines in such manner that they may be moved outwardly from its circumference, and secured in position, as occasion may require, as hereinbefore explained.

I also claim the peculiar construction and arrangement of the plate, a, and its support, b, that is with the lip, c, and grooves, f f, substantially in the manner and for the purpose as above described.

53,599.—Rock Drill.—George P. Ganster, New York City:

First, I claim the combination and arrangement of the flyer, C, ratchet wheel, D, pawl, o, rock shaft, Q, rod, T, and a crank, S, on the axle, S' of the roller, S'', or its equivalent, substantially as and for the purpose herein specified.

Second, In combination with an unyielding roller, H, of the construction substantially as herein described, I claim the elastic grooved roller, J, constructed and operating in the manner and for the purposes set forth.

53,600.—Brick Machine.—John George and Henry Hague, Jackson, Mich.:

We claim the attaching of the grinding or tempering arms, J, of

the pug mill of a brick press to a tubular bar shaft, F, fitted loosely on the shaft, B, which has the presser attached and driving said shaft by means of gearing, so arranged that the shaft, F, will rotate more rapidly than the shaft, B, substantially as and for the purpose herein set forth

53,601.—Shutter and Blind Fastening.—Charles H. Gilman, Portland, Me.:
I claim the combination and arrangement as herein set forth of the plate, D D, cylinder, E, packing, B B, bar, A, with a catch or staple, all substantially as and for the purpose described.

53,602.—Rock Drill.—Lucius M. Gilmore, Janesville, Wis.:
I claim the drill or built tool, E, when constructed and arranged substantially as and for the purpose set forth.

53,603.—Grinding Mill.—Solomon Godfrey, Peoria, Ill.:
I claim the combination of the openings, D and E, and the flange, C, with the rim, A, and the runner, substantiallyin the manner and for the purpose described.

53,604.—Washing Machine.—J. T. Greenwood, Sen., Beloit, Wis. Antedated March 13, 1866:
I claim the crotchets, D D, and the application of the regulating device, consisting of the levers, E E, screw rods, H H, thumb nuts, h h, plates, i i, and the springs, I I, when constructed substantially as herein described and for the purpose set forth,

53,605.—Stovepipe Damper.—Demas L. Grover, Groton, N. Y.:
First, I claim the plates, C D and B the pin, F, and stays, G, when constructed and operated in the manner described and for the purpose specified.
Second, I claim the handle, E, and the connecting pin, H, when constructed and arranged in combination with the plates and supports so as to operate in the manner described.

53,606.—Filtering Apparatus.—John P. Gruber, New York City:
First, I claim the combination of an exhausting and forcing air pump with a filtering vessel, which is constructed with a central filtering partition, a movable cover, and with pipes, I k, leading from the chambers, E F, to the pump chambers, substantially as described.
Second, The combination of the adjustable imperforated cap, h, with the cylinder, d', and partition, D d, arranged within a vessel, A, which communicates with an exhausting and forcing air pump, substantially as described.

53,607.—Railroad Station Indicator.—Parson E. and John P. Gruger, Lancaster, Pa.:
I claim the arrangement of the bolt, D, springs, S S, spring case, F, pawls or clicks, c' c2, in combination with the reversely-toothed ratchets, B' B2, on the same shaft, O that carries the cog wheel, M, when all these parts are fixed upon a plate, A, constituting one end of the box or indicator, transferable from one rod, N, to the other, and actuated substantially in the manner specified,

53,608.—Photography.—C. A. Guilmette (assignor to himself and George P. Towle), Boston, Mass.:
I claim making a negative from which to print a photographic likeness of a person with a fac simile of an autographic signature, forming part of such photograph, by means of a card or tablet having the signature written upon it, and placed upon some part of the person, and so that the autograph shall be taken with the person in the negative picture and without showing the outline of the card or tablet, as herein above specified.

53,609.—Rotary Blower.—Frederick Hainsworth, Chicago, Ill.:
First, I claim the employment of a rotary series of bellows, when arranged and operating substantially as herein described.
Second, I claim in combination therewith, the hollow shaft or tube with the removable coupling, when operated for the purpose herein specified and shown.

53,610.—Preparing Timber for Cutting into Veneers.—Thomas Hanvey, Elma, N. Y.:
I claim preparing logs or blocks of wood for cutting or slicing into boards, veneers and the like, by the process of steam boiling in tanks or vats of water, substantially as herein described.

53,611.—Hominy Mill.—James Hayden, Philadelphia, Pa.:
First, I claim the combination of the adjustable, slide, W, with the plates, I, for regulating the discharge of the corn through the openings, p, substantially in the manner described.
Third, Constructing the slots, l, of the cylindrical pieces, H, with cutting edges, m, for removing a portion of the hulls from the corn, substantially as described.
Fourth, The combination of the beaters, l, and sections of the central shaft, B, by means of the screws on the inner ends of the former, and the pins, j, the several parts being constructed and arranged in relation to each other substantially as described and for the purposes specified.
Fifth, The combination and arrangement of the ventilator, S, with the central shaft, B, for creating a current of air through the grain compartments, substantially in the manner described, and for the purpose set for h.

53,612.—Vulcanizing Vessels for Dentists' Use.—George E. Hayes, Buffalo, N. Y.:
I claim a vulcanizing vessel constructed of an outer shell and an inner lining, substantially as herein specified, whereby on the lining being corroded through steam may escape between it and the shell, as herein set forth.

53,613.—Steam Engine.—William M. Henderson, Philadelphia, Pa.:
First, I claim the union of the valve chest with the steam cylinder in such manner that the roof of the main steam ports is formed by the bottom of the valve chest, in the manner and for the purposes represented.
Second, The connection of two piston heads in a cylindrical valve chest, by a spindle or its equivalent, said heads being united in motion, and carrying between them a sliding valve, to which is imparted a stroke less than that of the driving heads, substantially for the purpose specified.
Third, The described arrangement of the grooves, V V', and channels, I I, in the piston heads with the passages, X X', in the valve seat, when operating as herein set forth.
Fourth, The arrangement of the air holes, K K', through the piston heads operated by the action of the valve, in the manner and for the purposes herein described.

53,614.—Hay and Straw Cutter.—William Henshaw, Spencer, Mass.:
First, I claim the cast-iron knife frame, G, made in the peculiar manner described, and shown in the drawings.
Second, The combination of the arms, F F', with their ribs or flanges, C C, with the knife frame, G, as shown and described.
Third, The combination with the frame, J, of the adjusting screws, k k, as and for the purposes stated,
Fourth, The combination with the front end of frame, G, of the lip, m, rubber, n, rod, o, and spring, p, as and for the purposes stated.
Fifth, The combination with the frame piece, J, of the arm, F', and table, K, when cast together, as shown and described.
Sixth, The combination of the adjusting screws, g g, with frame, G', and knife, d, as and for the purposes set forth.

53,615.—Paper Bosom Machine.—Sylvester B. Hill, Chicopee, Mass.:
First, I claim forming ornamented paper shirt bosoms by passing the prepared paper through or between rollers, constructed substantially as and for the purpose set forth.
Second, Forming paper shirt bosoms between section rollers, so arranged that the change of the relative positions of the sections will vary the ornamental design of the shirt bosom, substantially as set forth.
Third, The combination of an ornamented sectional roller with a solid roller, and thus forming ornamental paper shirt bosoms, and varying their designs, substantially in the manner described.
Fourth, The new article of manufacture, constituting an embossed paper shirt bosom, made substantially in the manner described.

53,616.—Fence.—W. D. Hillis, Elgin, Ill.:
First, I claim the wire or rod flattened at intervals, as described for the purposes set forth.
Second, I claim the picket provided with holes, E H E, Fig. 6, in combination with the wire, C D, substantially as described.
Third, I claim the mode of fastening the stringers, by means of their bent ends in the ring, I, secured by the spike, substantially as described and represented.

53,617.—Steam Generator.—Birdsill Holly, Lockport, N. Y.:
I claim the combination and arrangement of the vertically pendent tubes, C C, with the furnace, B, flues, d d, and water jacket, a, substantially in the manner and for the purposes described.

58,618.—Stave Machine.—Albert H. Hook, New York City:
I claim the clamp so constructed as to enable the jointing tools and the howeling, crozing and chamfering tools to perform their office upon the stave, without removing the staves from the clamp, said clamp being constructed for these purposes, substantially as herein set forth.

53,619.—Button Hole Cutter.—James A. and Henry A. House, Bridgeport, Conn.:
First, I claim the axially adjustable cutter, substantially as described for cutting button holes at any desired angle to the selvage.
Second, The combination of the axially adjustable cutter in one jaw of the pliers, with the adjustable plate in the other jaw of the pliers, when both are removable, to cut button holes of varying size, substantially as set forth.

53,620.—Folding Bedstead.—Tyler Howe, Cambridgeport, Mass.:
I claim the combination of the brace, C, constructed substantially as described, with the rail, A, the leg, B, and cross brace, E, the whole being arranged in manner and so as to operate together as specified.

53,621.—Water Elevator.—Edwin Hoyt, Stamford, Conn.:
First, I claim the friction wheel, D, having either a bevelled or plain periphery, in combination with the brake on the end of the crank, F, constructed and arranged substantially as described.
Second, The brake, c, on the end of the crank, F, in combination with the friction wheel, D, pin, E, end plate, B, and windlass, A, substantially as specified.
Third, Hanging or pivoting the crank, F, on a pin, E, which is secured loosely in the friction wheel, D, by the plate B, whereby the crank and pin revolve together for adjusting the brake to the required position for arresting the velocity of the windlass, substantially as specified.
Fourth, I claim the recesses and arms, e, in the friction wheel, D, and inclined as shown, substantially as and for the purpose specified.
Fifth, I claim the lug d, on the crank, F, as arranged in relation to the recesses and arms, e, in the friction wheel, D, for rotating the windlass, substantially as herein specified.
Sixth, I claim the rod, G, attached to the pawl, C, when arranged as described, and used in combination with the projection, c, on the crank.

53,622.—Pen.—Thomas S. Hudson, East Cambridge, Mass.:
I claim as an improvement thereon, the application of the ruler guard, A, to the pen carrier, a, by means of a tube, B, to encompass and slide on the said carrier, such tube being furnished with a slot, C, or its equivalent, to operate with a stop, d, projecting from the carries, as set forth.

53,623.—Lamp Burner.—James G. Hunt, Cincinnati, Ohio:
First, I claim the construction, arrangement and combination of the shell, A a g, diaphragm D c, tube, G, wick tube, E, and lamp collar, C, substantially in the manner described.
Second, The construction, arrangement and combination of the diaphragm, D c, lower perforated portion, a, of case, A, and tubes, G E, all applied to the collar, C, of the lamp, substantially in the manner described.
Third, The wood button, P, in combination with the wick adjuster of a lamp burner, substantially as described.

53,624.—Broom Head.—John E. Hunter, Mechanicsburg, Ohio:
I claim the construction of the case for receiving the broom corn in combination with the toothed jambs or rings, C, and support, F, attached to the side of the said ring, substantially in the manner and for the purpose set forth.

53,625.—Process for Making Steel.—Thomas H. Jenkins, New York City:
I claim the process of making steel by using what is known as malleable cast iron, which has been subjected while in the heated state to the action of a solution, substantially such as described and melting it in admixture with wrought iron in a crucible or equivalent therefor, substantially as described.

53,626.—Washing Machine.—Watson Kenderdine, Lumberville, Pa.:
First, I claim the combination of the rotary cylinder, A, with its surface of cone-shaped fluted rollers, C, and the adjustable concave, G, operating substantially as described.
Second, I claim raising the concave, G, by means of the lever, o, rods N and L, and cross bar, M, or their equivalents, substantially as described.

53,627.—Stop Cock.—Martin C. Kilgore, Washington, Iowa:
I claim a stop cock in two halves, united by screws or bolts for holding the parts together or loosening them, and having the plug through which the fluid passes made straight and with a groove or V, in its surface to prevent its moving endwise, with lining in the box of soft metal having on it a projection answering to the groove or V, in the plug.

53,628.—Suspended.

53,629.—Blow Pipe.—N. W. Kingsley, New York City:
I claim a blow pipe having a valve for regulating the supply of gas thereto arranged, and opperating substantially in the manner and for the purpose described.

53,630.—Piston for Deep Well Pumps.—Elisha Y. Kneeland, Buffalo, N. Y.:
First, I claim a piston valve constructed in sections, B B' B2, with intermediate leather crown packing, f, and guiding rod, h, for the purposes and substantially as described,
Second, The arrangement of two, three or more leather packing cups, A, with corresponding compressing or holding rings, E, in combination with the piston, so that when the two parts of the piston are screwed together, the rings will be successively pressed upon the flanges of the packing cups and held in place for the purposes and substantially as described.

53,631.—Process for Molding Articles from Paper Pulp.—Edward H. Knight, Washington, D. C.:
I claim the process of making boxes and other hollow paper articles, substantially as described.
In the process of manipulating paper pulp and in combination with the former, possessing the described functional character.
I claim an air forcing or exhausting device, operating substantially as described.
I claim in combination with a former, constructed to operate substantially as described, an elastic hollow handle provided with valve guarded opening or openings.
I claim a seamless box or other receptacle lid, lamp shade or other hollow paper article, made directly from pulp upon a pervious former in connection with an artificial draft, and blast of air or other fluid.

53,632.—Chamber Bucket.—Wm. W. Knight, Philadelphia, Pa. Antedated March 23, 1866:
I claim the seat, D, with its plate, E, adapted to and combined with the stop can, A, and its plate, b, in the manner described.

53,633.—Fluting Machine.—Susan Knox and W. D. Corrister, New York City:
We claim a fluting machine having the upper roller hung in a horizontal spring swinging frame, substantially in the manner described for the purpose specified.

53,634.—Portable Feed Rack.—Casper W. Lamb, Columbia City, Ind.:
I claim the combination and arrangement of the different parts of my farm-stock portable feed rack and shed, substantially as described and illustrated.

53,635.—Seed Planter.—James N. Lane, Bethel, Ky.:
First, I claim the scrapers, I, when hinged to the frame, and disposed diagonally to the line of draft, substantially as set forth.
Second I claim the arrangement of a seed planter for one horse, with seed valves operated by hand when the parts are constructed and combined, substantially as set forth.

53,636.—Purifying Isinglass.—Jesse Lewis and Isaac Stanwood, Gloucester, Mass.:
We claim separating from the swimming bladder or sound of the hake, or other fishes from which isinglass is usually made, the impurities by boiling, substantially as and for the purpose set forth.

53,637.—Hinge.—John R. Lomas, West Haven, Conn.:
I claim a hinge constructed substantially as herein set forth.

53,638.—Tag Needle.—Oscar Low, Chelsea, Mass.:
I claim my improved tag needle, made substantially in the manner and for the purpose as above set forth.

53,639.—Car Coupling.—Alpheus A. Lusk and Samuel A. Wells, Wooster, Ohio:
We claim a projection at the eye of the hook to prevent it from falling entirely back so that it will couple in any position.

53,640.—Manufacture of Steel for Safes.—Walter K. Marvin, New York City:
I claim as a new metal or alloy the composition herein described, the same consisting of chromium cast iron and wrought iron compounded in the manner and proportions hereinbefore set forth.
Second, The construction of safe boxes, vault doors and other burglar proof structures by using the same of the metal herein-before described.

53,641.—Distilling Pine Wood.—James A. Mattocks, Swansboro, N C.
I claim the construction and arrangement of a retort, protected by sheet iron or other material, furnaces, flues, sliding grates and the application of heat to the upper surface of the tar, as shown in the accompanying drawings and specifications.

53,642.—Machine for Cutting and Stoning Peaches.—W. D. Mayfield, Ashley, Ill.:
First, I claim the feed wheels, t and u, in combination with the knives or cutters, a' a', arranged with regard to each other and operating substantially in the manner described.
Second, The wedge-shaped ends to the knives, for the purpose specified.

53,643.—Manufacture of Hard Rubber.—Charles McBurney, Roxbury, Mass.:
I claim the use of waste rubber for the production of hard rubber, as set forth.

53,644.—Flour Sifter.—William C. McGill, Cincinnati, Ohio:
I claim the arrangement of vibrating sweep, I, with flexible and jointed scraper, J, and concave sieve, B, substantially as set forth.

53,645.—Soap Mold.—John McRoberts, New Orleans, La.:
I claim the mold constructed of two parts, G H, of V form in their transverse section and placed in an inclined position so that said parts, when in contact, will form a rectangular box having an inclined position and resting on one angle or crown, the upper part, H, being movable and all arranged to operate in the manner substantially as and for the purpose set for h.

53,646.—Bleaching Stained Cotton.—James A. Meany, Brooklyn, N. Y.:
I claim the process of cleaning and bleaching stained cotton by passing it through solutions of soda ash and of chloride of lime, and rinsing it after each operation in cold water, and in vinegar and water, in the proportions and manner substantially as herein described and for the purposes set forth.

53,647.—Machinery for Shaving Wood Screws.—Dustin F. Mellen, New York City. Antedated, March 14, 1866:
I claim the inclined hopper having a channel of polygonal form at the base, to receive the blanks from the hopper, as and for the purpose described.
I also claim the employment of pins, r, working on sliding plates in the disk, fig. 6, and sweeping around in the polygonal recess in the hopper to carry around the screws therein, substantially as described.
I also claim the cylinder, t', grooved as herein specified, and the fingers, x, in combination therewith, as and for the purposes described.
I also claim the curved spout, y, and spring jaws, z, for delivering the screw blank to the feed arm, a', as herein specified.
I also claim the feed arm, a', and the apparatus connected therewith, for reciving the screw blank from the jaws, z, and delivering it to the spindle, c', constructed, arranged and operated substantially as and for the purposes herein set forth.
I also claim the adjustable shaving apparatus gaged and operated as herein specified.
I also claim the revolving cross arm, f', and spring claws, or their equivalent, for stirring up the screw blanks in the hopper of the feed apparatus, for the purpose set forth.

53,648.—Machine for Nicking Screws.—Dustin F. Mellen, New York City. Antedated March 21, 1866:
I claim the combination of the piston rod, d, and directing forceps, p, employed with the feeding apparatus as described for feeding the screw blanks to the gripping dies, as specified.
I also claim the gage plate, S, to determine the exact radial projection of the screw blank from the face of the dies when brought to the cutter in combination with the gripping dies, c, herein described.
I also claim the vibrating adjustable frame, l, in combination with the holding dies, as and for the purposes described.
I also claim the combination of the friction clutch, w, spring, y, ratchet and stop, v2, for setting the clamps accurately, as herein specified.

53,649.—Handle for Milk Cans, Etc.—Charles Miller, Utica, N. Y.:
I claim in combination with a milk can, the handles, C and d, constructed and applied substantially as described, whether the handle, d, be hinged at h, or be made solid and immovable at its connections, h and L.

53,650.—Machine for Cutting Files.—George Miller, New York City:
I claim, First, The combination and arrangement of the chisel stock with the recoil springs, socket bearing and springs connected with the adjustable transom, operating substantially as and for the purpose herein shown and described.
Second, The combination and arrangement of the spindles, B J, with the feed motion, chisel stock, and rack and pinions, or their equivalents, as specified, and operating substantially as and for the purpose herein shown and described.

53,651.—Railway Signal.—Patrick Francis Milligan, Washington, D. C.:
I claim in combination with the frame work, on both sides of the railroad track, the chairs, S and X, and their supporting pulleys and bolts, whereby they are attached to the timber supports beneath the railroad track, the whole constructed and arranged as herein described and set forth.

53,652.—Washing Machine.—Henry C. Moody, Fulton, N. Y.:
I claim the arrangement, construction, and combination of the levers, G, the self-adjusting rubber, F, the side rollers, E, and guides, D, as herein described and for the purposes set forth.

53,653.—Harvester Rake.—C. Moul, Hanover, Pa.:
I claim, First, Applying the rakes and the reel arms to short radial shafts, g', all of which have independent movements of each other upon a revolving crown wheel, d, substantially as described
Second, Giving an intermittent oscillating motion to each one of the shafts, g', by means of toothed segments, h, and fixed segments, G L, said segments being constructed with flat bearing surfaces, h' t3, t4, for holding the rake and reel arms whilst passing over the platform and also over the draft frame, substantially as described.
Third, The combination of the anti-friction roller, t', with the plane surface, t2, of the toothed segment, L, and the flat surfaces of the oscillating segments, h, substantially as described.
Fourth, The combination of the upper and lower toothed segments with the intermediate revolving crown wheel, d, and the independent oscillating shafts, g', substantially as described.
Fifth The construction and arrangement of the segments h h', substantially as described.

53,654.—Broom Head.—Jacob H. Mumma, Harrisburgh, Pa.:
I claim the combination of the jaws, B B, with the case A, one of

the said jaws being hinged to the case as represented and one provided with an arm and the other with a sleeve, substantially as and for the purpose herein specified.

Second, The bars C C and D D, constructed so as to form a joint for expanding to suit the broom.

Third, The combination of the jaws, B B, with the bars, D D and C C, when constructed and used as and for the purpose herein specified.

53,655.—Stopper for Bottles.—L. B. Myers, Elmore, Ohio:

I claim, First, The discharge spout, A, constructed substantially as specified, whether it be independently made and fitted to the article with which it is used, or formed with the article as a part of it, substantially as specified.

Second, The cap, C, in combination with the spout, A, applied substantially as and for the purpose specified.

53,656.—Method of Deodorizing Petroleum.—Robert Newall, Marietta, Ohio:

I claim deodorizing petroleum, and other hydro carbons by treating and washing them with a solution of lye containing chloride of lime, soda ash, and common lime, or their several equivalents, in the proportions above stated, substantially as above described.

53,657.—Press.—William Norman, New York City:

I claim the toggle joint, H G, slots or guides, g, pulleys, J K, axels, I and a, spur wheels, d f, and cords or ropes, L N R, all arranged with reference to each other and to the pressing box, C, substantially as herein set forth, and for the purpose specified.

53,658.—Apparatus for Refining Iron.—John W. Nystrom, Philadelphia, Pa.:

First, I claim the herein described method of an apparatus for refining metals so that the oxidizing blast shall be admitted into the converting furnace under the molten mass, at elevations with respect to the surface of the metal, higher, as the work of refining progresses, as set forth.

Second, In a converting furnace constructed and operating as herein described, I claim forming the tuyeres of an oblong or rectangular sectional area at the point where they enter the furnace, substantially as and for the purposes set forth.

Third, In a converting furnace constructed and operating as herein described, I claim forming the tuyeres of a curved form, substantially as and for the purposes herein set forth.

Fourth, The combination with the converting furnace constructed and operating as herein described, of cranks and friction wheels, substantially as and for the purposes specified.

Fifth, The employment in connection with a converting furnace, constructed and operating substantially as herein described, of movable ingot molds, so as to allow of their being brought under the furnace, in the manner and for the purposes set forth.

Sixth, Forming the ingot molds of Z-shaped pieces, substantially as and for the purposes specified.

Seventh, Clamping the molds together successively, substantially as and for the purposes herein explained.

Eighth, The lining of the inside of the converting vessel and also of the ingot molds, with a composition of silicate of oxide of iron and fire clay or plumbago, as described.

53,659.—Stopper for Jars and Bottles.—Thomas O. Oliver, New York City:

I claim the combination of the eccentric, A, with arm, a, attached, with the staple, C, firmly attached to the lower disk, E, of the stopper, substantially as described, and for the purpose set forth.

53,660.—Horse Hay Fork.—John K. O'Neil, Kingston, N. Y.:

I claim the right-angled or bent lever, D, for producing the sliding movement, of the slide bars on the main bar, to open and close the barbs, B B, arranged and operating substantially as herein specified.

I also claim the arrangement and combination of the operating tackle and angular lever in such a manner as to shift the suspension of the instrument from one arm of the angular lever to the other, substantially as and for the purpose herein specified.

I also claim the jointed hook, H, constructed, arranged and operating in combination with the angular lever and operating tackle, substantially as and for the purpose herein set forth.

53,661.—Machine for Blocking and Shaping Hats.—George Osterheld and Rudolf Eickemeyer, Yonkers, N. Y.:

First, We claim the bending shell, H, applied and operating in combination with the hat block, D, and with suitable means of holding the brim of the hat, substantially as and for the purpose herein described.

Second, We claim so applying the holding plates for clamping the brim of a hat in a hat-shaping and blocking machine, that they are opened and closed automatically by the operation of the machine, substantially as herein described.

Third, We claim so applying and operating the banding shell and the holding plates as to produce the over-stretching of the hat-body in blight or depth, preparatory to the entrance of the block, substantially as herein specified.

Fourth, The banding ring, b, applied within the holding plate and operating in combination with the banding shell, H, substantially as herein described.

Fifth, The tip flattener applied and operating in combination with the hat block, substantially as herein specified.

Sixth, Making the tip flattener with a convolute face, substantially as and for the purpose herein set forth.

53,662.—Implement for Setting out Plants.—Edmund W. Packer, Paulsborough, N. J.:

I claim the combination of the shaft, A, tongs D D, and ram, F, when arranged together so as to operate substantially in the manner described, for the purpose specified.

53,663.—Cultivator.—C. S. Pangborn and George W. Beers, Onargo, Ill.:

We claim the combination of the treadles, L L, plow beams, G G, swivel sockets, H H, arms, J J, treadles, O O, and frame, D, constructed and arranged to operate in the manner as and for the purpose herein specified.

53,664.—Horse Power.—George Partridge, St. Louis, Mo., and David M. Johnson, Coshocton, Ohio:

We claim the master wheel, B, and sweep, C attached to the upright shaft, A, in combination with the horizontal shaft, E, provided with the level pinion, D, and the crank pulley, F, connected with the walking beam, G, all arranged to operate in the manner substantially as and for the purpose set forth.

We further claim in combination with the parts above specified, the horizontal shaft, I, arranged with an eccentric collar, K, or its equivalent, for the purpose of throwing the pinion, J, in and out of gear with wheel, B, substantially as and for the purpose set forth.

53,665.—Weft Bobbin.—Oliver Pearl, Lawrence, Mass.:

I claim the combination of the enlarged or bulbous end of a filling bobbin with the barrel of the bobbin, as herein described and for the purpose set forth.

In combination with the enlarged end of the bobbin, I claim the grooves or rings cut into the barrel at intervals to prevent the yarn from slipping from the bobbin, when in motion in the shuttle.

53,666.—Dental Vulcanizing Heater.—D. J. Peer, Rochester, N. Y.:

I claim two or more clamping bolts, B, in combination with the head and boiler of dentists' vulcanizing heaters, said bolts being constructed, arranged, and operating substantially in the manner and for the purposes herein shown and described.

53,667.—Vulcanizing Flask.—D. J. Peer, Rochester, N. Y.:

I claim in combination with the nowell, N, plate, P, cope, B, or its equivalent, the swinging or pivoted bolts, b, arranged and operating substantially in the manner and for the purposes shown and described.

53,668.—Secondary Electric Pile.—Geo. G. Percival, Brooklyn, N. Y. Antedated March 9, 1866:

I claim the forming of the electrodes of a secondary pile of layers of gas carbon or some other conducting power, substantially as and for the purpose hereinbefore described.

53,669.—Electrical Lamp.—Geo. G. Percival, Brooklyn, N. Y. Antedated March 9, 1866:

First, I claim the attachment to a lamp or to the base or fixtures thereof, of a secondary pile which will store up and retain galvanism until given off from time to time as may be required, for the purpose of lighting the lamp, substantially as hereinbefore described.

Second, The attachment to a lamp or to the base or fixtures thereof, of a helix of insulated wire, or its equivalent, forming part of the primary circuit of the secondary pile, when this helix is used to increase the spark produced by breaking this circuit, and the spark is used to light the lamp.

53,670.—Sawing Machine.—Charles L. Pierce, Buffalo, N. Y.:

I claim supporting a drag saw bar, A, at its rear end by a rocking slide bar, C, whose axis is in line with the axis of the driving crank, in the manner and for the purpose set forth.

Second, The combination of the slide bar, A, arranged as stated, with the driving crank and slotted cross head, in the manner and for the purpose set forth.

Third, Supporting the saw bar, A, at a point between the driving crank and saw by the adjustable guide box, E', and adjusting rack frame, F, and pinion, F', for the purpose and substantially as described.

Fourth, The combination of the windlass, P, and friction clutch, L5 L6, with the pulley, K, sliding chock, H', and buffer guide post, L, arranged and operating in the manner and for the purpose set forth.

53,671.—Spring Lever Clasp.—Gustavus D. Pike, Chatham, Conn.:

I claim the employment of the spring lever, 2, and the ears, d d and the teeth, E E E, or their equivalents, combined with the strap hole, a, and the riveting of clasp to strap, for the purposes specified.

53,672.—Tree Protector.—Joseph L. Piper, Winthrop, Mass.:

I claim the said improved tree protector, as made, of the platform to be applied to the trunk of a tree, and with the strips of glass arranged in such platform, substantially in manner as hereinbefore set forth.

I also claim the platform, as made, with the rebate and the saw kerf or recess arranged on and around it, substantially in manner and for holding the plates of glass, as specified.

53,673.—Railway Frog.—Peter Quinn, Philadelphia, Pa.:

I claim a frog rail or rails adapted to the main rails of a railroad and to those of turnout, and operating substantially as and for the purpose herein set forth.

53,664.—Railway Switch.—Peter Quinn, Philadelphia, Pa.:

I claim the switch rails, D and D', when connected and operating together, as described, and when the inclined switch rail, D, bears on the top of the main rail, A, when it is necessary to transfer the cars from the main track to the turn-out, all as set forth.

53,675.—Combined Switch and Frog for Railways.—Peter Quinn, Philadelphia, Pa.:

I claim the combination, substantially as described, of the movable frog rail, G, arranged to rest on one of the main rails with any suitable switch rails, the whole operating together as set forth.

53,676.—Water Elevator.—Geo. Race, Norwich, Conn.:

First, I claim a water elevator having a supplementary frame operated and constructed as shown and described.

Second, In combination with the supplemental frame, I claim the system of gearing, as shown, and so arranged and operated that the bucket can be lowered rapidly by a forward movement of the crank.

Third, In combination with the supplemental frame, I claim the brake lever, the hand rest, the spring pawl, and the adjustable friction band, all constructed and arranged as described and for the purpose set forth.

53,677.—Cooler for Brewing and Distilling.—Ludwig Reich, New York City:

I claim the pan, E, tubes, F, end box, G, communicating with each other and provided with the cold water vessel, A, and with or without the ice chamber, J, all arranged substantially as and for the purpose herein set forth.

53,678.—Box for Cigar Fuses.—Henry Reiman, Brooklyn (E.D.), N. Y.:

I claim the box with two compartments, and with a sliding lid and stops so constructed and arranged as to permit either compartment to be opened, but to prevent both from being opened or uncovered at the same time, substantially as herein described.

53,679.—Lamp Extinguisher.—Wm. A. Richardson and Henry D. Ward, Worcester, Mass.:

First, We claim the two wings, r, combined and arranged in relation with each other and with the wick tube of the lamp, substantially as herein set forth, for the purpose specified.

Second, The elastic construction of the lower parts of the said wings, r, for the purpose of holding them apart, substantially as described, until the flame is to be extinguished.

Third, The combination of the shafts, u, arms, c and c', and elastic wings, r, substantially as herein set forth for the purpose specified.

Fourth, The catch, w, in combination with the arms, c and c', and wings, r, substantially as herein set forth for the purpose specified.

53,680.—Cut-off Valve Gear.—John T. Rich, Philadelphia:

First, I claim actuating the cut-off valve of a steam engine positively, both in opening and closing through the medium of a toggle joint and multiplying the motion thereof, substantially as set forth.

Second, So combining the governor and cut off valve of a steam engine by means of a bell crank, F, lever, G, and other connecting mechanisms, as set forth, that the valve may be operated by the governor in connection with and independently of the toggle joint, E, substantially as set forth.

Third, The connecting rod, D, toggle joint, E, bar, m, link, L, and lever, G, in combination with the stud, H, valve stem, N, and valve, I, the parts being constructed and arranged substantially as and for the purposes set forth.

Fourth, In combination with the cut-off valve stem, N, the stud, H, constructed substantially as set forth.

53,681.—Bag Holder.—S. S. Rockwell, Lansing, Mich.:

I claim the shield, D, in combination with the springs, E, when used for the purpose of a bag holder, in the manner and for the purpose herein described.

53,682.—Apparatus for Cooling Beer.—William Rose, St. Louis, Mo.:

I claim the process of forcing air through the liquid, thus bringing the liquid in close contact with the air and reducing the temperature of the liquid to the temperature of the air forced through it.

53,683.—Lathe Chuck.—Richard Rothwell, Dover, N.H.:

I claim the conical-shaped lathe chuck, a, having a series of longitudinal grooves or depressions, d d, upon its periphery, substantially as and for the purpose specified.

53,684.—Tackle for Raising Sunken Whales and other Bodies.—Thos. Welcome Roys, New York City:

First, I claim the yielding connecting link, substantially as illustrated in figures 1 and 2, introduced between the suspension rope and tackle block or in the suspension rope on either side of the blocks, substantially as shown and described.

Second, The use of a weight working within guides in combination with the said spring or springs, as above, substantially in the manner and for the purposes hereinbefore described and set forth.

Lastly, The combination and use of the two horizontal bars or axles, B B', with the grooved pulleys, plain or fluted rollers, C, and india-rubber rings or endless bands, D, and suspender braces, E, substantially in the manner and for the purposes hereinbefore described and set forth.

53,685.—Fruit Jar.—George H. Russell, Dickinson, Pa.:

First, I claim forming one or more inclined ways or planes, with notches at their lowest points upon the cover of a fruit jar, can or other similar article, in combination with one or more fixed lands at the mouth of the jar, substantially as described and for the purpose specified.

Second, Hermetically sealing fruit jars, cans or other similar articles, with a composition of rosin and tallow, substantially as herein described.

53,686.—Boring Artesian Wells.—Anton Saffer, New York City:

First, I claim the intermediate guides, b, arranged in the joints or couplings of the tube, B, and adapted to mutually steady the parts, B and C, and allow an ample passage for the fluid or partially fluid matter rising between them, substantially as specified.

Second, I claim the wheel, E, with its grooves, e', and wiper, F, arranged to operate relatively to the cutters, B* B**, and their connections, substantially in the manner and for the purpose herein set forth.

Third, I claim in connection with the above the conical or tapered upper surface of the part, E, and levers, H, arranged to operate together alternately lifting and liberating the cutters, B* B**, and their connections, substantially in the manner and for the purpose herein set forth.

Fourth, I claim the cutters, B* B**, arranged transversely in combination with the braces, B***, and with suitable reciprocating mechanism for well boring, substantially as herein set forth.

Fifth, I claim the hollow screw, I, or its equivalent, adapted to regulate the motion of the cutters, B* B**, substantially in the manner and for the purpose herein set forth.

Sixth, I claim the shoulder, b*, arranged relatively to the screw threads and cutters and tubular stock, substantially in the manner and for the purposes herein set forth.

53,687.—Sound-boards to Pianos.—P. Schulor, Philadelphia, Pa.:

I claim the application of a metallic plate, E, constructed substantially as described, to the underside and directly beneath the treble portion of the bridge, C, of the sound board of a piano, substantially as and for the purpose described.

53,688.—Tanning.—Judson Schultz, Ellenville, N. Y.:

I claim the treating of hides or skins with saw dust, substantially as herein described.

53,689.—Shoe Brush.—H. E. Scotchmer, Chicago, Ill.:

I claim a pocket or traveler's blacking case provided with a brush having the handle and small brush detachable, and a blacking box, arranged to pack within the case, substantially as shown and described.

53,690.—Mold for Casting Flanged Pipe.—George T. Sheldon, Chelmsford, Mass.:

I claim the use and application of the squaring blocks, D D, and the cores, f, for the purpose of squaring or finishing the ends of flanged pipes, and forming the bolt holes, in the process of casting the same, substantially as specified.

53,691.—Skeleton Skirt.—S. J. Sherman, Brooklyn, N. Y.:

First, I claim the within-described hinge joint on the ends of the hoops, the same being rigid in the vertical direction, and adapted to yield inwardly, but prevented from yielding outwardly, by extending the one part past the axis of the joint so as to bear against the other part, substantially in the manner and for the purposes herein set forth.

Second, The three hinges arranged at the sides and front of the skirt hoop and capable of yielding inwardly but not outwardly, so as to allow the skirt to be compressed inwardly at any of those points without protruding outward at either point beyond the general circuit of the hoop, substantially in the manner and for the purposes specified.

53,692.—Beer Faucet.—Emil Sirret, Buffalo, N. Y.:

I claim forming beer or other liquids any degree desired previous to their being drawn, by constructing a hollow room or reservoir within an ordinary faucet between the cross pin and the end to be tapped in the barrel, to be operated into by the syringe, E, for the purpose and in the manner set forth.

53,693.—Sirup Filter.—James L. Smith, Tuscola, Ill.:

I claim the arrangement of sieves, D and B, the body and the braces, C C C, in the manner and for the purpose herein specified.

Second, The wool, F, in combination with the body, A, and sieves, D and B, when used as and for the purpose herein specified.

53,694.—Threshing Machine.—John P. Smith, Hudson, N. Y.:

First, I claim the concave provided with semi-spheroidal projections or threshing teeth, n, substantially as and for the purpose herein set forth.

Second, The deflecting board, F, so applied to the rear end of the machine as to deflect the threshed straw downward, substantially as and for the purpose herein set forth.

Third, The relative arrangement of the inclined board G2, the ribbed threshing cylinder, S, and the concave, D, substantially as herein described, whereby special feeding contrivances are dispensed with.

53,695.—Process of Generating Gases to be Used for Motive Power.—Daniel E. Somes, Washington, D. C.:

First, I claim the apparatus for generating steam or gas to be used as a motive power, substantially as described.

Second, Combining and using the ingredients herein described, substantially as and for the purpose set forth.

53,696.—Machine for Stripping Sorghum.—John M. Spencer, of Ottawa, Ill.:

I claim the arrangement shown and described of the toothed endless apron, B, the toothed cylinder, C, slotted plate, C, feed rollers, E E', and supports or table, J J.

53,697.—Laundry Stove.—Horatio Squyer, Rochester, N. Y.:

I claim the combination and relative arrangement of the furnace, H, having inclined planes or oblique sides, I, with the cauldron, D, as shown and described, the furnace being below, and in front of the cauldron, which latter is encased with a fire jacket, A.

53,698.—Spoke Shave.—John G. Steiger, Cleveland, Ohio:

I claim the special construction of the cast handle and clamp with the shoulder, b, formed between the clamp and the handle blade, B, and set screws, d, and operating substantially as described.

53,699.—Piping for Boots and Shoes.—Charles Stone, Stoughton, Mass.:

I claim as a new article of manufacture, a piping or binding for boots and shoes, having a rounded edge or nearly so, substantially as described.

53,700.—Telegraph Cable.—James Story, Paris, Ky.:

First, Constructing marine telegraph cables with a steel plate provided with projections upon its edges, for securing a platting of hemp cords, in the manner and for the purposes described.

Second, I claim the application and use of hemp cords or other equivalent substances in combination with a steel plate to support and take the tension off from the insulated conducting wires in marine telegraph cables.

Third, I claim the use of hemp cords in plats or other equivalent substances, in combination with a steel plate, when encased, and the joints secured as herein described.

Fourth, I claim supporting a series of curved conducting wires, in partition walls, placed in the cables at certain determined distances, and which are constructed and secured in the manner herein described for the purposes specified.

Fifth, I claim the elastic straps, e e, the same being placed so as to give support to the outer covering and secured to it, and the partition walls, in the manner and for the purposes described.

Sixth, I claim providing a marine telegraph cable with air chambers, constructed substantially as and for the purposes herein specified.

53,701.—Rail roadRail.—Zadok Street, Salem Ohio:

I claim the combination of animal charcoal, vegetable charcoal or other carbonaceous material, such as animal oil or tallow and prussiate of potash, in about the proportions specified, and for the purpose of hardening railroad rails, as set forth.

53,702.—Umbrella.—George Styles, New York City:

I claim the telescope tubes, a b, with holes k l m, in combination with the spring catch, j, and runner, c, of a parasol, constructed and operating substantially as and for the purpose described.

Also the trigger spring n, in combination with the catch, j, runner c, and tubes, a b, substantially as and for the purpose set forth.

53,703.—Curtain Fixture.—John B. Tarr, Chicago, Ill.:

I claim the arrangement of the lower roller, B, endless cord, b b, curtain, a a, attached to the endless cord, and tension roller, c', substantially as set forth.

53,705.—Mop Head.—Levi H. Thomas, Waterbury, Vt.:

I claim the handles or guards, E E, on the wire, D, substantially as and for the purposes herein set forth.

53,704.—Clothes Drier.—Samuel I. Trask, Guilford, N. Y.:

I claim, First, The combination with the side frames which contain the bars for sustaining the clothes, and which are hinged together at the top of the latches, D and E, substantially in the manner and for the purpose set forth.

Second, The combination with the said side frames, constructed as described, of the shoes, G, and rollers, F, the said shoes and rollers being on the same end of the clothes drier, as and for the purpose herein above specified.

53,706.—Bed Bottom.—Edward W. Tucker, Lowell, Mich.:

I claim, First, The bar, H, with cogs, a a, and rack bars, b b, when arranged in the manner and for the elevating or lowering the head of a bed bottom, substantially as and for the purposes specified.

Second, The bars, D, and bars, F, with springs, E, in combination with the springs, B B, rails, C, arranged substantially as and for the purposes herein set forth.

53,707.—Slide Valve for Steam Engines.—Reuben D. Turner, New York City:

I claim the hollow piston, E, cylinders, C C, and inner valve chest, B, in combination with each other, and with the valve, D, and outer chest, A, substantially as and for the purpose herein specified.

53,708.—Balance Slide Valve.—A. E. Vanbebber, A. Salle and J. Britton, Fulton, Ill.:

First, We claim the combination with a steam engine valve, C, of the suspension rod, E, balancing piston, D D P, and guide, O, all constructed and arranged to operate as and for the purposes specified.

Second, The combination of the spring G, and temper screw, I, as and for the purposes specified.

Third, The guide H, projecting inward over the edge of the piston, D, to act as a guard to prevent the blowing out of the piston, in the manner described.

53,709.—Burning Fluid.—Aaron C. Vaughan, Rainsburg, Pa.:

First, I claim treating benzine with common resin, in the manner and for the purpose set forth.

Second, A burning fluid composed of benzine treated with resin and mixed with ordinary illuminating oil, as set forth.

53,710.—Corn Harvester—J. M. Wallis and Elias Miller, Milton, Iowa.:

We claim the bar, D, passing through the shaft, M, and arranged in relation with the arms, J, substantially as and for the purpose specified.

53,711.—Construction of Pulleys.—A. Warth, Stapleton, N. Y.:

First, I claim the working face or faces of a pulley of one or more layers of india-rubber or other soft and elastic material, covered with leather or other flexible material, substantially as and for the purpose described.

Second, The combination and arrangement of the adjustable disks, a a, india rubber plates b', leather faces, d, and intervening metal plate, e, all constructed and operating substantially as and for the purpose described.

53,712.—Egg Holder.—Franz Wegrather, Chicago, Ill.:

I claim the cup formed in sections as shown and provided, with the cup, A, and spring, B, all arranged to operate as and for the purpose set forth.

53,713.—Harvesting Machine.—Thomas Welch, Churchville, N. Y.:

First, I claim the pitman, P, and set nuts in harvesters in combination with the head or case, A, whereby the wear of the boxes, b and b', may be compensated for.

Second, The use of the swivel nut, E, constructed, arranged and operating substantially in the manner and for the purposes set forth.

Third, Securing the head or case, A, and boxes, b and b', to the crank pin, O, of harvesters, by means of the groove c, and rib, e, substantially as shown and described, and for the purposes set forth.

53,714.—Ladies' Fan.—Thomas Welham, Washington, D. C.:

First, I claim a fan so constructed in relation to its handle that the fan and the handle may be adjusted in line or at any desired angle, substantially as described.

Second, So pivoting said fan as to permit it to revolve upon the handle, whether fixed in line with the handle or set at any angle, all substantially as described.

Third, In combination with such adjustable or revolving fan, a casket in the handle thereof, substantially as described.

Fourth, In combination with such adjustable or revolving fan, the weighted extremities of the fan or feathers thereof, substantially as described.

53,715.—Boring Artesian Wells.—Daniel Wheeler, Decorah, Iowa:

First, I claim the combination of stop, F, catch, A, and ratchet, B, in combination with rollers, B and E, or any equivalent contrivance, working substantially as described.

Second, The cog wheel, A N, with the square hole, A B, for the drill rod to work in, in combination with the moving dog, C, stop dog, F F, and spring, E, connected with dog, C, or any equivalent contrivance working substantially as described.

53,716.—Roofing Cement.—Warren P. Wheeler, Waterloo, N. Y.:

I claim the composition of matter above described for covering roofs of buildings, together with the process of applying the same, as set forth in the above specification.

53,717.—Belted Friction Gearing.—James D. Whelpley, Boston, Mass.:

I claim the belted friction gearing consisting of friction drums, A B, belt pulleys a' and b', and belts, d d', arranged, combined and operated substantially as described and for the purpose stated.

53,718.—Apparatus for Separating Ores.—James D. Whelpley and Jacob J. Storer, Boston, Mass.:

First, We claim the secondary hopper, in combination with the main hopper, and opening into it and into the open air by valves to be employed alternately, substantially as described.

Second, The door, c, and its rod, g, in combination with partition, b, substantially as and for the purpose described.

Third, The valves, e e' e'', constructed respectively with their openings, k, of the same size and shape as the open area of the bottom of the cavity to be closed, in combination with the bottom of the hopper and the dust-tight felt packing, substantially as described.

53,719.—Scissors.—Luther G. White, Waterbury, Conn.:

I claim forming a shoulder upon the handles of scissors or shears so that a recess shall be left between the same and the blades when riveted thereto, for the purposes herein specified.

53,720.—Smut Machine.—S. B. Williams, Wheeling, West Va.:

I claim the combination of the perforated concave, D, fan, J, below said concave, the beaters, U, air regulator, K3, and air conductors, W X Y, all arranged as herein specified to force the air in separate downward currents within, around and outwardly through the perforated walls of the concave, the external current being governed by the regulator, K3, and all the currents mingled with the dust in the fan case below.

53,721.—Steam Gage.—Charles A. Wilson, Cincinnati, Ohio:

I claim the air chamber, A, whose upper part communicates by a pipe, B, with the boiler steam space, while its lower part communicates by a pipe, D, with a diaphragm chamber of a steam pressure gage, and its extreme bottom by a pipe, C, with the boiler water space or devices, substantially equivalent, for the purpose set forth.

53,722.—Hollow Auger.—Arcalous Wyckoff, Elmira, N. Y.:

I claim the cutters, A A, constructed with two or more alternately projected cutting points, C and D, so arranged as to cut in parallel but concentric planes, substantially in the manner and for the purpose set forth.

53,723.—Postage and Revenue Stamps.—William C. Wyckoff, Brooklyn, N. Y.:

I claim coating the side of the paper which is to receive the print of the postage or revenue stamp, with a surface of water-color pigment or paint, or some sufficiently opaque or non-transparent surface as to receive a good impression from types or plates, and at the same time be soluble in water or other fluid, substantially as described.

53,724.—Stove Blacking Cutter.—William W. Armington, Meriden, Conn., assignor to himself and Stephen L. Usher, New Haven, Conn.:

I claim the follower, E, and the cutter, D, constructed and arranged to operate substantially in the manner herein described, in combination with the pan, A, or its equivalent, for the purpose specified.

53,725.—Saw-grinding Machine.—John G. Baker (assignor to Henry Disston), Philadelphia, Pa.:

First, I claim the combination with a grindstone, J, of a segment, G, for holding a saw blade on its concave surface, to which segment a vibrating motion in the arc of a circle having a fixed center is imparted by the mechanism described, or any equivalent to the same, for the purpose specified.

Second, The combination of the rock shaft, H, rods, d d, segment, G, or the nuts, f f, or their equivalents, for adjusting the said segment on the rods.

Third, The combination of the reversible, pulley, F, belt or band, E'', and segment, G.

Fourth, The combination of the segment, its set screw, h, the sliding piece, I, and its set screw, h', and spring lever, P, the whole being arranged for the retention and release of the saw blade, substantially as and for the purpose herein set forth.

Fifth, The combination of the segment, G, and its adjustable dogs, k and k'', with the devices herein described, or the equivalent to the same, for shifting the driving belts.

Sixth, The grindstone dresser, composed of a number of disks, s, with pointed teeth, adapted to the sliding spindle, Q', and operating substantially as and for the purpose herein set forth.

Seventh, The screw shafts, N N, having threads of different pitches, those of one pitch controlling the position of the grindstone, and those of the other pitch controlling the position of the dressing device, all substantially in the manner and for the purpose herein set forth.

53,726.—Check Hook.—Charles A. Ball (assignor to himself and Thomas Livey), New York City:

I claim the spring-check rein hook attached to the socket or plate, a, by the fulcrum pin, d, and provided with the moving end, x, that closes against the socket or plate, a, as and for the purposes specified.

53,727.—Curtain Fixture.—John H. Barnes and Thomas W. Brown, Brooklyn, N. Y.:

We claim the described device for holding and tightening the cords of window shades, etc., consisting of the plate, A, with the hook, B, or its equivalent, for taking the cord, such plate and hook being so arranged as to have motion up and down upon the screw by which they are held to the casing.

53,728.—Keyboard for Organs, Etc.—Moritz Baumgarten (assignor to himself, Jacob Heller, G. C. Clark, A. S. Keeler, and Morris Steinhart), New Haven, Conn.:

I claim constructing and combining two banks of keys substantially in the manner and for the purpose herein set forth.

53,729.—Inkstand.—Hezekiah Bradford (assignor to Horatio Bogert), New York City. Antedated March 30, 1866:

First, I claim a stationary cork or yielding stopper with or without a tapering or inclined end against which the pen comes in contact when it is dipped into the ink, as set forth.

Second, I claim the combination of the stopper, e, well, b, and fountain, c, as and for the purposes specified.

Third, I claim the fountain, c, and well, b, in combination with a stopper in the bottom of the inkstand as set forth, whereby the fountain may be filled when the inkstand is inverted, as specified.

53,730.—Clamp Pulley.—Rufus Chandler, Springfield, Mass., assignor to himself and M. S. May, Milford, Mass.:

I claim a clamp pulley having sections, A and B, with dove-tail connections therewith, as described, and a roll, e, all constructed, combined and arranged substantially as herein specified.

53,731.—Rotary Steam Engine.—John Collicott (assignor to self and Otis Marshall), Boston, Mass.:

First, I claim the pistons, D D, when formed in one piece with or immovably fixed to the rotary cylinder, and provided with packing strips acted on by the pressure of the steam, substantially as and for the purposes herein set forth.

Second, I claim the steam chest with its rotating balance valve, in combination with the steam ports and channels of a rotary steam or air engine, when arranged so that the steam shall be allowed to impinge directly upon the pistons in the center of their lengths, and at right angles, or nearly so, with their surfaces.

Third, I claim the hinged valves extending from end to end of the cylinder, when formed at their ends, to pack against the shoulder, c', on the cylinder heads by the pressure of the steam, as described.

53,732.—Cooking Stove.—John B. Crowley (assignor to Chamberlain & Co.), Cincinnati, Ohio:

First, I claim a fire back of a cooking stove composed of two or more overlapping or rebated plates, F F, secured at the midwidth of the stove, while permitted unrestricted elongation toward the sides of the stove, substantially as set forth.

Second, The hollow perforated stand or rest, H, in combination with a center plate, perforated at its middle portion, substantially as set forth.

Third, A stand or rest having a circular or other symmetrical head which fits a corresponding view on the under side of the center plate, for the purpose of support and reversal, as explained.

Fourth, The arrangement of depressed hearth plate, L I I, flaps, eccentric legs, m, hook, N, and eye, O, as herein described.

Fifth, The jamb plate, G g, formed and arranged in the manner and for the purpose set forth.

53,733.—Horse Shoe Calking Vise.—William Delano (assignor to self and Walter H. Foster), Bangor, Me.:

I claim the new or improved horse shoe calking vise, made substantially as described, viz., of the vibratory bearer or plate, G, and the common vise having the jaws, A B, the whole being arranged and combined substantially in manner and so as to operate as and for the purpose specified.

53,734.—Corset Busk Clasp.—William Devines, Brooklyn, N. Y., assignor to Howell Smith, New York City:

I claim the attaching of hooks and eyes to garments by means of clamps, constructed and arranged to fit over and catch into slots in springs inserted in hems in the garment, the clamps passing through openings in the sides of the hems, substantially as herein shown and described.

53,735.—Grain Separator.—J. H. Fairchild, East Highgate, Vt., assignor to self and George L. Haywood:

I claim the lever, G, hammer, m, and spring, L I, in combination with the packing, j, and roller, p, when arranged and operating substantially as and for the purpose set forth.

I claim the adjusting screw, o, spring, L, shafts, f c, arm or wrist, J, in combination with the hammer, m, hung to the shaft, f lugs, g, and reel, as and for the purpose substantially as described.

53,736.—Hydrant Stop Cock.—Henry L. Frailey (assignor to self and Christian G. Herr), Lancaster, Pa.:

I claim a stop cock, the barrel, C, of which is provided with three pipes, D' E' F, opening into the chamber, and the key, B, with a hollow central portion communicating by apertures, 1 2, with the pipes, D' E', and by its perforation, 3 4, with pipes, F' E, arranged and operating in the manner and for the purpose specified.

33,737.—Ditching Machine.—Conrad Freese, Aurelius, N. Y., assignor to self and Frederic H. Lyon, Cayuga:

I claim the horizontal framing, A, and annular plat form, B, supported by or mounted upon rollers, c c' c'' c''', in combination with a rotary digger, M, operated by draught animals attached to sweeps, J, and walking around the platform, B, substantially as and for the purpose set forth.

The two rollers, c c', arranged or applied to the platform, A, substantially as shown and described, for the purpose of guiding or turning the machine, as set forth.

The placing of the shaft, N, of the rotary digger, M, in a rising and falling frame, H, arranged in connection with racks, a a, and a pivoted bar, R, or their equivalents, for the purpose of adjusting the digger to its work, substantially as described.

The construction of the rotary digger, M, as shown and described, to wit, of the circular plate, c, annular plate, d, with the buckets, e, between them, provided with cutters, o, at their outer ends and with bent inner ends, f.

53,738.—Bench Vise.—Richard Jones (assignor to self and Thomas Bromby), Paterson, N. J.:

I claim the eccentric or cam, B, or its equivalent applied to a bench vise, to operate in the manner substantially as and for the purpose herein set forth.

53,739.—Hay Spreader.—Luke L. Knight, Barre, Mass., assignor to J. E. Taylor, Sutton, Mass.:

I claim the combination of the shaft, D, provided with the clearers, E, and the revolving shaft, B, provided with the elevating fingers or tines, C, as and for the purpose specified.

53,740.—Harvester Rake.—Joseph D. Loveland, Wheatfield, Niagara, N. Y., assignor to Dayton S. Morgan, Rockford, N. Y.:

I claim the combintaion in a harvester of teeth or brushes on the reel ribs to sweep the grain upon the platform, with a vibrating sweep rake to remove it therefrom, the combination being and operating substantially as described.

53,741.—Leather Splitting Machine.—J. A. Marden, assignor to Samuel Vance and Albert E. Currier, Newburyport, Mass.:

I claim the rotating cylinder, B, in connection with the reciprocating knife, S, arranged relatively with each other to operate in the manner substantially as and for the purpose set forth.

The pressure shoes, Y, in combination with the rotating cylinder B, and reciprocating knife, S.

The endless apron, U, in connection with the pressure bar, W, shoes, Y, cylinder, B, and knife, S, substantially as and for the purpose specified.

The placing of the cylinder, B, in adjustable bearings, substantially as shown when said cylinder is used in connection with the reciprocating knife, endless apron, pressure shoes and pressure bar substantially as and for the purpose set forth.

53,742.—Process for Desulphurizing Ores.—Melchor B. Mason, New York City, assignor to United States Mining and Ore Desulphurizing Company:

I claim the combination of lime, nitrate of soda and other equivalent alkaline substance, with pulverized or disintegrated ore in a raw condition, preparatory to the calcination thereof, all substantially in the manner and for the purpose herein set forth.

53,743.—Sewing Machine.—James S. McCurdy, Bridgeport, Conn., assignor to Elias Howe, Jr., Fairfield, Conn.:

First, I claim, a needle throat or die so constructed and arranged that it forms a guide for the needle throughout the whole depth of and below the shuttle case, and that its upper part presents above the work plate a rounded annular edge of such a character as to form a center between which and the pressing device or devices the cloth may be turned about a center in line or concentric with the axis of the needle, substantially as herein described.

Second, In combination with the throat, constructed and applied as above described, I claim the two independently but simultaneously acting pressure rollers, E E', applied and operating as herein specified.

Third, I claim the lever-like fingers, p, fulcrum, p', spring, s, and irregular shaped tracks, r r', in combination with each other and with the shuttle race and shuttle, substantially as and for the purpose herein specified.

Fourth, I claim the single-grooved friction roller, T, spring, U, and guide, w, applied in combination, and operating substantially as and for the purpose herein specified.

Fifth, I claim the attachment of the driving wheel or pulley to the main shaft of the sewing machine by friction, in the manner substantially as and for the purpose herein specified.

Sixth, I claim the spooler attached to the sewing machine by means of a spring, Q, applied and having its position controlled by a screw, s, substantially as and for the purpose herein specified.

53,744.—Griddle Cake Baker.—Jonas Mull (assignor to self, Ara D. Reed and J. R. Calkins), Troy, N. Y.:

I claim the employment of the inward and annular or surrounding flange or projection, A', of the surrounding rim, A, and its combination with the griddle cake baking sections, B and C, and flues or apertures, G, in the manner and for the purposes substantially as herein described and set forth.

I also claim the employment of the annular or surrounding chamber, a, and the combination thereof with the flues or apertures, G, and with the inner flange or surrounding projection, A', in the manner and for the purposes substantially as herein described and set forth.

53,745.—Knob Latch.—Wallace T. Munger (assignor to himself and J. A. Leggat), Bradford, Conn.:

First, I claim the combination of the latch bolt, C, the yoke H, and follower, E, substantially in the manner for the purpose specified.

Second, The combination of the horseshoe, F, link, I, spring, M, and latch bolt, D, substantially in the manner and for the purpose set forth.

53,746.—Machine for winding Yarns.—William Orr, Jr. (assignor to himself and William Orr, Senr.), Clinton, Mass.:

First, I claim in machines for winding yarn, hanging the swift on a pivot at one side of the center of its length, or at one side of its center of gravity, so as to give it a pendulous character, substantially as described.

Second, I also claim passing the yarn on its way from the swifts to the quill between elastic rolls, arranged and applied substantially as and for the purpose above described.

Third, I also claim in combining in one machine devices for winding yarn from the swifts, and quilling the yarn, when the two operations are performed by such combination in one connected operation, by means of sockets, V, W, the guides, H, H, and the elastic rolls, m, substantially, as described.

53,747.—Machine for Holding and Grinding Edge Tools.—John Richardson (assignor to himself and Edwin Fernald), Turner, Maine:

I claim the improved machine constructed as herein before described, for holding and grinding chisels, plane irons and and any other tools requiring a like bevel, and any tool having an angular edge of like bevel, perfectly true and with entire accuracy to any bevel required, either acute or obtuse.

53,748.—Water Can for Railroad Cars.—Leon T. Richer (assignor to himself and Isaac L. Allen), New York City:

First, I claim the employment of the waste or unclean water chamber, L, in combination with the vertical connecting tube, K, and receptacle or box, J, each being constructed and arranged in the manner, and for the purposes substantially as herein described and set forth.

Second, I claim the employment of the discharge water valve, D, in combination with the discharge pipe, C, and with the valve chamber, E'', each being constructed and arranged in the manner and for the purposes substantially as herein described and set forth.

Third, I claim the employment of the coil or spiral spring, E, in combination with the valve rod, d, upper connecting rod, F, lever, G, thumb piece, H, and with the tube E', each being constructed and arranged in the manner and for the purposes substantially as herein described and set forth.

53,749.—Attachment in Plows.—Milton Roberts, St. Pauls, Minnesota, assignor to himself and Nathan H. Roberts, Richfield, Minnesota:

First, I claim the attaching of the plow to the axle and wheels, in the manner substantially as and for the purpose herein set forth.

Second, I also claim the rod, J, pivoted to the axle, A, and provided with a hook, I, at its outer end in combination with the plow and the wheels and axle, substantially as and for the purpose specified.

Third, I also claim the wheel, B, provided with the concave flange, K, in combination with the plow, F, substantially as and for the purpose set forth.

Fourth, I further claim the rollers, N, placed in the frame, M, having the rods, O, O, attached in combination with the plow and the wheels and axle, substantially as and for the purpose specified.

53,750.—Pump.—H. M. Stoker (assignor to himself and J. C. Stoker), Watson, Illinois:

I claim the reciprocating pump cylinder, B, in combination with the fixed or stationary valvular pistons, E, E', and the abutment, F, placed or secured within the pump cylinder, and provided with the opening and valve with the eduction or force tube, G, communicating with said openings, substantially as and for the purpose herein set forth.

53,751.—Sheet-Metal Can.—George F. Stone (assignor to himself and J. H. Whithurst), Philadelphia, Pa.:

I claim the disk, A, which forms the end of a tinned plate vessel, and its groove, c, constructed as described for the reception of the edge of the body, D, when the whole is applied to a bath of molten solder, having its depth arranged in respect to the said disk and its groove, as set forth for the purpose specified.

53,752.—Hand Corn-Planter.—Salmon E. Tyler and Richard Tattershall (assignors to themselves and Jackson Simons), Anoka, Minnesota:

We claim the reciprocating head, E, rotating in the grooves, e e e,

the adjustable recessed cylinder, D, graduating the grooves, j j j, in connection with the set-screw, H, when constructed substantially as herein set forth and described.

53,753.—Cotton Gin.—Edward Alfred Cowper, Westminster, Great Britain:

First, I claim the intermittent nipping or forcible holding of the fibre of the cotton very nearly close up to the seed by the holding instruments, caused to approach at intervals, so as to nip or hold the fibre whilst the seeds are detached by another part of the apparatus.

Second, I claim the nipping-blade, A, roller, B, and beater, C, operating in combination in any manner, substantially as herein described.

53,754.—Paring, Cutting and Coring Machine.—William Weaver (assignor to E. Price), Phœnixville, Pa.:

First, I claim the curved serrated plate, e, in combination with the lever, F, and knife, d.

Second, The box, A, receptacle, A', tubes, J J' and K, and plates, i, i, the whole being arranged as and for the purpose described.

53,755.—Rotary Engine.—Robert D. Wright (assignor to himself and L. B. Holland), St. Louis, Mo. Antedated March 21, 1866:

I claim the employment of the plunge, b, in combination with the rotary piston, e f, all being constructed and arranged to operate substantially as herein described and represented for the purposes set forth.

53,756.—Means of Protecting the Bottoms of Ships.—Cowper Phipps Coles, Ventnor, England. Patented in England May 21, 1864:

I claim the combination of the exterior portions of structures that are liable to be submerged, with cement, by means of holding agents, the whole being combined, and operating substantially, as set forth.

53,757.—Fire Alarm.—Charles Dion, Montreal, Canada East:

I claim the spring, A, plate or tube, B, or other equivalents, as shown in the different modifications, in combination with the tilting lever, D, or its equivalent, and with the falling weight, F, or its equivalent, constructed and operating substantially as and for the purpose described.

3,758.—Compressed Gas Generator.—Jules Gros, Paris, France:

I claim the generator, d, provided with a revolving chambered cylinder or any equivalent device, in combination with the receiver, a, constructed and operating substantially as and for the purpose described.

53,759.—Propelling and Steering Apparatus for Vessels.—Jonathan Jopling, Bishopwearmouth, England. Patented in England May 30, 1865:

I claim the apparatus for propelling and steering vessels, consisting of a fan or fanner wheel, fixed on a vertical shaft, and made to rotate within a movable case, secured to a hollow shaft, the combination of the fan, and case, and shafts, being substantially such as described, and operating substantially in the manner set forth.

53,760.—Muff.—Moritz Mahler, Hungary, temporarily residing in Montreal, Canada:

First, I claim the muff provided with a covering of leather or other suitable material, without fur or hair on the side that comes next to the person, as and for the purposes set forth.

Second, I claim the muff formed wider at the bottom than at the top portions, so that the ends may be at an inclination, for the purposes and as specified.

Third, I claim rings or loops attached to the upper part of the muff, for the reception of the suspending cord, as set forth.

Fourth, I claim a pocket formed in the front portion of the muff and provided with a flap of skin or fur hanging from the top portion of the muff, down over the front part of the same, as and for the purposes specified.

53,761.—Steam Generator.—Peter C. Moller, Leipsic, Saxony, assignor to Johann Tobias Rominger, Dresden, Saxony:

I claim the combination of the cross-shaped blocks, L, water passages, K, elbows, M, jackets, O, tank, F, and coil, G, constructed and arranged relatively to each other in the manner and for the purposes herein represented and described.

53,762.—Propeller for Vessels.—Ambroise Raphin, Paris, France:

I claim the fly-wheel, C, mounted on two or more shafts, B, secured to the hull of a vessel, in combination with two or more parallel rods, D, and buckets, c, all constructed and operating substantially as and for the purpose described.

53,763.—Apparatus for Burning Liquid Hydro-Carbons.—Alexander Schpakofsky and Nicholas Strange, St. Petersburg, Russia:

We claim the method of, and apparatus for, burning the vapors of hydro-carbon fluids, substantially as herein shown and described.

53,764.—Car Coupling.—A. B. and Frank S. Taft, temporarily residing in Montreal, Canada East. Antedated March 21, 1866:

We claim the shackle, E, provided with the shoulders, d e, and fitted in the draw-head as shown, in connection with the pins, F B, provided with springs, C, and having rods, D, attached, all being arranged to operate substantially as and for the purpose set forth.

REISSUES.

2,217.—Process for Bleaching Fibrous Substances.—J. J. Eckel and Isaac S. Schuyler (assignees of Joseph Short), New York City. Patented Jan. 23, 1866:

First, We claim washing or cleansing liquid, composed of potash or caustic soda, and the chloride of sodium, spirits of ammonia, or an equivalent substance, dissolved in water, about in the proportion as set forth.

Second, The cold alkaline solution, composed of liquid potassa and the chloride of sodium, spirits of ammonia, or an equivalent substance, and water, about in the proportion as set forth.

Third, The bleaching liquid compound of chloride of lime, and sulphuric or other acid, about in the proportion as set forth.

2,218.—Artificial Limb.—Anton Mennel, New York City. Patented December 20, 1864:

I claim constructing the shell of an artificial limb of two or more layers of wood, each composed of one or more strips, placed crossways to each other, substantially in the manner and for the purpose herein set forth.

2,219.—Mode of Lining Pipes with Tin.—W. Anthony Shaw, New York City. Patented March 10, 1863:

First, I claim forming a double metallic pipe or tube out of any two of the ductile metals or their alloys by pressing them together through, over, on or in a die, in such manner as to make each of said metals form a tube or pipe, the one inside of the other.

Second, Putting the tinned lead together in a cylinder over said mandrel, and forcing them through a die over said mandrel, so as to press a lining of tin in the pipe, at the time of its formation.

Third, The manufacture of lead pipe with a lining of tin, by forcing an ingot of tin and an ingot of lead, while over a core, out of a cylinder through a die, by hydraulic pressure, as specified.

2,220.—Ruler.—S. L. Simpson, New York City. Patented June 27, 1865:

First, I claim the spring-stop, d, applied in combination with a valve, a, substantially as and for the purpose set forth.

Second, The index, e, and scale, f, in combination with the link, C, connecting the two parts of a parallel ruler, substantially, as and for the purpose described.

Third, The adjustable pencil slide, F, in combination with the radius arm, D, compass-dial E, and parallel ruler, A, A', constructed and operating substantially as and for the purpose set forth.

Fourth, The clamping screw, k, in combination with the arbor, h, pinion, g, disk, j, compass-dial, E, parallel rulers, A, A', constructed and operating substantially as and for the purpose described.

DESIGNS.

2,288.—Cuff and Collar.—William Bell, Jr., Boston, Mass.

2,289.—Alphabet Letters.—William H. Carter, Cincinnati, Ohio.

2,290.—Statuette and Clock Case.—William A. Giles, Chicago, Ill.

2,291.—Clock Case.—William A. Giles, Chicago, Ill.

2,292.—Bust and Clock Case.—William A. Giles, Chicago, Ill.

2,293.—Pump.—B. S. Nichols (assignor to Downs & Co.'s Manufacturing Company), Seneca Falls, N. Y.

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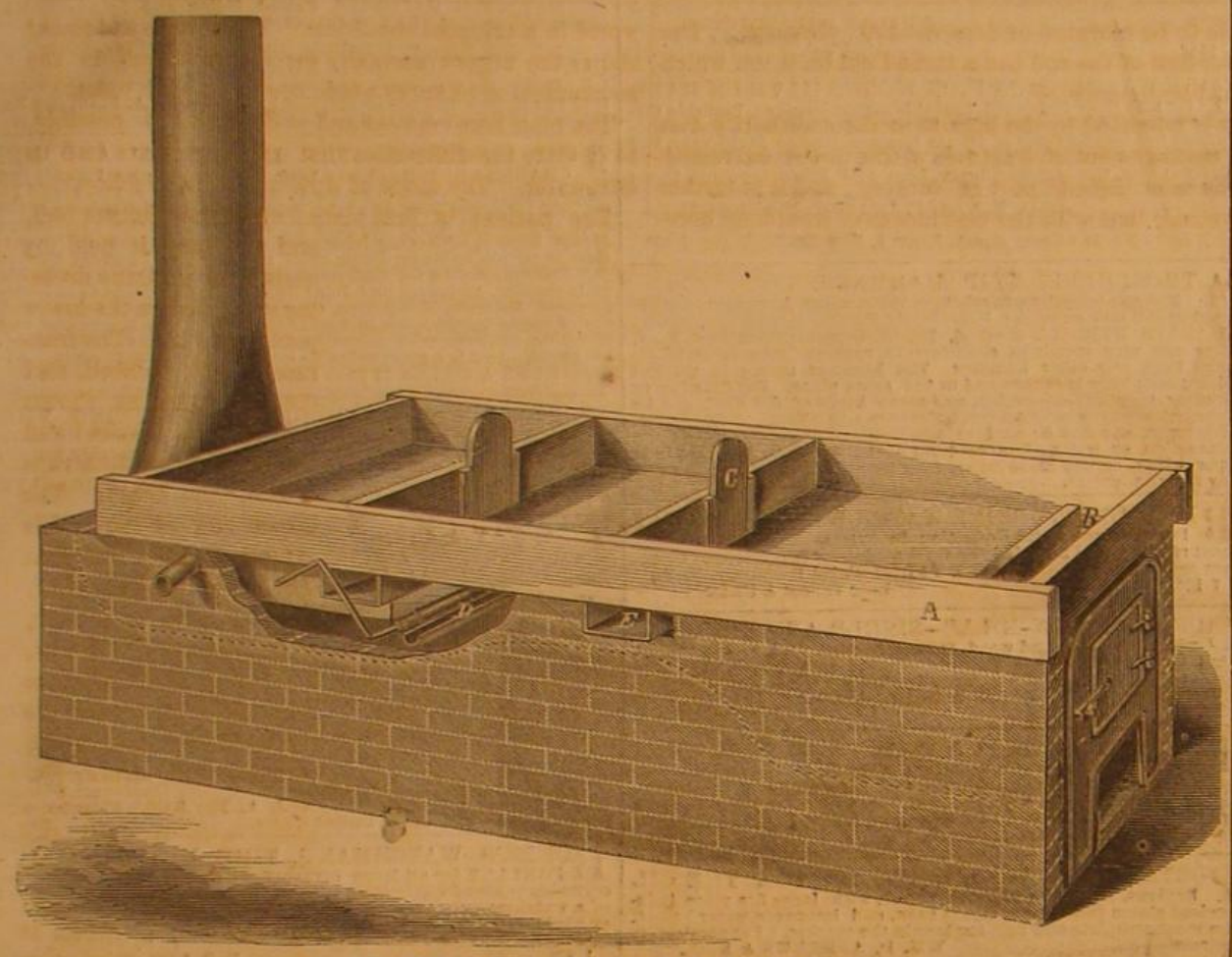
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In the engraving, A represents a flat pan divided into three parts. At first the juice is poured in at B, from whence it emerges into the larger partition where it is skimmed, and then allowed to pass successively into the two other compartments through the gates, C, as in all other evaporators. When it comes into the final compartment, there is a damper,



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This pan is perfectly smooth inside, and can be easily cleaned, in the common way, of all gummy matter, and it is also readily worked on a common arch, saving time and expense of setting many flues and having many dampers.

A patent was procured on it through the Scientific American Patent Agency on October 10, 1865, by E. W. Skinner. Address E. W. Skinner & Co., Mendota Agricultural Works, Madison, Wis., for further information.

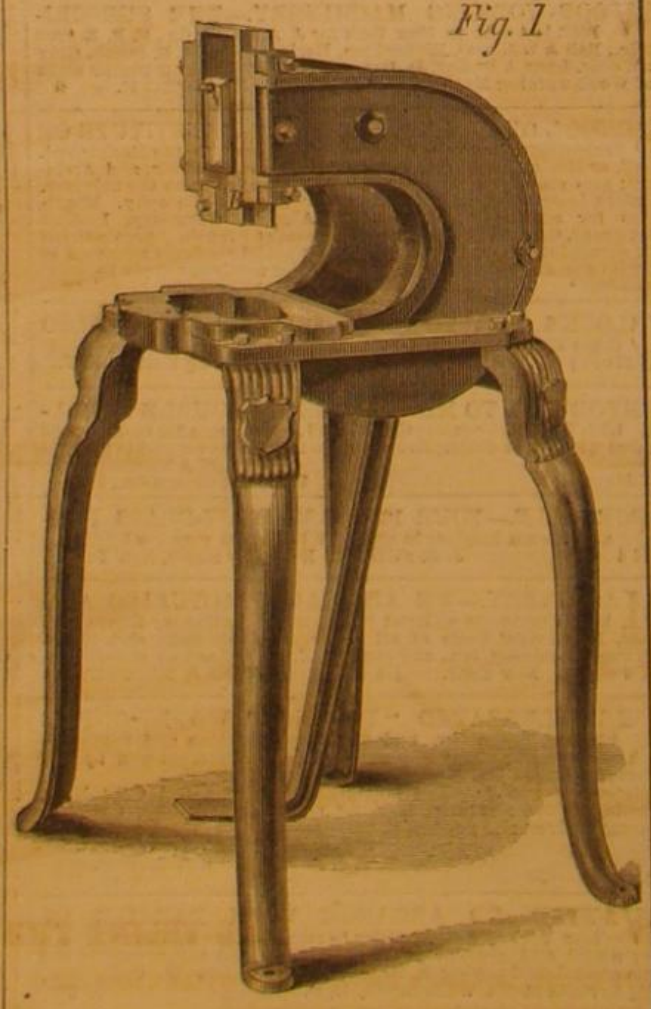
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Fig. 1

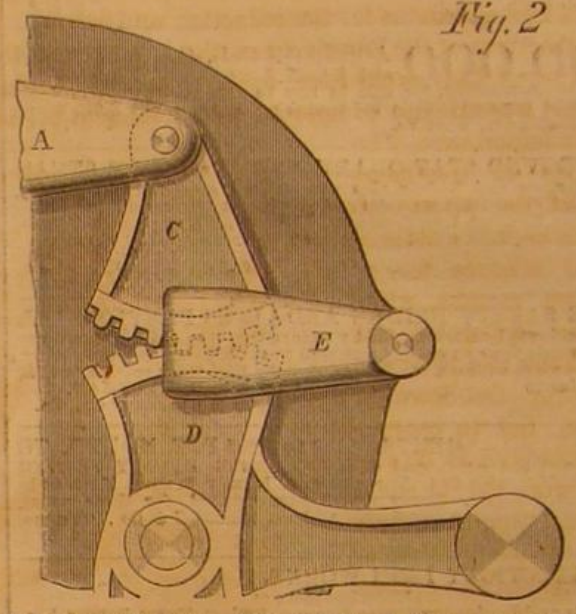


For such purposes the press here illustrated will be found extremely useful. It is operated by foot power, and can therefore be used where steam or water is not employed. Any kind of die can be inserted in the bed and slide, and great power is obtained by the mechanical agents employed. These are shown in Fig. 2.

The lever, A, which works the slide, B, in Fig. 1, has a toothed quadrant, C, jointed to it which is longer from one corner than from the other. That is to say, the teeth are not formed on a circle swept from the center it works on, but from a point independent of it.

The other quadrant, D, is similarly constructed. On each is a flange at the pitch lines of the teeth, so that the latter merely act as so many projections to compel the quadrants to roll together. The teeth are kept in gear by a clamp, E, jointed to the frame —which is free to accommodate itself to the motion

Fig. 2



of the quadrants. The result of this arrangement will be a vertical movement of the upper quadrant equal to twice the difference in length of the sides of one of the quadrants. This, of course, is communicated to the slide, B, through the lever, A. The action is equivalent to that of the toggle joint which is capable of transmitting great power. The quadrants before mentioned are worked by the foot of the operator pressing on the treadle, below the table. The machine is strongly made and handsomely finished.

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Vol. XIV.---No. 17. (NEW SERIES.) NEW YORK, APRIL 21, 1866. $3 PER ANNUM IN ADVANCE.

LATTA'S APPARATUS FOR THE REDUCTION AND RETENTION OF FRACTURES.

We present our readers this week with full engravings of a new apparatus for the reduction and retention of fractures of the lower extremities. As these injuries are of daily occurrence, liable to happen to every one, any attempt to improve their treatment is of public importance. The old mode of treatment compelled the patient to lie on his back in a state of enforced idleness for at least two months, while this new apparatus not only enables him to sit up, recline, or lie down at pleasure, but to pursue any business or to do any kind of work that he could do while sitting in a chair if well. When it is recollected that the loss of time is often considered the most serious result of the injury, the value of the improvement will be clear enough. It is evident that this freedom of posture and occupation of the body and mind tends to preserve the health of the patient, to increase the reparative power of the system, and promote a rapid cure.

In Fig. 1 the details are given. The bed splint is shown at A, and a long steel rod, B, is attached to the top of it by a socket, C, and at the bottom passes through a cross bar, D, on rollers. To the crossbar a scale and spring balance, E, is attached by a clamp which slides in a slot in the cross bar, and may be changed from one side to the other. The frame of the spring balance has also a slot in it to enable the scale to be elevated or depressed at pleasure. The lower half of the rod has a thread cut on it, on which is a thumb screw, F.

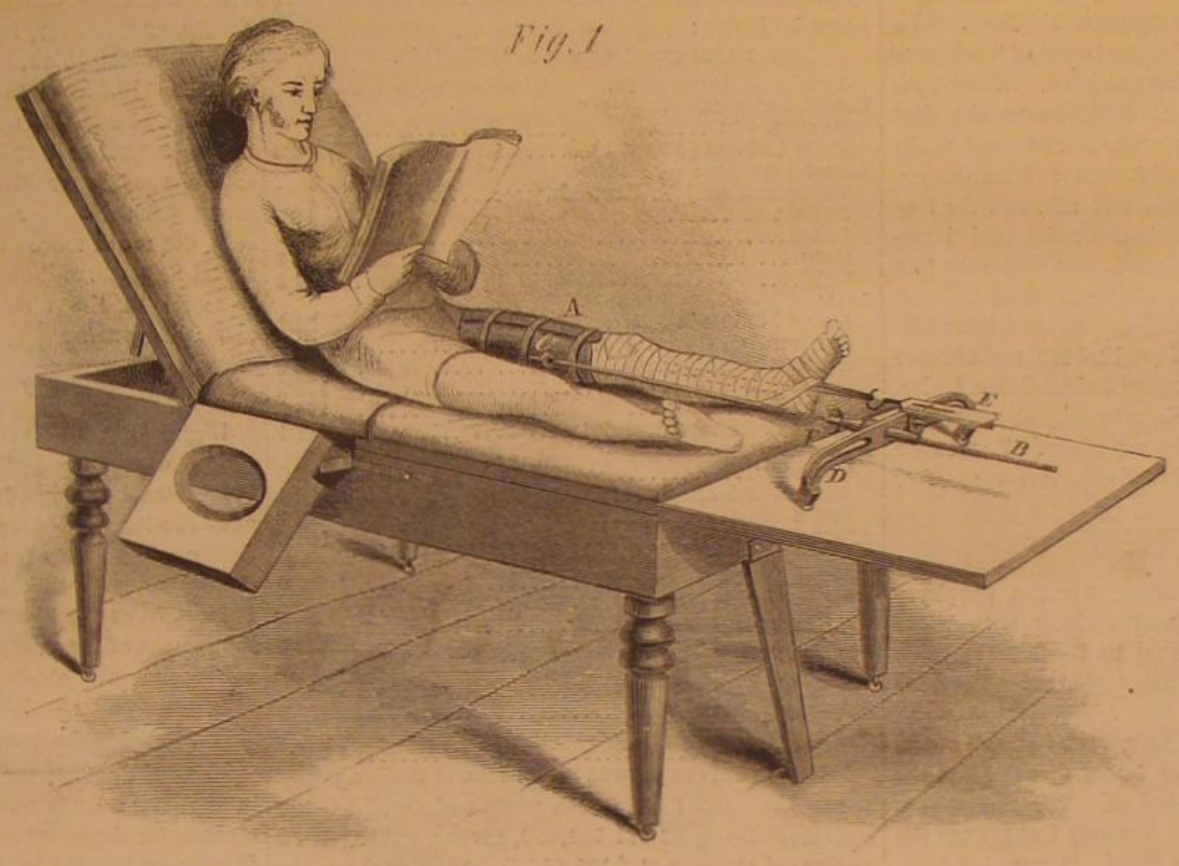
It is admitted by the highest medical authority that the management of fractures of the lower extremity is the most difficult part of surgery; and it is further admitted, that with the best means of treatment heretofore in use, not more than one-half of the cases can be brought to a satisfactory conclusion.

The number of cases annually occurring in the United States is estimated at over six thousand; consequently more than three thousand persons, many of them young, are every year turned out upon the world in a crippled condition. This simple statement shows the urgent necessity for improvement in the mechanical appliances made use of in such cases.

The plan here represented is designed, if possible, to obviate the difficulties that surgeons have had to encounter. The mode of application is as follows:—

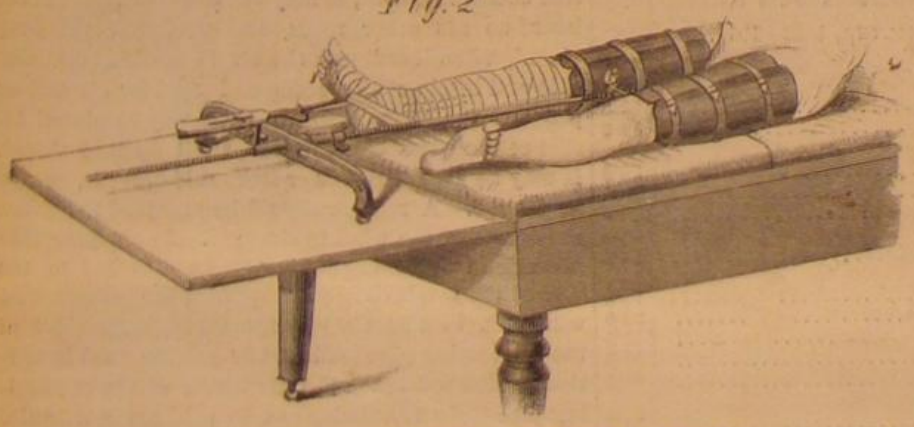
The patient is first placed upon the fracture bed, and the limb is held by assistants until the dressing is applied on the lower part of the leg. The fracture is now reduced, and the bed splint, as shown in Fig. 1, is applied and properly secured by straps around the thigh. The upper end of the rod is slipped into the socket at the top of the bed splint, and the loop of plaster, at the bottom of the foot, is attached to the hook on the scale. The nut on the rod is then turned down, carrying the cross bar with the foot attached along with it until the necessary amount of strain or extension is secured. The amount of strain is shown by the pointer on the scale, and it enables the nurse to keep the tension exactly at the point indicated by the surgeon. A fracture dressed in this way is almost free from pain.

Fig. 1



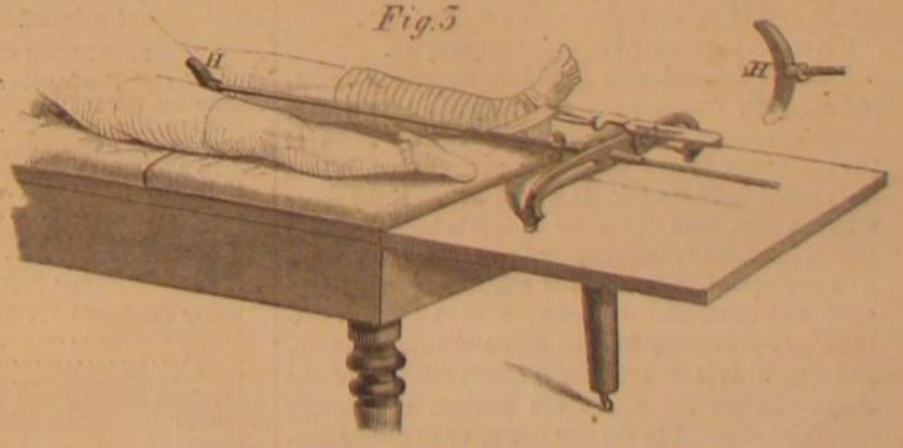
THE PATIENT IN POSITION.

Fig. 2



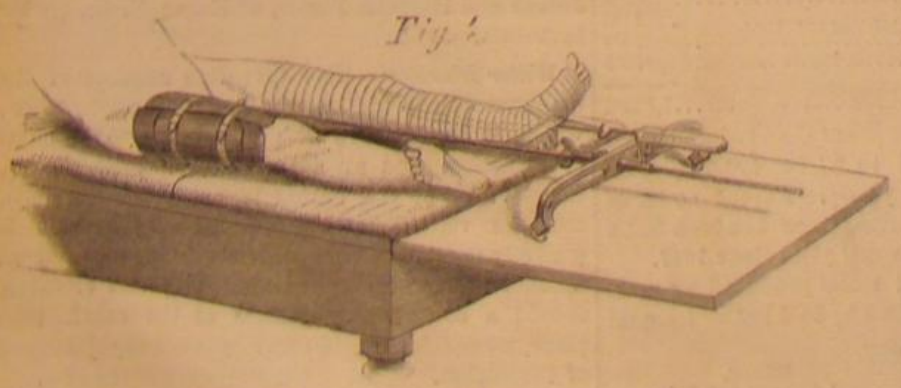
THE APPARATUS ON BOTH LEGS.

Fig. 3



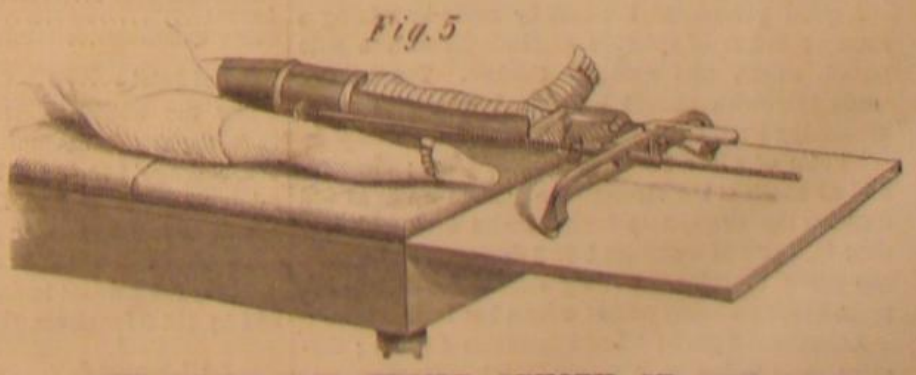
HOW THE LENGTH IS OBTAINED.

Fig. 4



THE SPLINT ON THE OTHER LEG.

Fig. 5



THE SPLINT THE WHOLE LENGTH OF THE LIMB.

The details in Fig. 2 are the same as in Fig. 1, with the addition of a second bed splint, both being attached to the top of the rod by a crosshead, G. This engraving also represents the mode of applying the dressing in case both limbs are broken, both limbs being dressed alike.

[Fig. 3 represents a measuring apparatus to make both legs of the same length. A crutch head, H, is substituted for the bed splint. The length of the limb is determined by means of a scale on the extending rod. It is often of the utmost importance for legal, as well as surgical reasons, to be able to get the exact length of the limb, but the old way of doing it with the tape line is entirely unreliable. By the plan here proposed, the surgeon can get the length of the limb as certainly as a carpenter could get that of a plank.

Fig 4 is the same as Fig. 1, except that the bed splint is placed upon the opposite limb. Sometimes the fractured limb is so bruised or wounded, that pressure upon it can not be borne. Under the old methods of treatment nothing could be done with such a case, but by the adoption of this device the counter extension is shifted to the sound side, and the strain is kept up without difficulty. The same plan is applicable to the treatment of acute inflammation of the hip joint without fracture.

Fig. 5 is the same as Fig. 1, only the bed splint is intended to reach the whole length of the limb. This represents a new plan for the treatment of fracture of both bones of the leg below the knee. When both bones of the leg are broken all control over the foot is lost, and it falls about any way, independent of the will or wish of its owner, and it was a common occurrence to find, after reunion was effected, the foot turned in or out so as to create deformity and lameness. This plan enables the surgeon to keep the foot exactly in the right position.

This apparatus was patented through the Scientific American Patent Agency, June 17, 1862, and another application is pending before the Patent Office, by Dr. M. M. Latta, of Goshen, Ind., who may be addressed for further information at that place. The entire patent is for sale. [See advertisement on another page.]

Indelible Ink.

Gold ink is made by grinding upon a porphyry slab, with a muller, gold leaves along with white honey, till they become reduced to the finest possible division. The paste is then collected upon the edge of a knife or spatula, put into a large glass, and diffused through water. The gold by gravity soon falls to the bottom, while the honey dissolves in the water, which must be decanted off. The sediment is to be repeatedly washed till entirely freed from the honey. The powder, when dried, is very brilliant, and when to be used as an ink, may be mixed up with a little gum water. After the writing becomes dry, it should be burnished with a wolf's tooth.

Silver ink is prepared in the same manner.

Indelible Ink.—A very good ink, capable of resisting chlorine, oxalic acid, and ablution with a hair pencil or sponge, may be made by mixing some of the ink made by the preceding prescription, with a little genuine China ink. It writes well. Many other formulæ have been given for indelible inks, but they are all interior in simplicity and usefulness to the one now prescribed. Solution of nitrate of silver thickened with gum, and written with upon linen or cotton cloth, previously imbued with a solution of soda, and dried, is the ordinary permanent ink of the shops. Before the cloths are washed, the writing should be exposed to the sun beam, or to bright daylight, which blackens and fixes the oxide of silver. It is easily discharged by chlorine and ammonia.

A good permanent ink may be made by mixing a strong solution of chloride of platinum with a little potash sugar, and gum to thicken. The writing made therewith should be passed over with a hot smoothing iron, to fix it.—*Ure.*

Nitrate of silver 1 to 2 dr ; water ¾ oz. ; dissolve, add as much of the strongest ammonia water as will dissolve the precipitate formed on its first addition, then further add mucilage 1 or 2 drachms, and a little sap green to color. Writing executed with this ink turns black on being passed over a hot Italian iron.

Asphaltum 1 part ; oil of turpentine 4 parts ; dissolve, and color with printer's ink. Very permanent.—*Cooley.*

Manufacturers of machines for addressing envelopes, newspaper wrappers, etc., will doubtless find it advantageous to advertise regularly in the Scientific American. Our readers are frequently inquiring for such machines.

Production of Gold and Silver.

Many questions of interest suggest themselves connected with the relative production of the precious metals. Previous to the discoveries in California, gold uniformly commanded a premium; its influx at that time quickly destroyed this, and the continued demand for silver resulted in its being at a slight premium. The ounce of gold in London in 1848 was 77s. 6d., and the ounce of standard silver 59½ or 15⅝ for 1. With the influx of gold from California, France, as is well known, gradually exchanged her silver for a gold currency, and India absorbed the silver in exchange for silks and other commodities. During the war cotton at high prices has been added to other articles for which silver was sent to India. On Jan. 1, 1866, the price of silver was 62d, or 4·2 per cent rise since 1848.

These facts are of interest in connection with the following tables which we have compiled showing the total production of gold and silver since 1847. The first table gives the estimated amount of gold yielded by all the producing countries from 1848 to 1865, both years inclusive:

PRODUCTION OF GOLD, 1848–1865.

Countries of Production.	
North America:	
Mexico, Etc	71·0
United States (Atlantic)	8·6
South America:	
Venezuela and N. Grenada	26·0
Bolivia	17·3
Brazil	42·6
Peru	24·7
Chili	20·3
Asia:	
Malay Peninsula	28.2
Farther India	72·3
Eastern Archipelago	46·2
Japan	130·5
China and Thibet	304·8
Northern Europe and Asia	411·1
Europe:	
Germany	9·0
Austria and Italy	29·1
Spain	56·8
Africa	110·0
Total, Old sources	1,408·6
United States (Pacific)	1,056·5
British North America	49·5
Australia and New Zealand	792·0
Total, New Sources	1,897·0
Other Countries	36·0
Grand Total	3,341·5

[The amounts expressed in millions of dollars.]

The aggregate for eighteen years embraced in the statement being $3,341,500,000, gives for that period an annual average of $185,638,888 additional to the world's stock of gold—an average constantly on the increase by the opening of new regions and the adaptation of scientific processes to its extraction.

PRODUCTION OF SILVER, 1848—1865.

Countries of Production:	
North America:	
Mexico, Etc	580·0
United States	53·0
South America:	
Bolivia	72·0
Brazil	29·5
Peru	120·0
Chili	65·8
Venezuela and N. Granada	19·6
Asia:	
Malay Peninsula	18·0
Farther India	36 0
Japan	144·0
China and Thibet	206·6
Northern Europe and Asia	66·0
Europe:	
Germany	39·5
Austria	36·0
Spain	49·5
England	11·3
Africa	24·0
Other countries	50·2
Grand Total	1,620·4

For the whole eighteen years the production has thus apparently amounted to $1,620,400,000, or on the average $90,022,222 yearly. Except so far as relates to the United States, there has been but a moderate increase in the annual yield since 1847.

To obtain the weight of metal produced we must multiply the amount in dollars by 25·8 grains for gold and by 412·5 for silver, thus—

Gold.	Silver.
3,341,500,000 dols.	1,620,400,000 dols.
25·0	412·5
86,210,700,000 grs.	668,415,000,000 grs.
12,315,814 lbs.	95,487,857 lbs.
6,157 tuns.	47,743 tuns.

or nearly in the proportion of eight tuns of silver to every tun of gold produced.

The above, however, is gold and silver nine-tenths fine, and to reduce them to fine metal a tenth must be deducted. The quantity of fine gold produced was thus approximately 5,542 tuns avoirdupois, or 307½ tuns a year, and the quantity of fine silver 43,969 tuns, or 1,832 tuns a year.

A cubic inch of water weighs 252½ grains, and the specific gravity of gold is 19 3, or gold is so many times heavier than water Hence, a cubic inch of gold weighs 4,873¼ grains, 0·69618 lbs. avoird. A cubic foot is 1,728 such cubic inches, and the weight of a cubic foot of gold is about 1,203 lbs. avoird. The whole of the fine gold produced in eighteen years was 5,542 tuns, or 11,084,000 lbs., an amount which would occupy a space equivalent to 9,213½ cubic feet. A solid shaft 92 feet high and 10 feet square would represent this amount. It would build a wall 1,842½ feet long, one foot thick and five feet high. If melted it would fill 68,916 wine gallons, or about 1,094 hogsheads of 63 gallons. Such illustrations will aid the mind in comprehending the magnitude of the gold heap collected from the various sources yearly, or as above, in a period of years. Cut into slabs one inch thick, the same amount would cover a space of 110,562 square feet! Divide any of the above sums by 18 and you obtain the weight, bulk or extent of the annual gold crop.

The specific gravity of silver is 10 5, or it is so many times heavier than water. It will therefore take not much more than one-half the weight of this metal to perform the same offices we have assigned to gold in the above calculations.—*Hunt's Merchants' Magazine.*

NEW INVENTIONS.

Water Wheel.—This invention relates to an improved water wheel of the class commonly termed the "Jonvil Turbine," and it consists in a peculiar construction and arrangement of the buckets, and their application to the wheel, and in a means for relieving the lever end of the wheel shaft and step from the weight of the wheel, as well as in a peculiar arrangement of gates, whereby it is believed that many advantages are obtained over other wheels of the same class in use. Henry Van Dewater, of Buffalo, N. Y., is the inventor.

Musical Instrument.—This improvement consists in applying a large reed to reed instruments or pipe organs, for the purpose of producing a tremulo tone. It may be applied in different ways, and its vibration is to be so slow as not to produce a musical tone. In reed instruments, of the class of melodeons and cabinet organs, it may be inserted in the reed board as are other reeds, and used with the swell closed, when it will put the air in motion both outside and inside of the reeds and reed board, and so produce the tremulo tone. Or it may be placed inside of the wind box with the swell open or closed. It may be used with one or more sets of reeds, as may be desired. A register should be provided to govern the access of the wind to the reed. In applying this invention to pipe organs it may be attached to the side of the conducting pipe between the bellows and wind box, with an air passage through the sides of the conducting pipe sufficient to put the reed in motion, which will cause the air inside of the conducting pipe to be vibrated so as to produce a tremulo. In all cases it is to be used with a valve and register. Joseph and Ephraim Foster, of Keene, N. H., are the inventors.

Water Elevator.—This invention consists in the employment of a friction wheel of novel construction, which, in combination with a crank, also of novel construction, and an automatical operating pawl, the elevation of the bucket is easily accomplished, and the velocity of the descent of the same is perfectly regulated, one hand only being required to operate the entire apparatus. With this elevator, should a carless management of the crank take place, no accident could occur by a too rapid descent of the bucket.

The inventor of this water elevator is Edwin Hoyt, Stamford, Conn., and the patent was issued April 3, 1866.

Back Numbers.—New subscribers are informed that the back numbers of the present volume are out of print. Subscriptions are entered from the date of their receipt.

THE MANUFACTURE OF COLD-DRAWN STEEL TUBES

Nearly two years ago we drew attention to a new and exceedingly remarkable process—the manufacture of steel tubes by cold drawing. At that time this process was so far in its infancy that it could hardly be considered as more than a scientific curiosity. The machinery erected at Willow-walk, Bermondsey, although sufficiently complete to demonstrate the fact that steel tubes could be made by boring out an ingot and passing it through dies, was still so far from perfection that it could not be regarded in any other light than as the embodiment of first, and, in a sense, crude ideas. But to active minds two years afford ample time for the production of great results, and at the moment we write an influential company has been established, and steel tubes are now manufactured under the patents of Messrs. Harding, Hawksworth, and Christophe, on an extended scale, by elaborate machinery; while the details of the process have been so far perfected that there is no reason to doubt that the cold-drawn steel tube manufacture will very soon occupy an important place in the trade of the country. Boiler tubes are now used annually by hundreds of tuns. Hollow shafting is not in demand solely because a demand could not hitherto be supplied at a moderate price. Lining tubes for ordnance, rifle barrels, surface condenser tubes, etc., are manufactured yearly in immense quantities; and it is certain that any sensible improvement on existing means of production will be fully appreciated by the public. We regard, indeed, the operations of the new company as being important in the fullest sense of the word, and we feel some pleasure in laying before our readers ample details of this, possibly the most remarkable invention in the art of working in metals which has been introduced for many years.

Nearly five years have elapsed since the first experiments were made with the view to produce cold-drawn steel tubes commercially. The credit of the first idea is due, we believe, to Mr. G. P. Harding and Mons. L. Christophe, who, while residing in Paris in 1851, had constant opportunities for observing the remarkable softness, toughness, and ductility of a peculiar steel manufactured by Mr. Hawksworth, of Linlithgow, N. B. This gentleman has for many years devoted his attention to the production of a very peculiar soft steel intended for the rolls of calico printing machines, on which, as is well known, the pattern or device is impressed by causing them to revolve under excessive pressure in contact with a very hard steel roll, on which the device is first engraved. After years of experiment, Mr. Hawksworth succeeded in making steel of a uniform quality which left nothing to be desired, and it is to this steel that the process under consideration is indebted for its development. It is true that tubes can now be drawn from almost any good steel; but this was not the case in the beginning, and it is possible that the numerous failures met with in the earliest stages of the invention would have proved sufficiently discouraging to lead to its abandonment had it not been for the peculiar facilities afforded by Mr. Hawksworth's steel. Prior to the year 1851, tubes had indeed been made cold from steel, but only as curiosities. The method of manufacture consisted in beating up a short tube from a circular steel disk into a cup shape, and then driving this cup once or twice through a die. In this way only short lengths could be procured at an immense expense. In a word, such tubes were, as we have said, curiosities and nothing more.

The first experiments in the new process were made at Paris by Messrs. Harding and Christophe, and the results were, upon the whole, so encouraging that these gentlemen, in company with Mr. Hawksworth, patented the machinery employed. The process itself is, perhaps, hardly a good subject for a patent. It is not so much a novel invention as the legitimate development of an old idea—that of drawing wire. That steel could be drawn into tubes constitutes a discovery, not an invention. Nevertheless, the history of this process affords a striking illustration of the amount of time, skill, energy, and capital required to bridge over the space intervening between an original idea and its commercial realization. No one can imagine that in this case the realization would ever have been effected but for the protection afforded by the patent laws. Even now the success of the process depends almost altogether on the machinery employed, and on delicate manipulations, the knowledge of which has only been acquired by dearly-bought experience. The earlier experiments conducted at Paris went little beyond affording proof that the manufacture of tubes on a large scale by the new process was possible, but all the operations were confined—and are still, as far as regards Paris—to the production of rifle barrels. Sufficient was done, however, to show that there was a good opening for the investment of capital. Machinery of a more powerful kind was therefore erected on temporary premises in Bermondsey in 1864; and after a time a company was formed under the title of the "Cold Drawn Steel Tube and Ordnance Company (Limited)." The premises of the old London Zinc Company, in Macclesfield street, City road, were taken, powerful machinery erected, and after many and unavoidable delays, the manufacture of steel tubes in quantities, as a commercial speculation, has at last been commenced, and we believe we are correct in stating that the new company is now in a position to execute very large orders. But it is not to be supposed that the machinery as now constructed is identical with that originally patented. On the contrary, many patents have been taken out, and various improvements have been introduced from time to time during the last five years.

The process of manufacturing steel tubes of equal diameter from end to end is exceedingly simple. A solid ingot of sufficient size is placed in a drilling machine and bored right through from both ends at once. The size of the ingot and the diameter of the hole depend on the kind of tube to be produced. A short and very thick steel pipe is thus produced, and this pipe is then threaded on a rod having an excessively hard steel acorn-shaped head. This rod or mandrel is secured to one head-stock of an hydraulic press. To a central frame work or head-stock a die is fixed, exactly within which stands the acorn-head of the mandrel. The end of the tube having been slightly tapered down is then introduced into the die aperture, and affixed to the crosshead of the moving ram by means to which we shall refer presently. The force pumps are then put in motion and the tube is drawn through the die, thereby having its external diameter reduced, while the acorn-head of the mandrel imparts a beautiful glossy surface to its interior. After a few passes through the dies, the tube is annealed, and then passed again, and so on until the required length and thinness is attained. In making tubes for surface condensers, for example, a bar of steel 2 feet long and 2 inches in diameter is taken; this is perforated from end to end with a $\frac{3}{4}$ inch hole, and then drawn out through a series of dies into a tube or tubes $\frac{13}{16}$ths of an inch in diameter, $\frac{1}{32}$d of an inch thick, and 60 feet long, weighing $\frac{1}{4}$ lb. per foot of length instead of $10\frac{1}{2}$ lbs., the weight of the original bar; and so far is this severe manipulation from injuring the metal that such a tube will resist a bursting hydraulic pressure of 7,000 lbs. or more than three tuns per square inch. The change which takes place in the position of the molecules is very remarkable; and in the fact that this change is so radical, resides, strangely enough, one of the best aids to the commercial success of the process. Only a good steel will endure the first and second drawing, which embody the most severe test to which the metal is exposed. The least flaw is thus detected in the earliest stage of the process, and the ingot can therefore be rejected before much labor has been expended upon it. The first two passes through the dies accomplished, the production of the finished tube becomes a matter of certainty, as the metal is apparently so consolidated by the drawing that it becomes enabled to resist all the rough usage to which it is subsequently submitted; and it must be borne in mind that the strain to which the metal is exposed becomes gradually diminished in amount as the frictional surfaces and the thickness become less.

It is obvious that where large quantities of tubes are to be produced, drilling the ingots constitutes a very important department of the manufacture. Great difficulties have, we believe, been encountered in producing a machine which would drill a large number of ingots simultaneously, and from both ends, with sufficient accuracy. It is easy enough to drill from one end only, but this involved too much time. Ten ingots are drilled at one time, with such approximate accuracy as suffices for every purpose. The machine only requires the attendance of one man and a boy, and can turn out from ten to twenty ingots, each producing from 20 feet to 40 feet of tubing according to thickness in ten hours. At present it is principally employed in drilling ingots for rifle and musket barrels, a special branch of the company's operations, the consideration of which we shall reserve for a second paper. Ingots of large size are sometimes drilled separately, much in the ordinary way, calling for no very special mention, but they are mostly produced by casting hollow, or by punching and rolling.

The drilling effected, the tubes are next brought to the draw bench. There are two of these benches at Macclesfield street. The larger of the two consists of two pairs of hydraulic cylinders 13 inches diameter and 12 feet stroke; the four rams are attached to a very massive crosshead supported by slide bars; and the tube to be drawn is placed between one pair of cylinders and coupled to the center of the crosshead. The dies are all formed in segments and packed tightly around the tube and within the die-holder. The mandrel is placed at the same time within the tube to maintain its internal diameter, or to increase it, as may be desired. Power is communicated by a set of six-geared, two-inch pumps, capable of producing a pressure of three tuns per square inch, or 800 tuns on the pair of rams. The velocity at which the rams move is 15 inches per minute, and the motion is perfectly equable, steady, and without vibration. The cylinders are fixed to strong cast-iron bed plates, and are heavily stayed both transversely and longitudinally. The die-holder is forged from a solid block of wrought iron, and has a sectional area at the weakest place of 160 square inches. The entire apparatus weighs 90 tuns, of which the cylinder, framing, etc, form 75 tuns, the rams and crosshead weighing 15 tuns. It constitutes, as a whole, possibly, the most powerful hydraulic machine ever devoted to manufacturing purposes, and, alike from its magnitude and design, it is well worthy of attention, even if we disregard the object for which it has been specially constructed. Although small tubes could be drawn by this press, it would be sheer waste of power to employ it for such a purpose. It is devoted to the production of hollow shafting, lining tubes for ordnance, etc., and will draw tubes from $3\frac{1}{2}$ inches to 18 inches in external diameter, an overhead traveler being employed to move such heavy masses of metal. Smaller tubes are drawn by a second apparatus with a single pair of 11-inch rams and a stroke of 10 feet. Heavy flanges cast on the cylinder constituting the die-holders, half a dozen tubes may be drawn at once. —*London Engineer.*

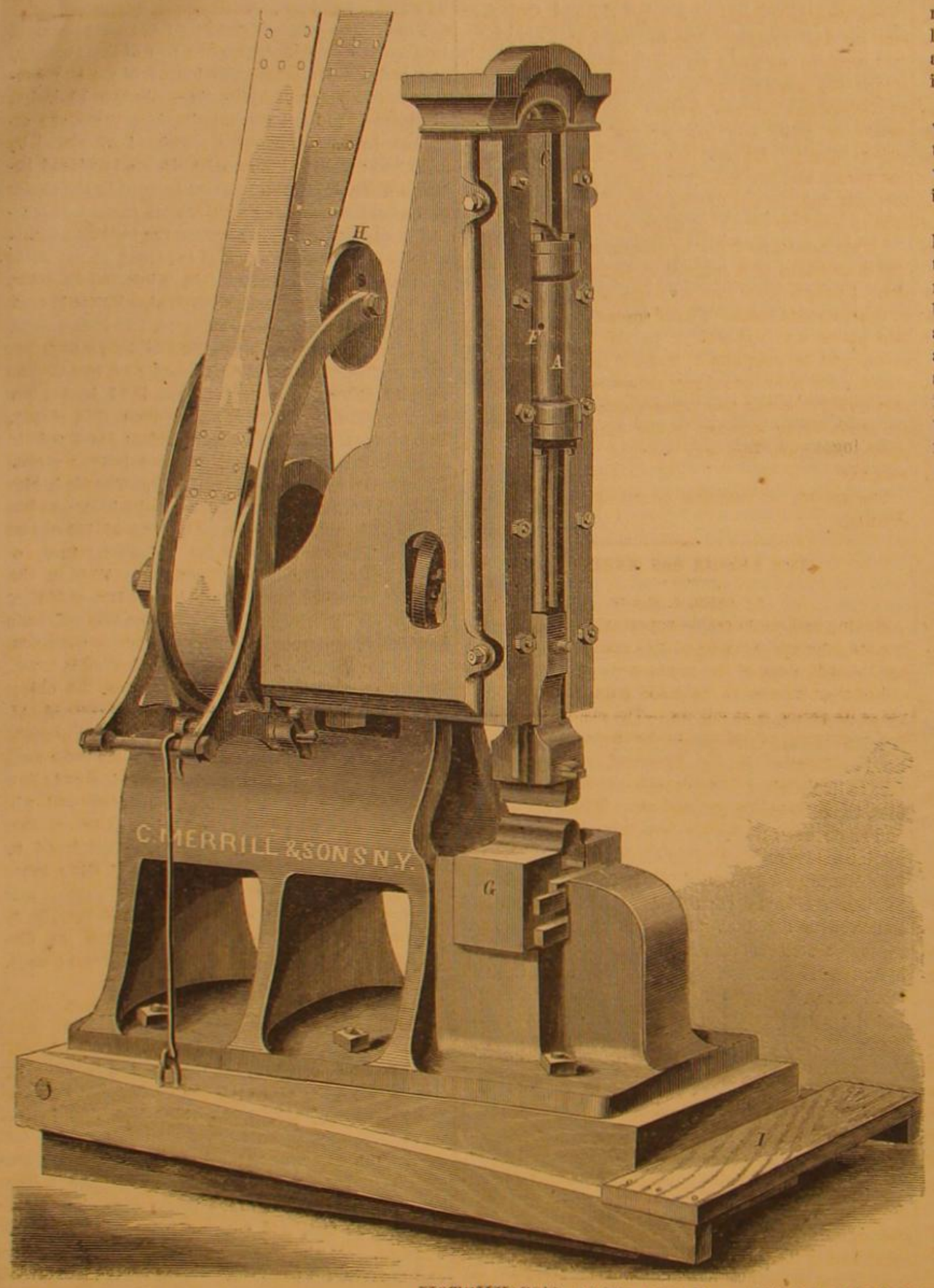
Kangaroo on a Tread Mill.

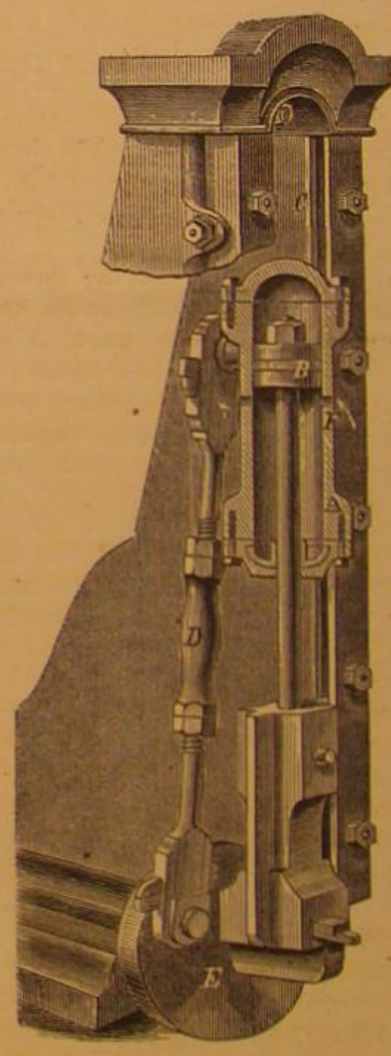
In our Australian advices we find the following:—"A market gardener in the neighborhood of Portland has put a kangaroo, which he caught and tamed, to various uses. The animal stands nearly 6 feet high. The owner has tested its strength and capabilities in the following manner:—He had a large circle made of slabs an inch thick, with the outside diameter 20 feet, and with an inner one of 17 feet 6 inches. On the circular floor is nailed flat ridges and furrows, thus affording a floor for the kangaroo's feet, and a resting place about 3 feet long for his tail. It is fitted up with simple wheels in the center, like those of a horse chaff-cutting machine, and it is fixed on an incline. The kangaroo is kept fast to a frame work of post and rails, stuffed with hay and bagging, to prevent his legs and back from being bruised. An opening is left in the rear to give his tail full play. By continually springing up he sets the machine in motion. The animal works at about half a horse-power and turns a grinding stone, chaff-cutter, bean mill, turnip cutter, and a washing machine, and all at the same time. This simple contrivance also lifts water separately for irrigating the garden"—Of course it does, and we have no doubt astonishes the natives as well. Why not estimate the power of engines by the nominal kangaroo? It would convey quite as accurate an impression as the nominal horse.—*Engineer.*

Improved Forge Hammer.

This engraving represents a new and improved forge hammer which has met with unparalleled popularity from the manufacturing community. Eighty of them have been sold in the past twenty months, to large and small concerns. They are made 10, 30, 40, 50 and 60 pounds weight. The 40 pound hammer will draw a three-inch bar three feet at one beat. It can be used in any building without injuring the foundation or walls, as it runs light and without noise.

The cylinder and hammer moving in vertical slides, each blow is square, exactly in the same place, and die work can be forged as exact as under a drop, and with greater rapidity; it is under the perfect control of the operator, can strike light or heavy, and give any number of blows in quick succession. It will draw, weld or swage in the most perfect manner, and requires less power than any other hammer giving the same blow. The working parts are simple, not liable to get out of order, and are carried in a strong iron frame.





HOTCHKISS'S ATMOSPHERIC FORGE HAMMER.

We give a brief outline of its details and operation:—

The hammer derives the increased force of its blow from compressed air. The air is compressed within a cylinder, A, by the piston, B, which fits the cylinder air-tight (see Fig. 2). The cylinder moves in the slides, C, by the action of the connecting rod, D, driven by the fire-plate, E, by belting in the usual manner The cylinder is air-tight at each end; there are two small holes, F, in the cylinder, through which the air passes freely in and out.

Circulars giving fuller particulars sent on application to Charles Merrill & Son, manufacturers, 556 Grand st., N. Y.

Unmalted and Malted Barley as Food for Stock.

Our readers will remember the excitement and discussions which ended in the abandonment of the duty on malt used for feeding stock. Most of them also will be aware that feeders of stock have not largely availed themselves of the privilege of obtaining duty-free malt under the restrictions prescribed. The reason for this will be found in the admirable and exhaustive report we now notice:—

Report of Experiments Undertaken by Order of the Board of Trade to Determine the Relative Values of Unmalted and Malted Barley as Food for Stock. By JOHN BENNETT LAWES. Presented to both Houses of Parliament by command of her Majesty. 1866.

This is not the first Government report on the relative advantages of malted and unmalted barley as food for cattle. In 1845 and 1846 Drs. T. and R. D. Thomson made a report which was, however, founded on few experiments continued for a very short time, and was necessarily inconclusive. For many reasons, therefore, to ease the mind of the Chancellor of the Exchequer, as well as to procure sound information for agriculturists, it was advisable to have the subject thoroughly investigated, and the Government did the best that was possible in placing the matter in the hands of Mr. Lawes. No doubts can now remain. The experiments were made on such a scale as to allow of arriving at general conclusions. Instead of the two cows and two oxen experimented upon for a few days by Drs. Thomson, Mr. Lawes took lots of ten, and continued the comparative experiments, some for ten and some for twenty weeks, and those conducted with sheep and pigs were on a similar scale. As regards the results of the feeding, we need only give the general conclusion arrived at by the author—"that a given weight of barley is more productive, both of the milk of cows and of the increase of live weight of fattening animals, than the amount of malt and malt dust that would be produced from it." We must add that these results are consistent with those obtained in the limited experiments of Drs. T. and R. D. Thomson, and also agree with those obtained in a previous inquiry by Mr. Lawes himself.

For further information on this part of the subject we must refer the reader to the report, and go back to the account of "the loss and chemical changes which the grain undergoes by malting," which will interest a larger number of our readers.

The preliminary experiments on malting appear to have been executed with the same care, but, unfortunately, the results as stated do not afford us a ready means of comparing them with those obtained by other chemists. On one point, however, they are sufficiently explicit. Dr. Thomson, who has always been considered an authority on this matter, states that the loss of weight which barley undergoes in the process of malting is about eight per cent. In the experiments of Mr. Lawes, however, the loss was found to be very much greater. He states the loss with barley of fair malting quality to amount to as much as nineteen per cent, two-thirds of this loss being moisture, and one-third solid substance. The loss of solid substance consists chiefly of non-nitrogenous matters, but includes also a small amount of nitrogenous and mineral matters. The last consists chiefly of soluble salts removed in the steeping, and it must be added that Mr. Lawes found that some sugar was also removed from the grain by the steeping.—*Chemical News.*

BLEACHING BROOM CORN.—"A broom maker, of Baltimore," writes us that broom corn is bleached by exposing it to the fumes of burning sulphur. A large box is provided, in the bottom of which a pot of brimstone is placed. The corn is then wet and hung up over it so as to expose a large surface, and the whole is covered with a piece of old carpet, to confine the vapor and allow it to escape slowly.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening, April, 5, 1866, the President, Prof. S. D. Tillman, in the chair.

THERMOMETERS AS STEAM GAGES.

Dr. Rowell remarked that some time since he proposed the use of thermometers as steam gages, the relation of the temperature to the pressure of steam having been accurately determined; the pressure could be ascertained with great precision by observing the temperature. Several engineers of his acquaintance had, accordingly, caused thermometers to be fixed in their boilers, but the bulbs very soon cracked to pieces, and the plan was therefore abandoned.

Dr. Parmelee said that the failure of the thermometers was due to the use of American glass in their manufacture. He had used thermometers a great deal, both in the laboratory and in vulcanizing rubber, and he had found that while tubes of American glass would crumble to pieces after use two or three times, bulbs blown from French or Bohemian glass would last seven months.

Professor Everett observed that our glass makers were doubtless able to produce good chemical glass, but they did not make the effort on account of the limited demand.

Dr. Feutchtwanger assented to this, and said that in the production of glass for achromatic lenses the American glass makers beat the world.

Dr. Rowell then proposed to reverse his plan; where difficulty is found in using thermometers for measuring temperatures, he would substitute a steam gage, and ascertain the temperature by measuring the pressure. He exhibited a small gage prepared for this purpose, intended especially for use in vulcanizing rubber, and remarked that the index moved over about an inch in ten degrees, while in the small thermometers in general use in vulcanizing, the movement of the mercury is through only one-tenth of an inch in ten degrees.

[It must be remembered that the measurement of the pressure by the temperature, or the measurement of temperature by pressure gage, is only to be trusted in the case of saturated steam. When the steam is superheated the temperature is higher with a given pressure than is given in Regnault's tables for saturated steam.—EDS. SCIENTIFIC AMERICAN.]

THE LOCALITIES OF PETROLEUM.

Professor C. H. Hitchcock, formerly of Amherst College, read a long paper on the geology of petroleum. He followed pretty nearly the same ground which has been repeatedly gone over at the Polytechnic by Dr. Stevens, whose remarks have been very fully reported in our columns. A few of his statements, however, may be new to a portion of our readers. He agreed with Dr. Stevens in saying that petroleum has been found in all the fossiliferous rocks, and that the principal oil-bearing formation in this country is the Devonian. He, however, seemed to regard some of the other formations more promising of a profitable yield than have generally been considered. Among them he mentioned the Triassic, in which petroleum has been found at Simsbury in Connecticut, and the silurian, which has been yielding oil in Cumberland county, Ky., since 1829. Between twenty and thiry years ago a great many wells were sunk in the Western States in search of salt water, and it was in this search that oil was struck in Cumberland county. As the mode of purifying the oil was not then known, it was allowed to run to waste. Since the great value of petroleum has become known, the sinking of wells in this district has been renewed, and some 25 or 30 of these wells are now yielding oil. Professor Hitchcock estimated that at least 75,000 barrels of petroleum has been raised in Cumberland county.

In regard to the disputed point of petroleum being found in California, the speaker said that at least 60,000 gallons have been sent to market in that State.

The formation of petroleum has been much discussed; it is the result mainly of vegetable decomposition, though some of the Canadian and other deposits contain a small quantity of animal matter, as is shown by the presence of sulphur, and by their extremely offensive odors. Except in one case all the water he had found associated with petroleum was salt, and he would suggest that the submergence of vegetation beneath salt water may have been an essential condition of the formation of petroleum.

The yield of petroleum in the United States, for the last five years has been as follows,

1861	24,000,000 gallons.
1862	40,000,000 gallons.
1863	70,000,000 gallons.
1864	87,000,000 gallons.
1865	91,160,000 gallons.

At the present time the product is not less than 14,000 barrels per day.

THE USES OF PEAT.

The President announced peat as the regular subject for the evening. From the long discussion that followed we select for our columns only a portion of the remarks of Mr. Josiah B. Hyde. This gentleman has devoted several years to the examination of peat, and has written some very able papers upon it. He said there are two kinds of peat, the fibrous and the non-fibrous—the fibrous is fit for fuel only, but the non-fibrous has many valuable uses. It is as good for clarifying sugar as bone charcoal.

"Peat cannot be dried by natural means. In this vial is an ounce of it reduced to an impalpable powder. I pour a little into my hand, and blow a cloud of it across this room. I have spread this on porcelain plates and exposed it to the bright sun for hours, and on weighing it, found it to be still just an ounce; but after two hours exposure to a temperature of 212°, it weighed three-fourths of an ounce. On again being exposed to the atmosphere it absorbed moisture and was restored to its original weight."

The subject of peat was continued for the next evening.

THE LENOIR GAS ENGINE.

BY FRED. J. SLADE.

Having had considerable opportunities for observing the practical working of this machine, the writer has thought some of the phenomena of its operation of sufficient interest to be made public. The principle of its action is as follows:—The piston moving at the beginning of its stroke by the momentum previously imparted to the fly-wheel, draws into the cylinder, through a suitable slide valve, a mixture of common illuminating gas and air. When the piston has moved through a little less than half the stroke the valve closes, and an electric spark is introduced into the cylinder and ignites the gases. The expansion caused by the heat of combustion drives the piston during the remainder of the stroke.

The composition of coal gas is not the same in all cases, but varies with the kind of coal used in its manufacture, and the extent to which the distillation is carried. A constitution probably not far from the average in our cities would be expressed by

Olefiant gas	7
Light corburetted hydrogen	56
Hydrogen	21
Carbonic oxide	11
Nitrogen	5
	190

Now, in combustion 1 cubic foot of olefiant gas unites with 3 cubic feet of oxygen and gives 2 cubic feet of carbonic acid and 2 of vapor water. One cubic foot of light carburetted hydrogen unites with 2 cubic feet of oxygen and gives 1 cubic foot of carbonic acid and 2 of vapor of water. One cubic foot of hydrogen unites with one-half a cubic foot of oxygen, and gives 1 cubic foot of vapor of water. One cubic foot of carbonic oxide unites with one-half a cubic foot of oxygen, and gives one cubic foot of carbonic acid.

The result of the combustion of 100 cubic feet of coal gas, therefore, will be represented as follows:—

		Oxygen		Vapor of Water.	Carbonic Acid.
Olefiant gas	7	and 21	yields	14	14
Light carburetted hydrogen	56	and 112	"	56	112
Hydrogen	21	and 10½	"		21
Carbonic oxide	11	and 5½	"	11	
Nitrogen	5		" Nitrogen	5	
	100	149		86	147
Nit. associated with oxy. in air,		560		560	
Original gases		809	yield products of combn	793	

We see from this that for the perfect combustion of gas of ordinary quality we must supply seven volumes of air for each volume of gas, and that for gases containing a greater proportion of hydro-carbons a greater quantity of air will be required, and, at the same time, the bulk of the products of combustion will be greater.

By applying a Richard's indicator of unusually delicate workmanship the writer obtained from an engine of 8⅔ inches diameter of cylinder, and 16¼ inches stroke, diagrams of which the accompanying is a fair specimen.

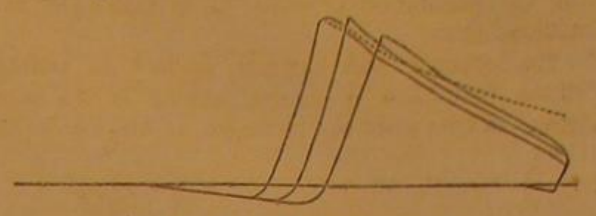


DIAGRAM A—50 REVOLUTIONS.

In this case as the explosion did not occur immediately on the closing of the valve, the tension of the gases falls to 11 lbs. per square inch (above a vacuum). After combustion it rises to 48 lbs. The temperature necessary to produce this pressure is found by the formula,

$$t_2 = \frac{P_2(1+k\,(t_1-32^\circ)\,)-P_1}{P_1 k}+32^\circ,$$

in which t_1=temperature of the gases before combustion, taken at 200° on account of the warmth of the cylinder.

P_2 is 48 augmented in the proportion $\frac{8}{7}\frac{2}{6}\frac{3}{3}$ and the mean co-efficient of expansion k of the gases under constant volume is ·00204. This gives us as the temperature of the gases at the moment of combustion, 2474°. The dotted line represents the theoretical curve of expansion, taking into account the loss of heat and consequent fall of pressure due to the work done (which is the proper theoretical curve for an indicator diagram). The temperature at the end of the stroke indicated by this line would be 2156°. The actual final temperature shown by the diagram, supposing there to be no leakage, is 1438°, and the difference, 718°, is the quantity of heat absorbed by the water jacket with which the cylinder is surrounded. It will be observed from this card, that the explosion takes place so late in the stroke that there is a considerable available pressure in the cylinder at the end of the stroke, which, of course, is not utilized. To prevent this waste, the manufacturer of these engines in this country, Mr. Miers Coryell, sets the admission valve so as to close earlier; and this has the further advantage, that at the middle of the stroke a given quantity of work is performed in less time than at the ends, and consequently there is less loss of heat.

The diagrams give information which may be of interest to some as to the time required for the explosion of such a mixture of gases. In this case it appears to be about $\frac{1}{20}$ of a second.

Diagram B was obtained on one occasion when the electrical points in the cylinder were wet, and owing to the uncertain passage of the spark the explosions were very irregular. It is introduced here to show the difference between explosions occuring at the middle of the stroke and those

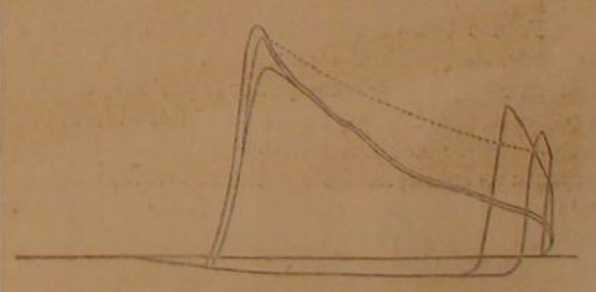


DIAGRAM B—45 REVOLUTIONS. 1 INCH=32lbs.

nearer the ends. It will be observed that the pressure attained in the latter explosions rises somewhat higher than the true expansion curve drawn from the point attained by explosion near the middle of the stroke (which, as for this purpose, there is no work to be taken into consideration, would stand at the end of the stroke 4 2 lbs higher than that shown).

This is probably due to the greater heat acquired by the gases before explosion. It will also be noticed that the time of acquiring the maximum pressure is considerably greater in the later explosions, being $\frac{1}{30}$ of a second in the earlier and $\frac{1}{20}$ or more in the later.

Lastly, the great loss of pressure by cooling is

strikingly shown—in equal times the lines fall below the hight due to expansion alone by an amount proportionate to the pressure that the gases would have at 32°. In the early explosions in this diagram, the pressure rises from 13 lbs. before explosion to 60 lbs. after, corresponding to a temperature of 3090°. The dotted line represents, as before, the true expansion curve, including the loss of 420° of heat and resulting diminutions of pressure due to the work done.

The construction of these engines is simple, differing in but few particulars from an ordinary horizontal steam engine. The cylinder and heads, as has been intimated, are cast hollow and kept cool by a current of water passing through them. The gas and air are admitted by a slide valve. The gas pipe is connected to a chamber bolted to the cylinder, and between which and the cylinder the slide valve moves. The gas passes through a small port in the back of the valve into the semicircular channel which covers it, and through this up and out of the valve into the atmosphere. It is then drawn down again by the suction of the piston through a number of small holes into the cup of the valve, and thence into the cylinder. This insures its thorough mixture with the air, while, at the same time, it prevents the possibility of explosion, since there is nowhere any explosive mixture except in the cylinder and cup of the valve, the latter being in open communication with the atmosphere.

An air chamber with openings, regulated by a slide, is placed over the holes in the valve to control the admission of air.

A separate valve on the other side of the cylinder is used for the exhaust. As constructed in the French engines this part is a weak point on account of the great heat to which it is subjected from the escaping gases. In the American engines, a small current of water passes through this valve and entirely removes this difficulty.

The spark for igniting the gas is supplied by a Bunsen's battery of one or two cells, and a Ruhmkorff coil giving from 100 to 150 sparks per second, and is distributed to each end of the cylinder.

To most persons it would probably appear that the great heat generated in the cylinder would be destructive of the surfaces. The writer, however, examined an engine that had been running regularly for a month, using in that time less than a quart of oil, and was surprised to find that the bore of the cylinder and the piston rod, though dirty from deposits of impurities, were not even scratched.

The explosion of the gas is unattended by any noise unless the connections are slack. The only size as yet constructed in this country is 4⅝ inches diameter of cylinder by 8¾ inches stroke, though engines of larger dimensions are in process of construction. A friction dynamometer applied to one of these gave the following result:

Length of lever	4 feet
Weight applied	7 pounds.
Revolutions per mintue	185

16,280 foot-pounds per minute=½ horse-power.

In France there are engines of 3-horse power and upwards, but with the exorbitant prices of gas in this country, 1 or 2 horse-power is probably as high a power as could economically be obtained from this motor. These engines have the advantage that the expense ceases immediately with the work, which is an especial recommendation where the work is intermittent. They can be started and stopped instantly by merely turning the gas cock. They are absolutely free from danger and do not require the attention of an engineer; hence for small powers they are cheaper than steam. On account of their safety, they are admissable in situations where steam would not be.—*Franklin Journal.*

A Curious Experiment.—Into a bell glass full of air a central tube is made to carry a slow current of hydrogen. At the end of the tube, which is carried nearly to the dome of the bell glass, electric sparks are made to pass. The hydrogen is immediately ignited, taking the form of small luminous spheres, which rush about in all directions. After a few seconds there are an infinite number of these little luminous globes, which seem to play at hide-and-seek without ever coming into contact.—*Causeries Scientifiques, H. Parville, 1866.*

Correspondence

One View of Perpetual Motion.

Messrs. Editors:—There is a large class of your readers who are interested and benefited by the insertion of such problems as the "razor question," which you have happily disposed of on the correct basis. The writer came to the same conclusion after examining the expansive theory, and also the suggestion that it might be due to the heat of the razor softening the beard in the process of cutting it. Let any person make a lather from hot water, and take the precautions necessary to shave easy, and then experiment by alternately dipping the razor in hot water and cold, several times repeated, at the same shaving, making due allowance for the novel feeling of a cold instrument being applied at such a time, and the result will not be doubtful.

In a back number, you express a doubt as to what is the popular meaning of the term "perpetual motion." Allow one who had the "mania" when he was a boy, but was cured by experiment and reasoning before he was twenty years of age, to give his opinion.

Perpetual motion is a mechanical device, whose movements shall generate sufficient power to continue those movements, *ad infinitum*, allowing for repairs, which are incident to the wear of all machinery. A prominent idea is, that natural laws, gravitation especially, can be circumvented; but thus early I learned that gravitation could not be cheated; that if a pound was raised a foot high by slight effort, that effort must be continued longer, so that what was gained over weight was lost in time—a law of physical science of great and constant usefulness, when fully comprehended.

I have some respect for "perpetual motion" as an educator, especially to many who have not enjoyed the advantages of scientific training. The various phases of the "hobby" stimulate thought and work out a variety of problems, a knowledge of which cannot fail to be of use in after investigations. What is gained in this way is seldom lost, being the result of experience. I am no apologist for a waste of time and talent expended in foolish attempts to produce the "impossible," but to what extent the effort is to be considered a waste is the real question. The knowledge gained, skill in the use of tools, and schemes exploded, which were worthless, and are not to obtrude themselves again upon our attention, are, in individual cases, at least, ample recompense for their cost.

Those visionary theorists who never see the fallacy of one of their pet schemes, are hardly to be reached by reason or ridicule, and if diverted from their "one idea" for a season, are very apt to recur to it again.

Your pungent and happy hits at this class, are felicitously varied, amusing and very enjoyable.

Observer.

The Cascade of Light.

Messrs. Editors:—You rightly explain the phenomenon alluded to in your last issue by your correspondent "Argent." That portion of the illuminating ray which is tangent to the side of the falling stream, or meets it very obliquely, is reflected continuously around its whole circumference, and thus produces the appearance of a luminous point as broad as the jet and as high as the depth of the ray or pencil of light.

Well may you add that "one of the most brilliant experiments ever exhibited in a lecture room is the throwing of the electric light upon (or rather into) a column of falling water." In this case the jet issuing from the side of the containing vessel, its direction on leaving it is horizontal or tangent to the vertex of the parabolic curve which it describes. In the side of the vessel immediately opposite the point of issue of the jet, is a hole of corresponding size, filled in with a piece of glass or a glass lens, through which the rays from the adjoining focus or source of light are transmitted, concentrated on, and thrown into the flowing column of water, in a direction so nearly that of the initial portion of the jet itself, or so obliquely to its surface, as to be totally and continuously reflected from point to point throughout the whole stream, and down to the very basin in which the water is received, thereby giving it the appearance of a cauldron of liquid fire. The stream may be made to assume any hue, as the mere interposition of a piece of colored glass between the light and lens will necessarily give it the appearance of molten iron, gold or silver, or make it assume the aspect of a column of liquid ruby, emerald, or diamond, etc.

This most beautiful experiment was witnessed some five years ago, at the University here, under the able professorship of the Rev. Mr. Hamel, a young physicist of great promise, who explained the phenomenon in the most conclusive manner.

If the containing reservoir be made a hollow column, with water only in the periphery, the light in the center, a series of holes for as many jets on the outside, a corresponding inner series with appropriate lenses, and a rotating rim of variously colored glass, the numerous jets issuing together from the vessel in streams of liquid fire of beautiful and ever-varying hues, produce the most magical and enchanting effect that can well be imagined or described.

Chs. Baillange.

Quebec, C. E, April 5, 1866.

An Experiment with Clean Iron.

Messrs. Editors:—I have noticed in your journal several communications on the subject of cold or unmelted iron floating when placed in melted iron. And on searching for light on the subject, to-day we tried the experiment of placing a piece of cast iron that had been turned clean and smooth, in a ladle of melted iron, when it sunk immediately and did not rise again. Previous to placing the cast iron in the ladle we put a piece of lead in the ladle. The iron sunk as quickly as the lead and with much the same apparent effect on the melted iron. I have therefore come to the conclusion that the reason of unmelted iron floating is not because of the greater specific gravity of melted iron, but that the cause lies somewhere concealed in the coating of sand scale or rust that usually covers the pieces that are thrown in the melted iron as coolers or for experiment. With this clue perhaps you or some of your correspondents may enlighten us.

J. B. Boyce.

Lockport, N. Y., March 28, 1866.

Shaving with a Wooden Razor.

Messrs. Editors:—I read in one of your papers a number of years ago, a receipt for a wash or soap that would soften the beard so that it could be removed with a wooden razor. Now I have all the papers, but cannot seem to find it. Can you inform me what number or volume I can find it in?

A. M. S.

Boston, Mass., April 2, 1866.

[Milk of lime, sulphuret of arsenic, or other depilatory, will soften the beard or hair so that it may be brushed off. These things act on the skin, however, more powerfully than on the hair or beard. A person is not very likely to use them a second time.—Eds.

To Recover Gold from Solutions.

Messrs. Editors:—Please inform me in your Notes and Queries how to recover the gold from a plating solution which was spoiled by adding, direct, a nitro-muriate solution of gold to the common cyanide solution. I have Byrne's "Metal Worker's Assistant," but it does not relieve the quandary.

H. & J.

Paoli, Ind., April 2, 1866.

[The bath is probably not injured. To recover the gold, put a stick of bright zinc into the solution. Zinc will precipitate gold from any solution.—Eds.

Tyler's Safety Switch.

Messrs. Editors:—In your valuable paper of January 20th, I noticed a communication from the *Railway Times*, which highly recommends Tyler's safety switch, and as I desire to adopt it on this road, you would be conferring a great favor by giving me the address of the inventor or manufacturer.

J. S. Murray.

Cienfuegos, Cuba, March 1, 1866.

[We do not know the present address of Mr. Tyler—should this meet his eye, he will please to address Mr. Murray as above.—Eds.

A Perpetual Motion Humbug.

MESSRS. EDITORS :—I have a pendulum in motion whose oscillations are maintained by magnetism induced by the pendulum carrying a helix past the poles of permanent a magnet, at the instant after its reaching the center of oscillation. The magnetic influence is, of course, only momentary, but is sufficient to drive the pendulum beyond its opposite center and thus maintain a constant vibration. Is this perpetual motion? Is it new to you or your readers?

J. M. H.

Worcester, Mass., April 5, 1866.

[If we understand the description, the statement is simply incredible. As there is an appreciable, though extremely minute portion of time required to induce magnetism in a helix by a permanent magnet, the pendulum would be drawn backward in its ascent more powerfully than it would be drawn forward in its descent, and thus its motion would be retarded. It would therefore stop sooner in consequence of the presence of the magnet.—EDS.]

New Things in France.

ABORTION.

Encore le goitre. M. Lager announces to the Academy of Sciences that he has produced a number of thyroid enlargements in rats by injecting metallic sulphates under the skin. He has discovered that the use of sulphates will produce abortion, a fact, I believe long known in England, where large doses of sulphate of potash have been employed for the purpose

GRAFTING RATS.

Rats are as plentiful in Paris as London, and they are often the victims of physiological experiments. M. Bert, for example, gained the prize in experimental physiology for removing their tails from their natural position, and grafting them upon all sorts of odd places—the middle of the back of the animal, for instance, and even in the cavity of the peritoneum. M. Bert made one very curious observation. He succeeded in uniting the small end of the tail to the body, and found out that the large extremity, which was free, recovered its sensibility, thus showing that the nerves will convey sensation in a direction inverse to that in which they act under normal circumstances.

SEEING THE INSIDE OF ONE'S OWN EYE.

By the use of endoscopes, laryngoscopes, and ophthalmoscopes the medical man is enabled to get a sight of many things shut out from ordinary view. M. Houdin has added another to these ingenious instruments—the iridoscope—by the aid of which an individual is able to see all that is going on in his own eye. It is simply an opaque shell to cover the eye, pierced in the center with a very small hole. On looking through steadfastly at the sky, or at any diffused light the observer may watch the tears streaming over the globe, and note the dilatation and contraction of the iris, and even see the aqueous humor poured in when the eye is fatigued by a long observation. It is needless to say that with the aid of this instrument a man can easily find out for himself whether he has a cataract or not. If he has he will only see a sort of veil covering the luminous disk, which is seen by a healthy eye. The instrument is certainly simple and curious, and will no doubt excite attention in those who are anxious to know more of themselves. An "iridoscope" may be readily extemporized by making a hole in the bottom of a pill-box with a fine needle.

POISONING BY PHARAOH'S SERPENTS.

We have had here two or three cases of poisoning in young men who have been occupied in making up Pharaoh's serpents. No one had died, but one has been seriously ill.—*Corrspondence of the Chemical News.*

PROTECTED LEAD PIPES.

A correspondent writes from Germany that the Water-works of Leipsic have recently been completed, and adds that the leaden pipes employed for house service have been protected by Schwartz and De Wilde's process. Our readers will remember that this is a process for obtaining on the inside of the pipe a coating of sulphide of lead, which is unacted on by water, that attacks lead itself.—*Chemical News.*

English Ironclads.

The following is a list of the ironclads we now possess, either actually in commission or nearly ready for sea, and exclusive of those which, like the *Hercules*, etc., have not long been begun:—

Ship's Name.	Tunnage.	Horse-power.	Length.	Beam.	No. of protected guns design'd for	Thickness of Armor	Thickness of Backing.
			Ft.	Ft		nches.	Inches.
Achilles	6,221	1,250	380	58	26	4½	18
Black Prince	6,109	1,850	380	58	26	4½	18
Warrior	6,109	1,250	380	58	26	4½	18
Agincourt	6,621	1,350	400	59	36	5½	10
Minotaur	6,621	1,350	400	59	36	5½	10
Northumberland	6,621	1,350	400	59	36	5½	10
Hector	4,089	800	280	56	32	4½	18
Valiant	4,063	800	280	56	32	4½	18
Defence	3,720	600	280	54	16	4½	18
Resistance	3,710	600	280	54	16	4½	18
Caledonia	4,125	1,000	273	59	32	4½	Wood ship, side 29½in. thick.
Ocean	4,047	1,000	273	58	32	4½	ditto 29½.
Prince Consort	4,045	1,000	273	58	32	4½	ditto 29½.
Royal Alfred	4,068	800	273	58	32	6 and 4½	ditto 29½.
Royal Oak	4,056	803	273	58	32	4½	ditto 29½.
Lord Clyde	4,067	1,000	280	59	34	4½ and 5½ and 6 in.	ditto 31½
Lord Warden	4,067	1,000	280	59	34	4½ and 5½ and 6 in.	ditto 31½
Zealous	3,716	800	252	59	16	4½	ditto 30½.
Bellerophon	4,246	1,000	300	56	12	6	10
Pallas	2,372	600	225	50	5	4½	Wood ship, side 22 in. thick.
Favorite	2 091	400	225	47	8	4½	ditto 26
Research	1,253	200	195	38	4	4½	ditto 19
Enterprise	993	170	190	36	4	4½	ditto 19½
Viper	737	160	160	32	2	4½	10
Vixen	754	160	160	32	2	4½	10
Waterwich	777	167	162	32	2	4½	10
Prince Albert	2,529	500	240	48	6	4½	18
Royal Sovereign	3,765	800	240	62	5	5½	Wood ship, side 36 in. thick.
Scorpion	1 857	350	220	42	4	4½ and 3	9
Wivern	1,857	350	220	42	4	4½ and 3	9

The *Times* puolishes this list, which is right, and adds a wish "that the Admiralty would adopt the French system of fastening on the plates with what are termed wood screws instead of through bolts," which is wrong; going on to say that "the latter weaken the plate very considerably and do not hold it on at all, whereas the trials made with the French system of fastening at Shoebury showed it to be so superior to ours as to be literally above any degree of comparison." This passage affords another excellent example of the blunders which people commit when they write about that which they do not understand. It is perfectly true that the wood bolts referred to did not break, and that for the best of all reasons—the wood did not afford sufficient hold to overcome their tenacity, the bolts drew bodily out of the timber, but the destruction of the target was none the less complete because they did not actually break.—*London Engineer.*

Composition of Alloys.

Lead.	Tin.	Bismuth.	Point of Fusion.	Point of Solidification.
120 parts.	140 parts.	120 parts.	130° C.	112° C.
145 "	145 "	100 "	140	129
150 "	150 "	75 "	150	135
150 "	150 "	50 "	160	150
170 "	180 "	35 "	170	163
210 "	190 "	30 "	180	165
140 "	155 "	30 "	190	180
200 "	185 "	30 "	200	180
200 "	180 "	30 "	210	180
240 "	150 "	30 "	220	180
207 "	194 "	30 "	180	180

It is generally to be remarked that the fusion point of an alloy is not in relation to the proportions of the metals which enter into its composition. The alloy of 150 parts of lead, 150 parts of tin, and 50 parts of bismuth (proportions evidently corresponding to 6 atoms of lead, 12 atoms of tin, and 1 atom of bismuth), is one of those which solidify most regularly—that is to say, that no one of the metals entering into its composition crystallizes separately on cooling, and that the alloy remains perfectly homogeneous.

It may be observed that the point of solidification of the last five alloys on this table is constant at 180°. When these alloys are melted and then allowed to cool, small crystals form at 220°, 210° 200°, or 190°, according to their composition, and when the temperature has descended to 180°, the whole mass solidifies. It is noticeable that during the whole time of solidification the temperature remains at 180°, and that the mercury of the thermometer again begins to descend only when every part of the alloy has become solid.

Another alloy remaining very homogeneous, and unvarying in temperature during solidification, is that composed of 207 parts of lead and 294 parts of tin (2 equivalents lead to 5 equivalents tin). This alloy melts as 180°, and solidifies at precisely the same temperature.

In these two alloys, which have the most useful properties, the different metals are united in atomic proportions, which seems to prove that, to obtain a good alloy, it is necessary to take into consideration the atomic weight of the metals composing it. It is beyond a doubt that such alloys, remaining so homogeneous during solidification, are possessed of valuable properties not belonging to other and less homogeneous alloys. This question is certainly of great interest in the manufacture of printing type, and for similar purposes; and deserves to be thoroughly studied.—*Bulletin de la Societe Chimique and Chemical News.*

[It will be observed that the temperatures are given in the centigrade scale. To reduce them to Fahrenheit degrees, multiply by 9, divide by 5, and add 32. In the centigrade thermometer, the interval between the freezing and the boiling point of water, is divided into 100 degrees, and the freezing point is made the zero. Fahrenheit divided the interval into 180 degrees, and made his zero 32 degrees below the freezing point. The proportion of 180 to 100 is the same as that of 9 to 5 —EDS.

The Funnel of the "Bellerophon."

At the recent trial of the *Bellerophon* English ironclad frigate, the boilers steamed freely and the engines were thus enabled to work up to the required power. The first trial was a failure in this respect, and success was obtained by putting two more courses, 16 feet, to the funnel or smoke stack. This was deemed an unfair proceeding by some, and the following discussion took place in relation to it in Parliament:—

Sir J. Pakington, who had a question on the paper with reference to the lengthening of the funnel of the *Bellerophon* for the purpose of forcing her speed, said that he should be extremely sorry to ask a question which implied a suspicion of anything like unfair conduct without having good reason for so doing. Therefore he felt bound to state that, since he had given notice of the question, he had received information that nothing more was done than was commonly done in other cases with the view to a fair trial of speed.

Lord C. Paget said the answer he had to give was that which he intended if the question had been put, that it was a common practice to lengthen the funnels of vessels with the view to obtain a better draft in the engine room. In the case of the *Bellerophon* the Messrs. Penn had lengthened her funnel without having sought any permission from the Admiralty. And he might mention that the *Warrior*, the right hon. baronet's own ship, had been treated in the same way. (Laughter.)

Air in Wine Tuns.

M. Camille Saint Pierre opened a large wine tun, the air in which would not support the combustion of a candle. As, however, the tun contained some quicklime, it was clear that the effect could not be attributed to carbonic acid. He therefore removed some of the air for analysis, and found it to consist in 100 parts of oxygen 11·85, and nitrogen 85·15. The author remarks that the excess of nitrogen may be attributed to one of two causes—either nitrogen must have been generated or oxygen must have been absorbed. The former hypothesis he rejects and considers it more probable that the walls of the tun, under the influence of moisture, become capable of absorbing oxygen; and he asks whether this action is due to mycoderms or the oxidation of certain matters soaked into the wood of old tuns.—*Les Mondes.*

THE diving bell has been abandoned on the Thames in favor of the diving bell dress, principally because the men employed were found, while the Westminster Bridge was being built, to spend their time at the bottom in playing cards, and there was of course no effectual means of keeping a check on them. It is not easy to play cards in a diving dress alone, however, and the remedy has proved very satisfactory in its operation.

BURGLAR alarms are inquired for by our country readers, and we think that makers of such articles would find it advantageous to keep a short advertisement in the SCIENTIFIC AMERICAN.

CURTIS'S CARRIAGE WHEEL.

Every one who has used a wagon has experienced the inconvenience of wheels shrinking away from their tires. It is practically impossible to make a wheel so that it will not shrink enough to loosen the tires, in dry weather; then the only alternative is to have them reset. This is sometimes done by inexperienced workmen, who err in setting them too tight, for if they are set properly for the dry wheel, they are too tight when the wheel swells, as it does when wet, as in the spring and fall. The result is that the wheel becomes cramped or dished, and loses its strength by being warped out of its natural position. It also runs hard because its center of gravity is outside of its bearing. Now, the only way to obviate this difficulty seems to be to secure the tire to the wheel without welding, so that it may be adjusted to the size of the wheel, whether dry or wet, and preserve the strength of the wheel in all its parts.

Fig. 1

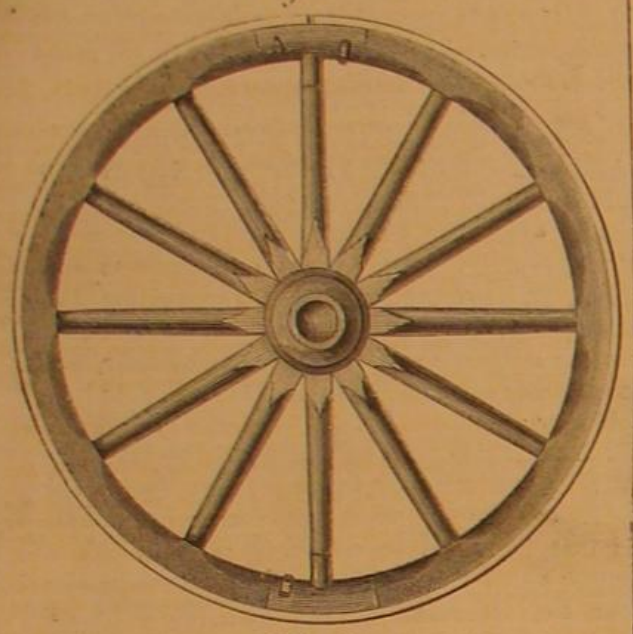
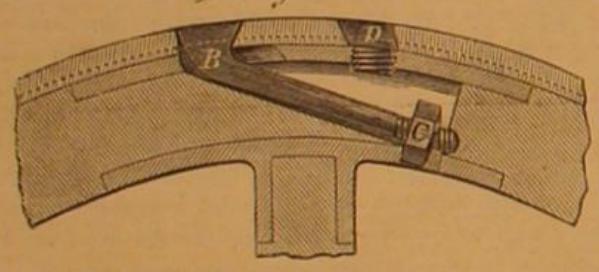


Fig. 2



This object has been effectually accomplished by the device represented in the accompanying engraving. Fig. 1 represents a carriage wheel having two socket pieces, A, of cast or malleable iron, forming part of the rim at opposite sides of the wheel, into which is tennoned both ends of the felly and a spoke, thus forming a superior fastening for bent rims as well as the device for securing the tire. Fig. 2 represents one of the socket pieces cut through the center so as to show its working parts. B is a hook-headed bolt passing through the socket piece at an acute angle with the tire, and on which there is a nut at C, with a slot in the socket casting to allow it to turn. D is a wrought-iron stud screwed into the casting and stationary there; the socket piece in the opposite side of the rim is the same with the exception of the stud, D.

In putting on the tire it is first hooked on to the stud, then passed round the wheel and hooked on to the bolt in the opposite socket piece; thus half of the tire is tightened. It is then passed round and the end hooked on to the bolt. These two bolts secure and fasten the tire so that it may be adjusted to the size of the wheel, whether wet or dry.

Persons desiring an interest in this patent should address the inventor and patentee, Andrew J. Curtis, West Winterport, Maine, by whom it was patented Jan. 2, 1866.

PROGRESS OF SCIENTIFIC EDUCATION.

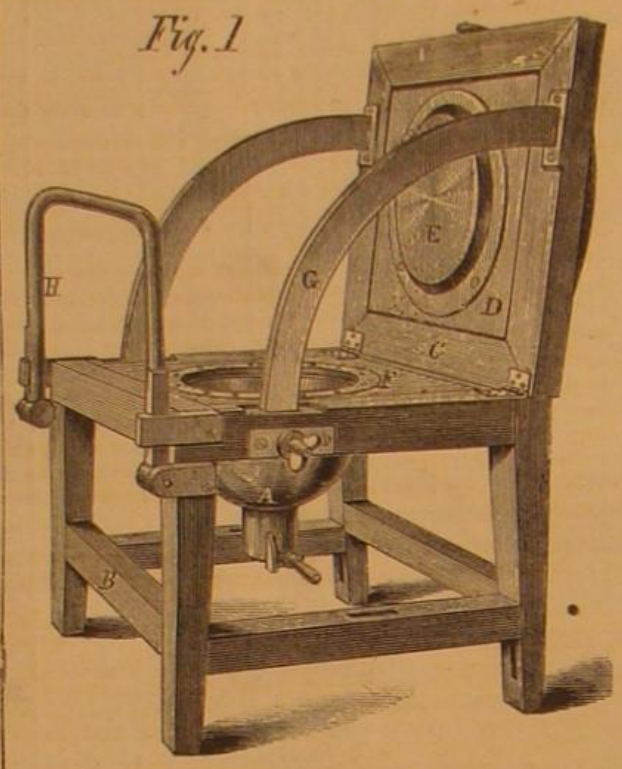
We are indebted to the author, S. Edward Warren, C. E., Professor of Descriptive Geometry, etc., in the Rensselear Polytechnic Institute, for a neat pamphlet describing the polytechnic schools and scientific department of colleges in the United States, that are devoted to the teaching of science. The number of these is twenty-three, and the statement of the dates at which they were severally formed exhibited very forcibly the rapid change that is taking place in the public estimation of the comparative importance of classical and scientific learning. The first was founded in 1824, the next in 1845, and all but four have been founded since 1850.

The pamphlet is published by John Wiley & Son, 535 Broadway.

RAINEY'S NURSERY CHAIR.

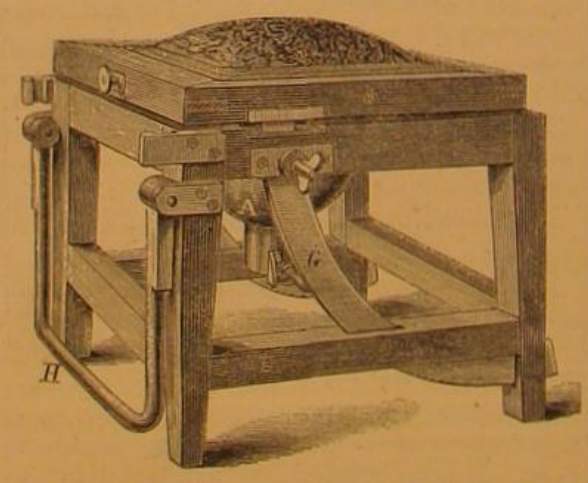
These engravings illustrate a new nursery chair for the use of children. It is so designed as to be capable of folding up in a small compass and packed in a box, and thus easily carried when traveling, either in cars or on steamboats. The principal parts

Fig. 1



consist of a metallic chamber, A, fixed in a frame, B. This frame is provided with a hinged lid, C, which has a movable center, D, one side of which is padded, as shown in Fig. 2, and the other furnished with a a cover, E, fitting the chamber, A. In order to make the points of contact perfectly air-tight, an elastic ring of rubber is let into the top, as at F.

Fig. 2



The center of the lid is capable of turning on pivots so as to bring the padded portion inside, in order that the occupant of the seat may have a comfortable support and not be brought in contact with the cover, E. At each side of the lid there are arms, G, which are curved to conform to the motion of the lid on its hinges. These, in connection with the fender or guard, H, in front, insure the child against injury from falling, so that it may be safely left to itself. The guard, H, is easily turned up or down as in Fig. 2, to remove or place the child in, and a faucet is fixed in the bottom of the chamber, A, for an obvious purpose. Various styles of this piece of furniture can be made so that its office is entirely hidden. It was patented by the Scientific American Patent Agency, on Nov. 28th, 1865. For further information address S. Rainey care of Aiken & Rainey, 60 Carondelet street, New Orleans, La.

A PAYING INVESTMENT.

Probably there are few newspapers in the world that receive a more careful scrutiny from readers than the Scientific American. It is a sort of standard reference upon all matters relating to the mechanical and manufacturing interests of the day, and its value as an advertising medium for those branches of industry is remarkable.

We are forcibly reminded of this fact by the appearance, in another column, of the engraving of "Hotchkiss's Atmospheric Hammer," the makers of which, Messrs. Merrill & Son, inform us that they have received orders amounting to *twenty-five thousand dollars* traceable directly to advertising, for the past few months, in the Scientific American; while other orders, received indirectly through our paper, amount to fifteen thousand dollars more—making forty thousand dollars in all.

We believe that manufacturers of improved machinery of every sort, will find it greatly to their advantage to keep constant advertisements in the Scientific American. From all parts of the country—north, south, east, and west—we receive inquiries for the best machinery. We cannot do otherwise than refer applicants to our advertising columns.

THE CHOLERA.

The arrival of the steamship *England* at Halifax, Nova Scotia, with a large number of cholera cases on board, has re-awakened the fears of the community, and the disease is the topic of the hour.

Medical writers say that mental disquietude, such as fear or apprehension incites, renders persons more liable to be attacked, and it is therefore to be regretted that the daily papers see fit to give sensational headings, and publish articles which cause unnecessary alarm. If the disease is infectious its ravages will not be stayed by exciting a panic in regard to it, and many unreflecting persons will aid in its extension by alarming reports that have not the least foundation. A calm, equable, mental condition, absolute cleanliness, both in person and apparel worn next the skin, wholesome food at regular intervals, and absence of anything like fear, are laid down by physicians as the best preventives of cholera.

Since the above was written it has transpired that the disease was not the cholera, but we believe our suggestions are not untimely.

SPECIAL NOTICES.

William O. Grover and William E. Baker, Boston, Mass., have petitioned for the extension of a patent granted to them on the 22d day of June, 1852, for an improvement in sewing machines.

Parties wishing to oppose the above extension must appear and show cause on the 4th day of June next, at 12 o'clock, M., when the petition will be heard.

Allen B. Wilson, of Waterbury, Conn., has petitioned for the extension of a patent granted to him on the 15th day of June, 1852, for an improvement in sewing machines.

Parties wishing to oppose the above extension must appear and show cause on the 28th day of May next, at 12 o'clock, M., when the petition will be heard.

Asahel G. Batchelder, of Lowell, Mass, and Geo. O. Way, of Claremont, Minn, administrators of the estate of Lafayette F. Thompson, deceased, have petitioned for the extension of a patent granted to the said Batchelder and Thompson on the 6th day of July, 1852, for an improvement in railroad car brakes.

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

Treatment of Cholera.—Dr. Hall, in an elaborate article in his *Journal of Health*, on cholera and its treatment, takes the ground that calomel is the only proper remedy, and that to employ any other is to trifle with human life. Dr. Scott, in a long article on the same subject, published in the *University Journal of Health*, says: "It cannot be denied that great fatality attends the treatment of cholera by calomel." Who shall decide when doctors disagree?

THE

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MUNN & COMPANY, Editors & Proprietors.

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

VOL. XIV., No. 17. [NEW SERIES.] *Twenty-first Year.*

NEW YORK, SATURDAY, APRIL 21, 1866.

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SUPPLEMENTAL SHEET.

With the present number we issue a supplemental sheet of four extra pages, which contains the official list of patent claims.

The pressure upon our columns has been so great during the past six months, that we have been embarrassed for space in which to meet the demands of our numerous advertising patrons, without seriously curtailing our reading matter. The SCIENTIFIC AMERICAN having ten-fold more readers than any similar journal now published, advertisers find that an investment in its columns returns a large profit.

Not wishing to disappoint our generous patrons in any respect, we intend in future to issue supplements whenever, in our judgment, the advertisements and patent claims are likely to trench upon the space that we consider due to our readers.

EXHIBITION OF A NEW ELECTRO-MAGNETIC MOTOR.

In the afternoon of Friday, April 6th, a number of gentlemen met at the lecture room of the Free Academy, in this city, at the invitation of Professor R. Ogden Doremus, to witness the operation of a new electro-magnetic machine, the invention of Mr. L. C. Stewart.

Most of our readers doubtless understand the principle of electro-magnetic machines. They all depend on the power which a current of electricity has to induce magnetism, either in a bar of iron, or in a hollow helix where no iron is present. If a piece of wire is insulated, by covering it with silk, cotton, or other non-conducting material, and it is then wound around a rod of soft iron, so long as a current of electricity is passing through the wire the rod of iron is a magnet, and so soon as the electric current stops, the iron ceases to be magnetic.

The simplest form of an electro-magnetic machine is a lump or bar of iron secured to one end of a vibrating lever, directly over the poles of an electro-magnet. The helical wire of the magnet being connected with a galvanic battery, the soft iron core becomes a magnet, and pulls the iron bar on the lever down; this movement opens a gap in the helical wire and breaks the current, when the bar ceases to be attracted, and it is lifted up by the motion of a fly wheel connected with the opposite end of the vibrating lever. This movement of the lever closes the gap in the helical wire, restoring the current and renewing the magnetism, when the bar is again drawn down. Thus the current is automatically broken and closed by the action of the machine, and the vibrations are made perpetual.

It long since occurred to many mechanicians that much greater velocity could be attained by securing several bars of iron to the periphery of a rotating wheel, and fastening a series of electro-magnets around the inner side of a fixed circumscribing wheel or concave. Mr. Stewart's machine is a modification of this plan, his improvement consisting mainly in the method of breaking and closing the circuit. This is effected by two brass wheels running with their peripheries in contact—shallow depressions being sunk in the peripheries so that the wheels do not touch each other while passing these depressions.

Mr. Stewart said that with one of his engines, with a helical wire 8 miles in length, he had reversed the current 80,000 times in a minute!

One of the advantages that is claimed for this engine is that sparks are avoided in breaking the current, and thus the combustion of the brass is prevented. Mr. Stewart stated that where sparks are produced it is necessary to employ platinum, gold, or some other of the noble metals.

Professor Doremus remarked that he must go a little further than Mr. Stewart. With the powerful battery belonging to the Free Academy platinum was not merely melted, it was volatilized; and even the natural alloy which is used for tipping the points of gold pens, irridosmium, they had melted and run together in larger masses, thus increasing its value.

So far the obstacle to the employment of galvanic electricity as a motor is the high cost of the power. The power is obtained by oxidizing zinc, which is worth thirteen cents per pound, while in the steam engine the power is obtained by oxidizing coal, which is worth half a cent per pound. It is true that in the steam engine not more than one-tenth of the power generated in the furnace is utilized; but all the investigations indicate that thus far in the electro-magnetic machine, the proportion is still smaller.

EXPLOSION OF A PETROLEUM LAMP.

We had an accident at our house last night, but fortunately it did no damage except to scare the children. It was this: Our coal oil lamp exploded with but little warning; the burner, chimney and wick blew out with so much force that it struck the ceiling some six feet above the lamp. The plaster of paris that the burner was fastened in with was all blown out also. Now I want to know the cause of this thing. We have been using coal oil for four or five years without any accident before, and we often leave the lamp burning all night, which I will be afraid to do again unless I know the cause. We bought our oil of a druggist, and supposed that it was good, and I still think it was. Please answer through that valuable paper, the SCIENTIFIC AMERICAN, which I think the best paper in the world, and oblige your friend and subscriber,

SAMUEL LUTHY.

Carrollton, Ill., 1866.

Our access of new subscribers is so rapid that we are obliged to repeat explanations of familiar phenomena, in order to give satisfaction to the largest number of our readers.

The two elements, carbon and hydrogen, combine in a great number of different proportions, forming as many different substances. These hydro-carbons have some properties in common, while they differ in others. For instance, they are all combustible, but they differ widely in their fluidity and volatility. At ordinary temperatures some are solid, as paraffine, and others are gaseous, as olefiant and marsh gas, which constitute the principal proportion of illuminating gas, while between the solids and gases in volatility are a large number of liquid hydro-carbons that boil or evaporate at different temperatures. Petroleum is a mixture of liquid hydro-carbons, usually holding also in solution both gaseous and solid hydro-carbons.

When explosions of petroleum occur, they are produced in this way. The oil is in a tight room or vessel, which prevents the gaseous and volatile hydro-carbons of its constitution from passing away as they escape from the liquid, but confines them together with the atmosphere of the room or vessel. After a sufficient quantity of the combustible vapor or gas is mingled with the air, if fire is applied to the mixture, each atom of hydrogen in the hydro-carbon enters into combination with an atom of oxygen to form a molecule of water or steam, and each atom of carbon enters into combination with two atoms of oxygen to form a molecule of carbonic acid. In other words, the petroleum vapor is instantaneously burned. The heat generated by this rapid burning causes so sudden an expansion of the carbonic acid and steam, which are the products of combustion, as to produce the effects of explosion.

The more volatile portions of petroleum are separated from the illuminating oil, in the process of refining, and are sold as naptha. We have heard dealers charged with mixing this naptha with illuminating oil, in order to sell it at a higher price, and it is possible that our correspondent's oil had been thus adulterated. It may be, however, that the explosion was due to a different cause. When the wick of a petroleum lamp is turned down very low, the oil will ascend and be evaporated more rapidly than it will burn, filling the room with the odor of petroleum, a fact that, probably, most people have observed who are in the practice of burning petroleum. At all events there can be no doubt that, in some way, the upper portion of our correspondent's lamp became filled with a mixture of atmospheric air and the vapor of petroleum, and then this explosive mixture was set on fire.

THE MIDLAND STEAM BOILER INSURANCE CO.

This is the title of a new company, recently organized in England to inspect and insure steam boilers against explosion. They had, at the last report, no less than 1,839 steam boilers under their care, and of these but one had exploded—being the first accident that happened in four years, and this one the proprietors had been repeatedly warned of, but disregarded the warning. During the year, 605 reports have been sent in to owners, and 7,172 inspections have been made, showing that each boiler was inspected every three months.

There were 55 boiler explosions in England in 1865, attended with great destruction of property and loss of life. "Great efforts," says the engineer, in his report, "have been made to obtain the facts in the cases, as they generally show some simple cause, and the utter fallacy of the 'mysterious' theories so popular among those who have only partially considered the subject."

Some of the causes of disaster are mentioned, and being exceedingly interesting to engineers and others, we republish them in a condensed form.

Many old boilers have been removed and replaced by new ones of better construction; explosions of the past year, showing that boilers which have been used for twenty years should be worked with great caution. Many cylinder boilers have been burnt by short water—arising in one case from a chip under the check valve—from the uncertainty of a float indicator where water boils violently, and to the want of back valves to prevent the water being forced out of one boiler into another. Several cases occurred where scale had become detached from the sides of the boiler, fallen to the bottom and there burnt fast; and very great injury has been done to boilers by emptying them under pressure and immediately filling them with cold water.

Many safety valves have been found habitually overloaded. When they leak, instead of grinding them tight, the engineer, or others, put on extra weight, and the want of repair was forgotten. Boilers used without gages, the proprietors depending on the calculated weight on the safety valve, are often found working at much higher pressures than were suspected. Pressure gages are frequently found out of order, one registering as much as 40 pounds out of the way. The most dangerous defects were found in cylinder boilers, and, curiously enough, where the inspectors were assured by the attendants that all was in perfect order. Around the brick work, even though the boiler was entirely separated from it, most dangerous corrosion occurred, and this even in new boilers. One singular case was where a sprung rivet had caused several jets of steam to play on the plates, which by long continuance had cut channels almost through. These defects were dis-

covered by the vigilance of the inspectors, and undoubtedly saved much property and many lives. They are as common in American as in English boilers, but are suffered to pass unattended to until explosion occurs.

The London *Mechanics' Magazine* reproaches us in a late issue for publishing a long account of boiler explosions without comment, saying that life is held so cheap in this country that hundreds may be killed through accidents by steam without especial notice. It would take a larger paper than the SCIENTIFIC AMERICAN to record and comment on all the boiler explosions in the United States, and the mere publication of them would do no good.

We have no such admirable concerns as these English boiler insurance companies, but we hope to before long, and in the meanwhile, let every engineer be his own assurer.

NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

A NEW SODA PROCESS.

A process for obtaining soda from common salt, which, if it should prove successful in practice on the great scale, will be an even greater advance upon the method by which what Dr. Hoffman has well called "the most valuable of all known transformations" is at present effected, than in the Bessemer process upon all previous methods of converting iron into steel, has just been patented by Mr. Walter Weldon. At present, the manufacture of "soda crystals" involves six distinct operations, requiring very extensive and costly plant, and a very large amount of both labor and fuel, besides rather more than an equivalent of that costly reagent, sulphuric acid. The first of these six operations consists in causing sulphuric acid to react upon salt at a high temperature, whereby sulphate of sodium is formed, hydrochloric acid flying off as vapor, and being condensed by means of towers filled with pieces of coke over which water is kept constantly trickling. The hydrochloric acid gas enters at the bottom of these towers, and in its way upward comes into contact with so large a surface of water as to be completely absorbed thereby, forming the aqueous solution of hydrochloric acid which is known in commerce as "muriatic acid," or "spirits of salts." The second operation consists in calcining the sulphate of sodium produced by the first operation with coal and lime, in what are called "balling furnaces," the result being the compound known as "black ash," and usually containing about 24 per cent of carbonate of sodium, 12 per cent of hydrate of sodium, or caustic soda, 2½ per cent of undecomposed salt, 2 per cent of undecomposed sulphate of sodium, and 59 or 60 per cent of "soda waste," consisting mainly of a mixture of oxysulphide of calcium with carbonate of the same base. The third operation consists in carefully lixiviating the "black ash," so as to separate its soluble constituents from its insoluble ones, the results being a solution of mixed hydrate and carbonate of sodium, and that insoluble residue which accumulates in such enormous quantities in the neighborhood of every alkali works, occupying valuable space, and giving off most offensive gases into the atmosphere. The fourth operation consists in boiling down to dryness the solution of mixed hydrate and carbonate of sodium, and the fifth in calcining the resulting "soda ash" with sawdust, in order to convert all the hydrate in it into carbonate. The sixth and last operation consists in dissolving the product as the fifth operation in water, and leaving the solution to stand until the carbonate of sodium in it crystallizes out. When a very pure product is required, the crystals first obtained are again dissolved, and the solution so obtained is left to crystallize as before. These six operations occupy altogether about a fortnight, and if the soda is wanted as bicarbonate, a seventh operation has to be performed, which occupies several days more. By Mr. Weldon's process, however, it is said that a large charge of salt may be converted into bicarbonate of sodium by a single operation, which may be performed in twelve minutes, and this, too, without the use of sulphuric acid, or of anything whatever that is not used over again, except coal, and without the production of a single ounce of any kind of "waste." Mr. Weldon's process is said to consist simply in placing within a suitable vessel, capable of withstanding a moderate amount of internal pressure, an equivalent of magnesia and an equivalent of chloride of sodium, or common salt, together with a small quantity of water, and then pumping in carbonic acid gas, obtained by blowing air through a coal fire. The result is said to be that the carbonic acid converts the magnesia into bicarbonate of magnesium, which can only exist in solution, and that this compound, as fast as it is formed, decomposes an equivalent of the chloride of sodium, forming chloride of magnesium, which is exceedingly soluble, and so remains in solution, and bicarbonate of sodium, which is much less soluble, and therefore falls to the bottom. Bicarbonate of sodium is thus obtained at one operation, extending over less than a quarter of an hour, and without the aid of any more costly reagent than can be obtained by the mere combustion of coal. The bicarbonate thus obtained can be converted into neutral carbonate by the application of a very moderate amount of heat, under the influence of which the bicarbonate gives off one equivalent of carbonic acid, which can of course be used over again. The solution of chloride of magnesium is evaporated to dryness, and the residue then heated to a little below redness, when the hydrochloric acid is all driven off, to be condensed in the usual way, and magnesia is left behind, ready for use over again. The magnesia used in the process thus costs nothing after the first time, and the only materials consumed are salt and coal. It is said that by this process soda may be produced at virtually no cost whatever, the value of the hydrochloric acid obtained exceeding the raw material, fuel, labor, wear and tear, and interest on capital. The quantity of soda now manufactured in this country annually is equivalent to about 700,000 tons of "soda-crystals," the present value of which is about £7 per ton. It follows that Mr. Weldon's process, if it should prove successful on the great scale, would save to this country alone, on its present consumption of soda, something like five millions sterling a year.

BURNING MAGNESIUM IN STEAM.

MM. Deville and Caron have found that magnesium will burn brilliantly in an atmosphere of *steam*. They passed steam through a tube containing magnesium, heated by the flame of a spirit lamp. The magnesium burnt vividly, liberating hydrogen. They tried the same experiment with zinc, and succeeded in making that metal also burn in an atmosphere of steam, but the temperature required was of course very much higher than in the case of magnesium. MM. Deville and Caron have also found that the presence of the feeblest acid will enable magnesium to decompose water, even in the cold. Water containing carbonic acid is decomposed by magnesium with great rapidity.

IMPROVED PROCESS OF SEPARATING SILVER FROM LEAD.

Pattinson's well-known process for separating lead from silver has recently been improved upon on the continent. After having been melted the lead is run into a crystallizing pan, and its surface covered with finely broken coke, upon which a stream of water plays. The mass of metal then receives a circular motion from an agitator, by which the whole is equally moistened and cooled. A crust forms on the top of the mass in about an hour, which encases the fragments of coke. The water is then turned off, the agitation stopped, and the unsolidified lead holding the silver, drawn off from the bottom of the crystallizing pan.

NEW METHOD OF MAKING ICE.

A new method of making ice has been devised by Signor Toselli, who uses a machine, adapted for household purposes, in which compressed steam replaces the ammonia or other agents in ordinary use. The machine consists of two cylinders, in one of which a solution of common salt is placed and heated. When the temperature of the saline solution reaches about 100 deg., the steam is passed into the second cylinder; after evaporating for an hour the connection between the two cylinders is broken, and the one containing the compressed steam is placed in a vessel of cold water.

A SINGULAR OVERSIGHT OF SEVERAL PHILOSOPHERS.

In his recent lecture on "The Relations of Radiant Heat to Chemical Constitution, Color, and Texture," delivered at the Royal Institution and since published in the *Fortnightly Review*, Professor Tyndall gives a curious instance of how small an oversight may entirely destroy the value of otherwise very careful researches, and of "what extreme caution," to use his own phrase, "is essential in the operations of experimental philosophy." Long before he had proved, as he has since done so completely, by varied and most conclusive experiments, that the fact actually is so, Professor Tyndall was convinced that what had already been established, in relation to the phenomena of radiation and absorption, with respect to gases and vapors and the liquids from which vapors are derived—namely that "the acts of radiation and absorption are molecular, depending upon chemical and not upon mechanical conditions,"—must necessarily be true also of solids. At the threshold, however, of the researches which he determined to undertake in order to test the soundness of this conviction, he was met by a multitude of facts, obtained by celebrated experimenters, which seemed, at first blush, quite conclusive the other way. Melloni, for example, had found that lampblack and chalk each exhibited precisely the same amount of radiant and absorbent power, and MM. Masson and Courtepee had performed a most elaborate series of experiments on chemical precipitates of various kinds, the results of which went to show that all such bodies possess exactly the same degree of radiative and absorptive energy, and led the experimenters to the conclusion that "where bodies are reduced to an extremely fine state of division, the influence of this state is so powerful as entirely to mask and override whatever influence may be due to chemical constitution." A host of other inquirers had arrived at similar results, but they had all committed a little oversight which utterly vitiated their work. The nature of that oversight Professor Tyndall thus explained:—"I have here," he said, "a metal cube with two of its sides brightly polished. I fill the cube with boiling water and determine the quantity of heat emitted by the two bright surfaces. One of them far transcends the other as a radiator of heat. Both surfaces appear to be metallic. What then, is the cause of the observed difference in their radiative power? Simply this. I have coated one of the surfaces with transparent gum, through which, of course, is seen the metallic luster behind. Now this varnish, though so perfectly transparent to luminous rays, is as opaque as pitch or lampblack to non-luminous ones. It is a powerful emitter of dark rays; it is also a powerful absorber. While, therefore, at the present moment it is copiously pouring forth radiant heat, it does not allow a single ray from the metal behind to pass through it. The varnish, then, and not the metal, is the real radiator. Now, Melloni, Masson, and Courtepee experimented thus: they mixed their powders and precipitates with gum water, and laid them by means of a brush upon the surfaces of a cube like this. True, they saw their red powders red, their white ones white, and their black ones black, but they saw these colors through the coat of varnish which encircled every particle of their powders. When, therefore, they concluded that color had no influence on radiation, no chance had been given to it of asserting its influence; when it was found that all chemical precipitates radiated alike, it was the radiation from a varnish common to them all which showed the observed constancy." In order to show still more conclusively that the case is really thus, Professor Tyndall performed the following further experiment: He took two powders of the same physical appearance, one of them being a compound of mercury and the other a compound of lead. He spread these powders, without varnish of any kind, one on one surface and the other on another surface of such a cube as that used in the experiment already quoted. Filling the cube with boiling water, and determining the amount of the radiation from the two surfaces respectively, he found that the surface covered with one powder emitted only thirty-nine rays while that covered by the other powder emitted seventy-four. He then took a second cube, having two of its surfaces coated with the same powders, but in this instance by the aid of a transparent gum. The radiative power of the surface coated with the one powder was now absolutely the same as that of the surface coated with the other

IMPROVEMENT IN PREPARING CITRIC ACID.

Citric acid, of which the consumption in this country is now very large, is imported chiefly from Sicily, and usually reaches this country as a black fluid, in appearance closely resembling a thin treacle. This black fluid is obtained by inspissating the juice procured by subjecting lemons to pressure, after the rinds of the lemons have been removed, for the sake of their essential oil. The first process to which this black juice is subjected, by the manufacturers here, is that of treatment with chalk, whereby an insoluble citrate of lime is obtained. This citrate of lime, after having been well washed with cold water, is decomposed by sulphuric acid, insoluble sulphate of lime being thus formed and citric acid passing into solution. At this stage the citric acid is still associated with a considerable quantity of coloring matter, of which citric acid is perhaps more tenacious than any other vegetable acid, and accordingly the next step is to remove as much of this as possible by means of animal charcoal. The solution is then evaporated, until, on cooling, it will crystallize. The crystals it then yields are by no means free from coloring matter, but are of a decided brown color, and are therefore re-dissolved, and their solution treated again with animal charcoal, evaporation and crystallization being then repeated as before. Such is the process by which citric acid is usually manufactured; but M. Perret, as has already been announced in these columns, is trying to introduce a process, the first stage of which would be the combination of the citric acid in the lemon juice with magnesia, instead of with lime. The *Bulletin de la Societe Chimique*, of Paris, has just given a detailed account of M. Perret's proposals, the main object of which is to avoid the great loss which so frequently occurs by reason of the inspissated lemon juice becoming so alterated, during its transit from Sicily to England, as to be completely spoilt. This liability of the inspissated juice to spontaneous alteration is shared by citrate of lime, and hence no advantage has been found to attend the plan, which has been many times tried, of treating the lemon juice with lime in Sicily, and so bringing the citric acid to this country, not as inspissated lemon juice, but as the compound which is first formed in the usual process for converting the crude into the commercial acid. M. Perret finds, however, that, by treating lemon juice with magnesia, compounds are obtained which are almost absolutely unalterable, resisting heat and moisture for a very long time without suffering the least injury. He therefore proposes that the lemon juice, immediately on its having been expressed, shall be treated on the spot, with an excess of magnesia—which earth, in the form of carbonate, quite pure enough for use for this purpose, is very abundant in Italy. There is thus formed a perfectly insoluble tri-basic citrate of magnesia, in the form of a very dense granular powder, and if this compound be added to a fresh quantity of lemon juice, heated nearly to the boiling point, there is obtained a solution of bi-basic citrate of magnesia, which, on cooling, yields crystals almost absolutely pure. This bi-basic citrate is of course the most suitable for transport, and will probably before very long be the only form in which we shall import citric acid.

CURIOSITIES OF SOAP BUBBLES.

Mr. J. Broughton, B. Sc., chemical assistant at the Royal Institution, has contributed to the March number of the *Philosophical Magazine*, an account of some very curious optical appearances observed by him in the remarkably permanent soap bubbles which M. Plateau some time ago taught us how to produce by means of a solution of one part of pure oleate of soda in fifty parts of distilled water, mixed with two-thirds of its bulk of pure glycerine. Mr. Broughton states that a bubble blown with this solution and placed on a wire ring under a glass case will frequently, after standing for an hour, exhibit at its upper pole a circular black spot, one third of an inch in diameter. The black is intense, but it always possesses the property of reflecting a small amount of light. In this position it can easily be examined by means of a lens, which renders visible optical effects of great splendor and interest, and reveals that the film is incessantly in motion. This discovery led Mr. Broughton to devise a simple arrangement for examining a small bubble by means of a powerful compound microscope, the bubble being strongly illuminated by a good condenser, so that the light, after a reflection, might pass through the microscope. With this arrangement he found the film of the bubble to exhibit optical phenomena of the utmost magnificence. The appearances observed in and near the black spot above described were, he says, "of especial splendor. On the black ground moved specks of brilliant yellow and orange, which again contain smaller spots of blue and black, of almost every geometrical form, but always in rapid motion. Many other appearances were observed; among the most common being spots of such regularity that at first sight they produce the effect of structure. Under a high power, these latter were resolved into series of Newton's rings of excessive minuteness. The variety of the phenomena was quite remarkable; but the most commonly occurring effects were those in which the colors red and green prevailed. The motion appeared to be invariable and incessant." Mr. Broughton calculated that the thickness of the film, in the part at which the appearance of a black spot was presented, amounted to about three eight-millionths of an inch.—*Mechanics' Magazine*.

Cast Steel—Magnesian Crucibles.

SIR:—Last month M. Boussingault presented a note of M. H. Caron to the Academy of Sciences on the air bubbles and blisters in steel, and in which he stated that cast steels in general, and particularly those which are termed in commerce soft, because the tempering modifies very little their hardness, are subject to contain bubbles. In order to avoid these, or at least to lessen the number and dimensions, the general practice is, as soon as the jet is run, to weigh the ingot with a piece of cast iron, fitting exactly into the ingot mold. The effect of this piece is to cool the surface in fusion which it touches, and thereby prevent the gases from escaping, and producing numerous cavities, which would deteriorate the value of the steel cast without this precaution.

These blisters are of two kinds. One sort, with metallic and iron-colored luster inside, seem to have been produced by a gas incapable of oxydizing the metal; this is the most numerous. The other presenting to the eye the varied colors of iron or of steel heated in the presence of an oxydizing gas, is much more seldom met with than the first, and is only met with at the surface of the ingots. It is certain that hydrogen, carbonic oxide gas, nitrogen, or a mixture of these gases, are the only possible causes of these blisters. Have these gases originated from the atmosphere of the furnace? or have they been absorbed in nature by the metal in fusion? If they do not proceed directly, and without transformation, from the ambient gases, how and why does it happen that they are developed just at the moment of the solidification of the metal? Lastly, how are these bubbles to be avoided? Such are the questions which M. Caron proposed to himself, the answers to which he has endeavored to furnish by direct experiment.

Steel, cast in a crucible of refractory earthenware, and left to cool slowly, is always full of cavities lined with crystals; often, even, when the gases of the furnace have penetrated in sufficient quantity into the crucible, the ingot is found to be surmounted by a metallic and cavernous efflorescence, occupying a considerable volume. This is never seen in the case of iron.

These two fusions of steel and of iron having been made under the same circumstances, the two metals have had to be exposed to the influence of the same gases composing the atmosphere of the furnace. There are, therefore, only two hypotheses now possible:—1. That the direct absorption of the hydrogen and carbonic oxide gas of the furnace by the metal in fusion may lead us to suppose that steel possesses the property of absorbing these gases, and that iron does not. 2. That, not admitting this direct absorption as demonstrated satisfactorily, we may be of opinion that the bubbles proceed from a disengagement of gases, caused by the action of the carbon (which distinguishes iron from steel) upon some substance mingled with, or dissolved in, the steel.

In order to determine which of these two hypotheses is the right one, M. Caron considered that it would be sufficient to melt steel in a porcelain tube, traversed by a current of hydrogen or carbonic oxide gas, and to ascertain the presence or absence of bubbles. When the cup in which the steel is placed is of porcelain, no efflorescence is perceived after the cooling of the molten metal; but the surface of the ingot which touches the porcelain is covered with cavities similar to those remarked in steel melted in a crucible. This being the case, M. Caron tried to know whether the nature of the vessel in which the fusion took place did not exert some influence on the result obtained, so he substituted for the porcelain cup a vessel of magnesia, and afterwards one of quicklime (both these cups being separated from the porcelain tube by a layer of platinum); he then obtained ingots perfectly free from cavities, efflorescence, or blisters.

These experiments demonstrate that it is not the hydrogen nor the carbonic oxide gas, absorbed by the iron or steel in fusion, which produces the blisters; they show, moreover, that the bubbles proceed from two causes, which contribute equally to the formation of carbonic acid gas. These two causes are, first and foremost, the oxide of iron produced by the oxidizing atmosphere of the furnace; next the decomposition, by the carbon, of the steel, of the silicate of iron formed at the contact with the silica of the crucibles. M. Caron states that it is very easy to obtain, by compression, crucibles of magnesia very resisting and inflexible. They have the advantage over chalk crucibles of being able to be preserved for a very long time without alteration. M. Regnault states that Tillover has operated successfully at the Sevres manufactory in fabricating magnesia crucibles. He compresses the magnesia by means of a lever-beam, and so infusible are they that platinum may be readily melted in them.—*London Mining Journal*.

C. H. D.

NEW PUBLICATIONS.

TEXT BOOK OF CHEMISTRY—For the Use of Schools and Colleges. By H. Draper, M. D., Professor Adjunct of Chemistry in the New York University. Harper & Bros., Publishers, New York.

This book contains over 500 pages and is embellished with more than 300 engravings, and embodies the valuable parts published on the same subject in 1846, by Dr. Draper's father. This volume is brought up to the present time, and a free use has been made of all the most recent authorities, both in the English and other languages. The subjects are all presented in plain language; and as a text book for schools or for those who desire to obtain a knowledge of the elemental principles of chemistry, we do not think it has a superior. The author appears to be a thorough master of the subject.

PATENT-OFFICE DECISIONS.

Application for a patent for improvements in Cartridge Cases.

The Board, by Elisha Foote—These cartridges are provided with a nipple in the base, adapted to the use of ordinary percussion caps, and to prevent accidental explosions, it is inserted entirely within the cylinder in what is termed the safety chamber. In this, however, the applicant was found to have been anticipated by several previous devices, and thereupon, by amendents, he has limited his claims to the peculiarities of his construction.

In the previous devices the nipple was placed at the center of the base, so that the cap would be struck by the hammer in every position of the cartridge in the barrel. In the applicant's it is placed at one side, and can be struck by the hammer only in one position, to insure which projections are made on each side of the cartridge to fit corresponding slots in the barrel. For these variations the patent is claimed.

We are unable to perceive any advantages from this arrangement. It seems to be going from simplicity to complication—to increase rather than diminish expenses, and to require care and precision in use beyond what was necessary in previous devices. Patents are intended to be a reward for improvements—something must be given to the public in return for the privileges bestowed. It is a great mistake to suppose that every different arrangement of devices is patentable. Changes of form merely, without new results, do not come within the object and provisions of the patent laws. Inventions, even, are made patentable (Act of 1836, Sec. 7), only when deemed "sufficiently useful and important."

The decision of the Examiner in charge is affirmed.

A DR. SACE has proposed a plan of utilizing the marshes of France, which at present produce nothing but fever and ague. M. Sace proposes sowing them with Canada rice, and turning down a lot of beavers; both the plant and the animal can live in any climate—both would be equally useful, and one would support the other. At present large sums are annually sent from France to America to purchase beaver skins, which might thus become articles of home production.

An English Capitalist on Lock-outs.

Recently, Mr. Thomas Lishman, of Stockton (formerly manager of the Millbank-forge, Hart-warren, now, in partnership with his brother, delivered a lecture on strikes, at Hartlepool, in the course of which he said, to strike for the shortening of the hours of labor, put short hours further off than ever. The way to cure low wages was for working men to hoard up money and become themselves the employers of labor, as was done in co-operative societies, and limited liability companies. The lecturer instanced the great effects of the Rochdale Co-operative Society, and what had arisen from two pence a week collected among twenty-eight weavers. The annual profits of that society, now more than thirty years old, were £5,000. Teetotalism was also a tremendous help in this matter of doing away with strikes. But the worst of all these matters was a lock-out. He was entirely opposed to strikes; but still more deadly against a lock-out. It was not for a raising of the number of the hours of labor that a lock-out occurred; but a spirit of vengeance actuated the man who locked his employees out. Trade societies would be beneficial if they would neither recognize "strikes" nor "lock-outs." Already, the workmen in the iron shipbuilding yards of this district had lost over £2,000, which would be forever lost to them and to the district. If the men saved the money expended in strikes they would be able to start concerns of their own.

Improvements in Gas Engines.

In gas engines, as at present arranged, it is common to fire the charges of mixed gas and air by means of electricity, but this is inconvenient, as it is found difficult to keep the batteries in working order. Mr. Hugh Smith, of Westbourne Park, therefore proposes as an improvement to fire the charges by means of vapor which burns spontaneously on coming in contact with air; the vapor he employs is that of the liquid phosphide of hydrogen; and he passes small pipes, which he calls explosion tubes, from the gas main to each end of the cylinder, and on these tubes are applied, just before the connection with the cylinder, bottles containing the liquid phosphide, so that the gas may pass over the liquid. When the cylinder is charged with gas and air, a tap on one of the explosion tubes is opened, and the gas, carrying with it the vapor of the phosphide, enters the cylinder, and the vapor there meeting with air, an explosion at once takes place, driving the piston along the cylinder, and in this manner the piston is driven from end to end of the cylinder. This method of firing the charges is applicable whatever be the form of the combustion chamber, whether it be, as assumed, in the foregoing description, a cylinder with a piston working within it, or of other form and construction.—*London Artizan.*

Paper from Wood.

We stated some time since that the paper on which the Scientific American is printed contained thirty per cent of wood pulp. A company has been formed with a capital of $500,000 for preparing the pulp, and on the 12th inst., they met to examine the works, which are situated on the Schuylkill, near Philadelphia. A poplar tree taken from the hillside was converted into clear, white, soft paper, in the space of five hours. In the evening a banquet was given by Messrs. Jessup & Moore, at the Continental Hotel. About 200 guests were present, and speeches were made by the Mayor of Philadelphia and other prominent gentlemen.

A Steam Hoist.—At the Newark Castle Wharf a steam hoist (without any engine), made at the Trent Iron Works, has been successfully tried. A timber frame forming the base of the machine, incloses a large cylinder. On the steam being admitted to it a beam of iron, armed with strong teeth, is forced out, and from this motion is given through a simple arrangement of wheels, which causes the chain barrel to revolve. The direct action of steam is thus brought into use without the intervention of a steam engine as in ordinary steam cranes. The working is easy, and without noise.

A balloon train, to ply between the Place de la Concorde and the Champs de Mars, is spoken of as one of the schemes to be tried during the great gathering in Paris next year.

Notes and Queries

E. A. V., of Md.—Illuminating gas may be made by the destructive distillation, in a close retort, at a bright red heat of wood, bituminous coal, petroleum, and other organic compounds which contain hydrogen and carbon. Several forms of apparatus for the purpose—some very cheap and simple—have been illustrated in our columns. The simplest, and probably the best apparatus for obtaining light from petroleum, is a kerosene lamp.

C. W. B., of N. H.—In order not to lose any power in conducting your water down an inclined pipe to your turbine, you must have the pipe of sufficient size to keep up the full pressure of the head upon the wheel.

B. H. P., of Iowa.—The specimen which you send us is a piece of a tin pail. If you "found it 40 feet below the surface and 17 feet in sand stone rock," some person must have carried it there. We have known miners in California to be puzzled by finding pieces of their own shovels in their diggings.

A. S., of Iowa.—The most effectual mode of making bridge bolts rust proof is to cover them with zinc—galvanizing, as it is improperly called. Next to this the best plan is to paint them with linseed oil and white or red lead.

E. S. W., of Conn.—For directions for making black ink, see page 211, current volume.

B. P. B., of Conn.—Blowers must of course be so placed as to allow a free supply of air.

G. A. S., of N. Y.—Professor Chandler's elaborate discussion of boiler incrustations having been so recently published in our columns, nothing in your paper, can be new to our readers, excepting, possibly, the suggestion that lime in the feed water may combine with the grease from the engine to form lime soap.

E. C. E., of Pa.—It will take any person of ordinary intelligence, certainly not more than thirty minutes to understand chemical symbols. He needs to be told only that they are the initials of the names of the elements, and that the atomic weight of any element is the number of times which its atom is heavier than the atom of hydrogen. We can conceive no greater waste of time than the attempt to teach chemistry without first teaching Dalton's atomic theory.

B. F. M., of N. Y.—A cylinder is a round body of the same size throughout its whole length; a body with a circular base which tapers to a point, is called a cone. The form of the cigar steamer approaches that of two cones joined at their bases; it is therefore called conical in form—never cylindrical.

J. B. F., of——.—"I wantto know what book is the best for a young man to take that wants to learn about steam and steam engines." One of the best is Bourne's Hand Book. We can send it for $1 50.

C. C., of N. Y.—The directions for making a sun dial were published in Vol. 2d. New series page 96—No. 6.

J. H. H., of N. Y.—Chloroform, benzine, and naptha are all solvents of india-rubber.

S. P., of Pa.—We cannot tell you how to become a locomotive engineer in the Scientific American.

J. S., of N. Y.—You have omitted to send anything but the size of your shaft, viz., 3½ inches by 13 feet long, and you wish to know whether it is strong enough for your water wheel. If we knew more about it we should give you an answer with pleasure. Mills that have balanced wheels and sashes can be run much faster than others not balanced.

F. M. H., asks.—"If I obtain a patent for spring bed bottoms with slots suspended by annular rubber rings, can I apply the same to carriage seats and sell rights for same without taking out a separate patent?" No A separate patent will be needed.

Drawing Dust from Shops.—If Brooklyn Inquirer will call, we will relieve him, or no pay. American Ventilation Company, 17 Courtlandt street, N. Y.

W. F. M., of N. J.—A Barker's mill applied to a hydrant would probably yield less power than a little turbine, and would be more expensive.

G. F., of Me.—For a discussion of the power of wind mills we refer you to Morin's Mechanics.

S. W. M., of N. Y.—There is no other disinfectant for your stagnant pond so cheap as the surrounding soil. You must either fill or drain it.

L. S., of Cal.—In a syphon gage the length of the divisions in the scale is not varied by the difference in the area of the surface of mercury acted upon by the steam.

W. G. B., of Del.—Electroplating with iron is effected by reducing the iron from the proto-sulphate, or the neutral chloride. Brass cannot be deposited by the battery. Perhaps by employing a very powerful current you may deposit the copper and zinc simultaneously, and then unite them by heat.

T. G. of Conn.—We know of no such substance as the oxalic muriate of tin.

E. S., of Ohio.—To make cloth water-proof, cover it with a mixture of paraffine and a minute proportion of linseed oil.

L. O., of N. Y.—The specific gravity of the human body is very nearly the same as that of water; it is said that a lift of about four pounds is sufficient to float an ordinary person. The specific gravity of cork varies very widely with different samples, but it is probable that from one-tenth to one-fourth of a cubic foot would float a person weighing 175 lbs., provided the whole of the body and head except the month was submerged.

T. H. M. H., of Pa.—The swarming of bees is easily prevented by keeping them in a large hive or room. This plan is extensively practiced. The bymenial flight is liable to take place during the season for most profitable swarming.

Patent Claims

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING APRIL 10, 1866.

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.

53,765.—Manufacture of Cans.—John T. Ackley and John K. Truax, Philadelphia, Pa.:

We claim the application of pitch or a bituminous or resinous cement to the inside or the outside of a box or can, made wholly or partly of paper, substantially as and for the purpose above set forth.

[The object of this invention is to produce a can made wholly or partly of paper or pasteboard, which will hold greasy and corrosive solids and fluids without leaking or oozing through its walls. The inner surface is coated with a resinous or bituminous cement, so as to protect the substance from which the can is made from the action of its contents, whereby a can composed wholly or partly of paper can be made capable of holding solids and liquids of a greasy or volatile and penetrating character. The outside may be coated likewise, if desired, and the lid or cover is also protected by the same means.]

53,766.—Churn.—Levi O. Allen, Gardiner, Maine:

First, I claim the compressing curb, C, and disk, H, acting in combination with the adjustable floats inclosed by them, as and for the purpose described.

Second, I claim the arrangement and mode of adjusting the floats relatively to each other and the containing vessel, as and for the purpose described.

Third, I claim the ribbed plates in each end of the churn box, in combination with the adjustable floats.

53,767.—Constructing Wells.—E. S. Alvord, Milford, Del.:

First, I claim the combination of the driving pipe, A, the inclosed short pipe, C, and the pump tube, B, arranged substantially as above described.

Second, I also claim the combination of the short pipe, C, the pump tube, B, when surrounded by gravel or other analogous filtering material, arranged substantially as set forth.

[The object of this invention is to construct a well by sinking or driving tubes into the ground, and forming at the bottom a cavity, the lower part of which is filled with gravel or other filtering material, to prevent dirt from entering the pump when it is operated.]

53,768.—Staging for Buildings.—William Arrouquier, Worcester, Mass.:

First, I claim an adjustable and portable staging constructed so that it can be attached to the window frames, or similar apertures of a building, which consists of the combination of the pieces, A B C D, bolts, E G, and supported piece, F, in the manner and for the purpose herein described and set forth.

Second, In the combination with the staging aboved described, I claim the metal frame or carriage, H, having friction rolls, i h h j, and lips, g and f', as and for the purposes herein set forth.

53,769.—Cistern for Draining Peat.—E. H. Ashcroft, Lynn, Mass.:

I claim the tank or drainage vessel constructed as described, with perforated sides and bottom, together with the perforated tubes connected therewith.

53,770.—Heater for Chimneys.—Thomas M. Aspinall and Stephen H. Whitlock, Piqua, Ohio:

We claim the arrangement of the heater box for insertion in the chimney above the arch and provided with a flue, A a A, for the passage of the heated air, etc., from the fire, a cold air induction opening, B, and a warm air delivery, C, substantially as described and represented.

53,771.—Leather Splitting Machine.—Cyrus W. Baldwin, Charlestown, Mass., and Lorenzo D. Hawkins, Stoneham, Mass.:

We claim the arrangement as well as the combination of the hand wheel shaft, its right and left screws, and the two wedges in the frame of the machine and with the boxes of the upper or gage roller and springs, or their equivalents, applied to such boxes, substantially as specified.

We also claim the combination as well as the arrangement of the abutments, K K, with the hand wheel shaft, its right and left screws, and the two wedges applied in the frame of the machine and with respect to the boxes of the upper or gage roller, and the springs or their equivalents applied to such boxes, substantially as specified.

53,772.—Tree Protector.—Burroughs Beach, West Merlden, Conn. Antedated March 30, 1866:

I claim a disk, A, constructed of wood, metal, or other suitable material, and of two or more parts, in such a manner as to admit of being snugly adjusted to the trunk of a tree in combination with the pendant flange, B, at the under side of the disk, substantially as and for the purpose set forth.

I also claim the tube, C, inserted in the disk in connection with the vessel, D, substantially as and for the purpose specified.

53,773.—Plow.—J. S. Beals, Alabama Center, N. Y.:

I claim the supplemental share, D, constructed substantially, as shown and described, and attached to the plow beam at the rear of the coulter and point of the share of the main plow, as and for the purpose herein set forth.

53,774.—Extension Table.—William Beadle, Keyport N. J.:

I claim the leaves, D D, falling parallel to the line of extension when in combination with the sliding tops, C C, the removable top or center boards, G G, and stationary box frame, for the purposes set forth.

53,775.—Float for Boats.—Alonzo T. Boon, Galesburg, Ill., assignor to self and J. Scott Richnor, Muscatine, Iowa:

I claim the adjustability of the buoys or floats, B, by means of the ears, c, and plates, d, and their arrangement and attachment to the platform, A, substantially in the manner and for the purpose as herein set forth.

53,776.—Clamp for Brooms.—Theodore F. Boyer, Harrisburg, Penn.:

I claim the wire clamp described, the same consisting of the upper part, A B, formed of a single piece of wire, a', as described, and two straight pieces, a2 a2, attached thereto, and of the lower part, C D, formed and constructed like the said upper part, A B, with the addition of the uprights, b1 b2 b3, as described; the said two parts being adapted for adjustment together on a broom, substantially as and for the purpose described.

53,777.—Manufacture of Cheese.—Jenks Budlong, Chardon, Ohio:

I claim the described improvement in preparing or making cheese for market by condensing the curd in a series of hoops arranged as specified, by the action of the screws, E F, shaft, I, and beam, G, arranged as specified.

53,778.—Combined Umbrella and Cane.—P. T. Brownell, Elmira, N. Y.:

First, I claim in umbrellas and parasols, placing the stretchers outside of and above the ribs, and hinging the inner ends of the ribs to the runner, substantially as described.

Second, I also claim the cane, A, made substantially as above shown, with a tube, C, at its upper end, a sliding box, K, to which the stretchers, J, are hinged, and a rod, F, which operates the runner, I substantially as described.

Third, I also claim the combination of an umbrella made substantially as described, with a hollow cane, A, which, when the umbrella is spread, serves as its handle, and when it is closed up, serves as a receptacle for it, substantially as shown.

53,779.—Artificial Fuel.—James F. Buckley, Brooklyn, N. Y. Antedated March 30, 1866:

I claim prepared charcoal saturated with whisky, volatile oils and a glutinous paste formed into blocks, as a cheap, aromatic, artificial fuel for common uses.

53,780.—Die for Nut Machines.—Orrin C. Burdict, New Haven, Conn.:

I claim a hexagonal die constructed in the manner substantially as herein set forth.

53,781.—Die for Punching.—Orrin C. Burdict, New Haven, Conn.:

I claim a die constructed substantially in the manner described, so that the size of the die may be adjusted by taking from or adding to the number of parts, substantially as specified.

53,782.—Bolt-heading Machine.—Orrin C. Burdict, New Haven, Conn.:

First, I claim the combination of the hinged bar, A', cam, B', and vibrating lever, C', for the purpose of arresting the movement of the slide, K, without disconnecting the power from the machines.

Second, The combination of the dies, E' and H', as preliminary shaping dies, when the said dies are combined with the herein-described nut machine so as to accomplish the preliminary shaping before the bar so shaped is presented in front of the die box.

53,783.—Thread Tension Device for Sewing Machines.—Thomas A. Chandler and H. C. Goodrich, Rockford, Ill.:

We claim the pivoted lever, I, and jaws, E, in combination with the spring, f, arranged in the manner and operating as and for the purpose set forth.

Second We claim the adjustable clamp, H, plate, A, and pivot, l, in combination with the spring, i, and lever, I, arranged and operating substantially as and for the purpose set forth,

53,784.—Stave Machine.—Thomas Cheshire, Cincinnati, Ohio:

I claim indenting or compressing into the edges of staves grooves or creases, so that the after swelling out of the wood in the casks or barrels shall make perfectly tight and strong joints, substantially as described.

I also claim, in combination with indenting or creasing wheels, the jointers pivoted and made yielding on the swing or rocking plates, F, substantially as and for the purpose described

53,785.—Beehive.—James B. Child, Lee Center, Ill.:

I claim the combination of the cross bar, C', horizontal bars, I I, lifting bars, G G, and spring catches, H H, when each bar, I, is provided with two lifting bars, G G, and all arranged to operate as and for the purposes specified.

53,786.—Paper Window Shade.—Lewin A. Colbert, Baltimore, Md.:

I claim, first, A window shade made of paper connected to one or more rollers by a woven fabric, and rendered translucent either before or after mounting, substantially in the manner described.

Second, The compound spring rollers and cornice box arranged and operating substantially as and for the purposes set forth.

53,787.—Toy Boat.—George J. Colby and Levi H. Thomas, Waterbury, Vt. Antedated March 30, 1866:

I claim a toy boat constructed in the manner as herein described, as a new article of manufacture.

53,788.—Water Wheel.—A. P. Conant, Smithland, Ky.:

I claim the arrangement of the tangential buckets of the wheel, C, curved bucket of the discharge wheel, D, and L-shaped gate, B, constructed and operating in the manner and for the purpose herein specified.

53,789.—Stovepipe Drum.—Theodore R. Cook, Saratoga Springs, N. Y.:

I claim the radiator, A, having the internal tubes, B and C, spiral diaphragm, a, and damper, E, all arranged and operating substantially as herein shown and described.

53,790.—Apparatus for Administering Medicines.—Samuel Curtiss, Jr, Williamsburgh, N. Y.:

I claim an apparatus for measuring and administering medicines, constructed and arranged substantially as described and for the purposes set forth.

[The object of this invention is to furnish an apparatus for containing medicine, when prepared for the patient, and it consists of a cup for containing the prepared medicine, having a scale to show the quantity prepared, of a reservoir for measuring the quantity to be given at one time, and a spoon-shaped orifice for administering the same, the medicine being forced from the measuring reservoir to the administering orifice by the action of a piston.]

53,791.—Broom Head.—John Danner, Canton, Ohio:

I claim in combination with a broom head having slots or openings in each of its sides, the clamping plate, C, and through or tightening bolts, for the purpose of first arranging and then tightly clamping the broom corn or other filling to the broom head, substantially as herein described and represented.

53,792.—Harrow.—N. A. Davis, Sutton, N. H.:

First, I claim suspending the cultivator head or rake in front of the carriage wheels by means of flexible supports so as to allow the vibration of the head laterally, and allow the same to be raised or lowered by the levers, G G, to any required hight to regulate the operation of the teeth.

Second, I also claim the flexible guards, P, attached to the outer end of the cultivator head, D, and reaching forward to near the front ends of the shafts, C, for the purpose of guarding the head from contact with stones, stumps, trees, etc. as herein specified.

Third, I also claim the manner of fastening the teeth, I, to the cultivator or rake head, D, by means of the arm, R, secured in the slot, T, to prevent the lateral swaying of the teeth, as specified, and in combination therewith, I claim the spiral spring, S, arranged and operating as set forth.

Fourth, I also claim broadly suspending a cultivator head or rake by means of flexible supports in front of the wheels and operating the same by means of a lever or levers from the driver's seat, as and for the purpose specified.

53,793.—Washing Machine.—David Dennison, Annisquam, Mass:

I claim the combination of the slatted frame, C, pressure roller, E, bar, D, swinging arms, D' D', bars, G H, spring, F, and box, b, constructed and arranged relatively to each other, and operating in the manner and for the purpose herein specified.

I also claim the arrangement of the swinging arms, D D, bars, G H, spring, F, box, f, and roller, E, in the manner and for the purpose herein specified.

[This invention relates to a new and improved clothes-washing machine of that class in which a fluted pressure roller is employed in connection with a slatted bed. The object of the invention is to obtain a machine of the class specified which will act uniformly upon the clothes, subject all parts of them to an equal pressure and friction, and cleanse them without injury.]

53,794.—Car for Transporting Petroleum.—James and Amos Densmore, Meadville, Pa.:

We claim the two tanks, B B attached to the platform of the car, A A, by means of the frame work, C C C C and C C C C, together with the boxes, 1 2 3 4 and 1 2 3 4, directly over the trucks when the same are constructed in the combination as hereinbefore described, and for the purposes set forth hereinbefore, or any other mechanical construction, substantially the same and which would produce the same result.

We claim the combination and application as entirely new, and as a valuable and useful improvement.

53,795.—Plumb Level.—Michael W. E. Doran, Indianapolis, Ind.:

I claim the construction and arrangement of a level or angle indicator by means of the plate, F, with slot, G, for adjusting the same across the shaft, E, and having the pendents, H, when operated substantially in the manner and for the purposes set forth.

53,796.—Button.—Frank Douglas, Norwich, Conn.:

I claim a button secured by pointed screw, substantially as and for the purpose described.

53,797.—Clothes Drier.—James W. Epperson and Thos. W. Farrill, Woodhull, Ill.:

We claim the movable head block, F, in combination with pulley, g, and hook, h substantially as and for the purpose described.

The axle, b, in combination with the head block, f, and the lines, l and k, substantially in the manner and for the purposes described.

53,798. Apparatus for Carburetting Air.—Horatio Fairbanks, Boston, Mass.:

I claim an improvement in apparatus for carburetting air in the reservoir, A, in combination with one or more reservoirs D G, and a series of frames or plates covered with cloth, or its equivalent, and provided with suitable openings for the circulation of the air, operating substantially as set forth.

53,799.—Machine for Stitching Needles into Paper.—George P. Farmer, Philadelphia, Pa.:

I claim, as an improvement on my machine patented July 1, 1862, the within-described box or hopper, A, separated into several compartments of different sizes and each compartment separated into other compartments by partitions, i i, all substantially as and for the purpose herein set forth.

53,800.—Method of Treating Leather Scrap.—Henry B. Farwell, Boston, Mass.:

I claim recovering the tallow or fatty matters from whitenings, or scraps of leather, in the manner as set forth.

I also claim in combination with the same the employment of oil of vitriol, as and for the purpose set forth.

53,801.—Horse Shoe.—Joseph W. Faulkner, Rockford, Ill.:

First, I claim the bifurcated spring clips with two prongs, constructed, arranged and operating as described for the purposes set forth

Second, The combination of the spring draw clip with the shoe, by means of the transverse slot and screw nut, so that as the clip is drawn to the shoe the shoe is tightened upon the hoof

53,802.—Well Borer.—F. Fohr, Rowlesburg, West Virginia:

I claim the use of a double connection between the sinker and drill, such for instance as the spring clamp and screw, or any other equivalent connection, for the purposes set forth.

[This invention consists in the combination of a spring catch or clamp with the sinker and drill of a well borer, in such a manner that a double connection between the drill and sinker is obtained, and if the screw or ordinary connection breaks, the drill is raised by the catch and prevented from being wedged into the hole.]

53,803.—Musical Instruments.—Joseph Foster and Ephraim Foster, Keene, N. H.:

We claim the tremulo reed, C, constructed as above shown, and applied to musical instruments substantially, as described, to produce a tremulo tone for all the notes which are played while the tremulo reed is operated.

53,804.—Sawing Machine.—Henry Fryatt and E. C. Edmonds, Buffalo, N. Y.:

We claim the arrangement and combination of the vertically sliding gate, C, and the horizontal ways, d d, thereon for the tongues, g g, of the saw to slide in, substantially as and for the purpose herein specified.

We also claim the combination and arrangement of the sliding gate, C, and the graduated balance lever, I, with its weight, K, substantially as and for the purpose herein specified.

53,805.—Amalgamator.—Willard Monroe Fuller, Chicago, Ill.:

In an apparatus for extracting gold and silver from quartz, constructed substantially as herein described, I claim surrounding the amalgamating kettle with an annular chamber the central space of which shall form the fire chamber of the apparatus, the said annular chamber being so arranged in relation to the kettle that the quartz or tailings may be drawn off simultaneously from all points of the circumference of the kettle, substantially as and for the purposes herein set forth.

In an apparatus as above described, I claim connecting the said annular chamber with a receiving chamber into which the quartz or tailings flow, which said receiving chamber may be organized for continuous or intermittent action, substantially as herein described.

In combination with the apparatus herein described, I claim the valve placed in the feed or hopper, and constructed and arranged substantially as set forth for regulating the flow of the ore into the kettle.

In apparatus constructed and operating as set forth, I claim the combination and arrangement of valves whereby the automatic discharge of the tailings may be effected.

In apparatus constructed substantially as set forth, I claim making the doors and flues which lead from the interior of the vessel to the outside thereof, of an OG shape, that is to say, with inclined surfaces to deflect the tailings and prevent the possibility of its accumulating and choking up the apparatus.

53,806.—Stovepipe Drum.—Milo Gage, Medina, N. Y.:

I claim the combination of the chambers, C D, with the tubes, A B B', the chamber, D, being divided into the two compartments g h, by the partition and damper, b c, and the tubes, B B', connecting alternately with said compartments, the whole operating in such a manner as to combine the advantages of a direct and indirect draught with a large amount of radiating surface, substantially as herein specified.

53,807.—Machine for making Eyelets.—Thomas Garrick, Providence, R. I.:

First, I claim the combination of the protuberance or teat, r, on the end of the hub or punch, t, with the cutting edge, a, of said punch, substantially as described for the purpose set forth.

Second, I claim the combination of the cutting die, e, and fixed hub and punches, t, constructed substantially as described with the moving cleaners d d, constructed and operating substantially in the manner and for the purpose set forth.

Third, I claim the combination of the mold in the movable punch for shaping the exterior of the eyelet, and the cutting shoulder, 2, constructed as described with the fixed hub or punch, t, constructed and operating in connection substantially as described for the purpose set forth.

53,808.—Waterproof Collar.—Henry C. Gibson, Camden, N. J.:

I claim a waterproof gentlemen's collar, the interior side of which is made of cloth, prepared substantially as herein described, and otherwise, and the exterior or paper side with or without glazing or enamel, made to resemble linen or other textile fabrics in use for the purpose, all as herein described.

53,809.—Bag Holder.—Cyrus F. Gillett, Sparta, Wis.:

First, I claim securing bags to funnel receivers by means of clamping supports, B B B, substantially as described.

Second, The hinged or flexible connections, a a, of the legs, B, in combination with the funnel receiver, A, and hoop, C, substantially as described.

53,810.—Pump.—Jacob Goodyear, Borough of Carlisle, Penn.:

I claim the combination and arrangement of the cylinders, A and A', B and B', the valves a and a', the rims m and m', and the india rubber rings, C and C', as and for the purposes set forth and described.

53,811.—Sheep Rack.—G. F. and T. M. Gondy, Independence, Ohio:

First, We claim the adjustable covers, B, arms or limbs, A', and chains, f f, in combination with the shaft, G, and rack, substantially as and for the purpose set forth.

Second, We claim in combination with the above, the adjustable guards, H, and cords, n, substantially as and for the purpose set forth.

53,812.—Paddle Wheel.—James Granger, Zanesville, Ohio:

The combination of the paddles, H, arms, I I, connecting holders, M, bridge pieces, J, endless chain G, and pulleys D E, constructed and arranged in the manner and for the purpose herein specified

[This invention relates to that class of paddle wheels in which the paddles are attached to endless chains passing over wheels, and it consists in so arranging the said wheels, and hanging the paddles on the endless chains, that a sweep in a circular direction will be given to the paddles in their passage through the water, the importance of which is obvious.]

53,813. Step for Spindles.—Charles E. Griffin and Thomas Marsh, Smithfield, R. I.:

We claim the independent step for spindles, B, in combination with a close oil chamber, a b substantially as described.

53,814.—Hay Rack.—W. E. Grimes, Allen, Mo.:

I claim the arrangement of the sections A C L and D, with the windlass, H, and pole, E, as and for the purpose herein specified.

53,815.—Process and Compositions for printing Photographic Pictures.—Victor M. Griswold, Peekskill, N. Y.:

First I claim as a new article of manufacture, the photographic surface described with or without the opal picture enamel.

Second, The composition of the opal collodion, by the formula, No. 1, and in the manner hereinabove set forth, or in any manner substantially the same.

Third, The forming of the plate over a mixture of ammonia, alum, and unslacked lime, as herinabove set forth.

Fourth, The composition of the sensitizing solution, by the formula, No. 2 and in the manner hereinabove set forth, or in any manner substantially the same.

Fifth The composition of the opal picture enamel by the formula, No. 3, and in the manner hereinabove set forth, or in any manner substantially the same.

Sixth, The combination in the process of manufacture, of the opal collodion, sensitizing solution, and picture enamel hereinbefore described, as and for the purpose hereinabove set forth.

Seventh, The process hereinabove described, for preparing and finishing an opal surface for photographic purposes.

53,816.—Machine for Pressing Glass Buttons.—Timothy Guilford, Cheshire, Conn.:

I claim a die constructed in several parts substantially in the manner described in combination with the punch, F, and follower, E, as and for the purpose specified

53,817.—Letter File.—James C. Hadden, New York City.:

I claim a file for letters, newspapers, etc., in which two or more angular-shaped holding pins or staples therefor are used, and arranged so as to operate substantially in the manner described.

I also claim in combination with the above, projecting the opposite corner of the book to that in which the letter-holding pins are used, by means of a metallic plate or plates, or other suitable material, substantially as described.

53,818.—Cane Stripper.—Joel A. Hall, Columbus, Ohio:

First, I claim, securing the stripping knives together in pairs by means of elastic or non-elastic bodies, C C, applied to their extremities, substantially as described.

Second, The construction of the cutting portions of the knife blades, G G with curved edges, g g, substantially as described.

Third, Providing for adjusting and setting the guide rollers, D D, nearer to or further from each other, said rollers being applied to the elastic knife blades, substantially as described.

53,819.—Lantern.—John O. Harris, Reading, Penn.:

First, I claim the cap, E, on the top of the globe, A, of the lantern, closed at its upper end, and provided with lateral openings, C, in combination with the jacket, F, closed at its upper end and provided with lateral openings, e, and also provided with a conical flange, G, at its lower end, having a perforated partition plate, substantially as and for the purpose set forth.

Second, The conical base, B, provided with perforations, b, in its bottom, in combination with the jacket, F, and cap, E, at the upper part of the lantern, substantially as and for the purpose specified.

53,820.—Gas Heating Apparatus.—David G. Haskins, Cambridge, Mass.:

First, I claim, the application, substantially after the manner herein described, of the flame of any gas or of any oil, or fluid, to the heating of a current of air which may be introduced from without into rooms, apartments, or buildings.

Second, I claim the combination with an outer casing, A, and an inner chamber, B, of heat-retaining and radiating devices, substantially as and for the purpose set forth.

53,821.—Smith's Vises.—S S. Hepworth, Boston, Mass.:

I claim the sleeve, B, in combination with the nut, A, connected to the movable jaw, E, operating as and for the purpose described.

53,822.—Rail Road Switch for Street Cars.—John A. Heyl, Boston, Mass:

I claim the arrangement of the double flanged wheel, C, and attached wheel, d, operated by levers, e and f, upon and in combination with the axles of a car as described, and operated with the said double-flanged wheel, astride of the guide rail, substantially as described.

53,823.—Shingle Machine.—Simeon Heywood, Claremont, N. H.:

I claim, in a shingle or other machine, the arrangement of the bars, A A, the movable bars, B B, the inclined planes C C C C, the racks, K K, the pinion, J, applied to the tilting bed, as and for the purposes set forth

53,824.—Lamp Burner.—George Hillegass, Philadelphia, Penn.:

First, In combination with the sides, B B, I claim the wings, C C, substantially as and for the purpose set forth.

Second In combinations with the sides, B B, I claim a device for adjusting the width of the aperture, substantially in the manner and for the purpose set forth.

53,825.—Polishing Wheel.—Leonhard Holtzschelter, Philadelphia, Penn. Antedated March 25, 1866.:

I claim the polishing wheel consisting of a disk, A, of wood or other suitable material, and a series of strips, D, of leather, packed and cemented together and into a groove in the periphery of the said disk, all as set forth.

53,826.—Hat-Pressing Machine.—Nicholas B. Hooker, Newark, N. J.:

First, I claim a revolving hat block, in combination with a series of irons constructed and operating so as to be self-adjusting in conforming to the sizes and shapes of different hat blocks, and capable of simultaneously pressing the "tip," "side-crown," and "brim," substantially as and for the purposes set forth.

Second, The pivoted hanging frame, H, when so constructed and arranged as to support, and act in combination with, a series of irons and their operating devices capable of pressing the "side-crown," "tip" and "brim," substantially as specified, for the purpose of simultaneously removing all of the irons from the hat by swinging the frame aside.

Third, The rod J, carriage, L, and levers K and M, in combination with an iron, I, substantially as specified, for the purpose of producing a self-adjusting verticle and lateral pressure of said iron upon the "tip" and "square" of a hat upon a revolving hat block.

Fourth, The slotted lever, T, rods, n and Q, and lever, R in combination with the frame, H, and an iron, substantially as specified for the purpose of producing a self-adjusting verticle and lateral pressure of the said iron upon the "brim" and "band" of a hat upon a revolving hat block.

Fifth, The combination and arrangement of lever, Z, rods Y and t, late, X springs, u, and an iron V, substantially as specified for the purpose of producing a self-adjusting lateral pressure upon the "side-crown" of the hat, yielding in conformity to the oval shape of the side-crown of the hat block.

Sixth, An iron, V, when provided with the partition, d', opening

e', and burner, G, substantially as and for the purposes set forth.
Seventh, The combination and arrangement of the frames, H, levers, K R M T Z, irons I P V, table, A B and block plate, D, substantially as and for the purposes set forth.

53,827. Catch for Money Drawers.—Saunders Hubbell, Jr., Urbana, Ohio:

I claim, First, the catch, E, the rod, F, and the spring arm, G, when operated substantially as and for the purpose described.
Second, The drawers, C D when combined with the catch, E, substantially as described and for the purpose specified.

53,828.—Attaching Thills to Carriages, Etc.—Winford R. S. Hunter, Blackberry, Ill.:

I claim, First, The employment of a spring, C, in combination with the slotted thill head or iron, substantially as described and for the purposes specified.
Second, I claim providing the slot a, with the recess, c, as and for the purposes set forth.
Third, I claim the combination of the spring, C, the bolt or pin, E and thills, A, provided with a slot, a, arranged as and for the purposes specified.

53,829.—Oil Tank.—Joshua K. Ingalls, New York City:

First, I claim the means of relieving the pressure within the tank or vessel, substantially as described.
Second I claim the jointed arm, c, or any equivalent device operated to regulate or adjust the pressure within the tank or vessel.
Third, I claim the strainer or sprinkler, T, arranged as shown and operated in connection with the relief pipe, as described.

53,830.—Hame.—Francis X. Kaffer, Champagne City, Ill.:

I claim the combination of the notched staple, a, with the flat spring, b, substantially as and for the purposes described.

53,831. Bolt Heading Machine. Charles Kane and James Kane, Pittsburg, Pa.:

First, We claim the dies, I and K, having their pressing surface at right angles with the center of their motion and having projecting ledges or shelves, i i, and k k, so that when the dies come together they leave between them a parallel cylindric space, the dimension of which is greater in a direction perpendicular to the line of motion of the dies.
Second, The cutters, M and N, in combination with the pressing dies, I and K, arranged in the manner and for the purpose specified.

53,832.—Bolt Machine.—Charles and James Kane, Pittsburg, Pa.:

First, We claim a bolt machine having a double set of dies one above the other, in the one of which to shave and in the other to cut the square neck of the bolt and head, the same arranged and operating substantially as described.

53,833. Combination of Ruler, Blotter and Paper Cutter.—Lewis Katen, Greenpoint, Brooklyn, N. Y.:

I claim the arrangement of the plate and the uprights in combination with the revolving blotter, the whole so arranged and constructed that they may be used for the various purposes herein set forth and described by simply reversing the position of the article.

53,834.—Beverage.—Jonathan H. Kenyon, Sempronious, N. Y.:

I claim birch nectar compounded of the ingredients herein described.

53,835. Bread and Meat Cutter.—Solomon Kepner, Pottstown, Pa.:

I claim the combination of the holder, F, with the frame, C, and knife, H, substantially as described and for the purpose set forth.

[The object of this invention is to furnish a convenient instrument for slicing bread or meat, and it consists of a platform upon which, and a frame within which, the article to be sliced is placed. In this position it is held by a movable holder applied to its upper part, so that the descending knife may cut a slice of exactly the required thickness.]

53,836.—Tree Protector.—Dallas Knowlton, Liberty, Maine:

I claim a tree protector having plate, A, cut open on one side as represented and having apertures, C, therein with pin, c, all constructed, combined and arranged substantially as herein specified as a new article of manufacture.

53,837.—Cultivator.—John Lacy, Chicago, Ill.:

First, I claim attaching the shovels to beams having an independent vertical movement and so connected to the movable frame, L H, that by moving the latter sidewise all the plows are moved with it, said movable frame being pivoted at b, substantially as and for the purpose set forth.
Second, I claim interposing the conical rollers, a, between the fixed and movable frames to enable the latter to be more easily operated, as shown and described.

53,838.—Hand Corn Planter.—Richard Lambert, Cortland Village, N. Y.:

First, I claim in combination with the slide, G, and rod, F, the adjustable block, H, substantially as and for the purpose set forth.
Second, I claim the arrangement of the case, B, with the double bottom, M M' the slide, G, rod, F, and spiral springs, L L, substantially as described.

53,839.—Method of Recovering Waste Alkali Used in the Manufacture of Paper—Theodore F. Lehmann, Alleghany, Pa.:

I claim converting the unspent caustic, alkali of alkaline solutions into a carbonate of the same by artificial application of carbonic acid.

53,840. Steering Screw.—Frank Lilburn, New York City:

I claim the arrangement of the shaft, D, the beam, E, and cord, e, gear wheel, F, and shaft, G, constructed and used, as and for the purpose herein specified.
Second, Arrangement of the cars, H and K, with the toggle joint and propeller, B, as and for the purpose herein specified.
Third, The combination of the propeller, B, with the steering propeller, e, when the two are connected and arranged to operate by the means substantially as herein specified.

53,841.—Measuring Funnel.—James Lloyd, Springfield, Ohio:

First, I claim the combination with a funnel of a measure index and the turning or sliding valve, E, and its valve seat, substantially as set forth.
Second, In combination with a funnel measure, a movable gage or scale, J, as and for the purpose set forth.
Third, In combination with the sliding valve, E, and the funnel measure, A, the movable gage or scale, J, substantially as set forth.
Fourth, In combination with the funnel measure, A, and the sliding valve, E, the air tube, K, located within the spout, so as not to impair the exterior cylindrical form of said spout.

53,842.—Car Seat. Edwin Lockwood and George W. Pitman, Bordentown, N. J.:

First, We claim the detachable back, B, united with the frame through the arm pieces, C, by means of the hooks, D, and brace E, and catch, G F, so as always to maintain the same relation to the seat, A, substantially as set forth.
Second, We claim in combination with the detachable backs, B, a double system of rods and levers so as to make either side of the seat adjustable, substantially as set forth.
Third, In combination with the levers, K we claim the rods, M M' when arranged substantially as and for the purpose set forth.
Fourth, In combination with the rods L and L' we claim a series of octets, I and the fixed rod, F, operating as a stop, so arranged that a greater or less inclination can be given to the seats, A, substantially as set forth.
Fifth, We claim the adjustable foot rest, S, arranged substantially and for the purpose set forth.

53,843.—Apparatus for Carburetting Air.—Charles B. Loveless, Syracuse, N. Y.:

First, I claim placing the oil and gas chambers under water in the tank, substantially as described and for the purposes specified.
Second, The closed cylinder, C, containing the oil and air chambers, substantially as set forth.
Third, The glass indicator, C, constructed and operating substantially as described.
Fourth, The oil feed pipe, F, passing in part through the water, substantially as described.
Fifth, The supply gas pipe, L, passing in part through the water, substantially as described.
Sixth, The tank, A, and blower, B, in combination with the closed cylinder, C, substantially as described.

53,844.—Washing Machine.—Philip Lutes, Platte City, Mo.:

I claim the structure of the upper portion of the washing machine, consisting of the central piece or lid, A', and the hinged end pieces, A2 A2, with the intervening spaces or openings, G G, as set forth.
Second, I claim the combination and arrangement of the concave tub, A, rollers, B, rubber, C C', arms, C' C', handle, C2, bearings, D, central piece or lid, A', hinged end pieces, A2 A2, and intervening spaces or openings, G' G', the whole being constructed and operating substantially as and for the purposes described.

53,845.—Machine for Cutting and Finishing Marble.—James W. Maloy, Boston, Mass.:

I claim First, The combination of a revolving tool or tools with a feeding table or platform, susceptible of two motions, one tangential to the circle described by the said revolving tool or tools, and the other at right angles to that of the first, as set forth and for the purpose specified.
Second, The combination of the two traveling tables or platforms, operating together as described.
Third, So arranging and operating the table or platform that supports the marble or other material to be acted upon as to convey the latter automatically to the revolving tool or tools.
Fourth, The arrangement of the clutch nut, d d', screw shaft, q' q', revolving shaft, i i, and vertical shaft, b b, operating as described for the purpose of feeding the traveling table along and yet permitting disengagement from the said devices, as specified.
Fifth, The use of the adjustable lever swivel clamp for holding the material to be acted upon firmly in its place, as described.
Sixth, The use of a revolving, grinding or rubbing cylinder so arranged and constructed as to contain the grinding material and deliver it through apertures to the material to be acted upon, as set forth.
Seventh, In combination with the revolving grinding or rubbing tool, the pronged lever arm, h'' h''', for the purpose specified.
Eighth, The arrangement of devices for feeding the revolving tool or tools up and down, the same consisting of the screw shaft, q' q', screw nut, O' O', and the shaft, t t, as described.
Ninth, The arrangement of devices for holding the sectional cutters in their place and so that they can readily be inserted or removed as specified.

53,846. Friction Coupling.—Judson Mattison, Oswego, N. Y.:

What I claim as my invention and improvement in friction couplings or shafting and machinery, is the use and application of vulcanized india-rubber, as an elastic friction substance to be used in the manner and for the purpose specified.
I also claim the construction and arrangement of the oil vessels or canals, S and V, with their drains or holes, T and Z, for the purpose set forth and described.

53,847.—Soap.—Nathaniel Ridley Eaves Mayer, Chester C. H., South Carolina:

What I claim in the composition in washing clothes, and other articles prepared substantially as described for the purpose set forth.

53,848.—Corn-Stalk Cutter.—George D. McClure, Denver Station, Ill.:

I claim an improved corn-stalk cutter, constructed and arranged substantially as described and for the purpose set forth.

53,849.—Apparatus for Stripping Corn from the Cob for Table Use.—William E. McGill, Cincinnati, Ohio:

I claim the combination of the spike plate with the sheller, operating substantially as and for the purpose herein set forth.

53,850.—Harrow.—Anthony Mero, New Haven, Mich.

First, I claim the construction of the bridge bar, B, with slotted and forked ends adapted for receiving and serving as bearings for the central turning posts, b b, of the harrows, substantially as described.
Second, The combination of the forked drag bars, C C, with the forked bridge bar, B, and the central posts, b b, substantially as described.
Third, The combination of the seat, E, with the forked bridge bar B, and rotary harrows, A A, substantially as described.

53,851.—Cotton Bale Tie.—Isaac H. Merritt, Cincinnati, Ohio:

I claim the combination of the band, A, and key, C when so arranged that the separated lugs of the single key shall detain the respective ends of the band, substantially as described and represented.

53,852.—Medical Compound for the Eye.—Granderson Mershon, M. D., Brookville, Iowa:

I claim combining the above-named substances in such proportions that the medicinal virtues of each are greatly increased, forming a specific for inflammatory diseases of the eyes.

53,853.—Bed Bottom Connection.—Frederick Metz, Lyons, N. Y.:

I claim the combination of the socket, D, with the head, E, and bearing, a, of the clasp or plate, C, said socket and head being provided with the groove and tongue, c d, or their equivalent and the whole arranged in connection with the slats, A, in such a manner as to allow them to turn to opposite positions, substantially as specified.

53,854.—Spring Saddle.—John C. Miller, Louisville, Ky.:

I claim connecting the seat of the saddle separate from and independent of the bars of the tree, and hanging the said seat upon the ends of springs at a distance of several inches above the bars of the tree, all constructed as herein described and set forth.

53,855.—Machine for Seeding Raisins.—Samuel C. Moore, Boston, Mass.:

I claim the spiked or toothed cylinder, B, in combination with the grate or open frame cylinder, H, arranged to work together, substantially as described, for the purpose set forth.
In combination with the cylinder, H, I claim the scraper, t, arranged inside of the cylinder.
In combination with the toothed cylinder, B, I claim the prongs, , for removing the fruit from the teeth of the cylinder.
Also in combination with the toothed cylinder, B, I claim the rack of teeth, R, for removing the stones and seeds and pits from the teeth, Q.

53,856.—Farm Gate.—J. C. Murphy, Mendota, Ill.:

I claim a gate constructed substantially as described in combination with the wheel, c, track, d, hook, M pulley, H, and inclined bars, a b, arranged and operating as and for the purpose specified.

53,857.—Loom.—Ira Orndorff, Russelville, Ky.:

I claim First, The changeable sectional pattern wheel when the sections are changed and held in place, substantially in the manner and for the purpose described.
Second, The adjustable cams arranged on the side of the disk as shown in Figs. 7 and 8, to change the shuttle boxes, substantially as and for the purpose set forth.

53,858.—Loom.—Ira Orndorff, Russelville, Ky.:

I claim, First, The combination of the changing shuttle boxes with the lay, arranged and operated substantially in the manner and for the purpose set forth.
Second, Changing the shuttle boxes of looms by a pattern cam and ratchet combined, arranged, and operating substantially in the manner and for the purpose described.

53,859. Awning.—J. A. Pain, Clyde, N. Y.:

I claim the arrangement of the jointed rod, l m n, the inclosed drum, d, and operating cord, p, substantially as described and represented.

53,860.—Threshing Machine.—Nelson Palmer, Hudson, N. Y.:

First, I claim the eccentric bolts, G, or their equivalents, to regulate the relations of the concave to the cylinder, substantially as set forth.
Second, I claim springs of rubber or other material when placed between the slats to give elasticity to the movements of the concave, substantially as and for the purpose set forth.
Third I claim the board, H, when used substantially as and for the purpose set forth.
Fourth, I claim the board, H, when used in combination with the cylinder, A, and board, H, substantially as and for the purpose set forth.

53,861.—Method of Preserving and Drying Green Corn on the Cob. David Parker, Shaker Village, N. H.:

I claim the drying and preserving of green or unripe corn on the cob, by first scalding or partially cooking it, and then drying it rapidly by artificial heat in ovens or drying chambers, until all the moisture is driven off from the grains and cob, substantially as herein described.

53,862.—Harvester.—E. G. Passmore, Jr., Philadelphia, Pa.:

I claim, First, The sliding shaft, D, its bevel wheel, L, gearing into a wheel, L', on the rake shaft in combination with the gearing herein described, or equivalent to the same, for operating the cutters, the whole being arranged for the simultaneous stopping and starting of the cutting apparatus and rake, substantially as herein described.
Second, The studs, g, made adjustable on the arms, N, and adapted to the flanged cam, substantially as and for the purpose specified.

53,863.—Knife and Fork Scourer.—R. R. Patterson, Springfield, Ill.:

I claim, First, The scourer, I, or its equivalent sliding within a frame or holder having suitable handle for moving the same, in combination with the bed, B, upon which the knives or forks are laid, when arranged together, substantially as and for the purpose specified.
Second, In combination with the above I also claim the perforated receptacle or reservoir, a, for the scouring material when secured to the scourer or its holder, in such a manner that as it moves over the knives or forks, it will throw the scouring material upon the same, substantially as described.

[This invention relates to a novel and useful implement for the scouring and cleaning of knives and forks, whereby they can be scoured with the utmost dispatch and in a most satisfactory manner.]

53,864.—Feed Water Apparatus.—James H. Pease, Reading, Pa.:

I claim, First, The arrangement of the injector of a locomotive or other boiler in combination with the feed pipe of its force pump, when such pipe has a suitable stop cock for opening or closing the communications through the same, substantially as and for the purpose specified.
Second, The combination of the feed pump and the injector whereby to supply water to a locomotive or other boiler by one set of pipes and connections, substantially as herein described.
Third, The stop cock in combination with the discharge orifice of the injector overflow, for the purpose specified.

53,865.—Saponifier.—Henry Pemberton, Alleghany, Pa.:

I claim the use of the aluminates of soda or potassa, either with or without admixture of the hydrates of those alkalies in the manufacture of saponifier or concentrated lye, substantially in the manner hereinbefore described.

53,866.—Buckle.—L. W. Perkins, Beloit, Wis.:

I claim, First, The frame, A, and lever, B, constructed and arranged to operate in the manner and for the purposes herein set forth.
Second, The removable strip, e, in combination with the jaw, D, and lever, B, for the purpose of adjusting the jaw, as described.
Third, I claim making the faces of the jaws, C and D corrugated or roughened for the purpose of holding the strap more securely, as set forth.

53,867.—Cultivator.—George Perry, Muscatine, Iowa:

First, I claim the adjustable beams, C C, in combination with the slotted cross bar, A, and the slotted braces and notched latches, M M, substantially as and for the purposes set forth.
Second, I claim the foot levers, G G, in combination with the supplementary frame, substantially as and for the purposes set forth.
Third, I claim the buttons, O O, attached to the frame, D D, and rigidly securing the supplementary frame either up or down when desired, substantially as and for the purposes set forth.
Fourth, I claim the levers, H H, and the parallel bar, I, in combination with the hinged standards of the interior shovels and oscillating beams, C C, the latter being also adjustably attached, substantially in the manner and for the purpose set forth.
Fifth, I claim the mode of attaching the standards of the interior plows by the jaws, L L, to the beams, c c, substantially as and for the purposes set forth.
Sixth, I claim a hinged shovel attached to the standard by a wooden pin, substantially in the manner and for the purpose set forth.

53,868.—Machine for Grinding Clay.—Benjamin Porter, Jackson, Mich.:

I claim in combination with the central grinding shaft, G, and box, D, I claim the auxiliary grinding shafts, H H, substantially as described.
I also claim the cleats or pieces, d d, on the inside of the box, substantially as described for the purpose set forth.
I claim the combination and arrangement of the rock shafts, T T, arms, U U, slides, V V, arms, X X, and cam, a, to push out the molds when required.

53,869.—Machine for Catching Sheep and other Animals.—Robert Ralston, Kalamazoo, Mich.:

First, I claim the jaws, being held disengaged by the brace or its equivalent, preparatory to its being fastened upon the leg.
Second, The points of the jaws passing each other, thus allowing them to fit closely to the leg of a small or large animal.
Third, The combination and arrangement of the machine, substantially as and for the purposes set forth.

53,870.—Sash Fastener.—John C. Rankin, Mount Vernon, N. Y.:

I claim the slatted plate, B, and the slide, E, or their equivalents, applied to the sashes of a window, substantially as described.
I further claim the slide, E, with its notches, d d, spring, F, and button, e, box, C, and the plate, B, provided with the vertical slot, a, and cross slot all, arranged and applied to the sashes, substantially as described.

53,871.—Locomotive Head Lights.—Thomas S. Ray and Samuel E. Cleveland, Buffalo, N. Y.:

First, In a locomotive head light lamp for burning petroleum or coal oil, having a cylindrical wick tube, a top shield and deflector, so constructed and placed upon the wick tube as to form a combustion chamber above and around the base of the flame, we claim a circular opening made through the shield and below the deflector for the purpose of admitting air directly to and slightly below the base of the flame, substantially as described.
Second, In a locomotive head light lamp having a cylindrical wick tube, we claim having the bottom of the wick tube open so as to admit the air free and unobstructed into the wick tube to supply the inside flame in combination with an outside case which admits air through perforated openings in its bottom, or through openings which cause the air to take an indirect route in its passage into the case, for the purpose and substantially as described.
Third, In a locomotive head light lamp having a cylindrical wick tube and a shield or cap around the top of the burner, we claim a free unobstructed and direct passage for the air through the shield to the outside base of the flame, in combination with perforated openings through the bottom of the case, or with openings which cause the air to take an indirect route into the case, for the purpose and substantially as set forth.
Fourth, We claim the combination of a cylindrical wick tube left free and open at the bottom for admitting air to the inside of the flame, with a deflector placed on the top of the wick tube for deflecting the air to the outside of the flame, substantially as set forth.

53,872.—Harvester.—Owen Redmond, Rochester, N. Y.:

I claim engaging the gearing with, and disengaging it from the driving shaft, C, by means of the loose sleeve, b, double couplings, d d', springs, e e', and turning sleeve, a, the whole arranged, combined and operating substantially as and for the purpose herein set forth.
I also claim the combination of the connecting bar, K, and

standard, I, with the finger beam, G, the bar being jointed at s, and the standard forming a stiff connection with the finger beam, or an extension thereof, and the whole being so arranged that a simple lifting of the finger beam will elevate its outer end to a greater degree than its inner end, substantially as described.

I also claim the wedge side, o, in combination with the heel projection, q, of the finger beam, for the purpose of stiffening and sustaining the latter before it is raised, substantially as described.

I also claim the combination, of the slide, o, rock lever, N, lever, L, and link, u, whereby the slide is first pressed forward to stiffen the finger beam and the latter is then raised, substantially as specified.

I also claim supporting the shoe, Q, by the grasp wheel or truck, T, in combination with making said shoe adjustable higher or lower by the screw, h', resting on the shank or bearing, g', of the wheel, the whole arranged, combined and operating substantially as set forth.

53,873.—Evaporator.—David Reeves, South Pass. Antedated April 7, 1866:

First, I claim the employment or use, in a sugar-evaporating pan, of a bottom, F, and partition, E, arranged in such a manner that a communication may be formed between the several compartments, and the communication cut off when desired, by the moving of the bottom in contact with and from the lower edges of the partitions, substantially as specified.

Second, The packing, a, inserted in the lower edges of the partitions, substantially as and for the purposes set forth.

[This invention relates to an improved means for transferring the juice from one compartment of the pan to another, whereby the seum is not allowed to incorporate with the body of the juice or sirup during said transfer; and also to an adjustable throat or damper placed in the flue, and arranged in such a manner as to graduate the heat under the finishing compartment as occasion may require]

53,874.—Fliers for Spinning.—George Richardson, Lowell, Mass.:

First I claim the elliptical form and semicircular shape of the arms, b, as herein specified, and for the purpose set forth.

Second, I claim the headless bobbin, d, in combination with a flier, constructed as herein described.

53,775.—Mariner's Compass.—Edward S. Ritchie, Brookline, Mass.:

I claim the combination of the annular float and one or more magnets, and the encompassing case or cases thereof.

I also claim the combination of the divisional ring, the annular float, and one or more magnets, and the encompassing case or cases thereof.

I also claim the arrangement of the divisional ring and the annular float, so that the ring may make a part of the hollow float.

I also claim the arrangement of the divisional ring in another respect, viz., so as to incline to the plane of the magnets, the same being substantially as and for the purpose hereinbefore explained.

I also claim the combination as well as the arrangement of the two magnet cases, the bearing carrier, and the divisional ring, or the same and the annular float.

53,876.—Churn.—Frank J. Robinson, Laconia, N. H.:

First, I claim the construction of the dasher with inclined radial plates, h h, and vertical tubes, g g, substantially as and for the purpose herein specified.

I also claim the combination of the central opening, p, for the ingress, and the tubes, n n, for the egress of air, in combination with the dasher, for the purpose set forth.

53,877.—Provision Safe and Table.—Jonathan S. Robinson, Baltimore, Md.:

I claim the combination of the safe, A, and table, B, when constructed and operating as described.

53,878.—Horse Hay Eork.—L. M. Roby, Leesville, Ohio.:

First, I claim the combination and arrangement of head bar, A, constructed as described, with the tines, B, secured as specified and with bale posts, C, bale, D, trigger post, E, and adjustable trigger, K, substantially as, and for the purposes set forth.

Second, The trigger, K, constructed as described, in combination with arm, b, screw, i, spring, x, and tooth, s, substantially as and for the purpose set forth.

53,879.—Brick Machine.—T. H. Rodgers, Chicago, Ill.:

I claim, First, The main frame, A, provided with the mold, in combination with the plunger, D and levers, F and G, arranged and operating as and for the purpose set forth.

Second, In combination with the above described parts, I claim the shaft, H, provided with the lever, J, and connecting rod, I, for operating the press, as described.

Third, In combination with the press constructed as described, I claim the lever, b, for elevating the plunger, D, and removing the brick, as shown and described.

53,880.—Fireplace.—Francis M. Rogers, Cincinnati, Ohio:

I claim, First, In the described combination, the back, G, crown plate, I, and damper, K, forming a smoke-consuming and reverberating chamber, J, throat and direct exit, substantially as set forth.

Second, I claim the series of ash flues, l, arranged as described, in combination with the direct exit flue, for the purposes set forth.

53,881.—Revolving Fire-arm.—Sylvester H. Roper, Roxbury, Mass.:

I claim, First, The combination of revolving carrier, the piston, the hammer, and the connecting link, G', arranged and operating substantially as described.

Second, I also claim the inclined plane, v, on the end of the piston, in combination with the inclined plane, u, on the head of the hammer to lock the hammer, as described, whether used in combination with a revolving carrier or a stationary cartridge bed.

Third, I also claim the double-acting spring, H, constructed and arranged as described, in combination with the ratchet wheel, E, and the eccentric slot, s, as and for the purpose described.

Fourth, In combination with the double-acting spring, H, the ratchet wheel, E and the eccentric slot, s, I also claim the thumb screw, t, as and for the purpose described.

Fifth, I also claim connecting each end of the main spring to the hammer by a separate stirrup, arranged and operating as described.

Sixth, In combination with the cylindrical case, B, and its cover, d, I also claim the yielding spring, e, as and for the purpose described.

53,882.—Vegetable Slicer.—Christian Rosenburg and Warren Tamer, Chicago, Ill:

We claim the slicer herein described, composed of the bed, A a, with the double side pieces, B1 B2 C1 C2, and adjustable holes E F, adapted to receive knives of different sizes and hold them at various hights, substantially as and for the purpose herein set forth.

53,883.—Molding and Casting Apparatus.—George Ross, Newport, Ky. Antedated October 18, 1865:

I claim First, The vertical pipe mold drying oven, herein described, arranged with separate and distinct communications with the molding and casting pits, as and for the purpose specified.

Second, The described, or equivalent, consecutive arrangement of receiving pit, A, molding pit, B, oven C, and casting pit, D.

Third, The combination of the two cranes, F and G, with the molding pit, B, oven, C, and casting pit, D, arranged substantially as specified.

Fourth, The skids, H H, arranged in the described combination with cranes, F and G, and continuous pit, A B C D.

53,884.—Holder for Chisels.—John Russell, Sing Sing, N. Y.:

I claim clamping the chisel between two disks of india rubber or gutta percha, by means of the set screw, D, or its equivalent, substantially as and for the purposes set forth.

53,885.—Apparatus for Separating the Precious Metals from other Substances.—Van Buren Ryerson, New York City:

I claim the pan with the bottom formed with recesses, substantially of the form herein described, in combination with the means or the equivalent thereof, for giving reciprocating motions, substantially such as described.

53,886.—Stovepipe Damper.—Rufus S. Sanborn and William Bennett, Ripon, Wis.:

We claim the metallic plate, A, with the funnel-shaped tube, B, when arranged in the manner substantially as and for the purposes herein specified.

53,887.—Manufacture of Molasses.—George W. Sayre, Pisgah, Ohio. Antedated March 25, 1866:

I claim the arrangement, construction, and combination of the steam boiler D, sirup pan, E, and dome, F, with condensing pipes, H J and K, and water tank, P, as herein described, and for the purposes herein set forth.

63,888.—Bed Bottom.—Frederick Schimming, Philadelphia, Pa.:

I claim the sacking or bed bottom, the straps, l l, and the springs, e e, arranged substantially as herein specified and described.

53,889.—Watchman's Register.—Ph. Louis Schmandt Hoboken, N. J.:

I claim the use and employment of the point, N, or an equivalent moving part of a clock in combination with the lid or dial cover, C, where a mark of the the time by a motion of the lid, c, is produced on said lid.

53,890.—Lamp Snuffer.—Karl Schou, Lafayette, Ind.:

I claim an improved lamp snuffer, constructed and operated substantially as herein described, in combination with a lampwick tube, for the purpose set forth.

[The object of this invention is to furnish an instrument for snuffing and trimming lamp wicks, both when the lamp is burning and when extinguished, and it consists of a pair of blades, which, by pulling upon the end of a wire projecting from the burner, are made to close upon each other above the end of the wick tube, trimming the wick evenly.]

53,891. Plow.—S. F. Seely, Sylvania, Ohio:

I claim the curved or semicircular rear part of the beam, A, and front part of the plow or land side, B, substantially as shown, to operate upon weeds, trash, etc., and prevent the same from choking or clogging up the plow, as set forth.

The semicircular coulter, D, in combination with the semicircular rear end of the beam, substantially as and for the purpose specified.

The subsoil plow, E, having a curved standard, E, pivoted to curved bars, G H, the front ends of which are pivoted to the land side at elevated points, to operate in the manner substantially as and for the purpose herein set forth.

[This invention relates, first, to a new and useful improvement in the construction of the plow and the coulter for the same, whereby the plow is prevented from becoming choked up or clogged with weeds and trash which are very liable to collect in front of it during the operation of plowing. Second, to a new and improved subsoil plow attachment, so constructed, arranged, and applied that it will have a tendency to penetrate the earth as the plow is drawn along, and to break up and loosen the soil at the bottom of the furrow made by the surface plow, and at the same time not be liable to break in the event of coming in contact with stones or other obstructions.]

53,892.—Means for Operating the Pickerstaff of Looms. Peleg A. Sherman and Freeman Baxter, Pawtucket, R. I.:

We claim the inclined slotted guide, J, as set forth for communicating the desired motion to the hook, E, or whatever instrument or device is used to convey the weft through the warp.

We claim the guide, J, and the lever, A, connected to the brace, F, by the stud, B, in combination with the rod, C, and pickerstaff, D, as and for the purpose set forth.

53,893.—Broom Head.—Samuel S. Sherman and Jeremiah G. Sherman, McHenry, Ill.:

We claim fastening the broom corn or other material into the broom head, by forcing keys or wedges through slots in said head, substantially as herein shown.

The slots, a b, the keys, p, the cross bars, b, and ledges, c, when arranged and operating substantially as herein shown.

53,894.—Door for Puddling and other Furnaces.—Nathaniel L. Libby, Boston, Mass., and Benjamin Shiverick, Waltham, Mass.:

In combination with an iron door we claim a lining of calcined plaster, gypsum, or other material which conducts heat slowly, made either solid, or with an opening or airspace, as may be preferred.

We claim a nose piece or guard around the hole in the door made separate from the door and fastened to it.

We claim making the lining of the door to cover and protect, or partially cover and protect the nose piece or flange around the hole in the door, substantially as described.

We claim in furnace doors a lining made of plumbago or crucible material, to protect the door and intermediate lining from intense heat.

We claim the combination and arrangement of the iron plate, A, lining, J, and lining, K, substantially as described.

We claim making the lining of furnace doors in one piece of white clay fire brick crucible material.

We claim fastening the lining to the iron plate by the bars of metal, L L, substantially as described.

We claim the holes in the door in combination with the lining for the purpose specified, substantially as described.

53,895.—Rectifying Apparatus.—Thomas Simmons, Chicago, Ill.:

I claim the combination and arrangement of the reservoir, A, the receiver, B, the connecting pipe, C, provided with the stop cock, D, or its equivalent, and the steam pipe, L, arranged and operating as and for the purposes specified.

I claim the combination and arrangement of the reservoir, A, the perforated chamber, P, the receiver, B, connecting pipe, C, and steam pipe, L, operating as and for the purpose set forth.

53,896.—Annular Auger.—Robert Stewart, Elmira, N. Y.:

I claim making the thread of a hollow auger with openings, c, substantially as and for the purposes set forth.

Revolving each outer hollow auger in a reverse direction from its next inner hollow auger, substantially as and for the purposes set forth.

Arranging a series of hollow augers so that the rear end of each auger shall project sufficiently beyond the next larger auger to turn as its own shaft in independent journal boxes, substantially as and for the purposes set forth.

53,897.—Buttonholes for Paper Collars.—Daniel Stoner, Chicago, Ill.:

I claim the combination in a buttonhole for card board paper collars and cuffs, or collars and cuffs of any similar material, of the enlargements, A and B, proportioned as specified, and the peculiarly constructed slit connecting the same, all arranged and operating substantially as specified and shown.

53,898.—Lamp Cleaner.—Edmund F. Sutton, New York City:

I claim the elastic self-adjusting wiping finger on one side of the stick or shaft, in combination with the fixed wiper on the opposite side of the stick or shaft, the two operating together, substantially as herein specified.

53,899.—Planes for Making Blind Slats.—Enoch K. Thomas, Rock Island, Ill., and Hans H. Andreson, Davenport, Iowa:

We claim the construction of a cutter for producing slats with one or two cutting edges, and opening through the shank of the cutter for the passage of the slats, substantially as described.

The combination of one or more slat cutters, constructed substantially as described, with a plane stock having its sole stepped, substantially as set forth.

53,900.—Exercising Machine.—T. P. Thorpe, New York City:

I claim making use of wire, or its equivalent, for the seat, E, the rods, N, the springs, C C the base or foundation, A A A, and the feet, B B B B, as herein formed or combined and described, and for the purposes herein mentioned.

I also claim the toy horse or balance weight marked, P, and sliding on rods, N N, as described for the purposes herein mentioned.

53,901.—Cotton Picking Machine.—A. Tiensch, Memphis, Tenn.:

First, I claim the employment of rotary brushes, or their equivalent, substantially as described, for the purpose of gathering cotton from the plants.

Second, Mounting a series of movable brushes upon a carriage in such manner that upon moving the carriage over rows of cotton plants said brushes will draw the cotton from the pods and deliver it in the machine, substantially as described.

Third, The combination of movable and stationary combs, k l, or their equivalents, with rotary brushes which are adapted for gathering cotton from the pods, substantially as described.

Fourth, Providing the movable combs, l, with clearers, p, or their equivalents, substantially as described.

Fifth, The combination of a slotted or open guard plate, E, with a series of brushes adapted for picking cotton from the pods, substantially as described.

Sixth, The hinged doors, D D', forming the upper and lower sides of a cotton receiver, in combination with the devices for gathering cotton from the pods, substantially as described.

Seventh, Locating the driver's seat, P, in such relation to the cotton receptacle that the driver can see when this receptacle is filled, and also manage the horse drawing the machine.

Eighth, Constructing the sides, A A, of the carriage body so as to form side guards on each side of the gathering part of the machine, substantially as described.

Ninth, Providing for adjusting the brushes and securing them at any desired hight according to the hight of the cotton plants, substantially as described.

Tenth, The hinged brace, M, and tongue, I, applied to the carriage of a cotton picker or gatherer, substantially as described.

Eleventh, The combination of an adjustable seat, P, with contrivances which will admit of the adjustment of the front part of the machine, substantially as described.

53,902.—Propeller Wheel.—Thomas Tripp, Chicago, Ill.:

I claim constructing the blades of a propeller screw with two reversed curves which shall be arcs of the two circles last above described, as and for the purposes specified and shown.

53,903.—Furnace Grate Bars.—George O. Tupper, New York City:

I claim the furnace grate bars, the rib or lower part of which is corrugated longitudinally, with one or more corrugations on each side, substantially as herein described, and for the purposes set forth.

53,904.—Grain Hoisting Apparatus.—Otis Tufts, Boston, Mass.:

I claim the transversely movable valve seats, k, in combination with the pulling shaft, o, and rack and pinion, m m, or equivalent, for the purpose of stopping, starting, regulating the speed, and reversing the direction of motion in grain hoisting apparatus, substantially as represented.

I claim, in combination with a hoisting apparatus, and more particularly with the starting and stopping cord or rod thereof, of a closed vessel filled with liquid, and provided with a piston, when such cord or rod is arranged, as by movement imparted thereunto, to open or close apertures which will by allowing the liquid to pass the piston permit motion of the hoisting apparatus, or by preventing the liquid from passing, the piston will stop the hoisting apparatus, and hold it from moving substantially as described.

I claim the combination with the stopping and starting cord or rod of a hoisting apparatus, of the valves of a liquid stop apparatus, and the steam valve or movable seat of the steam engine motor, operating substantially as described.

53,905.—Percolator.—P. H. Vander Weyde, Philadelphia, Pa.:

First, I claim the method herein described of making extracts and for filtering purposes, which consists in dividing the column or vessel to contain the material to be extracted or filtered, into a series of horizontal layers or divisions, which by suitable mechanical means may be moved upward so as to allow the addition of the fresh materials to the bottoms, and its removal from the top when extracted, substantially as described.

Second, I claim the manufacture of artificial bone black from wood charcoal, and its use for filtering purposes, either alone or mixed with compounds of lime or magnesia.

53,906.—Water Wheel.—Henry Van Dewater, Buffalo, N. Y.:

First, I claim the cycloidal buckets, c, applied to the wheel in connection with the inclined flange, b, at the top of the wheel, and the band, B, at the outer edge of the lower part of the buckets, provided with an inner inclined or beveled surface, substantially as set forth.

Second, Constructing the cylinder, A, of the wheel with a horizontal partition, a, in connection with openings, h, made in said cylinder below the partition and the chamber, D, in which the wheel shaft, C, is stepped, substantially as and for the purpose specified.

53,907.—Sash Supporter and Fastener.—Isaac H. Wait, Otisco, Mich.:

I claim combining with an overpoised lever, B, pivoted to the window frame and having a permanent hook or jaw, c, upon it, a second pivoted hook or jaw, i, and so made as that one or both of said hooks may act in connection with a holder or holders, f f, on the sash, substantially in the manner and for the purpose herein described and represented.

53,908.—Trunk Hinge.—William Wakensham and Theodore A. Dunham, Newark, N. J.:

I claim a hinge for trunks, chests, and other articles provided with lids having cleats or "valances" attached constructed in angle form so as to extend or lap over the ends or sides of the trunk or other article and the end or side "valances" of the lid, substantially as herein shown and described.

53,909.—Seeding Machine.—Z. D. Waters, Brookville, Md.:

First, I claim the arrangement of one or more seed cups within a hopper box, F, in such manner that said cup or cups shall elevate the seed above the bottom of the hopper and discharge the seed into a funnel, g, which conducts it out of the hopper, substantially as described.

Second, Conducting the seed and fertilizer from two funnel hoppers, g g', into an inserted funnel-shaped guard, G, substantially as described.

Third, The construction of the seed or fertilizer hopper of a cylindrical chamber, b, communicating with an upper receiver through slotted opening, d, substantially as described.

Fourth, The combination of the elevated receiving hopper, g, with the cylindrical vessel, b, and one or more revolving seed elevators, substantially as described.

Fifth, The conical hooped scatterer, I, arranged beneath the discharging apertures of the hoppers, g g', and surrounded by a conical skirt or guard, G, substantially as described.

Sixth, Extending the upper ends of the receiving hoppers, g g', above the plane of the apertures, a a, leading into the cylindrical chambers, b b, substantially as and for the purposes described.

Seventh, Providing for discharging seed or fertilizing substances, or both, from a hopper by means of revolving elevators or cups which are entirely inclosed within said hopper, substantially in the manner described.

Eighth, Attaching the coverers, m m, to a forked standard, which is constructed substantially as described.

53,910.—Cotton Gin.—Joseph Watrous, Jr., Mystic River, Conn.:

I claim in combination with the slide frames the removable side castings and deflecting boards, arranged as described.

53,811.—Cultivator.—Edward P. Wheeler, Nebraska City, Neb. Ter.:

First, I claim the arrangement of the levers, F, pivoted standards, L, and plow beams, D, as described.

Second, I claim pivoting the levers, F, and standards, L, to the plow beams by means of the longitudinally arranged pins or rods, p, as and for the purposes shown and set forth.

Third, I claim providing said levers when arranged with the standards, L, as set forth, with the knee rests, l, as and for the purposes specified.

Fourth, I claim the combination of the hinged beams, D, standards, L, levers, F, and hooks, d, arranged as described and shown.

Fifth, In combination with the beams, D, and standards, L, I claim the arrangement of the adjustable standard, P, and cross bars, Q R, as described.

Sixth, I claim the combination of the cross marking bar, T, provided with shovels, V, with the drags, J, for the purpose set forth.

Seventh, I claim the combination and arrangement of the standards, L, P, the levers, F, beams, D, cross bar H and brace, I, when arranged, so as to render said standards, L, rigid, for the purpose of plowing in grain, as shown and specified.

53,912.—Churn.—Edwin P Whitcomb, Coldwater, Mich.:

I claim the combination of the frame which supports the gearing, the reverse motion, diamond-shaped right-angle blades, or beaters, as described, with the space or water chamber which surrounds the churn substantially as herein set forth.

53,913.—Manufacture of Candy.—H. C. Wilkins, Albany N. Y.:

I claim the composition of matter above described for the manufac

ture of candy, together with the process of making the same, substantially as set forth in the specification.

53,914.—Transmitting Power.—Jacob Woolf, Burr Oak, Mich.:

I claim the shaft, B, the arms, G G, with the shafts, H H, and weight boxes, K K, arranged substantially as described, and operating either by pulleys, E, E and I I, and belts, or by toothed gearing, or by any device to accomplish the same end, so as to cause the weight, K, or their equivalents to be thrown out of balance in such a manner, that one shall be constantly further from the axis of the shaft, B, than the other, and thereby aid it in its revolution, as and for the purpose set forth.

53,915.—Rotary Engine.—Henry J. Behrens (assignor to himself, Henry C. Dart, and Edward Dart), New York City:

First, I claim the concentric fixed hubs, recessed substantially as described, in combination with the two-geared shafts, their attached pistons and the cylinder, substantially as herein set forth.

Second, The pistons attached to the facing sides of the two disks, secured to their respective shafts, and so arranged that the piston or pistons of one shaft work against the face of the disk of the other shaft, substantially as herein described.

53,916.—Hame for Horse Collars.—John E. Brown (assignor to himself, Charles A. Mott, and A. A. Peebles), Lansingburgh, N Y.:

First, I claim the adjustable collar, B, arranged with the spring, d g, and the spring, f, in combination with the holes, b, in the plate, a, at the outer edge of the hame, substantially as and for the purpose set forth.

Second, The loop, E, bent in right angular form, notched at its rear or outer end, and secured to the hame by the eyes, g, to admit of the eye, j, of the trace strap being adjusted higher or lower in the loop, and retained as adjusted by the pole straps, substantially as shown and described

53,917.—Baling Press.—J. B. Gridley, Louisville, Ky.:

First, I claim in a baling press, the levers, G G, having their inner ends applied to or near the center of the follower, in combination with hangers, rods or bars, I I, which afford the fulcra for said levers, and a rope, chain or other draught device, whereby the loose ends of the levers are made to approach each other, substantially as and for the purposes herein specified.

Second, In combination with the levers which are made to act upon the follower, by having their loose ends moved toward each other, and which have their fulcra upon hangers, rods or bars, I claim a rope chain or any other device which shall impart motion to the follower, before the levers attain their effective acting position, substantially as and for the object set forth.

Third, I claim the means substantially as herein described, for adapting the levers, in assuming the position from which they act, to stand at the definite angle with the hangers or rods, I, from which they may be most speedily made to take the position in which to act, effectively upon the follower, said means, consisting either of the widening of the levers at the points where the hangers or rods are attached, or in the application of the metallic blocks, H, or their equivalents.

Fourth, I claim the combination with the levers, G G, hangers, I I, and rope, K, of the follower C, D, ribs, d', and guide slots, a, the latter being adapted to prevent the tilting or canting of the follower, in its movements through the press-box, as explained.

Fifth, I claim the particular manner of constructing the point which connects the levers with the follower, to wit: by means of the three parts, E F F, connected by a single pintle, c, as herein described.

Sixth, I claim the metal blocks, H H, attached to the levers, G G, and provided with hooks, f f, and guides, d', to which hooks, f f, the rods, I I, are connected, substantially as and for the purpose herein set forth.

53,918.—Metallic Fastening for Plow Beams.—Lewis Gibbs (assignor to Bucher, Gibbs & Co.), Canton, Ohio:

I claim a metallic fastening for uniting a plow beam and handle, made with lugs, flanges and recesses, and united thereto in the manner and for the purpose herein described and represented.

53,919.—Coffer Dam.—Aaron Filmore (assignor to himself, B. H. Austin, Jr., and Adolphus S. Austin), Buffalo, N. Y.:

I claim a portable coffer dam, A, (with or without a movable end piece, A2), for the purpose and substantially as described.

53,920.—India Rubber Hat and Cap Band.—William H. Halsey, Hoboken, N. J., assignor to David W. Mapes, Orange, New Jersey:

I claim the combination of the two rollers, with their surfaces prepared as described, one roll having a sunken or depressed and the other an elevated surface, substantially as, and operating as and for the purposes set forth.

53,921.—New Article of Manufacture from Hard Rubber, to be used in Articles of Dress.—William H. Halsey, Hoboken, N. J., and Maurice Fitzgibbons, New York City, assignors to David W. Mapes, Orange, N. J.:

We claim as a new article of manufacture, hard rubber or gutta percha, or similar material, ornamented by being subjected to two or more successive pressures or impressions of figured rolls, substantially as above described.

53,922.—Hard Rubber or Gutta Percha for Articles of Dress and other use.—William H. Halsey, Hoboken, N. J., and Maurice Fitzgibbons, New York City, assignors to David W. Mapes, Orange, N. J.:

We claim the process herein, substantially as described, which consists of subjecting hard rubber, gutta percha, or other similar material, to two or more successive pressures of figured rolls, substantially as and for the purposes above described.

53,923.—Stencil Brush.—Daniel K. Herr, Locust Valley, Pa., assignor to Theodore W. Herr, Lancaster, Pa:

First, I claim the combination of the brush tube, G, and the external casing, B, constructed and operating substantially in the manner and for the purpose specified.

Second, The brush, J I, when expressly made or adapted to my brush tube, G, and to be used in combination with the external casing, B, in the manner and for the purpose set forth.

53,924.—Nail Plate Feeder.—C. D. Hunt, Fairhaven, Mass., assignor to the American Nail Machine Company, Boston, Mass.:

I claim the combination and arrangement of the double rack bar, K, the pawls, I I, the lever, G, the spring, M, and the cam, H, as applied to the vibratory arm, A, and the shaft, E, substantially as specified.

53,925.—Stovepipe Damper.—Sumner Marvin (assignor to himself and Alfred W. Boynton), South Royalston, Mass.:

I claim the damper apparatus, composed not only of the frustum, A, having the opening, b b, but of the two dampers, C, D, and their connecting rod, E, made and arranged together, and with a flue or pipe, B, substantially as specified.

53,926.—Eyeleting Machine.—Andrew A. Reed, North Bridgewater, Mass., assignor to Elmer Townsend, Boston, Mass.:

I claim the combination of the stationary work-supporting surface, the punch, and the setting mechanism, when the latter is arranged to feed the eyelet laterally to, or under the hole punched for its insertion, substantially as described.

I also claim the construction by which the eyelet is removed by the feed pin, directly from the magazine, without the intervention of a chute or roadway, substantially as described.

I also claim the combination of a stationary eyelet magazine, with a rotating ring, provided with pockets, into which the eyelets are thrust, substantially as described, and from which they are removed by the feeding instrument, substantially as set forth.

53,927.—Sewing Machine for Sewing the Sweat Linings to Hats.—Frederick S. Sanford and Dwight Wheeler (assignors to Glover Sanford and Sons, and Dwight Wheeler), Bridgewater, Connecticut:

We claim the work plate, D, guides, E and F, constructed and arranged substantially in the manner described, in combination with a stitching apparatus, for the purpose specified.

53,928.—Detaching Boats from Davits.—E. H. Sheffield, Stonington, Conn., and E. P. Palmer (assignors to E. H. Weston), New York City:

We claim the jointed hooks, c, fitting into sockets, d, on the ends of a boat, A, in combination with the retaining chains, f, and with suitable mechanism for tightening or releasing said chains, constructed and operating substantially as and for the purpose described.

53,929.—Harvester Rake.—Thomas Taylor (assignor to Samuel C. Ridgeway and John Fox), Baltimore, Maryland:

I claimed the combined action of the crank shaft and curved arm of the raker, moving in the swiveled guide for giving motion to, and operating the raker, as herein recited.

53,930.—Horse Shoe.—Cassius M. Werner (assignor to himself and Edwin A. Bigelow), Rockford, Ill.:

First, I claim forming the clasps with open loops, as and for the purpose described.

Second, Casting the clasps in one piece with the flange bar, as described, for the purpose set forth.

Third, The combination of the sole, the ribs, the flange bars and the clasps substantially as described.

53,931.—Artificial Leg.—James W. Weston and Frederick Buckner, New York City, and Reinhold Bocklen, Brooklyn, N. Y., assignors to James W. Weston New York City:

First, We claim an ankle joint formed by a spring of rubber or other suitable material, provided with recesses in its top and bottom surfaces, in combination with corresponding projections on the foot and limb, substantially as specified, so that the foot is allowed a limited motion in any direction, but is brought properly back to its place by said spring, as set forth.

Second, We claim forming the ankle joint spring in the manner specified, with the front portion thereof more rigid than the back portion, in order that the foot may conform to the surface stepped upon, as set forth.

Third, We claim a connecting bolt with rounded heads or nuts in combination with the elastic ankle joint, substantially as and for the purposes specified, and in combination therewith we claim the sheet-steel socket for the heads, as set forth.

Fourth, We claim the elastic stop block or blocks applied as shown, to arrest the forward movement of the lower limb, as specified.

Fifth, We claim the hooks, 11, formed of a bent piece of metal passing around the limb at the joint to strengthen the same, in combination with an elastic contractile band or spring applied between said hooks to throw the lower limb forward, as specified.

Sixth, We claim adjusting the limb to the conical shape of the stump by the lining of veneer or other suitable material, rolled up with the edges lapping and attached at the upper end to the artificial limb, in combination with the curved adjustable wedge, or its equivalent, as and for the purposes specified.

Seventh, We claim the conical filling pieces introduced into the artificial limb, as specified, to adjust the limb to the stump, as set forth.

53,932.—Saddle and Harness.—Achille Angeline, Genoa Italy:

First, I claim in the manufacture of cushions or pads for riding saddles, pack saddles, and harness of all kinds, of elastic substances, such as vulcanized gutta percha or caoutchouc when of the form and shape, substantially set forth.

Second, The formation of said elastic substances into tubes, double tubes, dice, knobs, or spheres, substantially as and for the purposes herein set forth.

53,933.—Rocket.—William Hale, London, England:

I claim the application of the principle by which the expansion of the whole volume of the gas as it issues from the vent is made to subserve the purpose of producing rotation in the rocket about its longitudinal axis, substantially as described.

53,934.—Steering Apparatus.—Morris West Ruthven, Middlesex County, England. Patented in England Nov. 10, 1864:

I claim in combination with a tiller operated by gears, pivoted levers and links, substantially as herein described, a weight or spring which reserves or stores the power with which the water forces the rudder in one direction, and is applied to aid the helmsman in putting the rudder over in an opposite direction, substantially as set forth.

53,935—Peat Machine.—James Hodges, Penny Hill, Bagshot, England:

First, I claim the pulping trough and separator, E F, provided respectively with the spider diaphragms, I, and fixed bars, K, and also provided with the shaft, G, having upon it the vanes, J, and bars, L, all arranged to operate in the manner substantially as and for the purpose set forth.

Second, The pulping and distributing trough, N, provided with diaphragms, c, having a varying number of arms, and also provided with valves, apertures, or slides, Q, at its bottom, and with a shaft, O, having vanes, P, upon it, arranged to operate substantially in the manner as and for the purpose specified.

Third, The combination of the screw excavators, elevator and pulping mechanism applied to a vessel, and arranged for joint operation, substantially as and for the purpose set forth.

Fourth, The preparing of the peat bed with subsoil drains, substantially as described, when used in connection with a vessel provided with an excavator and pulping apparatus, substantially as set forth.

53,936.—Rudder.—Morris West Ruthven, Middlesex Co., England. English Pat. July 11, 1863:

I claim in combination with a rudder composed of a series of hinged sections, the connecting of said sections at their upper ends by means of a slotted crank or lever on one part that receives in its slot a pin or antifriction roll on the next adjacent part, and so on throughout the series, to cause the parts when moved by the rudder to assume an approximate curve, substantially as described.

53,937.—Sluice for Propelling Vessels.—Morris West Ruthven, Middlesex County, England. Patented in England May 1st, 1865:

I claim the employment in the propelling of vessels of rotating sluices such as are herein described, each in combination with two outlet passages, the sluice in each case being arranged to turn with its axis while the periphery and ends of the sluice are free as may be from contact with the inclosing surfaces of the chamber in which the sluice is contained, by which arrangement the sluice may be turned comparatively free from friction, and consequently requires but little power to turn it.

53,938.—Swing.—John F. Hartman, Fond du Lac, Wisconsin:

I claim the combination and arrangement of bar, B, and swing bars, D D, with the levers, E F G and H, and rope, I, substantially as and for the purposes set forth.

53,939.—Pump.—A. Leuchtweiss, Cincinnati, Ohio:

I claim the sharp-edged abutment, c, in combination with the discharge passage, a, screw, C, and cylinder, A, constructed and operating substantially as and for the purpose described.

REISSUES.

2,221.—Gang Plow.—N. F. Burton, of Galesburg, Ill. Patented Oct. 28, 1861:

First, I claim the device for adjusting the beams, A A', by means of plate, f, and clamps, e e, and bars, g g, substantially as set forth, whereby the depth of penetration of the plows, M and I, may be changed at pleasure.

Second, The combination of the subsoil plow, I, having a long-winged mold board, with the surface plow, M, arranged as and for the purpose set forth.

Third, The attaching of the axle, D, to the beams, A A', through the medium of the bail-shaped rod, L, in combination with the arm, H, attached to the axle, D, and having its bearing or fulcrum on the rod, L, as herein described, whereby the depth of the penetration of both plows may be regulated at pleasure, and they may also be made to run out of the ground when desired.

2,222.—Lock.—Rudolph Vollschwitz and J. J. Schnaepfer, (assignees by mesne assignments of F. Randolph) New York City. Patented July 25, 1865:

First, We claim a lock with a tubular case, B, containing a bolt, D, and one or more tumblers, E, to be operated from either side by a key, K, substantially as and for the purpose set forth.

Second, The latch, F, in combination with the bolt, D, and tubular case, B, constructed and operating substantially as and for the purpose described.

2,223.—Revolving Fire-Arm.—J. J. Greenough, New York City, assignee of James Warner, Springfield, Mass. Patented June 24th, 1856:

First, I claim the employment of a pin or other projection as described in the shield or rear frame for receiving recoil of the breech constructed as herein described, at a point just behind and in rear of a chamber that is on a line with the barrel when in position to be discharged for firing the arm, as and for the purposes above set forth.

Second, I also claim making the pin or projection, E, adjustable, substantially as and for the purposes set forth.

Third, I claim the cavities, i i, in the battery plate, c, in such position and of such form as to receive and hold the ball or balls in case of the accidental discharge of any of the chambers not in adjustment with the barrel, as described.

2,224.—Harvester.—Reuben Hoffheins, Dover, Penn. Patented May 20th, 1862:

First, I claim a sweep rake which is mounted upon the heel of the finger beam proper, or upon the inner front corner of the platform of a harvester which has its cutting apparatus and platform hinged to the draft frame, all in such manner that the rake arm sweeps the platform from front to inner side, and maintains a correct position in relation to the finger beam and platform during the rising or falling movements thereof on the joint or joints by which the finger beam is connected to the draft frame, substantially as set forth.

Second, A rake rotating upon an axis which is perpendicular to the top surface of the platform, or nearly so, and having its arms successively turned up, substantially as and for the purpose described.

Third, The angular rake arms rotated independently of the axis, f, and controlled substantially as described, in combination with a guide way which is perpendicular, or nearly so, to the said axis, f, of the rake head, substantially as and for the purpose described.

Fourth, Elevating and depressing revolving rake and reel arms by means substantially as described, whereby I am enabled to dispense with an incline plane or camway, as set forth.

Fifth, An inclined standard or support, F, or its equivalent, rigidly mounted upon a loosely-hinged platform or finger beam, and adapted for supporting a sweep rake in an unchanging position in relation to said platform without obstructing the free motion of the platform or finger beam, substantially as described and shown.

Sixth, A standard or support, F, which sustains the sweep rake above the draft frame or driving wheel thereof, said standard being mounted directly and wholly upon a hinged finger beam or the platform thereof, substantially as described and for the purpose set forth.

Seventh, A revolving toothed-head or crown wheel, J, constructed with supports for rake and reel arms, in pairs, said supports being arranged outside and around the axis of said wheel, J, substantially as and for the purpose described.

Eighth, In a harvesting machine which has its cutting apparatus hinged or jointed to the main frame in such manner as to allow it to conform at both ends to the undulations of the ground, and a rake mounted upon the said jointed cutting apparatus, or upon the platform thereof, I claim so constructing and arranging the several parts that the support of the rake can occupy a position outside of the inner drive wheel, B, or a position which is between the point of suspension, h, and the outer divider, G, and can also be hung, or be suspended below the draft frame, substantially as described.

Ninth, Effecting a combination of a rake and reel located substantially as described, and a finger beam and platform with the main frame, by means of a hinged draw bar, b, a hinged brace, I, a hinged suspender, f, and an extension bracket, 2, or their equivalents, substantially as and for the purpose described.

Tenth, The combination of a rake and reel, a yielding draw bar, b, inner shoe of the cutting apparatus and hinge-joint, e, on the draw bar, substantially as and for the purpose described.

Eleventh, Preventing a too sudden or abrupt deflection of a rake and reel mounted upon a hinged-joint cutting apparatus by carrying the point of suspension beyond the rake support, towards the centre of the draft frame by means substantially as described.

Twelfth, A continuously revolving rake which is mounted directly and wholly upon the platform or finger beam so as to rise and fall therewith independently of the draft frame, when said rake is located between the centre of the draft frame and the outer divider, and passes in at the front of the machine upon the platform and sweeps around to the inner side of the platform, substantially as described.

Thirteenth, The combination with a double hinged joint combined reaping and mowing machine, of a sweep rake which enters at the front of the machine upon the platform, in such manner that the rake and cutting apparatus rise and fall together while reaping; and also in such manner that the rake and platform may be readily removed and the cutting apparatus at its inner and outer ends allowed to float upon the ground and to accommodate itself at both ends to the undulations of the ground, substantially in the manner described.

Fourteenth, The combination of a suspended hinge joint cutting apparatus of harvesters and a combined rake and reel, which is mounted directly and wholly upon the suspended platform or hinged finger beam, substantially as and for the purpose described.

Fifteenth, Controlling the rake and reel arms by an upper and lower guide between which an attachment of the respective rake and reel arms passes, substantially as described.

Sixteenth, The combination of a combined rake and reel mounted upon a hinge joint cutting apparatus, and a yielding belt tightener, substantially as and for the purpose described.

Seventeenth, The employment of a yielding belt or chain tightener, or its equivalent, in connection with harvesters which are constructed with a hinged-joint cutting apparatus, substantially as and for the purpose described.

Eighteenth, The pulley support, Q, with its pulleys, W2 W2, in combination with a band or chain, N, and pulleys, W1 W3, substantially as and for the purpose set forth.

Nineteenth, Providing in a harvester with the rake attached to its hinged finger beam or platform, an extensible means for driving the rake, which will permit the platform and rake to rise and fall together and accommodate themselves, independently of the draft frame, to the undulations of the ground, substantially as described and for the purpose set forth.

2,225.—Knitting Machine.—Joseph Hollen (assignee by mesne assignments to John Nesmith), Blair, Penn. Patented July 16th, 1850—extended 7 years:

First, I claim forming the needle in the manner substantially as described, so that each needle shall be capable of being separately projected and withdrawn in the operation of knitting, by the application thereto of mechanism, substantially such as described, for producing these movements.

Second, I also claim the above described means of projecting and withdrawing the separate needles, or any other substantial equivalent of a knitting needle when used to perform its functions.

Third, I also claim the arrangement of the needles on a cylinder, in the manner described, in connection with the described means of moving or revolving the cylinder as a needle carrier.

Fourth, I also claim the combination of the jack, the sinkers and depressers, substantially as described.

Fifth, I also claim the thread bearer, v, having an extended sideway motion to and fro, at each stitch, by which it lays the thread across the needle at each stitch, and returns with it to be ready for the next stitch.

Sixth, I also claim the spring vise for regulating the supply of thread to the needle, opened by the rod, W, substantially as described.

Seventh, I also claim the particular arrangement and combination of the several parts of the machine by which their various motions are derived from a single crank and screw thread, substantially as described.

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RESULT OF THE VAN DE WATER WHEEL CHALLENGE.—MESSRS. EDITORS:—I see in your issue of the 24th inst., a notice with the above heading, with a very one-sided statement of a trial of my Water Wheel with Leffel & Co.'s, which was in every way unfair. The wheel that Leffel & Co. put in Mr. Burbank's Mill was a new one, got up with great care, with polished steel buckets, after his first one was beat, using twenty inches more water than my wheel. According to Leffel & Co.'s table, twenty inches of water under fifteen feet head gives 6·44 horse-power. Now, 6·44 horse-power under fifteen feet head ought to grind six and one-half bushels of wheat per hour, or thirty-six barrels in 24 hours more than my wheel, and he *only claims* beating me 24 barrels in 24 hours, which would show the result of the trial to be in my favor. I am told by a party who knows all the particulars of the trial, that the stones which my wheel run were not in good order, and that it was an unfair trial. I had no notice, nor any one there to see to my interest in the matter. I do not know which drove the most machinery besides the mill stones; my wheel generally drives all the machinery in the mill except two smut mills. My wheel was all cast iron, rough as it came from the foundery, not polished buckets, the first tried from that pattern, using twenty inches less water under fifteen feet head, grinds twenty-four barrels flour less in twenty-four hours than the Leffel wheel. If I had been in Leffel & Co.'s place I should have kept quiet about that trial. I intend to build a wheel venting the same amount of water as the Leffel wheel, when I will let the public know the result. With regard to the challenge, my offer is still open for Leffel & Co.'s acceptance; the Five Thousand Dollars is still ready as I proposed, with a fair trial at grinding.

Below I give Mr. Burbank's certificate, saying my wheel used less water than the Leffel wheel. The new Leffel wheel vents the same as the old one. I see the certificate which Leffel & Co. publish says they did not measure the amount of water used, that it was only as fair a test as could be made without measuring water; as if the amount of water used was of no importance in a trial of the power of water wheels. Very respectfully,
HENRY VAN DE WATER.
Buffalo, N. Y., March 27, 1866.

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RESULT OF THE VAN DE WATER CHALLENGE.—MESSRS. EDITORS:—The readers of your valuable paper will recollect that in your issue of Nov. 11, 1865, Mr. Van De Water challenged any water-wheel builder to compete with his make of wheel for $500. In your issue of Dec. 9, 1865, I accepted his challenge, and named $5,000 as the competing sum, and appointed Fairmount Water Works, Philadelphia, Pa., as the place of trial, where not only the relative merits but the actual percentage of each wheel (large or small) would be made known to the public.

Mr. Van De Water evaded this by proposing the test should be made in Rochester, N. Y. I had some thirty of my wheels at work in Rochester—one of them in G. W. Burbank's mill, that had been running three and a half years, which had three or four buckets knocked out. Mr. Van De Water put one of his wheels in the same mill, and by running against my wheel in that condition, deluded himself into the belief that his wheel was equal to mine. Hence the challenge. I replaced my wheel in Burbank's mill with one that was in order. Without my knowledge a test was recently made; for the result I refer you to the article below, signed by six responsible millers and mill owners of Rochester. This, Messrs. Editors, we suppose is the reason Mr. Van De Water evades the test, after having made a public challenge. JAS. LEFFEL & CO.,
Springfield, Ohio, March 6, 1866. for Jas. Leffel.

ROCHESTER, N. Y., Feb. 28, 1866.

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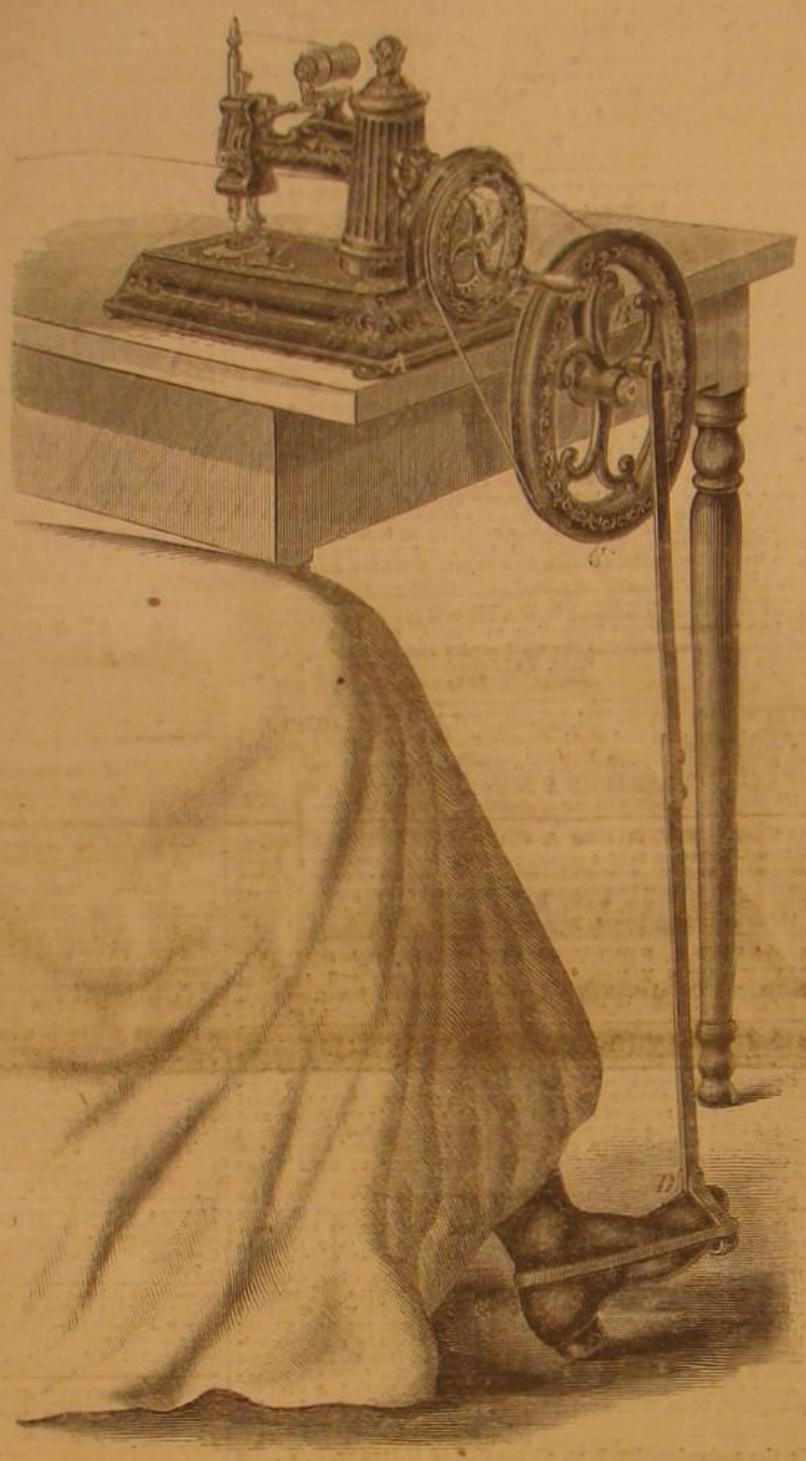
Improved Motion for Sewing Machines.

Many of the lower-priced sewing machines have no treadle or other means of applying power, except a small balance-wheel and a handle therein. It is difficult to get sufficient velocity on these machines without driving the hand and arm at such a rate that the operator is soon tired out; moreover one hand is always occupied in moving the machine so that attention is distracted from the work, which is often injured thereby. The engraving published herewith shows a method of attaching a treadle to such machines so that they are moved by the foot of the operator the same as all other machines. The treadle only has to be purchased where the operator has the machine, and not an expensive piece of cabinet work such as the table often is.

The method of attaching the treadle is as follows:—A cast-iron plate, A, is fitted to two studs on the bottom of the machine and is prolonged at the end furthest from the reader to receive a clamp, B, which carries the main driving wheel, C. From this wheel a rod proceeds to a stirrup, D, at the end, which constitutes a treadle, light and durable. It can be easily put on and taken off any table without marring the surface, and will greatly facilitate operations.

The machine to which the treadle is attached is very neatly got up and does good work for one of its class, that is, the single thread machine.

For further particulars address J. G. Folsom, Winchendon, Mass., who has an application pending before the Patent Office on this invention.



FOLSOM'S MOTION FOR SEWING MACHINES.

Academy of Sciences.

Father Secchi sent an account of the spectra of some stars, as seen by him recently in a new spectrometer by Merz, with a prism by Hofmann, of Paris. A drawing of the spectrum of *α* Orionis accompanied the communication. The spectrum of Sirius is decribed by the learned author as resembling that of sulphur.

M. De Vergnette-Lamotte sent a long memoir "On the Preservation of Wines by the Employment of Heat." M. Pasteur, reviving an old suggestion of Appert, proposes to heat wine for a few minutes to 75° or 80° C. The author objects to this, and says it is better to submit the wines for some time to a temperature not exceeding 45°. He seems to admit, however, that Appert's or Pasteur's plan answers well with the more saccharine and alcoholic wines, like ports and sherries, etc.

M. Fouque presented a memoir "On the Chemical Phenomena of Volcanoes." Only the general conclusions of the author are given in the *Comptes Rendus*, and the most interesting of these is the last. The author wished to demonstrate that the contact of sea water with the molten mass on which the solid crust of the earth rests is sufficient to account for all the eruptive phenomena. With this view he made some synthetical experiments, having for their object the reproduction of some of the substances he had found in the fumaroles of Mount Etna. In the course of his experiments he found that steam alone decomposes chloride of sodium, forming caustic soda and hydrochloric acid; and, further, that sulphate of lime and chloride of sodium react on each other in the presence of the vapor of water, producing sulphate of soda, and many other compounds he has noticed in volcanic emanations. Is it possible that the first of these observations may lead to the simplification of the soda process?—*Chemical News.*

Extension of Patents.

Many valuable patents are allowed to expire every year for the want of a little care on the part of patentees in not applying for an extension. The petition must be filed in the Patent Office at least ninety days before the expiration of the patent, which gives time for the preparation of testimony. Inventors who have patents dated in 1852, and who may wish to have them extended for seven years, can receive all necessary advice how to proceed, by addressing this office.

HOPKINS'S WATER COOLEER.

This water cooler is composed of an inner and an outer casing, with the intervening space filled with any non-conducting material. The inner casing is made to receive the ice as it is delivered to the consumer without the necessity of cutting away the corners and otherwise breaking it—as in the ordinary round cooler. The great loss of ice resulting from the necessity of cutting it into small pieces and exposing a much greater amount of surface to the water is avoided, while the external dimensions do not have to be any larger than in ordinary coolers.

After the block of ice is placed with the water in the cooler, as in ordinary ones, the covers are replaced and the water may be replenished through the reservoir, A, which is so arranged as to shut off all communication with the external air to the interior of the cooler. Hence, there is no necessity for removing the cover except to introduce more ice.

A glance at the reservoir will always indicate the hight of the water in the interior of the cooler. As the water is introduced gradually at the base of the ice, says the inventor, with the covers tight, it does not melt as rapidly as when poured upon it from above with the covers off, which, at the same time, admits the warm surrounding air.

It is claimed that this cooler will save from thirty-three to fifty per cent of ice, as it was in use last season, while the cost will be but a trifle more than ordinary coolers. Samples may be seen at the warerooms of J. Hall Reohrman, No. 606 Cherry street, Philadelphia, where orders will be received. State rights will be disposed of on application to the patentee, No. 1,107 Walnut street.



It was patented Jan. 16, 1866, by E. E. Hopkins, of Philadelphia, Pa.

FAST WORK.—Benj. F. Avery, of Louisville, Ky., informs us that for three months past he has finished 2,000 plows per week. He turned out over 622 in one day, which, we should say, was rapid work.

OF THE 529,241 persons who visited Kew Gardens last year 260,040 arrived on Sundays, and 269,201 on week days.

MECHANICS

INVENTORS, MANUFACTURERS

The SCIENTIFIC AMERICAN is the largest and most widely circulated journal of its class in this country. Each number contains sixteen pages, with numerous illustrations. The numbers for a year make two volumes of 416 pages each. It also contains a full account of all the principal inventions and discoveries of the day. Also, valuable illustrated articles upon Tools and Machinery used in Workshops, Manufactories, Steam and Mechanical Engineering, Woolen, Cotton, Chemical, Petroleum, and all other manufacturing and producing interests. Also, Fire-arms, War Implements, Ordnance, War Vessels, Railway Machinery, Electric, Chemical, and Mathematical Apparatus, Wood and Lumber Machinery, Hydraulics, Oil and Water Pumps, Water Wheels, Etc.; Household, Horticultural, and Farm Implements—this latter department being very full and of great value to Farmers and Gardeners. Articles embracing every department of Popular Science, which every body can understand and which every body likes to read.

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Scientific American.

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

Vol. XIV.—No. 18. (NEW SERIES.)

NEW YORK, APRIL 28, 1866.

$3 PER ANNUM IN ADVANCE.

Apparatus for Receiving and Delivering Mail Bags with the Train in Motion.

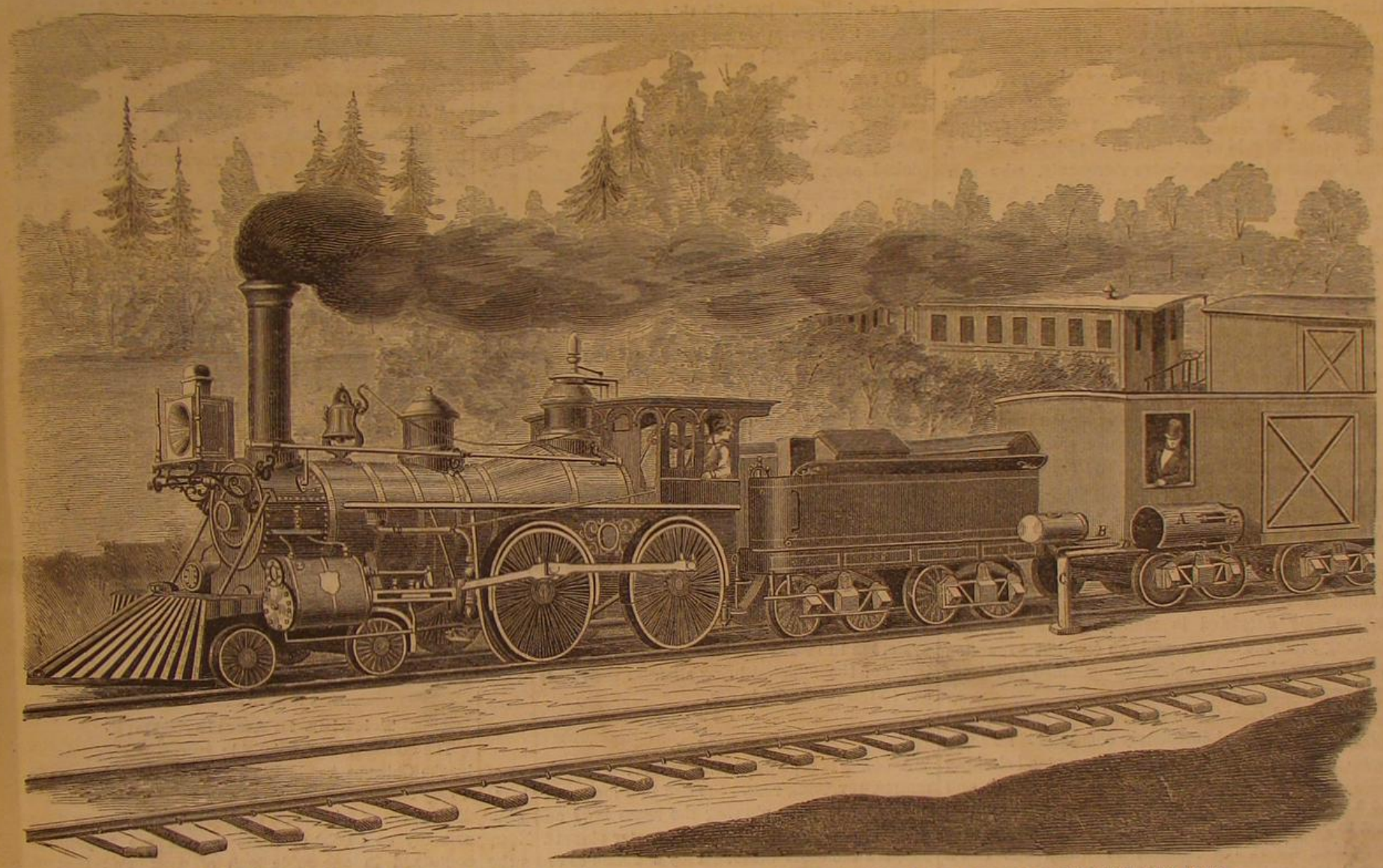
In many parts of the country the post offices are some distance from the railroad, and the stoppage of trains merely to deliver the mails is a costly piece of business. Not only are three or four hundred persons detained on their journey, but the pecuniary loss involved arising from the waste of power in checking the momentum and then overcoming the inertia of a heavy train on starting, soon reaches a considerable figure.

In order to avoid this continual expense it has been suggested that the mail bags might be caught, or snatched in a twinkling, as the train thundered on without pausing in its passage. In some parts of England, we are given to understand, this scheme has been carried out in the following manner—our informant did not observe the arrangement very closely and does not vouch for its accuracy:

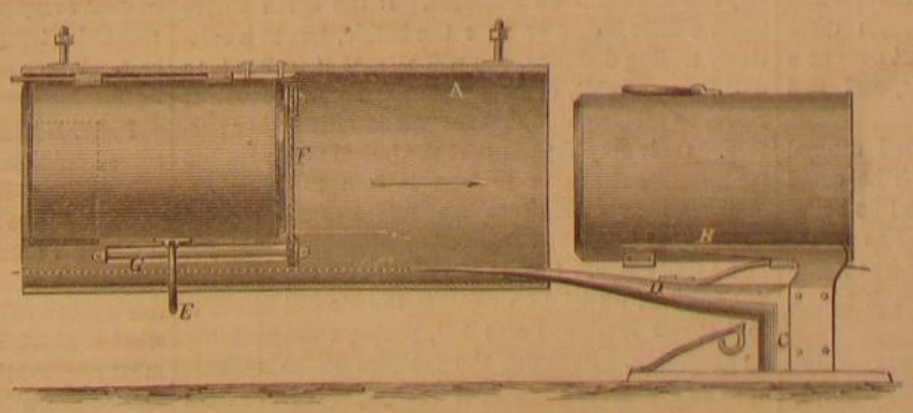
By the side of the track a substantial post is erected with a projecting arm; from this the mail bag is suspended at the proper hight. On the train is another arm which can be lowered down. At all other times it is safely housed. When the mail is to be caught, this arm on the train has a stout net on it which is so adjusted with reference to the bag that when the two come in contact the bag will be caught and detached from its position; remaining in the net both by its own weight and the pressure exerted on it by the air.

A plan similar to this is here given, but it is much more certain in its operation. The details are shown in the small figure, while the position of it when in operation is shown in the perspective.

A cylinder, open at both ends, is connected horizontally to the side of the mail or post-office carriage of the train. The mail to be delivered from the train is placed in a cylindrical case, A, or mail bag; this mail bag is placed in the rear end of the cylinder, and is supported therein by loops on its exterior, being slid on to a rod fixed to the top of the cylinder, A. The forward end only of the rod is fixed to the cylinder, so that the loops by which the mail bag is suspended may slip freely off its rear end, and permit the mail bag to pass out the rear of the cylinder.



CHAVANNES'S APPARATUS FOR DELIVERING AND RECEIVING MAIL BAGS ON MOVING TRAINS.



The mail bag to be picked up by the train is placed in a similar bag or case to that which contains the mail to be delivered, and the bag rests, or is supported on parallel rods, B, carried by the arm, C, which stands at the side of the line of rails. The arm is placed in such a position that the mail bag supported by it will be raised into the cylinder carried by the mail carriage as the train passes. The cylinder for this purpose is made of sufficient internal diameter to allow of the mail bag or case entering the cylinder in spite of any rocking motion there may be in the carriage. A slot is also formed through the bottom of the cylinder from one end to the other, so that the bottom of the cylinder may not come in contact with the arm which supports the mail bag to be picked up. When the latter enters the cylinder, the mail bag to be delivered (which has previously been placed in the cylinder) strikes against the mail bag to be picked up, and imparts its momentum to it, so that the bag to be delivered passes out of the rear end of the cylinder, while the other remains in the cylinder and is carried on within it. The mail bag which passes out of the cylinder is received on a rod, D, which passes through a ring, E (see Fig 2), on the under side of the bag. This rod is supported by the arm which carries the bag to be picked up.

To insure that the mail bag to be picked up by the cylinder shall not pass out at the rear end, a net work or partition of tarred ropes, F, is placed across the center of the cylinder. This net work is connected to the cylinder by rings or eyes which run on rods, G, within it, so that the net work may be capable of sliding backward a distance toward the rear end of the cylinder.

Each of the mail bags is furnished with a buffer or pad at its end so as to lessen the blow of the two bags when striking against each other, and in order,

that the contents of them may be preserved from the violent action which would otherwise occur.

These are the main points, and the operation of them is readily understood.

It was patented through the Scientific American Patent Agency, by Andre Chavanne of Paris, France, on July 25, 1865. For further information address Seyton & Wainwright, 30 Wall street, New York.

WHAT I SAW OF THE PEARL FISHERY.

The *Leisure Hour* publishes a long communication with the above title, giving the writer's experience in the island of Ceylon, but the following extract is all that relates strictly to the subject of pearl fishing:

We found Condatchy Bay the scene of much animation; for more than one hundred and fifty boats, principally from the Coromandel and Malabar coasts, had reached the bay, and their crews were making preparations for engaging in pearl fishing, which was not to commence until the 16th of the month, three days after our arrival.

An oyster bank is divided into five parts, only one of which is fished in a year, and each in turns. This prevents the bank from being completely stripped, and gives the young oysters a chance of reaching maturity. The right of fishing on certain portions of the bank is sold at auction to the highest bidder, and purchased by speculative merchants, who gen erally lose money in the business. This, however, does not prevent them from engaging in it, since there is a chance of a large fortune being made at it in one season.

Each fishing boat is manned by twenty men, beside a *tindal*, or man acting as pilot, who has authority over all the others. Ten of the twenty men are divers; the others attend on them, pull the boat, and perform all other duties.

The oyster banks off Condatchy are about twenty miles from the shore; and early on the evening of the 15th more than a hundred boats were manned by men anxiously waiting for the signal for them to start for their respective fishing grounds.

At ten o'clock in the evening a gun was fired at Arippo. It was a signal that the boats might start; and setting a sail to catch the land breeze, then fairly on its way for the sea, we started. I had consented to form one of the ten of a boat's crew, whose duty consisted in managing the boat and looking after the divers; and, on our first excursion out, Senhor Manos, who had commanded the brig, was our *tindal*, or pilot.

We reached our station a little before sunrise, and preparations were immediately commenced for business. The divers divested themselves of all clothing except a small piece of calico about the loins; and to a belt around the waist each fastened a small net to hold the oysters. Each had a piece of iron weighing about ten pounds, to which was tied a small line with a loop in which a foot could be inserted. These weights were to enable them to descend with greater rapidity to the bottom; for, as they could only remain under water from one minute and a half to two minutes, it was necessary that no time should be lost on the way down.

One end of the small line attached to the weight was retained in the boat, to enable us to recover the weight after the diver had reached the bottom and withdrawn his foot from the loop. Although there were ten divers in each boat, only five went over at a time. This enabled each to have a rest, and still kept the work constantly going on.

Each man before going over had placed around his body, under the arms, a line by which he could be pulled to the surface, the end of the line being held by one of the crew in the boat; and as an additional precaution against danger, a line was hanging from the stem of the boat, and sunk with a weight to the bottom.

With a knife in one hand, and firmly grasping the nose with the other, five of our divers went over the side, and rapidly disappeared below, while those in the boats saw that the lines attached to their bodies ran out clear, and stood ready to pull them up, should the signal be given for us to do so.

This was the first work of the kind I had ever seen performed, and the minute and a half or more in which we waited for the shaking of the lines, which was the signal for us to haul up, seemed to me a period of nearly ten minutes.

All came up within a few seconds of each other, and each had not less than one hundred oysters in the net. The diver attached to the line I was holding was the first to make an appearance, and required much more force in pulling him up than what I thought was necessary; but as he reached the surface, the reason of this was immediately seen. He was bearing in his hands a mass of oysters adhering together, which he had succeeded in detaching from a rock with his knife. The mass could not have weighed less than forty pounds.

The other five divers immediately went down; and in this way the work was carried on until noon, the divers having gone down about forty times each since the time they commenced in the morning. The sea breeze had then commenced blowing, and we started for the shore.

Thus far we had been fortunate; and yet there was a possibility that in the many bushels of oysters we had secured there might not be a pearl of the value of one shilling. But with this possibility there was another: the cargo we had procured might be worth five or ten thousand pounds.

On reaching the shore the oysters were taken from the boat, put into a pit, and then covered over with matting and some earth, there to die and decompose. The shells would then be open, when they would be picked over, and the pearls, if they contained any, would be extracted.

More than two thousand men had been at work on the banks that day, and many tuns of oysters had been taken from their homes to die.

"What," thought I, "can be the real cause of this labor, this waste of time for a substance that is of no practical use to mankind?"

To many of those I had seen employed that day an answer to this question would have been very simple. They would have told me that they were working for money; but I looked beyond this for the real cause of their toil.

The conclusion at which I arrived may be wrong, perhaps worse—ungallant; for all this wicked waste of time I ascribed to the fact that ladies have vanity. From the result of this infirmity thousands of others have to suffer. It seems that the law of nature, that from the misfortunes of a few many must suffer, applies to pearl oysters as well as human beings; for since being in the fishery I have learned that only oysters in ill health produce pearls; yet the misfortunes of the afflicted bring all from their beds in the sea to the earth pits to die.

Bolides.

A bolide is a planet in miniature: a small mass of matter, revolving round the sun in a longer or shorter elliptical orbit, obeying the same laws and governed by the same forces as the greater planets. Now, suppose the orbit described by a bolide to cross the orbit of the earth, exactly as one road crosses another; and, moreover, that the two travelers reach the point of junction or crossing at the very same time. A collision is the inevitable consequence. The bolide, which, in respect to size, is no more than a pebble thrown against a railway train, will strike the earth without her inhabitants experiencing, generally, the slightest shock. If individuals happen to be hit, the case will be different. If the earth arrive there a little before or after the bolide, but at a relatively trifling distance, she will attract it, cause it to quit its own orbit, dragging it after her, an obedient slave, to revolve around her until it falls to her surface. Or it may happen that the bolide may pass too far away for the earth to drag it into her clutches, and yet near enough to make it swerve from its course. It may even enter our atmosphere, and yet make its escape. But, in the case of its entering the atmosphere, its friction against the air will cause it to become luminous and hot, perhaps determining an explosion. Such are the meteors whose appearance an enormous hights our newspapers record from time to time.

Be it remarked that bolides are true planets, and not projectiles shot out from mountains in the moon, as has been conjectured. A projectile coming from the moon would reach the earth with a velocity of about seven miles per second. But the most sluggish bolide travels at the rate of nearly nineteen miles per second, fast goers doing their six-and-thirty miles in the same short space of time. None of the interior planets travel so rapidly as that. Mercury, the swiftest of them all, gets over only thirty miles per second. Mr. Tyndall states that this enormous speed is certainly competent to produce the effects ascribed to it.

When a bolide, then, glances sufficiently close to our earth to pass through our atmosphere, the resulting friction makes its surface red hot, and so renders it visible to us. The sudden rise of temperature modifies its structure. The unequal expansion causes it to explode with a report which is audible. If the entire mass does not burst, it at least throws off splinters and fragments. The effect is the same as that produced by pouring boiling water upon glass. The fragments, falling to the ground, are aerolites. It is needless here to cite instances of their falling. They are of universal notoriety. Aerolites have no new substance to offer us. If the earth, therefore, be made up of atoms, we may conclude that the universe is made up of atoms.—*All the Year Round.*

Weakness of Large Flues.

An engineer of one of the English boiler insurance companies relates the following incident:—

"As an instance of the value of the hydraulic test, the following is worthy of record. A large, one-flued boiler was proposed for insurance with this company, which was in course of being generally overhauled and repaired and also enlarged by the addition of several feet to its length The old flue tube was 3 feet diameter throughout, $\frac{3}{8}$ plates, the new part of tube was gradually enlarged to about 3 feet 4 inches, the total length being about 38 feet. The proposed load on safety valve was 60 lbs. per square inch. It was suggested to the owners to strengthen the tube by angle iron hoops or cross tubes, and their attention was directed to the fact that the calculated load (per Mr. Fairbairn's formula), under which such a flue might be expected to collapse, was little over 80 lbs. per square inch. It was also recommended to apply the hydraulic test after the alterations, etc., were completed. Unfortunately the tube was not strengthened as advised, and on the test being applied, the flue collapsed almost the entire length, when the pressure had reached about 83 lbs. per square inch, thus illustrating most forcibly the correctness of the formula referred to, and the value of the hydraulic test; as, had the boiler been set to work, the flue would in all probability have failed with fearful result."

Trichina in American Pork.

The committee of scientific gentlemen appointed by the Chicago Academy of Science, have just made a very complete report on the origin, growth and disposition of trichina. Their researches show that as many as 10,000 of these insects are sometimes contained in one cubic inch of pork, and that an average of one in every 50 of the hogs in the Chicago market is more or less affected, and the comparative immunity from the disease which our own people have enjoyed, undoubtedly results from the habit of cooking meat before eating it, while in Germany it is eaten raw by the poorer classes on account of the high price of fuel. For its distruction the committee say:—"It is simply necessary to cook it thoroughly so that every portion of the meat shall have experienced a temperature of at least 160 degrees Fahrenheit. We cannot insist too strongly on this point."

Prof. Newman says, contrary to the generally received opinion, birds prefer to fly against the wind. The quails of Europe almost invariably start on their passage of the Mediterranean with a head wind, and if it chops round and blows fresh from the southwest, they are drowned by thousands, and their dead bodies are washed ashore for weeks afterwards. When the wind is abaft, it gets under the bird's feathers in the most aggravating manner, and upsets his equilibrium and equanimity at the same time.

A Cork Ship.—The Mobile papers report the arrival of a great curiosity at that city, a vessel made entirely of cork, which is lying at one of the wharves. That she will never sink may be true enough, but the other claim of the Mobilians, that "she will last forever," requires some proof.

PAPER MADE FROM WOOD.

In our last number we briefly noticed the wood paper works just started at Manayunk in Philadelphia. We regret very much that we were unable to accept the invitation of Messrs. Jessup & Moore to visit the works in company with the large number of gentlemen present on the 12th inst. The N. Y. *Times* supplies the following account of the process, which will read with interest:

The Manayunk Pulp Works, we were informed, were begun in August, 1864, and completed during the present month. The buildings are built of stone and brick, and occupy a space of about 1,000 feet in length by 350 in width, and cost over $500,000. The canal and river are close to them, and the Flat Rock Paper Mills make part of the establishment, which covers in the aggregate ten acres of ground. These are without doubt, the most extensive works of the kind in the world, and are capable of producing from twelve to fifteen tuns of paper pulp per diem, while the straw pulp produced by the Flat Rock Mills averages daily from 7,000 to 8,000 pounds. The works were projected by a company of gentlemen from different parts of the Union, and the subscribed capital is estimated at from ten to fifteen millions of dollars, and the investments, or active capital employed in the Wood Pulp Works and the Flat Rock Paper Mills, is between one and two million dollars. These works will increase the daily production of printing paper about 13,000 pounds, lessening to that extent the consumption of rags, thus diminishing the price of both.

The present process for pulping wood was begun about the year 1850, by Mr. Hugh Burgess. Various improvements have at different times been made in the apparatus, until perfection may almost be said to be attained. The chief part of the process is a secret, but some idea of its wonderful nature can be given by a brief description. The wood which is to be made into pulp is taken into the chopping house, containing two choppers, capable of cutting each over 35 to 40 cords of wood every twenty-four hours. The wood is reduced in these choppers to little chips, which are received in cars and conveyed by an elevator to the boilers, ten in number, situate in a building 75 by 132 feet. These boilers can turn out 300,000 pounds in pulp (dried) in twenty-four hours. Here the chips are boiled in alkali for five or six hours, until the fibers are separated, when the mass, mixed with chemicals, is blown into vats below. The chemicals held in solution are then drawn from the pulp by water, and then the pulp is afterward taken out and bleached in the usual manner. When bleached it is put into a vat in the drying house, when, being diluted with water, it assumes the consistence of weak milk. From this vat it is conveyed through a pipe to a sort of tank, from which it is made to run over a revolving cylinder, and the water being drawn off, the pulp adheres to one side of the cylinder, from which it runs on a blanket to other cylinders, until it becomes dry enough to maintain consistency. It passes over thirteen cylinders before it is sufficiently dry to be cut into sheets. The sheets intended for bookmaking are sent to the mills at Wilmington, while those for newspapers are taken to the Flat Rock Mill adjoining, where they are mixed with straw material, in the proportion of eighty per cent of wood to twenty of straw, to give the requisite degree of softness and tenacity. It will be noticed that in the production of pulp no mechanical action is used, chemical means only being employed.

In all these vast buildings nothing but the smoke that goes out from the chimneys is wasted. The liquid which runs off from the pulp is "recovered" in the round house, a building two hundred feet in diameter. Here are twelve furnaces, from which a blast is carried over the surface of the liquor, flowing in boilers below, which deprives it of its ligneous and other adulterations. The residue, with a due mixture of white ash, is again brought into requisition in the tanks. Whatever there is of residuum after these processes, is employed for manure. Adjoining the round house is an alkali storehouse and a mixing house, and kilns for the manufacture of marble lime required in the alkali department. At the north end is a settling pond to furnish clear water for the works. It is 300 feet square, 10 feet deep, and has a capacity of 5,500,000 gallons. All the mills are worked by water power. The consumption of wood for this establishment may be inferred from the fact that its stock of that necessity on hand at this time is about 15,000 cords. It employs comparatively few hands, most of the labor being done by machinery.

THE SOLAR SYSTEM.

The following catalogue has been compiled expressly for the SCIENTIFIC AMERICAN, and embraces all the members of the solar system known up to January 1, 1866, except those comets whose elliptical orbits have not been well ascertained. Although America was late in the field of astronomical research, she has shared with the old world the glory of some of the grandest discoveries in astronomy. We can claim a new ring and satellite to the planet Saturn, eleven planets, and upwards of twenty comets :

Name.	By whom and when discovered.	Period of revolution.
Mercury	The ancients.	88 days
Venus.	"	225 "
Earth	"	
Mars	"	1 yr 11 m
Ceres	Piazza, at Palermo, Jan. 1801.	4 yrs 7 m
Pallas	Olbers, Bremen, March 28, 1802.	4 yrs 7 m
Juno	Harding, Gottingen, Sept. 1, 1804.	4 yrs 4 m
Vesta	Olbers, Bremen, Dec. 29, 1807	3 yrs 7 m
Astrea	Hencke, Driessen, March 8, 1845.	4 yrs 1 m
Hebe	" " July 1, 1847.	3 yrs 9 m
Iris	Hind, London, Aug. 13, 1847.	3 yrs 8 m
Flora	" " Oct. 18, 1847.	3 yrs 3 m
Metis	Graham, Ireland, April 25, 1848.	3 yrs 8 m
Hygeia	DeGasparis, Naples, April 12, 1849.	5 yrs 7 m
Parthenope	" " May 11, 1850.	3 ys 10 m
Victoria	Hind, London, Sept. 13, 1850.	3 yrs 7 m
Egeria	DeGasparis, Naples, Nov. 2, 1850.	4 yrs 2 m
Irene	Hind, London, May 19, 1851.	4 yrs 2 m
Eunomia	DeGasparis, Naples, July 29, 1851.	4 yrs 4 m
Psyche	" " Mar. 17, 1852.	5 yrs
Thetis	R. Luther, Bilk, Ger., Ap. 17, 1852.	3 ys 11 m
Melpomene	Hind, London, June 24, 1852.	3 yrs 6 m
Fortuna	" " Aug. 22, 1852.	3 yrs 9 m
Massilia	DeGasparis, Naples, Sept. 19, 1852.	3 yrs 8 m
Lutetia	Goldschmidt, Paris, Nov. 15, 1852.	3 ys 10 m
Calliope	Hind, London, Nov. 16, 1852.	5 yrs
Thalia	" " Dec. 15, 1852.	4 yrs 2 m
Themis	DeGasparis, Naples, April 5, 1853.	5 yrs 7 m
Phocea	Chacornac, Marseilles, Ap. 6, 1853.	3 yrs 8 m
Proserpine	R. Luther, Bilk, March 5, 1853.	4 yrs 4 m
Euterpe	Hind, London, March 8, 1853.	3 yrs 7 m
Bellona	R. Luther, Bilk, May 1, 1854.	4 yrs 7 m
Amphritite	Pogson, Oxford, Nov. 1, 1854.	4 yrs 1 m
Urnia	Hind, London, July 22, 1854.	3 yrs 7 m
Euphrosyne	Ferguson, Washington, Sept. 1, '54.	5 yrs 7 m
Pomona	Goldschmidt, Paris, Oct. 26, 1854.	4 yrs 2 m
Polhymnia	Chacornac, Paris, Oct. 28, 1854.	4 ys 10 m
Circe	" " April 6, 1855.	4 yrs 5 m
Lucothea	R. Luther, Bilk, April 19, 1855.	5 yrs 2 m
Atalanta	Goldschmidt, Paris, Oct. 5, 1855.	4 yrs 7 m
Fides	R. Luther, Bilk, Oct. 5, 1855.	4 yrs 4 m
Leda	Chacornac, Paris, Jan. 12, 1856.	4 yrs 6 m
Laetitia	" " Feb. 8, 1056.	4 yrs 7 m
Harmonia	Goldschmidt, Paris, March 1, 1856.	4 yrs 5 m
Daphne	" " May 22, 1856.	3 yrs 8 m
Isis	Pogson, Oxford, May 23, 1856.	3 yr 10 m
Ariadne	" " April 15, 1857.	3 yrs 2 m
Nysa	Goldschmidt, Paris, May 27, 1857.	3 ys 10 m
Eugenia	" " June 28, 1857.	4 yrs 6 m
Thestia	Pogson, Oxford, Aug. 16, 1857.	4 yrs
Aglia	R. Luther, Bilk, Sept. 15, 1857.	4 ys 11 m
Melett	Goldschmidt, Paris, Sept. 9, 1857.	
Doris	" " Sept. 19, 1857.	5 yrs 6 m
Pales	" " Sept. 19, 1857.	5 yrs 5 m
Virginia	Ferguson, Washington, Oct. 4, 1857.	4 yrs 4 m
Nemausa	Laurent, Nismes, Fr., Jan. 2, 1858.	3 yrs 8 m
Europa	Goldschmidt, Paris, Feb. 4, 1858.	5 yrs 6 m
Calypso	R. Luther, Bilk, April 4, 1858.	4 yrs 3 m
Alexandra	Goldschmidt, Paris, Sept. 11, 1858.	4 yrs 6 m
Pandora	Searle, Albany, Sept. 10, 1858.	4 yrs 7 m
Mnemosyne	R. Luther, Bilk, Sept. 22, 1859.	5 yrs 7 m
Concordia	" " March 24, 1860.	4 yrs 5 m
Elpis	Chacornac, Paris, Sept. 12, 1860.	4 yrs 6 m
Danae	Goldschmidt, Paris, Sept. 9, 1860.	5 yrs 2 m
Echo	Ferguson, Washington, Sep. 14, 1860.	3 yrs 8 m
Echo	Lesser, Berlin, Sept. 14, 1860.	5 yrs 6 m
Ausonia	DeGasparis, Naples, Feb. 10, 1861.	3 yrs 8 m
Angelina	Tempel, Marseilles, March 4, 1861.	4 yrs 5 m
Cybele	" " March 8, 1861.	6 yrs 5 m
Maid	H. P. Tuttle, Cambridge, Apr. 10, 1861.	4 yrs 4 m
Asia	Pogson, Madras, Ind., Apr. 17, 1861.	3 yrs 8 m
Leto	R. Luther, Bilk, April 29, 1861.	4 yrs 7 m
Hesperia	Schiaparelli, Milan, April 29, 1861.	5 yrs 7 m
Pomopea	Goldschmidt, Paris, May 8, 1861.	4 yrs 5 m
Niobe	R. Luther, Bilk, Aug. 13, 1861.	4 yrs 7 m
Feronia	Peters, Clinton, N.Y., Jan. 29, 1862.	4 yrs 5 m
Clytia	Tuttle, Cambridge, April. 7, 1862.	4 yrs 4 m
Galatea	Tempel, Marseilles, Aug. 30, 1862.	4 yrs 7 m
Euridice	Peters, Clinton, Sept. 22, 1862.	4 yrs 4 m
Freya	D'Arrest, Copenhagen, Oct. 23, 1862.	6 yrs 5 m
Frigga	Peters, Clinton, Nov. 12, 1862.	4 yrs 5 m
Diana	R. Luther, Bilk, March 15, 1863.	4 yrs 3 m
Eurynome	Watson, Ann Arbor, Sept. 14, 1863.	3 ys 10 m
Sappho	Pogson, Madras, May 3, 1864.	3 yrs 6 m
Terpsichore	Tempel, Marseilles, Sept. 30, 1864.	4 ys 10 m
Alcmene	R. Luther, Bilk, Nov. 27, 1864.	4 yrs 7 m
Beatrice	DeGasparis, Naples, Apr. 26, 1865.	3 yrs 9 m
Clio	R. Luther, Bilk, Aug. 25, 1865.	3 yrs 7 m
Io	Peters, Clinton, Sept. 19, 1865.	4 yrs 4 m
Jupiter	The ancients.	11 ys 9 m
Saturn	"	29 ys 5 m
Uranus	W. Herschel, Slough, Mar. 13, 1781.	84 y 10 m
*Neptune	Galle, Berlin, Sept. 23, 1846.	164 y 8 m

*Theoretically discovered by Le Verrier and Adams prior to this date.

PERIODICAL COMETS.

Name.	By whom and when discovered.	Period of revolution.
Encke	Pons, Marseilles, Nov. 26, 1818.	3 yrs 4 m
DeVico	DeVico, Rome, Aug. 22, 1844.	5 yrs 5 m
Winneck	Winnecke, Bonne, March 8, 1858.	5 yrs 6 m
Brorsen	Brorsen, Kiel, Feb. 26, 1846	5 yrs 6 m
Biela	Biela, Josephstadt, Feb. 26, 1826.	6 yrs 6 m
D'Arrest	D'Arrest, Leipsic, June 27, 1851.	5 yrs 3 m
Faye	Faye, Paris, Nov. 22, 1843.	7 yrs 4 m
Tuttle	Tuttle, Cambridge, Ms., Jan. 4, 1858.	13 ys 7 m
Peters	Peters, Constantinople, June 26, '46.	12 ys 9 m
Halley		76 ys 3 m
Pons	Pons, Marseilles, July 20, 1812.	70 ys 8 m
Olbers	Olbers, Bremen, March 26, 1815.	73 y 11 m
Tuttle	Tuttle, Cambridge, July 18, 1862.	123 y 11m
Peters	Peters, Albany, N. Y. July 25, 1857.	258 yrs
Tebbutt	Tebbutt, Australia, May 13, 1861.	415 yrs
Bremiker	Bremiker, Berlin, Oct. 22, 1840.	344 yrs
Donati	Donati, Florence, June 2, 1858.	1875 yrs

SATELLITES.

Earth.

Moon	The ancients.	

Jupiter.

1 Io	Galileo, Padua, Jan. 7, 1610.	
2 Europa	" " " "	
3 Ganymede	" " " "	
4 Calisto	" " " 13, "	

Saturn.

1 Mimas	W. Herschel, Slough, Sept. 17, 1789.	
2 Enceladus	" " Aug. 28, 1789.	
3 Tethys	Cassini, Paris, March, 1684.	
4 Dione	" " " "	
5 Rhea	" " Dec. 23, 1672.	
6 Titan	Huygens, Hague, March 25, 1655.	
7 Hyperion	G. P. Bond, Cambridge, Sept. 16, 1848.	
8 Japetus	Cassini, Paris, Oct. 25, 1671.	

Uranus.

1 Ariel	Lassell, Liverpool, Sept. 14, 1847.	
2 Umbriel	W. Herschel, Slough, Jan. 18, 1790.	
3 Titania	" " " 1787.	
4 Oberon	" " " "	

Neptune.

Not named	Lassell, Liverpool, Oct. 10, 1846.	

Rings of Saturn.

1 Bright ring Galileo, Pisa, Nov. 12, 1610.
*2 Dusky " G. P. Bond, Cambridge, Nov. 11, 1850.

*C. W. Tuttle, assistant at the Cambridge Observatory, first suggested, in 850, an interior dusky ring as a true explanation of the phenomenon discovered by Bond.

Schonbein on Ozone.

The rumor which you helped to spread abroad that Schonbein has succeeded in isolating ozone and antozone, attracted, it seems, the notice of the Scientific Association of France, and that learned body invited Schonbein to come to Paris and exhibit his experiments to the wondering gaze of Parisian savans. Schonbein's reply gives us the exact state of his knowledge or belief on the subject, and is worth communicating to English chemists. He says that he has been engaged almost exclusively, and without interruption, in the study of oxygen for thirty years, and during this time he has discovered a number of facts which allow of his drawing the following conclusions:—1. That oxygen may exist in three different allotropic states; 2. Two of these states are active, and opposed one to the other—he designates one of them ozone, and the other antozone; 3. Equal quantities of ozone and antozone neutralize each other to form ordinary neutral or inactive oxygen; and, 4. Ordinary neutral oxygen may be split up or transformed, half into ozone and half into antozone. The experimental demonstration of the truth of these conclusions, however, he admits, is not so simple—as for example, the composition and decomposition of water; and he adds that the experiments necessary for their logical deduction would occupy more time than could be devoted to a single lecture. "Some scientific journals," says Schonbein, "have been badly informed when they asserted that I had succeeded in isolating ozone and antozone in a state of purity. The assertion is without foundation. It is true that for a long time I have made a great number of attempts to arrive at this desirable end, but always without complete success. Ozone and antozone are always mixed with neutral oxygen from causes closely associated with the generation of the two active modifications." The Professor concludes his letter by offering to come to Paris, should it still be desired, and if his health permit, and give a short course illustrative of the whole subject. It is to be hoped he will be invited, and while here, perhaps he might be induced to go on to London, which I do not think he has visited since the year he announced his discovery of ozone.—*Paris Correspondent of Chemical News.*

DR. EBRARD observes that an adult leech, gorged with blood, requires nearly eighteen months in a state of captivity for the process of digestion. Young and free specimens require six weeks or two months.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening, April, 12, 1866, the President, Prof. S. D. Tillman, in the chair.

THE WAY TO MAKE A FILTER.

Mr. Thompson, of Cayuga, N. Y., described his method of making a filter. He divides a deep wooden tub by a tight vertical partition through the middle, perforating the partition at the bottom with numerous small holes. The tub is nearly filled on both sides of the partition with granulated charcoal made from sugar maple, and screened through a mesh of one-sixteenth of an inch, the fine dust being separated by bolting. The foul water enters the tub on one side at the top, passes downward and through the small holes in the partition, and rises upward on the other side, leaving its impurities, both solid and gaseous, in the charcoal.

Mr. Thompson stated that one practical difficulty that he had encountered in filters was the adhesion of the water from cohesive attraction to the walls of the filter, down which it flows in narrow channels without passing through the purifying material. To remedy this he now surrounds the filter on the inside with a series of narrow ledges, sloping downward and inward, which conduct all the water into the body of the charcoal.

The best wood for making charcoal for filters is boxwood, but it is impossible to obtain enough boxwood for the purpose. The wood that comes next to this in excellence is sugar maple, and this, consequently, is employed. It must be burned twice, once under turf, and afterward in a tight retort or cylinder, the combustion being continued till all the gaseous products are expelled.

Charcoal is far better to catch the solid impurities in water than sand, or even than broken quartz. If carefully burned and granulated, so as to preserve the fibrous structure, each one of the little pores may be seen under a microscope surrounded by a serrated edge, presenting the best surface possible for arresting any matter floating in the water. As in addition to this power of mechanically separating the solid impurities, charcoal possesses in the highest degree, the power of absorbing the gases held in solution by water, it is, unquestionably, the best of all materials for filters.

Mr. Thompson said that his filters would occasionally become fouled, and the water for a few days would be unfit to use; the filter would become clear again and the water would be as sweet as ever. He asked for an explanation of this action.

[The explanation is doubtless this: The solid organic matter collects in the filter until it has accumulated in sufficient quantities to induce decomposition, when it gives off carburreted and sulphurreted hydrogen, and the other offensive gases which are the usual products of animal and vegetable decay.—Eds. Sci. Am.]

Professor Everett remarked in relation to the method of preparing the charcoal, that if Mr. Thompson would examine the mode followed by powder makers, he would find it more simple than the one that he had described.

Dr. Parmelee observed that the best filtering is soft brick.

PEAT.

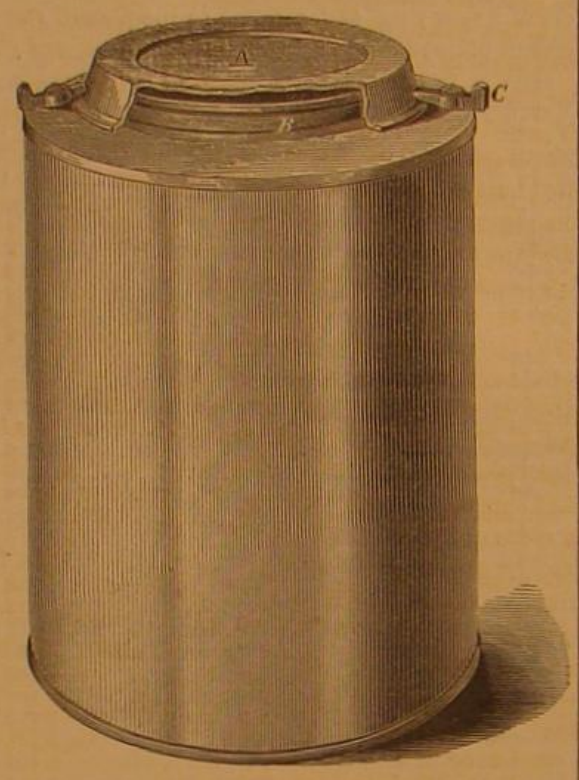
The President announced the regular subject of the evening, which was peat. A long discussion followed, but we report for our columns only the statement of—

Mr. Hirsh. At a previous meeting the assertion had been made that in refining sugar, peat charcoal would decolorize the sirup as well as bone charcoal, and Mr. Hirsh, being engaged as a chemist in a sugar refinery, decided to try the experiment. Into each of seven glass beakers, he put 15 grammes of peat charcoal, and into another beaker of the same form and size 15 grammes of bone charcoal. A glass tube was inserted into each beaker, with its lower end to the bottom of the beaker, and through these the coal was saturated with dark-colored sirup. After standing three hours—the usual time in large operations—the sirup was forced out at the top of the beakers by fresh charges poured through the tubes. That which had passed through the bone charcoal was perfectly white, while that which had passed through the peat was only partially discolored.

Mr. Hyde remarked that the peat used in this experiment had been burned four years, whereas it should be freshly burned.

ILLIG AND NEUBERGER'S FRUIT CAN.

The old way of preserving fruit for winter use was, as all persons know, to use an inordinate quantity of sugar and boil the fruit in the same till it lost all flavor. The result was an unwholesome preparation, totally devoid of the natural flavor of the fruit. A vast improvement on this is the method now in vogue of scalding the fruit and sealing it up hot in its own juice, in cans or jars made for the purpose.



These engravings represent an improved can for the purpose, which is admirably adapted for its object. The can has a tin cover, A, fitting over a projecting rim on the body of it; said rim having a rubber joint or gasket, B, let into a recess so that it cannot slip off. When the fruit is in and properly scalded, the cap is pushed down and immediately seals it up from contact with the air.

It sometimes happens that the steam from the scalding fruit lifts the cover again, so that air is admitted and the contents spoiled unless some one places a weight on top to keep it down; where there are many hundred cans in preparation at once this is a troublesome piece of work, and therefore the inventors provide two small buttons, C, which hold the cover firmly in place and prevent the evil referred to. This can has been in use one season, and is highly approved. The inventors wish to sell State, county, or shop rights to manufacture. For further information address Illig & Neuberger, 137 Clinton street, Buffalo, N. Y., by whom it was patented on April 11, 1865.

PROF. DOREMUS'S LECTURES.

At eight o'clock in the evening of Tuesday, April 17th, the Academy of Music, in Brooklyn, was filled from floor to dome with the best citizens of the place to listen to the first lecture of Professor Doremus's course, which he entitles "Views of Life through the Medium of Natural Science."

These lectures are an enterprise of the Mercantile Library Association, of Brooklyn, which has appropriated $3,500 for the experiments; $2 is charged for admission to each lecture, or $5 for the course of three. The stage was covered with tables loaded with elegant apparatus, all of the largest dimensions, and the scene painter had been employed to produce geological illustrations on a gigantic scale. As the lecturer spoke constantly from eight till half-past ten, it is impossible for us to give a verbatim report of his remarks; we select a few of the more interesting portions:—

THE THREE STATES OF MATTER.

After a brief and eloquent introduction, the speaker said that he should consider matter first in its three forms—solid, liquid, and gaseous, and the relations of these three forms to heat. He would exhibit experiments to show that when matter changes from the gaseous to the liquid state, or from the liquid to the solid, heat is generated; also other experiments to show that when matter changes in the reverse way, from the solid to the liquid, or from the liquid to the gaseous, heat is absorbed, or cold is produced.

THE COLOR OF GASES.

First, he would call the attention of the audience to the properties of gases. They are all transparent, and most of them are white and invisible, though a few are delicately colored. "This vase is filled with bromine gas, which is red, as you see. This contains chlorine, which derives its name from its green color. If I turn this vase over, which contains hydrochloric acid, those near the stage will perceive that some gases are possessed of odor as well as color."

THE WEIGHT OF GASES.

On the stage was a pillar some ten feet in hight, supporting at its top a balance beam about eight feet in length, from the ends of which were suspended scales of the same proportions. On one scale was an empty barrel, exactly poised by weight in the opposite scale. Two assistants took up a barrel of carbonic acid gas, and poured it into the barrel upon the scale. Of course the operation presented exactly the appearance of pouring nothing from an empty barrel; but the carbonic acid, being about once and a half heavier than atmospheric air, was poured as water would have been, and its weight was shown by the immediate tipping of the beam.

The weight of carbonic acid gas was exhibited in another manner not less impressive. A large tank full of the gas had been fixed among the scenes, at an elevation of some fifteen feet, and from the bottom of the tank at the front side a trough, ten or twelve feet in length, inclined downward at an angle of 45°. Two rows of short candles were burning in the bottom of the trough, and just beneath its lower end was hung a light overshot wheel, four feet in diameter, made of paper and laths. At a signal, an assistant, by pulling a string, opened a door in the side of the tank at the upper end of the trough, when the invisible gas flowed downward through the trough, extinguishing the candles in succession, and when it poured from the lower end upon one side of the overshot wheel, the wheel began slowly to revolve.

CARBONIC ACID.

"This vase is filled with carbonic acid. You see that it is as transparent and invisible as the atmosphere. I will dwell for a moment on its properties in consideration of the great part which it performs in the life of our globe. It is composed of carbon and oxygen. When it enters the leaves of vegetables it is decomposed by the force of the sunbeam; the oxygen returns to the atmosphere and the carbon enters into the composition of the grains and the roots that we eat. This gas is the supporter, therefore, of vegetable life—the original source from which we derive the food that sustains our own existence. The oxygen exhaled by the vegetable enters our bodies through the skin, as well as through the lungs, and coming again in contact with the carbon of our food enters into combination with it, and this gas is again produced. By this combination the heat of our bodies is maintained. Like Shadrach, Meshach, and Abed-nego, we are constantly burned without perceptible change. From this gas, then, we are originally formed, and to it principally we return. It is the alpha and omega—the beginning and the end of life."

THE PECULIAR COLDNESS OF SHERRY COBLERS.

Among the experiments intended to illustrate the absorption of heat when bodies are changed from the solid to the liquid state, was one which was thus described, as it proceeded:—

"If I put some water into this tumbler, add a little ice which is at the temperature of 32°, a little sherry wine, and a little sugar, and agitate the mixture till the sugar is dissolved; on introducing the thermometer into the liquid, I find the temperature is several degrees below that of the ice at the beginning. Those who have observed the peculiar coldness of a sherry cobler, will understand that it is due to the absorption of heat by the sugar in passing from the solid to the fluid state."

BURNING OF EXPLOSIVES IN VACUO.

After several other experiments similar to those o

which we gave an account last year, the lecturer said that he would exhibit one which, though not very impressive, was of very peculiar interest—this was the burning of explosives when removed from the pressure of the atmosphere. Though gunpowder contained sufficient oxygen to effect its combustion, yet when heated in a vacuum, it boiled away without any explosion; fulminating mercury and other fulminates behave in the same manner. Gun-cotton, if heated to incandescence in a vacuum, is slowly dissipated without combustion. A strip of gun-cotton was then attached to a loop of platinum wire, and placed in a bell glass. The wire was connected with the poles of a small galvanic battery, which soon brought it to a red heat. The lower end of the gun-cotton was charred, and when the current was broken it ceased to glow. The bell glass was then filled with air, and the cotton was taken out; on again closing the circuit the platinum wire was quickly reheated, when the gun-cotton vanished with a flash.

SCALE OF EXPERIMENTS.

Besides the novel experiments exhibited in these lectures, the ordinary class experiments are conducted on a scale which produces the effect of novelty. For instance, in burning potassium on water, a tank was used which extended entirely across the theatre in front of the stage, covering the whole area of the space usually occupied by the orchestra, and the middle of this tank contained several hundred pounds of ice in massive blocks; upon this water and ice half a pound or more of potassium pellets were scattered, producing most brilliant corruscations of violet and yellow sparks and flames, and filling the whole theater with a cloud of potash. Several gallons of liquid carbonic acid was condensed, and the bar of mercury frozen by it was a yard in length and two inches in width. To exhibit the combustion of steel in the blow pipe flame, a whole saw and half of a long sword were burned, the sparks pouring forth in a shower fifteen feet in length.

Professor Doremus has a remarkably clear, loud voice, and every word of his long lecture was heard in all parts of the house. The experiments succeeded each other so rapidly, that the audience was entertained and delighted to the close.

MATCH MAKING.

The query, what becomes of all the pins? might be met with another—what becomes of all the matches? We have often thought that as conveniences multiply and become common, people lose a sense of their value, so that, only those respectable persons, "the oldest inhabitants," appreciate them. In the "flint and steel" days, happily gone by, it was only by dint of much tinder, wind, and patience, that a light could be obtained, and unhappy sufferers in the pangs of colic or others yet more sorely oppressed, waited anxiously for the lucky spark that should fall on the tinder; brightening at last into a ruddy glow to chase away the darkness and the pain together.

Who attaches any consequence to a match? Certainly not he who seizes one at random from the safe on the wall, and curses it if it fails. Not he who finds a bundle of them ready at hand in all places, high and low. But despite the low estimation in which they are held, the manufacture of them is one of the most important of the minor branches of industry, in all countries.

Willis says in one of his poems—

"I am not old, my locks are not yet gray,"

but we can call to mind not long ago when matches were a curiosity and were carefully used, not squandered, as they now are. They were sold at a shilling per box, and in still earlier days at much higher prices. As to the quantity now made, it is something enormous. Even in one factory in this State they use in one year no less than 720,000 feet of pine of the best quality for matches, and 400,000 feet of bass wood for cases. Of sulphur—ill smelling compound—400 barrels are required, and of phosphorus 9,000 pounds. To make the boxes 500 pounds of paper are used daily, and for the larger boxes 8,000 pounds of pasteboard weekly. They also use 66 pounds of flour for paste every day, and the proprietors pay $1,440 for penny stamps daily.

A large factory in England has some peculiar features which are interesting. The wood to be made into matches is cut up into lengths which are afterward divided into the size of matches. These splints, as they call them, are then heated, or slightly charred on the ends, which is said to make them dip better; the paraffine and brimstone, both of which are used in the manufacture, being absorbed better by the hot wood than if cold.

The splints are next carried to one of the framing rooms. There are two of these, each seventy feet long by thirty-five feet wide, proportionate hight, and well ventilated. In these rooms the utmost activity prevails, upwards of three hundred children being employed in placing the prepared matches in frames previous to the combustible mixture being attached to the ends. In each room there are twenty-four tables, each having a stand for twelve persons.

The table is similar to a large school desk, but more upright. An iron frame is placed in a standing position, and from a quantity of matches lying on the flat part of it the framer takes and places a run at the bottom upon a small piece of board with notches in it to receive fifty, at equal distances apart, then piles one board upon another, each run having the fifty notches placed in the grooves, and in a few minutes the task is completed. The whole is then screwed tightly together, forming a compact mass. Each child takes her full frame, and according to her number—each person being known in the building by one—a mark is made on a slate by a person at the end of the room, when at the end of the day the number of frames each has filled is counted and paid for her portion at the end of the week. It is curious to the visitor to hear the constant reports of lucifers being trodden upon, but the floor being either of stone or iron, all danger of fire is done away with.

The room in which the composition is mixed and prepared is called the kitchen, and a very important place it is. Great care is required and the process is performed by two steady and skillful men. The ingredients are given to one of the men, who first mixes it in a pan, dry, similar to a cook making paste and when worked with the hands, sufficiently, is laid upon a stone or iron slab. Water is then added to it and a stiff paste made. It is then placed in pans and a certain quantity of glue added, to make it adhesive to the matches. Steam is used for all the heating processes.

The next process is the dipping, or covering the ends of the splints with the explosive material. A panful of the mixture is taken from the kitchen, and put into a receptacle of hot water, which is kept at a certain heat during the time required. The dipper takes the frames which are brought by the girls from the framing room, and (after the mixture is placed upon the iron slab, and regulated by a gage to about the thickness of one eighth of an inch) dips them into the thin paste, the whole of which is charged with the explosive ingredients.

After the matches have been dipped they are taken by the boys to the drying-rooms. These are three in number, one to each dipper, and they are built with every care for the prevention of accident. The floor is thickly spread with sawdust, which causes the loose matches to sink under the feet and thereby escape friction. The rooms are of arched brick, having double iron doors, and should a fire occur, these doors could be closed, and the ventilators or air-traps at top let down by the dipper, and the rooms hermetically sealed; the fire is then smothered. For every frame taken into the dipping room, one of a two days' drying is taken out to the packers; and from there being 50 splints in a row, boxes containing 100 or 200 are easily filled, very little calculation being required. Nevertheless, it is surprising to see how dextrously the filling is done, as is also the framing; many of the children not being more than nine or ten years of age, and their little fingers acting like clockwork.

The box making is the last round in the ladder, and forms a very good concluding part of the process of making a simple box of lucifers. The wood of the boxes is made of the best spruce-fir, pieces of a sufficient length having been placed upon a movable plane, which travels backwards and forwards upon a railroad. When the plane is cutting the wood it is pulled by steam power along the under surface of the block, it being securely held in its place at either end by screws and blocks. The slices are cut with amazing rapidity, and it requires two of these powerful machines to keep supplied the boys who prepare them for the boxes.

The boys take the slips or slices, and in quick succession place them upon a block which is gaged with thin pieces of metal. They then bring down upon the slice of wood, with some degree of strength, a block indented with a corresponding gage, which marks the grain of the piece of wood, so as to double it up into the shape of the box, and cut it off at the same time. One boy can cut or prepare twenty gross an hour.

Doubtless in our factories there are some improvements on these plans. If so we should be pleased to receive an account of them.

All Things in Motion.

In imagining the ultimate composition of a solid body, we have to reconcile two apparently contradictory conditions. It is an assemblage of atoms which do not touch each other—for we are obliged to admit intermolecular spaces—and yet those atoms are held together in clusters by so strong a force of cohesion as to give to the whole the qualities of a solid. This would be the case even with a solid undergoing no change of size or internal constitution. But solids do change, under pressure, impact, heat, and cold. Their constituent atoms are, consequently, not at rest. Mr. Grove tells us: "Of absolute rest nature gives us no evidence. All matter as far as we can ascertain, is ever in movement, not merely in masses, as with the planetary spheres, but also molecularly, or throughout its most intimate structure. Thus, every alternation of temperature produces a molecular change throughout the whole substance heated or cooled. Slow chemical or electrical actions, actions of light or invisible radiant forces, are always at play; so that, as a fact, we cannot predicate of any portion of matter, that it is absolutely at rest."

The atoms, therefore, of which solid bodies consist are supposed to vibrate, to oscillate, or better, to revolve, like the planets, in more or less eccentric orbits. Suppose a solid body to be represented by a swarm of gnats dancing in the sunshine. Each gnat or atom dances up and down at a certain distance from each other gnat, within a given limited space. The path of the dance is not a mere straight line, but a vertical oval—a true orbit. Suppose then that in consequence of greater sun heat, the gnats become more active, and extend each its respective sweep of flight. The swarm, or solid body as a whole expands. If, from a chill or the shadow of a cloud, the insect's individual range is less extensive, the crowd of gnats is necessarily denser, and the swarm, in its integrity, contracts.

Tyndall takes for his illustration a bullet revolving at the end of a spiral spring. He had spoken of the vibration of the molecules of a solid as causing its expansion, but he remarks that, by some the molecules have been thought to revolve round each other; the communication of heat, by augmenting their centrifugal force was supposed to push them more widely asunder. So he twirls the weight at the end of the spring, in the open air. It tends to fly away; the spring stretches to a certain extent, and as the speed of revolution is augmented, the spring stretches still more, the distance between the hand and the weight being thus increased. The spring rudely figures the force of cohesion, while the ball represents an atom under the influence of heat.

The intellect, he truly says, knows no difference between great and small. It is just as easy, as an intellectual act, to picture a vibrating or revolving atom as to picture a vibrating or revolving cannon ball. These motions, however, are executed within limits too minute, and the moving particles are too small, to be visible. Here the imagination must help us. In the case of solid bodies, you must conceive a power of vibration, within certain limits, to be possessed by the molecules. You must suppose them oscillating to and fro; the greater amount of heat we impart to the body, the more rapid will be the molecular vibration, and the wider the amplitude of atomic oscillation.—*All The Year Round.*

In the reign of Darius gold was thirteen times more valuable, weight for weight, than silver. In the time of Plato it was twelve times as valuable. In that of Julius Cesar gold was only nine times more valuable, owing perhaps to the enormous quantity of gold seized by him in his wars.

Correspondence

Solid Iron Floating on Molten Iron.

Messrs. Editors:—In No. 15 of the current volume you give an explanation of the reason why solid iron floats on molten iron. You say that iron, like water, in changing from a liquid to a solid state, expands. Is this be so, why is it that all patterns for castings are made one-eighth of an inch to the foot larger than the casting is required to be? Surely, when the molten iron is poured into the mold it is filled completely full, and by taking the caps off from any flask, you will see that the iron, in cooling, has shrunk away from the sand one-eighth of an inch to the foot in every direction. This being the case, a cubic foot of molten iron should be lighter than a cubic foot of solid iron. You say the reason why a pattern must be made larger than the desired casting is that the iron hardens while it is very hot, and then in cooling, shrinks. How do you reconcile this? Does not the iron occupy less space when hard and cold than the molten iron did? is iron when it is cooling not passing from a liquid to a solid state? and is it then both shrinking and expanding at the same time? Does iron continue to expand so long as its temperature of the mass is falling? if not, at what point is it the largest? Or, on the other hand, if it shrinks, at what point is it the smallest? By answering through the columns of your valuable paper, you will oblige your Canadian readers.

N. C. B.

Coaticook, April 8, 1866.

[It seems, in this case, that a few of our readers have failed to apprehend our meaning. Let us try again. Suppose that we have cast iron at a temperature of 2200°, and now pour it into a mold. It will begin to cool and will shrink in bulk, as may be seen by the surface of that in the gate settling. It will continue to contract until it reaches the temperature of solidification, about 1700°. It now changes from the liquid to the solid state, and in undergoing this change, it expands. Any founderyman may observe this expansion in the case of a casting which has a large sprue in proportion to its bulk, so that the metal will continue liquid in the gate—as the surface of the metal in the gate will rise at the instant of solidification. Now we have the mold filled with solid cast iron of just the same size as the pattern, but this iron is at a temperature of some 1700°, and we let it cool down to a temperature of 70°. In this cooling, it shrinks about one-eighth of an inch to the foot; hence the necessity of making the pattern larger than the casting. But this contraction is not equal to the expansion which takes place in the change from the liquid to the solid state. The pattern must be made larger because it is made for solid hot iron.—Eds.

A Coin and Feather in Vacuo.

Messrs. Editors:—I have noticed in your valuable paper, under the head of "Notes and Queries," in answer to L. S. B., of S. C., a statement that is exactly the reverse of that which I had supposed was correct. You say, a piece of metal will weigh more than a feather in vacuo. Neil Arnott, M. D., in his "Elements of Physics," Vol. I., page 346, says: "A small weighing beam, having attached to its opposite ends pieces of cork and lead which equipoise in the air, if placed under the receiver of an air pump quickly exhibits the cork preponderating." As I have no means of trying the experiment I cannot demonstrate the fact. Can you give me the philosophy of it? Jas. S. Conant.

Joppa Village, April 13th, 1866.

[The correspondent to whom we replied, had an idea that the attraction of the earth is magnetism, and in proof of his theory he stated that a coin and a feather, if weighed in a vacuum, would have precisely the same weight, though in the air the coin, of course, would be heavier. In the case of a feather and piece of metal, which are of equal weight in the atmosphere, the one having the largest volume is of course buoyed up more in the air, and on removing the buoying fluid that one will preponderate.—Eds.

Hardening Dies.

Messrs. Editors:—Please inform me the way to temper a steel die so it will not crack off at the edge in tempering. The dies are about two and a half inches in diameter, one inch thick, with the edges turned to one-eighth of an inch thick. I have had edges to fly half off sometimes, and some never crack at all. State whether I should have a composition to temper in. James Ayars.

[The reason that a great many dies crack in hardening is, that they are hammered too much. A practice is gaining ground daily among our best machinists, of making dies directly from the bar or plate, where the size permits, without forging them at all. Dies so made are invariably safer in hardening than when hammered, and they last quite as well. Steel that is hammered, is, in most cases, of unequal density, so that the expansion and contraction in hardening is likely to destroy work. The twist drills of which so many are sold, are never hammered at all, and the manufacturers assure us that they never lose one by springing or breaking in tempering. Compositions, or baths, as they are sometimes called, may be of use in many cases, but cold water is as good as anything for general work. Cyanide of potassium, strewed over the die when hot, and the same plunged into water, will give a superior hardness to a die.—Eds.

Water Wheels for the South.

Messrs. Editors:—We have been favored several times by your kindness in furnishing information on machinery, the address of manufacturers, etc, etc., and we feel much obliged by your attentions. Our Southern country is much in want of all descriptions of labor-saving apparatus, all useful inventions, etc.

Just at present we have pressing demands for a superior kind of patent cast-iron horizontal water wheel; one that possesses a concentration of power at the same time it economizes the supply of water; and is, withal, of cheap and simple structure.

We are not familiar with the merits of the several kinds heretofore used, known as the Jonval, turbine, Tuttle, Stephenson, and others, but believe there are some which are highly commended as certainly superior to all these, and are of comparative late introduction.

Will you be pleased to inform us in particular on the matter and give us the address of proprietors and manufacturers, if not inconvenient to you. The branch of business especially under my charge here is that of machinery, etc. W. G. Atkinson

Richmond, Va., April 10, 1866.

[There is a great difference of opinion among practical men in regard to the relative merits of the different kind of wheels. We will not undertake to decide the matter, but would advise the different manufacturers to send to our correspondent such facts and figures as will enable him to decide the question for himself.—Eds.

The Long and the Short of it.

Messrs. Editors:—In your last issue in your "Answers to Correspondents," you say that a long screwdriver gives no more power than a short one if the handle is no larger. For the sake of apprentices who can start a screw with the former which they cannot with the latter, allow me to explain what I believe to be the true principle of the "power." It is simply this: the depth of the slot allows them to slightly lean the driver, thus obtaining a longer lever with the longer driver. G. D. M.

Farmington, Me., April 13, 1866.

[Screws are not got out by prying on them with a lever. If our correspondent will take a screwdriver a foot long and another one six inches, with the same handle on each, he will do just as much work with one as with the other.—Eds.

Several Questions.

Messrs. Editors:—Will you please answer the following questions through the medium of your valuable paper? Will it require more power to raise water to a pump which is twenty feet higher than the fountain, than it will to one that is only ten, except what is required to overcome the additional friction of the water in the pipe? A man who puts in a good many pumps, is a good mechanic, and reads the Scientific American, tries to make me believe that it takes no more power in one case than in the other. His idea is this: With a perpendicular pipe twenty feet long, with the lower end immersed in water, and connected with a pump at the upper end, it takes no more power to work the last stroke before water strikes the piston of the pump, than it does at the first one, when the water begins to rise. I would inquire how many degrees of heat an oven must be to bake bread? I would like to know if it has to be hotter than saturated steam at 30 pounds pressure? Is superheated steam hotter at 30 pounds pressure than saturated?

I have found by experience that a steam pipe covered so as to exclude the air, will rust through from the outside in from three to six months, according to the thickness of the pipe. A two and a half inch pipe, laid under ground in a wooden box, packed with fine charcoal, was completely honey-combed in one winter—length of pipe 30 feet. Why is it?

H. P. W.

Lawrence, Mass., April 8, 1866.

[It takes just twice the power to raise a given quantity of water 20 feet that it does to raise it 10 feet. The temperature for baking bread, we believe, is about 220°. The temperature of saturated steam at 30 pounds pressure is 274°; that of superheated steam at the same pressure, is higher. Iron rusts in moist air more readily than in dry air.—Eds.

Taps.

Messrs. Editors:—This is the second letter I have written on the same subject—namely, taps. The first letter I sent you was not published, and it is probable this one will share the same fate. That makes no difference with me, however; your paper is worth to me all I pay for it and more besides. There is one thing sure—the apprentice is in a fair way to gain the desired information on the tap question. Your correspondent, M. N., in the Scientific American of April 14th, throws no new light on the subject, if we except the taps being larger where it first enters the hole, which is a detriment in many cases. For instance, it will not start nearly so well; especially in cast iron. I would also ask M. N. how many taps in general are used in a machine, for there is a strong probability that the apprentice mentioned was not an apprentice to a bolt maker. M. N.'s theory of turning the tap larger where it first enters, and then filing it off tapering, which makes a wider cutting edge at the start, equalizing the cutting and strain, is right, but taps have been made thus for years where I work. But can you always get one made in that way out of a hole? For instance, in tapping a casting, instead of a nut, M. N. will find his tap not always come out the same road it went in, especially when bolt makers have ground it. Yours, P. McCormick.

Newark, N. J., April 13, 1866.

[We admire our correspondent's perseverance and spirit in writing again, and coincide with his views in general. The question of taps, and their adaptation to different works is a wide one, and not to be settled in one or two letters to an editor, or one or two answers to correspondents. Comparatively few taps are used in machines, and when it comes to running down a tap 1½ inches in diameter in cast iron, and 1¼ in wrought iron (as is daily done on marine work) it is a matter of some consideration whether it cuts and clears. Many persons will say that a tap must never be turned back, as it breaks the teeth. So it does, if they are not made right, but how is one to get a full or a fair thread without doing so? As we stated first, tools that will cut like razors are easy to make, but those that are durable and conform to circumstances, are the most satisfactory.—Eds.

Popular Remedies for Disease.

Messrs.—Editors:—As the cholera is anticipated here this summer, it is of the greatest importance that any preventive or cure should be made known to the public. An old gentleman who has attended a great many persons sick with the cholera, and who in his business uses the cyanide of potassium, the air in the room in which he works being at all times thick with the fumes or evaporations from it, states that if it had not been for the cyanide of potassium, he would have died long ago of the cholera, and that he is of the opinion that it can be used to great advantage as a preventive and cure. Will you

please state through the columns of the SCIENTIFIC AMERICAN your views on the subject?

CHARLES A. GARDINER.

New York City, April 16, 1866.

[The science of therapeutics—the effect of medicines on diseases—is one of the most difficult problems that has ever been undertaken by the human mind. Constitutions differ; what will cure one man will kill another, and very frequently people recover in spite of medicines, instead of in consequence of them. It is only by the method pursued by Lewis, Velpeau, and other modern investigators, that any truths in regard to the effect of medicines can be established. They take large numbers of cases, divide them fairly in two equal portions, treat one-half with the proposed remedy, and leave the other half without treatment, and carefully record the result. We attach no weight whatever to the loose and careless method which usually prevails in observing the effect of medicine on disease. In this case it is our opinion that the man would not have had the cholera, had there been no fumes of the cyanide of potassium around him. There are several persons in this city who are not in the habit of breathing those particular fumes, and who have, notwithstanding, escaped the cholera.—EDS.

Hot and Cold Solutions.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN of April 7th, your correspondent "F. T. E" asks the question: "Why does salt not dissolve in hot water in larger quantities than in cold?' He adds: "All *other* soluble substances dissolve more readily in warm than in cold water." "F. T. E." is mistaken in this last statement. About twice as much lime may be dissolved in water at the freezing point, than at the boiling point. May it not be because the lime expands more with a given amount of heat than the water? In this case the particles of lime would be forced further apart by heat than the particles of water, and cold water would dissolve more than hot.

In your article headed "Solid floating on molten iron," you say that Dr. Rowell has observed that several other substances besides iron expand in solidifying, and you mention lead as one of them. I have tried the experiment according to your directions, and think that it is a mistake. The lead floated, it is true, but it seemed to sink a little below the surface of the melted lead. I think it floated for the same reason that needles or iron filings will float on water when not wet on top; that is, on account of the repulsion between the melted lead and the dry surface. If you pour melted lead into a mold, it will be seen to fall in on the surface at the instant of solidifying, showing that it contracts.

CHARLES JANES.

Providence, R. I., April 7, 1866.

Photo-lithograpy with Half-tone.

(From the London Photographic News.)

The production of printing surfaces on stone, zinc, etc., by the agency of photography, has occupied the attention of experimentalists for many years, and in many respects a high pegree of success has been obtained. The process of Mr. Osborne, for the working of which a company has recently been formed in America, gives results in line and stipple which leave little to be desired. Mr. Ramage, of Edinburgh; Mr. Lewis, of Dublin; Col. James, and many others have also attained great excellence in the same direction. Messrs Simonau and Toovey, of Brussels, have attained some success in the production of half-tone, and the attempts of Col. James in the same direction have not been without promise. Still the fact remains, that no process for the actual production of photographs from nature by means of photo-lithography is in practical working, or has hitherto established a position, and that such a process remains an important desideratum, any means of meeting which would be hailed with a glad welcome by all concerned in the graphic arts.

Unless we are mistaken in our estimate of a series of specimens before us, by Messrs. Bullock Brothers, of Leamington, a process which they have recently patented bids fair to meet the long-felt want most successfully, and to render with a fair amount of delicacy, the true photographic gradation of negatives from nature. The subjects before us, consisting of landscapes with variety of foliage and architecture, are exceedingly excellent, and present all the good points of a good photograph, perfect gradation and half-tone, and great brilliancy, differing little in general effect from good silver prints from the same negatives.

Messrs. Bullock have followed in paths already partially trodden, but have made such practical deviations and modifications as have led them to success where others have only failed. Their aim is to secure in the transfer a suitable grain, so as to obtain the kind of gradation possible in lithography, without producing a coarse or woolly effect. Among the various methods by which they propose to effect this end, the plan used in producing these examples seems to be at once the most practical and efficient. A transfer paper is prepared with a plain solution of gelatin, and when this is dry a grain is printed on it from an aquatint plate. Paper so prepared can be kept in stock, and rendered sensitive when required by immersion in a solution of bi-chromate of potash. It is then ready for printing and transferring in the usual manner, and produces on the stone a photographic image, the continuous gradation of which is broken up into the stippled gradation of an aquatint plate. This is the broad principle; but it admits of much ingenious modification in practice, which is so far effective that it produces the most successful and promising examples of photo-lithography with half-tone which we have yet seen.

New Process for Indigo Dyeing.

Before it can be used for dyeing, indigo must be rendered soluble in alkaline and caustic solutions by being treated by a reducing body; by this reaction indigo loses its color, but after being fixed on stuff and exposed to the air, it absorbs fresh oxygen and returns to its original color. This process, theoretically so simple, is practically complicated by serious difficulties, and requires, on the part of the dyer, much practice and great dexterity. Thus, for instance, with indigo reduced by fermentation with vegetable matters, in a caustic solution, the various acids produced during the fermentation combine with the alkali, the liquid soon ceases to be caustic, and loses the property of dissolving the reduced indigo. To remedy this a fresh quantity of alkali (soda, potash, or lime) must be added from time to time; but should an insufficient quantity be added, a portion of the reduced indigo remains undissolved, and soon decomposes under the fermenting matter. If, on the contrary, an excess of alkali be added, a certain quantity of white indigo is lost by its combining with potash, and forming an insoluble product.

According to M. Leuchs, of Nuremberg, all these objections are obviated by effecting the change from blue to white indigo by pectine. Pectine exists in considerable quantities in the turnips of different species, in pumpkins, melons, etc., it may be extracted from these fruits, or they may even be directly used to reduce indigo. The most simple process consists in heating 45 or 50 kilogrammes of the caustic lye to 75° C., adding half a kilogramme of well pulverized indigo, then suspending in the vat a kind of basket of iron wire, containing from 8 to 10 kilogrammes of fresh turnips, cut into small pieces. Then heat gradually to boiling point; the indigo soon loses its color, and the solution decanted into special vats and diluted with water freed from air, will be ready for dyeing purposes. Contact with air must of course be as far as possible avoided.

When the dye bath is exhausted it may serve for a fresh operation by adding indigo, a little caustic soda, and boiling it as above with a certain quantity of turnips.

On the iron wire trellis there will remain hardly 5 or 6 six per cent of the original quantity of turnips. This residue may used in paper making.

The simplicity of this new process may easily be proved by introducing into a closed tube a small quantity of indigo mixed with a few drops of soda or caustic potash, adding a small piece of turnip, and boiling; the indigo will rapidly lose its color, and redissolve and return to its original color by exposure to the air.

As turnips are not everywhere cultivated, and during certain seasons are not to be procured fresh, the author has found that the active principles may be extracted by boiling the turnips with water, under a pressure of two or three atmospheres. C. Leuchs & Co., of Nuremberg, now manufacture on a considerable scale an extract of turnips, 1 kilogramme of which will dissolve cold 4 kilogrammes of indigo. —*Annalen Chem. und Pharm.*

NEW INVENTIONS.

Let-off Motion for Looms.—This invention relates to a let-off motion which is governed by the force with which the batten meets the fabric in striking up, or in other words, by the density of the fabric itself. The invention consists in the arrangement of an angular roller shaft (or a shaft or roller supported by the arms of two cross levers), over which the warp runs, and on the end of which an arm is mounted from which extends a spring bar in combination with a lever carrying one or more pawls which gear into a ratchet wheel mounted on the end of the warp-beam in such a manner, that by the tension of the warp, produced by the latter in the act of beating up, the shaft or roller over which the warp passes, is depressed, and a longitudinally sliding motion is imparted to the spring bar, and thereby the lever, which carries the pawls, is caused to swing back more or less in proportion to the force exerted by the batten on the fabric in beating up; and the pawls are made to take one or more teeth of the ratchet wheel, and as the batten recedes, the angular rock shaft, or its equivalent, returns to its original position, and the lever which carries the pawls is moved back by the action of a spring or by the direct action of the spring bar, causing the pawls to act on the ratchet wheel and to turn the warp beam in proportion to the number of teeth previously taken by said pawls. Samuel Estes, Newburyport, Mass., is the inventor.

Lamps.—The object of this invention is to correct inequality or unevenness in the light of lamps wicks, and also to clear the wick of cinders and of any other matter which obscures the light or hinders the perfect burning of the fluid. It consists in placing around the top of the wick tube a supplementary tube which is pivoted or arranged in such a way as to be capable of being vibrated to and fro, for the purpose of clearing or cleaning the wick and the top of the wick tube from cinder and from any matter that adheres to the tube, and also of being placed in positions out of parallelism with the top of the wick tube so as to bring it into parallelism with the wick, when the latter has been trimmed to an angular line or has been forced up unequally by the wheel so that one side is higher than the other. The supplementary tube is operated by a lever which extends through the side of the burner. Edmund Brown, Burlington, Vt., is the inventor.

Grate Bar.—The object of this invention is to furnish a simple and cheap grate bar, protected by its construction, from vertical or lateral warping from the effects of pressure or heat, to take the place of the complicated and costly grate bars now in use for that purpose. This object is accomplished in a simple and effective manner, by corrugating the rib or lower part of the bar with one or more longitudinal corrugations. George O. Tupper, 23 Abingdon Square, New York, is the inventor.

Apparatus for Distilling Petroleum and other Liquids.—This invention relates to an apparatus composed of a hollow drum and steam coil, which are heated by superheated steam, and surrounded or covered by a suitable jacket, in combination with a helical trough, commencing on the top of the steam drum and extending down to its bottom, in such a manner that crude petroleum, or other liquids, let into the top end of the helical trough, are gradually heated and partially evaporated, and those parts of the liquids which reach the bottom end of the trough, in a liquid state, drip down upon the highly-heated steam coil, where they instantly flash into vapors, and the distillation of petroleum, or other liquids, can thus be conducted without interruption, and without danger of an explosion or conflagration. L. V. Fichet, 440 Broadway, New York.

ONE of the strange properties of aluminium bronze is that after being forged it is annealed by precisely the reverse treatment to which iron is subjected, as it is heated to dull redness and then plunged into cold water.

Improved Spoke Tenoning and Felly Boring Machine

Many small wagon makers and wheelwrights scattered about the country, will find the device here illustrated a great advantage to them, since much more work can be done with it and with less exertion than by the common way.

The arrangement consists in applying a small machine to a bench or horse, as shown in the engraving, placing the wheel with the spokes in close to it, and then cutting the tenon on each spoke with rapidity and accuracy. In detail the machine consists of a casting, A, having a mandrel with an expanding cutter, B, on the end which can be set to cut tenons of various sizes. The mandrel has a series of grooves turned in it, which receive a lever, C, formed to suit them. This lever projects, as will be seen, and is intended to feed the cutter up to the spoke.

By turning the crank, D, and at the same time grasping the projecting lever, the cutter will be revolved and fed up, thus forming a tenon in a short time. The leg of the casting, A, has a rack formed in it in which a pinion, not seen, works. This is to elevate the whole machine so as to suit different hights, and there is an adjustable rest, E, which accurately centers and holds the spoke while being acted on. In Fig. 2 the same machine is shown adapted to boring fellies, a bit being substituted for the cutter shown in Fig 1. There are stops on the adjustable rest at H, which the bit holder brings up against, thus limiting the depth of the hole. At the front of the vise block, I, which holds the felly are two guide irons, J, to keep the same in position when dowel holes are bored. These machines will be found very handy. The invention was patented by L. A Dole, on Oct. 31, 1865. Address Dole, Silver & Deming for further information, at Salem, Ohio.

Fig. 1

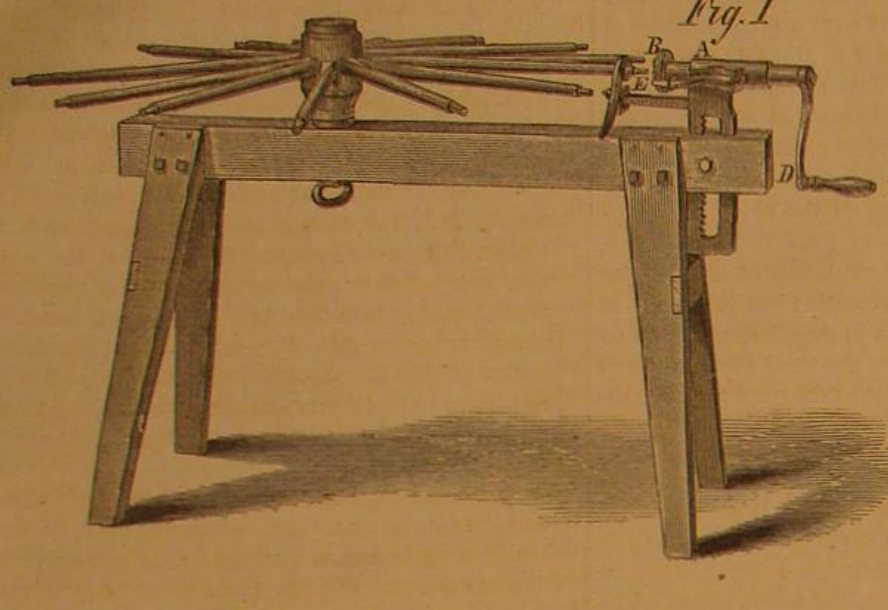
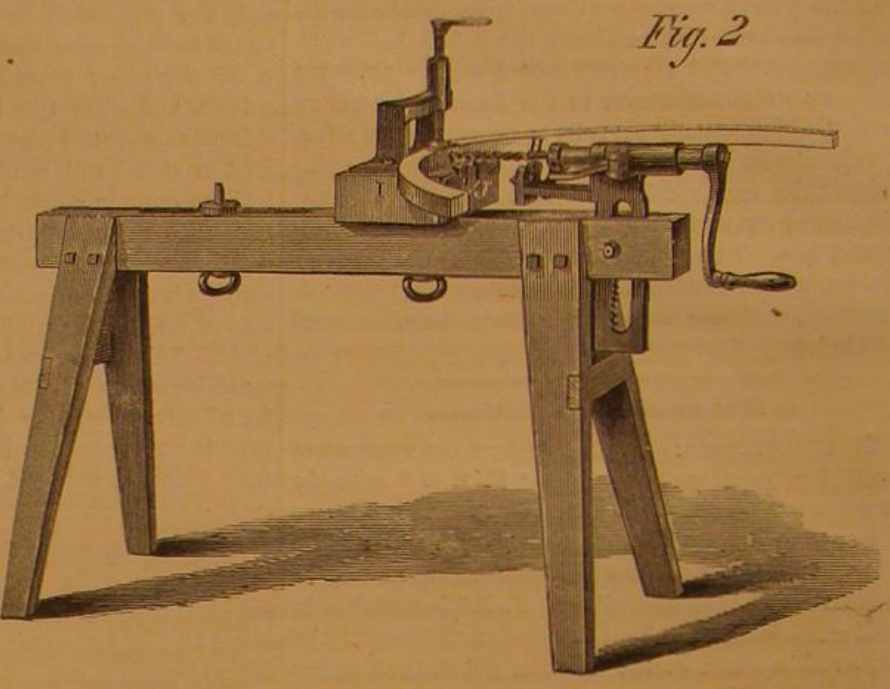


Fig. 2



DOLE'S SPOKE-TENONING AND FELLY-BORING MACHINE.

WESTERN STEAM BOILERS.

Mr. William H. Glynn, an engineer of Dubuque, Iowa, writes us to say that his experience, in regard to priming of Western steam boilers and the malproportion of them, accords with that of Mr. Schaeffer, which was recently published in the Scientific American.

Mr. Glynn states that he has frequently seen cylinders coated inside as if they were whitewashed—the result of priming; and, further, that many accidents also take place from the bursting of steam pipes. This, he thinks, takes place from a sudden checking of the water and steam, by the fall of the steam valve, which induces a sudden strain that the pipe cannot bear. He thinks priming is also caused, in many instances, by opening the throttle too wide, when the cylinder is cold. The steam will be condensed in the cylinder, forming a partial vacuum, which the water from the boiler naturally flows into. He also says that he finds no more trouble in keeping water in tubular boilers than in two flue boilers, if the former are clean.

A Spiritual Invention.

Mr. Frank Chase, of South Sutton, N. H., states that the blind fastener, illustrated on another page of this number, was revealed to him through Emma Hardinge, a spiritual medium, by the ghost of his uncle, a worthy mechanic sometime deceased. Acting upon the hint of Miss Hardinge, he made the fastening, which is certainly a good one, and if done by the spirits, as Mr. Chase claims, is certainly no discredit to their inventive genius. People often dream of valuable inventions, but they do not always turn out so well as they dream they will.

Album for Porcelain Pictures.

Mr. J. C. Spooner, photographist, of Springfield, Mass., has shown us a new album of his invention, designed for porcelain pictures. It has heretofore been impossible to preserve such pictures except in frames, for unless special care is taken the transparency of the picture, which gives it its chief value, is entirely lost. Mr. Spooner makes his albums with a glass front in one part of it, so that by sliding the picture back it can be readily held up to the light and sun and still be preserved from injury. Externally the album is handsomely finished and is so constructed that a number of pictures are alternately exhibited through the same glass.

CHRYSLER'S FRUIT JAR.

Many persons still use cement or wax in sealing fruit jars, and prefer that plan to others, as being certain under all circumstances. For this mode of closing fruit jars the cap shown in the engraving, will prove a very convenient one.



It consists of a pasteboard disk, A, and a tin cap, B. The pasteboard fits tightly to the jar and is almost sufficient in itself to secure the desired end, but in addition to this the cover or cap, A, is placed on top and a small quantity of cement or wax poured in over it. This immediately runs into the groove, C, and makes a perfectly tight joint, while the air, pressing on the top of the cap with great force, keeps the pasteboard disk in close contact with the jar. By the use of the pasteboard the fruit is not injured, as is the case when brought in contact with india rubber, and no wax can enter the jar in sealing or unsealing. It is in all respects simple and reliable.

For further information address J. M. Chrysler & Son, No. 15 Pine street, Lockport, N. Y. Patented Nov. 21, 1865.

A SEVEN-TOOL LATHE.

The London *Artizan*, of April, gives an illustration of a new lathe for turning crank axles. All machinists know that there is a vast amount of work on these, and that it is necessarily slow and tedious. The body of the crank has not only to be cut out, but a vast amount of turning on the bearings beside. Where this is done on a common lathe the job is a long while in it, and both employer and workman get sick of the sight of it.

To expedite the process a lathe has been devised by Mr. Ramsbottom, of the Crewe Locomotive Works, England, which has a tool for every essential part. That is to say, the sides of both cranks are faced at once, making four tools and four slide rests at work on this part; the two bearings are also turned up at once, and one of the ends is faced, making seven tools at work at one time.

It is stated that these tools work well together, and that the workmen have no trouble in attending to them. Of course, since the lathe operates well, comment is superfluous, but it will occur to all practical men that axles cannot be true turned in this way, for the spring of the throw, in passing over, would be likely to cause the tools to jump into the bearings and mar them.

Most, if not all the crank axles in the Crewe Works are now made from Bessemer steel, and by another peculiar machine the throw of the crank is cut out from the blank in about ten hours, which is quick work.

M. Tardirel states, that if a perfectly smooth and polished plate of glass, ivory, or metal is caused to rotate with great velocity in a horizontal plane, it does not communicate its own motion to a highly finished ball which may be placed upon it.

[M. Tardirel need not have inconvenienced himself to have stated that.—Eds.

Good Idea.—On the *Chemin du fer du Nord*, tubular stays have been used for locomotive fireboxes to some extent, the escape of water through the stay showing at once that it has suffered from corrosion. These stays are made by drilling through the solid bar.

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FOREIGN AND AMERICAN STEAMERS.

The advertising columns of the daily papers show that there are upwards of twenty-five foreign steam vessels leaving this port at various intervals for ports in Europe. All the imports and exports to and from this country are brought by these ships, and the money earned by them goes abroad into the hands of foreign manufacturers, instead of into our own. The smallest repairs needed to the machinery are kept, if possible, until the vessels arrive home; none but the most urgent being made here.

Whatever the commercial cause of our maritime decline and fall may be, it certainly cannot be laid at the doors of our engineers. It is not that our vessels are so much more costly to run than foreign ones that we cannot, or do not, compete with them. The reverse is the case. Engineering has made great progress in the past ten years. Radical improvements have been introduced, and plans which were only put forth as experiments have been adopted in practice to manifest advantage. The difficulties with the surface condenser have been surmounted; the prejudice against it has passed away. A more intelligent system of working steam expansively prevails. Variable cut offs are being adopted more generally, and give satisfaction to the owners of the ships. And well they may, when it is found that less fuel is burned and better time made under equal conditions. If we want facts for this assertion they are at hand. Examples of the superior economy of American marine engines are to be found.

For purposes of comparison no better examples could be found than two steamers lately built to run between New York and Richmond, Va. These ships are exactly the same in measurement and model, and have similar engines. The only exception is that one has a fixed cut off of the Stevens's pattern, while the other has Herman Winter's rotary cut off, which can be used at all grades of expansion at the will of the engineer. The result is that the ship with the variable cut off makes 2½ hours better time and consumes less fuel by three tuns than her consort.

Fifteen years ago, when the Collins ships were first started, they made their time (and good time it was) on 80 tuns of coal per 24 hours, and that was the day of fixed cut offs—for they had Stevens's long-toe movement. The *Fulton* and *Arago*, vessels of 2,500 tuns burthen, running between Havre and New York, make 11½ knots per hour on 50 and 55 tuns of coal, and the *Cahawba*, a vessel of 1,800 tuns burthen, makes 11 and 12 knots on 40 tuns average consumption.

The Pacific mail steamships are the most economical vessels in the world. The largest are rising 3,500 tuns burthen, and can steam an average of 12 knots an hour on 35 and 40 tuns of coal per day of 24 hours. The *Persia*, an English iron ship of the Cunard line, burns more than three times as much. The *China*, one of the latest vessels added to the Cunard line, has oscillating engines of 80-inch cylinder and 66-inch stroke, geared so that the screw shaft makes 2½ revolutions to one of the engines, and burns, on the statement of her chief engineer, Mr. Nixon, 80 tuns per 24 hours. Even the *Re De Italia*, a huge iron-clad vessel, nearly 300 feet long and 50 feet wide, clad with 4½ inch plates, crossed the Atlantic at the speed of 11½ knots on 40 tuns of coal per day.

We might continue to multiply instances at great length which would sustain the assertion that, compared with foreign ships, American steamers are more economical, but we have already cited enough.

It has been said that wooden steamships are so much more costly to run and keep in repair, and in point of durability so inferior to iron ships, that we are unable to compete with foreign lines, for all our ships are of wood. If this be true, then the carrying trade will be confined for some time to come to English bottoms. All vessels under that flag are of iron, and we cannot compete in the construction of them with labor and material at present rates. In 1821 the total per centage of the foreign trade was 11·3, and in 1864 it was 60 per cent of the whole tunnage, showing a rapid and alarming increase.

HIGH WAGES.

"Five years ago, I built a house for two-thirds less money than I can now," said a friend, recently, "and I notice that notwithstanding prices of living are tending downward, like Oliver Twist mechanics want more. Sugar is lower, butter is falling, flour is lower, beef is no higher than it has been, but in the face of all this, strikes are the order of the day, and I should like to know where it is going to end. What is the reason of it?"

"The reason is quite plain," we answered. "Mechanics cannot help wanting more; they are in demand. Did you ever hear of a merchant taking less than the market price for his goods because people wanted him to? Did you notice that butter became cheaper, or coal lower, when the press commented upon the exorbitant prices charged for these articles?"

"No, I did not."

Yet you see on the approach of warmer weather, that coal and butter both fall, simply because the supply is greater than the demand. When the call was brisk, however, certain skillful operators were able to control the market. Kerosene oil, that three months ago, retailed for ninety cents a gallon, now sells at seventy-five cents. What made that fall? Daylight. The days grew longer; less oil was consumed; the demand was less, and the price came down, as a matter of course. It is precisely the same with wages. You will notice that mechanics get about the same rates all over the country; changing only with the state of the local market. Mechanics are in demand now, and their wages must go up; no power can prevent it. When building materials were high, capitalists held aloof, saying, "there will be a fall," and then wages remained at a fixed point. So soon as gold fell, and the political prospects of the country were brighter, increased activity was manifest in all branches of industry, and mechanics' wages rose as a natural consequence, for there were not men enough to do the work. This is the simple reason for the movements that are taking place.

They will continue until there are more men. In 1857, good mechanics could be had for $1 25 per day, because there was nothing for them to do; nobody wanted them; their labor was a drug. Now it is the reverse; everybody wants them, and up they go.

Our advice is, that they hold on to their earnings so that when the evil days draw nigh they may have an anchor to windward to hold by.

ANOTHER EXPLOSION OF NITRO-GLYCERIN.

A telegram from San Francisco informs us that, "on Monday afternoon, April 16th, a terrible explosion of what was supposed to be nitro glycerin occurred in San Francisco, rear Wells, Fargo & Co.'s building. The explosion shook the earth like an earthquake for a circle of a quarter of a mile. Samuel Knight, superintendent of Wells, Fargo & Co.'s express, died in half an hour of injuries received. G. W. Bell, supervisor and assayer, was instantly killed. Mr. Wallut, Wells, Fargo & Co.'s assayer, Joseph Elliot, John Gallagher, Frank Webster and William Justin were also killed. Eight dead bodies were so mutilated that they could not be identified. Louis McLane, Captain Eldridge, of the Pacific Mail Steamship Company, and Judge Hoffman were bruised and cut. Felix Lamax, D. Stacy, Jefferson Taylor, H. Blane, clothing dealer, Captain J. Ayres, Fred Leiz, Frank Moran and others were injured, but not fatally. The damage is estimated at least two hundred thousand dollars. The cause of the explosion is a mystery; the freight agent of the Pacific Mail Company says that two boxes, each measuring about four cubic feet, were taken from the steamer's dock to where the explosion occurred. One box was consigned to Idaho City and the other to Los Angelos. Both were stained with oil. The contents are not known."

This explosion, like the one that occurred in Greenwich street in this city, seems to have been the result of spontaneous combustion of nitro-glycerin. The various fats and oils from which soap is made, are composed of glycerin in combination with an acid; when brought in contact with an alkali, they are decomposed, the acid uniting with the alkali to form soap, and the glycerin being set free. By proper manipulation glycerin may be induced to combine with nitric acid, to form nitro-glycerin. The nitric acid being composed of nitrogen and oxygen, in the proportion of 14 pounds of nitrogen to 40 of oxygen, carries into the compound a large quantity of oxygen, which, being held to the nitrogen by a very feeble affinity, is ready on a change of conditions to enter into combination with the hydrogen and carbon of the glycerin, burning them with explosive violence.

Now, it seems that under certain conditions the oxygen may slowly enter into combination with the combustibles of the glycerin. In this case the heat generated is the same in quantity as in the case of sudden combustion, but if the oil is so situated that the heat may escape as rapidly as it is formed, the temperature of the liquid is not perceptibly raised, and no explosion takes place. But if the oil is packed in wooden boxes, or is surrounded by any kind of slow-conducting material, then the heat accumulates till the temperature of combustion is reached, when the whole mass explodes.

THE CHOLERA.

The cholera is a disease of the stomach and intestines, manifested by purging and vomiting, and running sooner or later into discharges like water with rice boiled in it. This is the essential nature of the disease, no matter where it appears. When it comes as an epidemic, commonly called "Asiatic cholera," there co-exists, to a greater or less degree, what is called malignancy; manifested by coldness of the surface of the body, depressed pulse, purple, shriveled appearance of extremities, and perhaps spasms. It is this quality that is the source of danger, and it may vary in intensity from the slightest to the most virulent degree, causing death in three hours, and before the purging and vomiting have had time, of themselves, to produce any effect.

There is now a very general impression that this dreadful scourge is to visit our country during the present season. Owing to the large amount of foreign immigration constantly flowing to this port, people are generally expecting that this will be the spot where the epidemic will first make its appearance. It is, however, quite as likely to break out in some other seaport; indeed, Halifax has had a very narrow escape, and one case is reported to have occurred at Portland.

In view of a probable visitation, we devote some

space in this number to the treatment of the disease. We publish a communication from Dr. Hall, the well-known editor of *Hall's Journal of Health*. It was called forth by the criticism published on page 262 of the SCIENTIFIC AMERICAN. We also reprint from the *Missionary Herald* an article upon cholera and its treatment, written by Dr. Pratt, of Marash, who was at Constantinople during the prevalence of the epidemic in that city last year.

We do not undertake to recommend any special medical treatment for this disease, but would urge upon our readers the importance of cleanliness in every respect—a removal of everything that can possibly generate malarious influences; also, a regular diet of plain, wholesome food; a total disuse of stimulants—which invite, rather than, as many erroneously suppose, ward off the disease—and to avoid excesses and excitements of every description.

An acquaintance of ours was in this city in the summer of 1849, when cholera was very prevalent and fatal, especially among the unfortunate poor, who are so shamefully huddled together in this and other large cities. There was cholera in the air, cholera in the street, cholera in the newspapers, cholera in every man's mouth, cholera in the houses of the rich, cholera in the tenements of the poor, and a general tendency to bowel complaints among all classes. Our acquaintance, being attacked with strong premonitory symptoms, at once sent for his doctor, took to his bed, covered up warm (it was a hot July day), had bottles of hot water put to his feet, and applied a generous mustard plaster to his stomach and bowels, all of which worked like a charm.

Such treatment can do no harm; and if the doctor has wisdom enough to hit upon the right remedy, and the patient can hold on to his courage, there is not much danger. In cholera the whole system is rapidly drained off through the alimentary canal, like water through a fresh break in the dam. If the break is not stopped, the whole structure gives way. It is said that fear kills more than the disease itself.

STILL ANOTHER EXPLOSION OF NITRO-GLYCERIN.

Since the article on the editorial page, discussing the spontaneous combustion of nitro-glycerin, was written, we have accounts of a still more terrible calamity from this cause, which occurred at Aspinwall on the third of April.

The steamship *European*, an iron screw steamer of about 1700 tuns burthen, belonging to the West India and Pacific Steamship Company, arrived at Aspinwall from Liverpool on the second of April, and the next morning at seven o'clock the explosion occurred.

The wharf beside which the steamer was laying, was about four hundred feet long and forty wide, and was constructed in the most substantial manner, with a heavy flooring and roofed over its entire length. The *European* was on the north side, and her sister ship of the same line, the *Caribbean*, on the other side. The freight house was a splendid building, constructed of stone, slate and iron entirely, and was about three hundred feet long and eighty wide.

To those removed from the wharf the first visible effect of the tremendous force of the explosion was in the instant and almost entire demolition of the freight house—a structure of the most durable nature, and one that was apparently able to resist almost any explosive force except within the building itself. One track only ran through the building, the rest of the floor space being devoted to a platform for freight discharged from or to be loaded in cars. Both the end walls of this building were demolished, and the superb iron roof, rafters, girders, braces, etc., fell into the interior of the building, forming a huge unshapen mass of ruins and destruction, where a moment before everything was strength and symmetry. Of course, in an instant after the occurrence, when those unhurt recovered from the effect of the concussion, a rush was made for the wharf to succor those injured, and here it was that the whole scene burst upon the view—a scene heartrending and awful, and telling that many of those who a few moments before were in the enjoyment of life and health had forever passed away from earth. The iron plates of the ship's hull were torn out completely, and almost everything about decks was a mass of ruins. The wharf abreast of where the explosion occurred was completely cut through the piles, cross beams, flooring, and in fact everything was carried away, and the entire structure was shattered, every plank even being started from its position. On board the *Caribbean* the destruction was very great; her boats were all crushed, her deck houses shattered and many of the heavy iron beams and knees of the ship's hull were broken like pipestems.

The *European* was towed out into the bay by a naval vessel, when she took fire, a second explosion of moderate violence occurred, and she sunk.

It was some time before the true cause of the disaster became known. The bills of lading called for no gunpowder, and the ship had but a small quantity for firing signal guns. No steam was up, and all were at a loss for a knowledge of what it was until the seventy cases of glonorin, or nitro-glycerin, shipped at Liverpool for San Francisco, told the whole story, and brought to light how much more dangerous an article than gunpowder formed one of the principal items of the ship's cargo.

The number of killed and wounded is not accurately known, but it is stated at upwards of seventy.

FAILURE OF A LAUNCH.

Recently an attempt was made in England to launch a huge ironclad war vessel, called the *Northumberland*, but after running down about 170 feet on the ways, she stopped, and at latest advices was hard and fast. Our foreign contemporaries are full of accounts of the disaster, and attribute it to different causes. The most apparent one, however, is the slight incline given to the ways, and the immense weight of the ship, which crushed out the lubricants between the sliding timbers, and interlaced the fibers of them. A very forcible realization of the effect of friction is thus given, when it is seen that it can suddenly arrest the momentum of a mass weighing over 9,000 tuns, after sliding 170 feet in a few seconds.

From the *Mechanics' Magazine*, we take a portion of an article referring to the preparations which were made to launch the ship anew—all total failures:—

"To prevent the ship launching herself unexpectedly during some exceptional high tide, she has been shored and wedged in, in such a manner, that any downward movement on the ways seems impossible. In addition to this, two chain cables have been taken through the hawse holes and made fast to anchors buried in the ground, the ship's own capstans having been used to draw the cables taut. The arrangements for floating are more complex; her keel has been wedged up throughout its entire length, so as not only to secure and ease the weight up, but take some of her enormous pressure off the forward cradle. In addition to this, twelve large wooden pontoons have been constructed, each of which is 30 feet long by 9 feet broad and 9 feet deep, perfectly caulked and water-tight. They have all been prepared from molds, so that they fit close to the bottom of the ship, on each side of which they are made fast in pairs. The floating power of these is equal to 400 tuns, in addition to which 100 tuns more are obtained from a number of empty puncheons made fast under her stern. Eight lighters have also been moored under her stern at dead low water, which, with the previous appliances, give a floating power 1,000 tuns. Beyond this a dredging machine having a steam capstan on board, and moored in the river, is reckoned on for another 100 tuns, beside powerful purchases applied on both sides of the ship from the Millwall yard. Under the bows of the *Northumberland* three powerful hydraulic rams are placed, two of which, equal to a total pressure of 1,200 tuns, are fixed one against each cradle, and both are securely supported with timber backings down to the launching ways. The third, similarly held by a timber frame, is of nearly 1,000 tuns power. This, however, is fixed in the center, and upright, so that it can work from the ground up beneath the bows of the vessel, which it was assumed it would, to the full extent of its immense pressure, partly lift and ease off the ways forward.

But notwithstanding this array of power, the trial on Saturday to launch the vessel failed—not an eighth of an inch did she advance, although she moved vertically at the stern. So Monday, with its high tide, was waited for, and Monday came and went, but the *Northumberland* remained, although there was a great increase of power applied to move her. It is therefore now proposed to wait for Monday, the 16th inst., on which day it is anticipated the tide will be the highest of the year, and give nearly 25 feet of water under the *Northumberland's* stern post. In case of a favorable wind it may even rise as high as 26 feet—a depth that would place nearly 8 feet of water under her bows, which ought to be nearly sufficient to float her. But in order to make assurance doubly sure, it is intended to take every possible precaution against the contingency of low water by adding such powers of flotation to the ship as will enable her in a great measure to get off without an unusually high tide. To this end the lighters will be dispensed with and in their place two small frigates will be lashed astern at the low water preceding the high tide. Each will be fixed to the hull so as to have an independent action, while arrangements will be made to enable them to slip their fastenings and get clear of the vessel directly she begins to move quickly. In addition to these, four more large pontoons are to be placed under the stern. They will have a greater floating power than that of the whole ten now under the vessel, and will exercise their greatest power at the greatest advantage, and exactly where it is most needed. The ways will be well greased and two additional hydraulic rams will be brought to bear upon her.

A Flint Piano.

A curious novelty has just been brought to London and is about to be exhibited to the public. It consists of a remarkable-looking piano, made of flints suspended from an iron frame, which are struck with a short flint to produce the notes. The flints are about forty in number, and elongated, but of various lengths and thicknesses. They are arranged in the order of their tone, and the labor and investigation of years were required before the complete scale was formed.

The *Star* says that M. Baudry, the gentleman who has made the instrument, was two years seeking for one particular stone, or tone—the terms being here almost synonymous. Two other tones were, after an almost endless investigation of flints, obtained from pieces of schist, the only exception to the flint tones which form the instrument. M. Baudry entertained some friends on Saturday afternoon last with a performance on this curious instrument, which was much admired, not only for its novelty, but also for its musical effect. The tones are unlike those of any known instrument, as may be readily comprehended by any one who knows the ring of a piece of flint, and possess a sharpness that renders the performance peculiar, though by no means unpleasing. The flints are many of them very peculiar in form, and it would be a matter of no small difficulty to frame any coherent theory of the causes of the variety of tones observable, for they are by no means in the exact ratio of the size or weight of the different flints. M. Baudry's perseverance and skill in working out his ingenious idea have met with that success which he sought, and he deserves now to meet with a further success, which it is to be hoped will be awarded to him by the public.—*Mechanics' Magazine.*

A Cheap Galvanic Battery.

M. Gerardin has sent a note "On a Battery of Iron Turnings," which he thus describes:—I replace the zinc of a Bunsen's battery by iron borings; an iron bar placed in the middle of the borings serves as a reophore. The iron is placed in common water. In the porous vessel I place a solution of perchloride of iron with *aqua regia* added. The electricity of this solution is collected by a carbon serving as the positive pole. The carbon is made of powdered coke agglomerated with paraffine. Such a battery may be made of large dimensions, and a great deal of electricity obtained at small cost.

ELECTRIC lights have been definitely established in the two lighthouses of the Heve, near Havre. The intensity of each of these new lights is estimated as equivalent to 5,000 carcel lamps, and it may be increased twofold, with little additional cost, whenever the condition of the atmosphere requires it.

RENEWING WORN BANK-NOTE PLATES.

A clean, crisp, comfortable bank-note is not a luxury to be indulged in every day by the majority of mankind; nevertheless, most people are familiar with its appearance. Its production involves no small amount of labor, although by subdivision and distribution a very large number are now produced in a very short time. Much care and nicety have always been bestowed upon it, and are especially demanded in the present day, when the means of imitation are so well within reach of the designing and unscrupulous. The chief object in the manufacture of bank-notes is to render forgery impossible, or at least easy of detection. This is sought to be effected by peculiarity of paper, design, and printing, or by a combination of these means, as is done in the Bank of England, and other banks. The mechanical design, however, has chiefly been relied on for security. It has been the constant aim to make the impression such as to render the genuine note readily distinguishable by the public for its high art, and to the bank officials by secret peculiarities in its execution. A further security was formerly afforded against forgery by a self-registering machine, which was contrived by the Messrs. Oldham. By this machine each note was impressed with a distinctive mark known only to the bank authorities. Until about 1837 copper-plate printing was the only process in use for bank-notes. In that year, however, Messrs. Perkins and Heath effected their valuable improvements in practical engraving. This was the reproduction of designs by the mill and die by mechanical pressure, and which, when applied to calico printing, was attended with such extraordinary results. This invention simply consisted in engraving the pattern on a soft steel plate, which was afterward hardened, and the pattern transferred by pressure to a soft steel roller. The pattern was, of course, produced in relief on the roller, which was hardened to reproduce the pattern on the plate from which the printing was to be done. In 1855 electrotype printing was introduced in the Bank of England by Mr. Smee, and since that time the notes have been produced by surface printing by the electrotype.

In the bank of Ireland the plates are prepared according to Perkins and Heath's method. The separate designs forming the complete bank-note are first engraved by hand on separate steel blocks, which are afterward hardened, and are preserved as permanent patterns not to be printed from. These engravings are transferred to the steel rollers under heavy pressure, the rollers being afterward hardened and used as dies to impress the engraving upon the printing plates. The engraved plates for printing the bank-notes are made of soft steel, and are never hardened after being engraved. Being of large size—20in. by 16in.—they would most probably lose their flatness in hardening. Another reason for not hardening the plates lies in the fact that when worn, the soft plates are easily repaired again by means of a special arrangement, designed for the purpose by Mr. Grubb, the engineer to the Bank. By this arrangement the rollers are applied again to the plates with perfect accuracy for renewing the impression. The printing plate, when receiving its first impression from the master roller or die, is fixed upon the table of a strong press, from which a pressure of 5 tuns can be obtained, the pressure being regulated as required by means of a weighted lever. The position of two register points in the plate is accurately noted by means of micrometer microscope, and registered in a book kept for the purpose. The master roller is then passed over the plate by the machine under the heavy pressure, being very steadily guided by a special parallel motion arrangement. The table is provided with complete adjustments of peculiar delicacy, and the pressure of the engraving roller upon the plate is not produced by the roller descending upon the plate, but by the table being raised up to the roller.

Being of considerable weight, the table is balanced so that its vertical movement is effected with a force equal to a few pounds only. It is provided with two separate lever arrangements, for light and heavy pressures, whereby any pressure, from a few pounds up to 5 tons, can be put upon the plate. When a plate requires renewing it is again fixed upon the table in the same position as before by means of the micrometer microscope and the register of its position; the roller being passed over it deepens those parts of the impression which the continuous printing has worn away. The renewal of plates is effected with the utmost accuracy; indeed, so perfect is the process that the finest lines in the engraving are preserved without becoming perceptibly coarser even after a plate has undergone many renewals. Thus, the most delicate engravings are restored as often as required in plates, when worn by the process, of printing, with the greatest certainty and facility. Should it be necessary to bring up the impression on any special portion of the plate, even this can be done. It is effected by a delicate adjustment in the bed of the table, by which the plate can be slightly tilted transversely to the direction of the motion of the roller, and thereby increasing the pressure at any particular point. In order to obtain this tilting motion the bed is made with a convex cylindrical segment lying within a concave one, the plate being in the center of motion. The movements for adjustment are effected by screws so finely set that they will adjust to a thousandth part of an inch.—*Mechanics' Magazine.*

The "Nautilus."

A trial has recently been made of a new principle of motion, as applied to vessels, called the Hydraulic Porpeller, Ruthven's patent. The *Nautilus*, to which the power has been applied, was built expressly to show that it can, with less horse power than ordinary river boats, equal them in speed. The *Nautilus* at the trial started from Vauxhall Bridge pier at eleven o'clock in the morning, and ran up and down the Thames in company with the *Citizen* and other river steamers, and held way with them steadily, gaining a little on some. She ran between Vauxhall and Westminster Bridges with the wind and tide in 4 min. 26 sec., and against in 8 min. 22 sec., being at the rate of 13·5 and 7·2 miles per hour respectively, or at an average speed of 10·35 miles per hour—say 10¼. She then steamed down the river, and when off the Tunnel pier, with both strong wind and tide in her favor, going at full speed, was made to stop suddenly by reversing the valves. She stopped dead in less than ten seconds and in about a quarter of her length. Her Majesty's ironclad gunboat *Waterwitch*, now being built, is to be fitted with the new propeller, which is nothing more nor less than water taken in under her bottom and set in motion by simple machinery worked by a steam engine. The water is discharged in a heavy stream on both sides of the vessel; consequently there is nothing outside the vessel to be injured by any accident. Another important novelty is that the vessel is quite independent of her rudder, and is worked under the complete control of the master, officer of the watch, or man on deck, without any communication with the engine. The *Nautilus* is also fitted with Ruthven's steering apparatus—an invention which gives a large amount of power to the rudder.—*Mechanics' Magazine.*

[This principle has been repeatedly tried in this country, but to use a common expression, the boats so fitted have been unable to "get out of their own way."—EDS.

Pneumato-Electric Organ.

Electricity has been very ingeniously and effectively applied to form a connection between the keys of an organ and the valves which permit air to pass to the pipes. Complicated mechanism is thus got rid of, an extremely simple arrangement, whatever the distance between the keys and the pipes, being substituted. Its mode of action is easily understood. According to the *Scientific Review*, when any key is depressed by the finger, a small communicator under it completes communication with a galvanic battery by dipping its lower ends into minute cups of mercury. Electricity then passes along a wire to a small electro-magnet, that immediately becomes excited, and, attracting a keeper, opens a valve, allowing air to pass into the organ pipe, which sounds at once, and continues to do so as long as the finger presses down the key. It is clear, that, however powerful the organ or distant the pipes, the fingers are not in the slightest degree distressed in playing. The battery used is simple, inexpensive, and permanent in its action. It consists of glass vessels, arranged on the upper surface of the bellows, and each containing a solution of sulphate of mercury; into the latter plunges a plate of zinc, which is placed between two plates of gas retort graphite, when the bellows is raised by the action of blowing. No effect, therefore, is produced, except when required, which prevents waste of battery power.

SPECIAL NOTICES.

Jesse S. Lake and David Lake, of Smith's Sanding, N. J., have petitioned for the extension of a patent granted to them on the 20th day of July, 1852, for an improvement in grass harvesters, and re-issued in four several divisions, dated 1st day of January, 1861, and numbered respectively 9, 10, 11, and 12; this petition being for the extension of each of these reissued patents.

Parties wishing to oppose the above extension must appear and show cause on the 2nd day of July next, at 12 o'clock, M., when the petition will be heard.

Eliakim B. Forbush, of Buffalo, N. Y., has petioned for the extension of a patent granted to him on the 20th day of July, 1852, for an improvement in grain and grass harvesters, and reissued the 25th day of May, 1865 in four several divisions, numbered respectively 1,972, 1,973, 1,974, and 1,975, this petition being for the extension of each of these reissued patents.

Parties wishing to oppose the above extension must appear and show cause on the 2nd day of July next, at 12 o'clock, M., when the petition will be heard.

French Iron-clad Navy.

In an account of British and French Navies, Furnished by Mr. Donald McKay, of Boston, to the *Herald* he appends the following statement of the French ironclads at the present time, said to have been made up from personal inspection of the vessels:—

Magenta and Solferino.—Displacement, 6,750 tuns; 1,000 horse-power mean draft, 26 feet; length of load line, 280 feet; breadth, 57 feet; wooden hull; 4½ inch armor plating; weight of armor, 900 tuns; speed in smooth water—*Magenta* 13½ knots; *Solferino* 14 knots.

Couronne.—Displacement, 6,000 tuns; 900 horse-power; mean draft 25 feet. length of load line 260 feet; breadth 55 feet; iron hull 4½ and 3 inches armor plating; weight of armor 700 tuns; speed in smooth water 13 knots.

Gloire.—Displacement, 5,650 tuns; 900 horse-power; mean draft 25½ feet length of load line, 255 feet; breadth 56 feet wooden hull; 4½ inch armor plating; weight of armor, 800 tuns; speed in smooth water, 13½ knots.

Invincible.—Displacement, 5,525 tuns; 900 horse-power; mean draft 25½ feet length of load line, 255 feet; breadth 56 feet; wooden hull; 4½ inch armor plating; weight of armor, 800 tuns; speed in smooth water 13½ knots.

Normandie.—Displacement, 5,650 tuns; 900 horse-power; mean draft 26 feet; length of load line, 255 feet; breadth 56 feet; wooden hull; 4½ inch armor plating; weight of armor, 800 tuns; speed in smooth water 13½ knots.

Flandre, Gauloise and Guyenne.—Displacement, 5,700 tuns; 1,000 horse-power; mean draft 25 feet; length of load line, 260 feet; breadth 56 feet, wooden hull; 6 inch armor plating; weight of armor, 1,000 tuns.

Heroine.—Displacement, 5,700 tuns; 1,000 horse-power; mean draft, 25 feet; length of load line 260 feet; breadth, 56 feet; iron hull; 6 inch armor plating; weight of armor 1,000 tuns.

Magnanime, Provence, Revanche, Savoie, Surveillante, and Valeureuse.—Displacement, 5,700 feet; 1,000 horse-power; mean draft 25 feet; length of load line, 260 feet; breadth 56 feet; wooden hull; 6 inch armor plating; weight of armor 1,000 tuns. The *Provence* has made 14 knots in smooth water.

Taureau.—Displacement 2,450 tuns; 908 horse-power; mean draft 16 feet; length of load line 200 feet; breadth 47½ feet; wooden hull; 4½ inch armor plating; weight of armor, 800 tuns.

Belliqueuse.—Displacement 3,350 tuns; 900 horse-power; mean draft, 19½ feet; length of load line, 230 feet; breadth, 40 feet; wooden hull; 6 inch armor plating; weight of armor 100 tuns.

Paixhans and Palestro.—Displacement, 1,540 tuns; 150 horse-power; mean draft, 8½ feet; length of load line, 156 feet; breath 40 feet; wooden hull; 4½ inch armor plating; weight of armor 275 tuns; speed in smooth water, 7 knots.

Peiho.—Displacement, 1,500 tuns; 150 horse-power; mean draft 10½ feet; length of load line, 150 feet; breadth, 45 feet; wooden hull; 4½ inch armor plating; weight of armor, 275 tuns; speed on smooth water, 7 knots.

Saigon.—Displacement 1,500 tuns; 150 horse-power; mean draft, 10 feet; length of load line, 156 feet; breadth 46 feet; wooden hull; 4½ inch armor plating; weight of armor, 275 tuns; speed in smooth water, 7 knots.

Embuscade, Impregnable, Protectrice and Refuge.—Displacement, 1,225 feet; 150 horse-power; mean draft, 9½ feet; length of load line 130 feet; breadth 51 feet; iron hull, 5½ inch armor plating.

Arogante, Implacable, Opiniatre.—Displacement, 1,340 tuns; 150 horse-power; mean draft 8½ feet; length of load line, 145 feet; breadth 48 feet; iron hull, 5½ armor plating. The *Implacable* has made 7½ and the *Opiniatre* 8 knots per hour, in smooth water.

TREATMENT OF CHOLERA.

To meet the conditions of this disease, the nature of which is explained in our editorial columns, the following directions are given by Dr. Pratt in the *Missionary Herald*:—

"(1) For the *stage of diarrhea*. This may come on insidiously, painless and hence not alarming, but should be met promptly. The remedy is, 'The cholera mixture,' so called, consisting of equal parts of—

Laudanum,
Tincture of Rhubarb, and
Spirits of Campher.

"Begin with 30 drops, taken clear and unmixed, with a little sugar placed in the mouth afterward. Repeat the dose *after every evacuation*, increasing it if the case becomes urgent to 60 drops (a teaspoonful), or 90 drops if necessary. If the diarrhea is not controlled by this means, an injection of from 30 to 90 drops of laudanum, in a tablespoonful of starch, will prove a valuable help. This may be often repeated. If the diarrhea ceases, do not entirely intermit the medicine, but give in gradually diminished doses, every one or two hours, for a period of twelve or even twenty-four hours.

"(2) *For the vomiting stage*, the best remedy is—

Laudanum,
Tincture of Capsicum,
Tincture of Ginger, and
Tincture of Cardamom seeds,

equal parts; to be given, from 40 to 60 drops, undiluted and followed by sugar, after every fit of vomiting; taking care to give it as soon as the fit ceases, when it will be more likely to be retained. An excellent adjuvant to this is a large mustard poultice to the abdomen.

"(3) *For the stage of malignancy*, the only remedy is *stimulants*, especially brandy, which must be given with great freedom, from two to four teaspoonfuls every half or even quarter hour, till heat returns, and pulse and sensibility of extremities are restored. It is always to be given undiluted. Alcohol, or other spirits, will answer the purpose, if brandy is not to be had. It will be necessary to combine with this, artificial heat—bottles of hot water to the body and extremities—friction of the limbs (which no one need fear to apply), and mustard, perhaps, to the feet and hands, stomach and limbs. Remember that *boldness*, to the verge of rashness, is better than excess of caution, and that no danger is to be apprehended from any of these remedies so long as the symptoms for which they are given are uncontrolled.

"The use of cold water must be *strictly forbidden*, except merely to gargle the throat; a very small quantity, swallowed, will bring on the diarrhea after it has been stopped for hours. A little water of gum arabic may be allowed, a teaspoonful at a time; or, perhaps, lumps of ice might be taken with safety.

"For the *typhoid fever*, which often follows an attack, chamomile or sage tea, and diaphoretic treatment, will be all that is needed, beside a moderate use of stimulants, for convalescence."

CHOLERA PREVENTIVE.

A Burgundy-pitch plaster worn over the region of the stomach during the prevalence of the disease. It should be warmed a little before it is put on, the person standing erect when it is applied, so that the plaster shall not interfere with the motions of the body. It is asserted that a British regiment supplied with such plasters, lost only five men during a severe visitation of cholera, and they had refused to wear them. This remedy was used by Dominie Westbrook, in his Academy, at Harlem, as far back as 1832, and in a school of 60 boys, there was not a case of cholera, although the disease was very violent in the village.

CHOLERA—DR. HALL'S LETTER.

Messrs. Editors:—The article on "Cholera" in the January and February Nos. of *Hall's Journal of Health*, advance the following sentiments:—

1st. Of all curable diseases, the cholera is among the easiest cured, if promptly attended to in its first stages of two or three thin and weakening passages from the bowels, within any twelve or fifteen hours.

2d. Any remedy swallowed to prevent cholera, will increase the liability to an attack.

3d. It is almost suicidal for any man to attempt to treat his own case.

4th. That a physician should be called always on the instant of an attack, but when it is impossible to procure his services within an hour, ten or twenty grains of calomel should be taken in pill or powder, as a means of stopping the discharges, and of thus arresting the disease, until the physician arrives; because it is easiest to be procured generally—will remain on the stomach, from its heaviness, when even cold water is ejected as soon as swallowed—and because it is the most certain of all medicines known to stimulate the liver to action, this want of action being the fundamental cause of the disease.

5th. The calomel treatment has been more universally relied on in India, England, and the United States, than any other one remedy hitherto; but, as all diseases assume varying phases from year to year, it is better to rely on no previous treatment, should the cholera appear among us in 1866, but to send promptly for a physician; who, being among the affected all the time, can the quickest detect these changes, and is most competent to adapt means necessary to meet these varying phases.

6th. When cholera is prevailing, a single large, thin, painless, weakening, action of the bowels is cholera begun, and the business man should start for home in a vehicle instantly, calling on his physician on his way, and take him home with him; or if he cannot be had for an hour or two, get into bed as soon as possible, dress up warm, eat ice if thirsty, bind a thick warm flannel tightly around the abdomen, and wait with a calm, courageous confidence for his doctor's arrival; but if that arrival is delayed, and the symptoms seem to increase, then take the calomel where its healthful effect is to stop the passage within two hours. W. W. H.

MISCELLANEOUS SUMMARY.

A conference of professors and teachers, with others interested in education, convened by the Metric Committee of the British Association for the Advancement of Science, met last Friday evening in the Lecture Theatre of the Museum of Geology, Jermyn street. The object of the meeting was to discuss the introduction of the metric system of weights and measures. A resolution was passed approving of instruction generally in the system, and that as Government practically prescribed the curriculum of the training colleges, they should be asked to make questions in the metric system a portion of the examination of teachers for certificates.

A Western Clock Factory.—A clock and brass manufacturing company has been organized in Chicago, with a capital of $200,000. Forty acres of land within six miles of the city have been purchased, and the buildings are to be erected forthwith. The capacity of the manufactory will be two hundred thousand clocks per annum, and from four to five hundred tuns of brass for the market, in addition to what will be worked up in the establishment. The material for the manufacture of brass will be obtained from Lake Superior and La Salle, copper from the former and zinc from the latter. It is to be expected that the establishment will be in operation some time in July.

The rinderpest—which we are glad to notice is generally on the decrease—has appeared in Cadzon Forest, among the famous breed of wild cattle, belonging to the Duke of Hamilton. The duke, with the view to preserve his valuable herd of Ayrshires, has put them down in his coal pits, where they are enjoying complete immunity from the plague though it is raging above.—*Mechanics' Magazine.*

Dr. Parry accounts for the non-destructibility of the stomach by digestion, as follows:—In a state of health the blood is always alkaline, and the gastric juice acid. The introduction of food to the stomach attracts the blood to that organ, as well as determines a secretion of gastric juice, and the alkalinity of the blood protects the stomach from the action of the acid.

The cannon cast for the Austrian navy are composed of—copper, 600 parts; zinc, 382 parts; iron, 18 parts. This alloy is reported to be excessively tenacious and easy to forge and drill.

A vineyard was lately sold by auction at Gevrey, in the Cote d'Or, at the rate of $5,000 an acre, the highest price known to have been given in that country.

The Paris Universal Exhibition of 1867 will offer to the public, among other curiosities, says the *Moniteur*, an aquarium which will be thirty metres long by twenty metres in hight. It is intended, as in the aquarium of the Acclimatization Society, to bring together as complete a collection as possible of the most curious specimens of the submarine world. The size of the aquarium will cause spectators to fancy that they are under water. On looking upwards, the rare opportunity of seeing sharks, tunny fish, cod, and porpoises disporting themselves in their own element, will be given; and it is expected that this will form one of the many interesting features of the forthcoming exhibition.

M. Schlœsing has succeeded in discovering an arrangement by which an intense heat, sufficient to melt iron, can be got from ordinary gas. The principle of his contrivance is the complete combustion of the proportionate amounts of gas and air within a confined space, and the continuous supply of the combustible materials. A copper tube, carefully pierced, is the chief instrument in securing those results. M. Schlœsing was able to melt a piece of iron, weighing 400 gms., in twenty minutes, by his plan.

It appears that the common salt occurring in nature in the Andes in process of time undergoes nitrification, being now in company with lime and the nitrogen of the air, by a process not easily explained—the chlorine of the salt going to the lime, forming chloride of calcium, and nitrate of soda being produced.

Dr. Gallard stated, in a paper to the French Academy, that in many districts where intermittent fevers had prevailed from time immemorial, the drainage effected by railway works removed these disorders.

Notes and Queries

E. F. C. D., of Md.—The best oil for light machinery is sperm oil. Any kind of wood may have gold leaf applied to it You can obtain gilding size of any painter.

N. J.,——of.—A horizontal engine and boiler of the best make will give good satisfaction in a saw mill.

J. G.A., Ga.—We fear your broken amber pipe is a hopeless case. As all cements are dissolved or softened by heat, it follows that you cannot mend it that way. Possibly bands of silver in connection with a good cement may do. Try some good jeweller.

T. E. F., of N. H.—You ask "which bearing has the most friction, one that is six inches long and six inches in diameter, or one that is six inches in diameter and nine inches long? We will take, for instance, a locomotive axle with the same weight on each." According to Morin, the friction will be the same.

J. S. W., of N. Y.—In your estimate of the actual power of a horse you omit the hight to which the coal is raised—one of the essential elements.

G. C. D., of Tenn.—We think the purple ink of your letter is one of the animal dyes; it would cost ten dollars to have it thoroughly tested, and a bottle of it would be required.

J. E., of N. Y.—Smee says that the auro-cyanide of potassium is the best salt for electro-gilding. For the mode of its preparation we must refer you to his work; it is published by John Wiley, of 535 Broadway, New York.

H. G. R., of Ohio.—Your mode of computing the velocities of pulleys is right. The velocity is in inverse proportion to the diameter. Cannot your foreman understand that the proportion of 6 to 7½ is the same as the proportion of 1,200 to 1,500. One and a half is one-fourth of six

J. S., of Ind.—We have published the mode of making papier mache so often, we must refer you to back numbers for it

N. C., of N. Y.—The bright scales in the stone that you enclose are mica. There is no probability that the specimen contains gold, but this can be positively ascertained only by careful assay, which will cost ten dollars.

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Patent Claims.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine to accompany the claim, at a reasonable additional cost. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

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PRELIMINARY EXAMINATION AT THE PATENT OFFICE

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If an inventor decides to apply for a patent, he should proceed at once to send us by express, charges prepaid, a model not over one foot in size, and substantially made. He should also attach his name and residence to the model.

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On application for Reissue	$30
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On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
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On filing application for Design (fourteen years)	$30

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don't believe you have all of the currants you want in the summer; if so all you have got to do is to cut short pieces of last year's growth of wood from the bushes, and stick them in the ground where you want them, and they will produce a crop by another season. If you want them to grow in the shape of dwarf trees, cut out all the eyes above and below the ground, except a few near the top; this prevents their sending up shoot from the roots, and they will never grow any more than the one stem. The only objection to this mode of training is that they bear too heavily, and are apt to break down with the weight of the fruit; but you can prevent that by supporting each bush with a stick and twine. Now, this is the way you can raise plenty of this fruit, at but little trouble and no expense. If you have not got any cuttings, you can get them from some of your neighbors, or if you fail there, come to us and we will supply you with pleasure."

Blue Obtained by the Reduction of Chloroxynaphthalic Acid.

An alkaline solution of chloroxynaphtalate of soda is boiled with zinc in impalpable powder. The reduction begins in about twenty minutes, and a pale yellow solution results. The liquor is now decanted and ammonia added, which in a few hours changes the color to a beautiful green. After this the solution is neutralized by an acid, which causes the precipitation of brown flocculi. These are collected and washed on a filter, and afterwards dried. When dry the substance appears green, and shows a metallic lustre.

The compound is insoluble in water; it dissolves with a red color in boiling aniline, and gives a green solution with strong sulphuric acid from which water separates it with a violent tint. It dissolves in alcohol with a violet color; the solution diluted with water gives a beautiful blue color, which is turned red by acids. The ammoniacal alcoholic solution is transparent, and appears blue by transmitted light. By reflection it appears red, and looks as holding carmine in suspension. The product fixes itself violet on wool, and may be fixed on cotton by means of albumen.

The dilute alcoholic solution dyes silk blue, and also wool and cotton mordanted with albumen. The bath treated with acid dyes rose color; the dye, in fact, like litmus, is turned red by acids and blue by alkalies.

Sulphureted Hydrogen.

This gas, which for experimental purposes is usually obtained by means of sulphuret of iron, may be procured more conveniently, and in a state of great purity, by the use of sulphuret of calcium. The latter is formed very easily by mixing uncalcined powdered gypsum with one-fourth of its weight of calcined gypsum, and powdered pit coal equal to one-third of the whole of the gypsum used, and working up the mixture to a stiff dough with water; next forming it into pieces four inches long, two wide, and one and a-half thick, sprinkling them with powdered coal, and drying them, then placing them with coke in a wind furnace, and keeping them at a very high temperature for two hours. When cold they will be found externally to consist of oxysulphuret of calcium; but internally of pure peach-colored sulphurate of calcium, which may be broken in pieces about the size of nuts, and preserved in well-stoppered glass bottles. If water is added to these, and then sulphuric acid in small quantities at a time, sulphureted hydrogen is given off with great uniformity.—*Scientific Review.*

Thallium Glass.

M. Lamy finds that thallium is preferable to lead to replace potash. It communicates a yellow color to glass just as sodium gives a green coloration. Thallium glass, it is said, is denser and more refractive than potash glass, and the author believes such glass will be specially applicable for some certain optical purposes, and also for the manufacture of some artificial jewels. The best specimen was obtained with the following proportions:—

Sand	300
Minium	200
Pure carbonate of thallium	335

The mixture fused easily, and formed a perfect homogeneous mass, which had an agreeable and brilliant yellow tint. The density was 4·235, and the refraction index for the yellow ray was 1·71.

An unmanagable criminal in jail at Ravenna, Ohio, was quieted by an injection into his cell of two pounds of chloroform.

Coal Oils and Petroleum.

For the Scientific American.

Coal oil is produced by the distillation of bituminous coal or shale, at low heat, has of late years been largely employed under the name of kerosene for illuminating purposes, but a similar article produced at less cost from petroleum has nearly supplanted it for the same purpose.

Petroleum is the crude oil issuing from springs or artificial wells, and is obtained largely thus in the United States, Canada, and elsewhere, and especially in Rangoon, in Burmah. It may vary in specific gravity from ·800 to ·900, but is usually about ·820; the lowest gravities having usually the highest color, and those found in Canada being darker and more offensive in odor than those in the United States. Petroleum contains the lighter oils volatile at the ordinary temperature of the air, and is therefore unsafe for use in lamps. These with other products are separated by distillation in the following order: naphtha, benzine, kerosene, lubricating oils. Naphtha, kerosoline, etc, are the lightest fluids, which first pass over in distillation at 100° F., the boiling point of petroleum, and have a specific gravity of about ·650.

Benzine, specific gravity ·735, comes over from the still after the naphtha upon increasing the heat. This is employed by painters and varnishers as a substitute for spirits of turpentine, and being a powerful solvent is effectual in removing oil and grease from clothing; but, as will hereafter be seen, should not be confounded with benzole, which is the true benzine, although resembling it

Kerosene.—The heat of distillation being yet more increased, kerosene or burning oil is produced. Specific gravity ·790 to ·820. If the foregoing lighter oils have been properly separated, the kerosene now produced will be perfectly safe if burned in a proper lamp, with a closely-fitted burner, permitting no communication between the interior of the lamp and the external.

No coal oil should be used for lamps which gives off inflammable vapors under 100° F. The best specimens will not do so under 130° F. Nor should any be burned which will inflame by a lighted match. The best is of specific gravity not exceeding ·810.

Test, Let a small quantity of oil in a teacup or other vessel be placed in a dish of water near the boiling heat, and the bulb of a thermometer be held in the oil. Then observe at what temperature it first inflames by application of a lighted match. Or without a thermometer, by comparison with a known safe specimen, both being managed in the same way; if the suspected oil is not ignited more readily than the other, it may be deemed equally safe.

Lubricating Oils.—The heavier oils which pass over at a higher heat, after the kerosene, are valuable for lubricating purposes. Or the entire remainder of the contents of the still after separation of the kerosene, is sometimes employed as a lubricating oil, without further distillation.

Remarks.—The products of distillation of petroleum are composed in a great measure of hydrides of alcohol radicals, with either no benzole or minute traces of it only. But those derived from distilling coal or shale, have a smaller proportion of the hydrides and much benzole, toluole, etc. And in the distillation of coal, low heat favors the formation of hydrides, and a high temperature produces more benzole, perhaps by decomposing the hydrides as soon as they are formed.

Benzole, (sometimes called benzine).—This important substance, though it may be produced in other ways, is most readily obtained, as suggested, from coal, and cannot be produced from petroleum. From this is produced nitro-benzole or artificial oil of bitter almonds, from which are formed the celebrated aniline colors now so common.

It may interest the reader to know that the cost of a given amount of light from coal oil is about one-tenth that from sperm oil, or one-fourth that from tallow candles, and no doubt considerably less than that from gas. X.

Appearances of Good and Bad Meat.

Dr. Letheby, in a report on the cattle plague, gives the following characters of good and bad meat, which are especially interesting:—"Good meat is neither of a pale pinkish color nor of a deep purple tint. The former is indicative of disease, and the latter is a sign that the animal has died from natural causes. Good meat has also a marbled appearance from the ramifications of little veins of intercellular fat; and the fat, especially of the internal organs, is hard and suety, and is never wet; whereas that of the diseased meat is soft and watery, often like jelly or sodden parchment. Again, the touch or feel of healthy meat is firm and elastic, and it hardly moistens the fingers; whereas that of diseased meat is soft and wet—in fact, it is often so wet that the serum runs from it, and then it is technically called wet. Good meat has but little odor, and this is not disagreeable; whereas diseased meat smells faint and cadaverous, and it often has the odor of medicine. This is best observed by cutting it and smelling the knife, or by pouring a little warm water upon it. Good meat will bear cooking without shrinking, and without losing very much in weight; but bad meat shrivels up, and it often boils to pieces. All these effects are due to the presence of a large proportion of serum in the meat, and to the relatively large amount of intercellular or gelatinous tissue; for the fat and true muscular substance are to a greater or less extent deficient. If, therefore, 100 grains of the lean or muscular part of good meat are cut up and dried at a temperature of boiling salt water (224° F.), they lose only from 69 to 74 grains of their weight; but if diseased meat is thus treated, it loses from 75 to 80 per cent of its weight. I find that the average loss of weight with sound and good beef is 72·3 per cent, and of mutton 71·5 per cent, whereas the average loss of diseased beef is 76·1 per cent and of diseased mutton 78·2 per cent. Even if it be dried at a higher temperature, as at 266° F. when all the moisture is expelled, and when good meat loses from 74 to 80 per cent of its weight, the proportion of loss in bad meat is equally as great. Other characters, of a more refined nature, will also serve to distinguish good from bad meat. The juice or serosity of sound flesh is slightly acid, and it contains an excess of potash salts, chiefly the phosphate; whereas diseased meat, from being infiltrated with the serum of blood, is often alkaline, and the salts of soda, especially chloride and phosphate, abound in it. Lastly, when good meat is examined under the microscope, the fibre is clean and well defined, and free from infusorial creatures; but that of diseased meat is sodden, as if it had been soaked in water, and the transverse markings are indistinct and far apart; beside which, there are often minute organisms like infusorial bodies. These are very perceptible in the flesh of animals affected with the cattle plague, and Dr. Beal has described them as entozoa-like objects. They differ altogether from the parasites which constitute the trichina disease, and the measles of pork. How far the use of diseased meat affects the human constitution is unknown. In those cases where certain parasite diseases exist in animals, there is no doubt of its injurious nature; for the tape-worm, the trichina, and certain hydatid or encysted growths are unquestionably produced by it. Experience also points to the fact that carbuncle and common boils are in some degree referable to the use of the flesh of animals affected with pleuro-pneumonia; and occasionally we witness the most serious diarrhœa and prostration of the vital powers after eating diseased meat. It is, therefore, safest to forbid its use; and it is at all times best to guard against the possibility of injury by having meat well cooked. It should be so cooked that the very center of the joint should be exposed for sometime to the temperature of 212° Fahrenheit. The instructions of Liebig in this particular are hardly safe; for although a temperature below that of boiling water may coagulate albumen and develop the flavors of cooked meat, it may not insure the destruction of dangerous parasites. It is therefore better to have the meat a little overcooked than otherwise."—*London Journal of Pharmacy.*

The Pittsburgh *Commercial* says a coal company has now piled near Hornesdale, 350,000 tuns of coal—Said to be the largest body of coal ever collected in one heap on the face of the earth. It would require a train over two hundred and sixty miles in length to remove the stock; 700,000 carts would be needed reaching in one continuous line more than 2,000 miles. This large deposit will give some idea of the magnitude of the coal interests of our State.

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Explanation of Characters used; Definitions of Words used in this Work; United States Weights and Measures; Decimal Fractions; On the Selection of Millstones; On the Dressing of new Millstones—making their Faces Straight, and ready for putting in the Furrows; Furrows: the manner of Laying them out—their Draft, and cutting them in; Directions for laying off and cutting the Holes for the Balance Ryne and Driver; Directions for putting in the Balance Ryne and the Boxes for the Driver, and making them fast; Of setting the Bed Stone, and fastening the Rush therein: Directions how to Bridge or Tram the Spindle; Instructions for grinding off the Lumps of New Stones, Turning the Back of the Running Stone, Rounding the Eye and Balancing the Stone; Directions for Dressing and Sharpening Millstones when they become dull; Respecting the Irons of the Mill; Description of Plate 4, Showing the Principles upon which the Millstones work; How to fit a New Back on a Stone that has been running; Of the Elevator, Conveyor, and Hopper Boy; Of Bolting Reels and Cloths, with Directions for Rolling and Inspecting Flour, Directions for Cleaning Wheat; Instructions for Grinding Wheat; Directions for Grinding Wheat with Garlic amongst it, and for Dressing the Stones suitable thereto; Directions how to put the Stones in Order for Grinding Wheat that has Garlic amongst it; Directions for Grinding Middlings, and how to prevent the Stones from Choking, so as to make the most of them; Reels for Bolting the Middlings; Instructions for a Small Mill, Grinding different kinds of Grain; Of the Manner of Packing Flour; Table showing the number of Pounds which constitute a Bushel, as established by Law in the States therein named; The Duty of the Miller; Pearl Barley or Pot Barley; The art of Distillation; Of the Importance of Draughting and Planning Mills; Cogs; the best time for Seasoning and Cutting them; The Framing of Mill Work; Windmills; a Table of the Velocity of the Wind; Instructions for Baking; Receipt for making Rabbitt Metal, etc.; Cement; Solders; Table Showing the Product of a Bushel of Wheat of Different Weights and Qualities, as ascertained from Experiments in Grinding Parcels; Of Saw-Mills and their Management; The Circular Saw; Rules for Calculating the Speed the Stones and other pieces or parts of the Machinery run at; To find the Quantity, in Bushels, a Hopper will Contain; Table of Dry Measure; Spouts—the Necessity of making them Large; To lay off any required Angle; Of Masonry; Of Artificer's Work; Of Bricklayer's Work; Bricks and Laths—Dimensions; Timber Measure; Table—Diameters in inches of Saw Logs reduced to inch board measure; Of the Wedge; Of Pumps; The Screw; Table showing the power of Man or Horse as applied to Machinery; Measure of Solidity, Rules for calculating Liquids; a Table showing the Capacity of Cisterns, Wells, etc., in Ale Gallons and Hogsheads, in proportion to their Diameters and Depths; Steel—Of the various degrees of Heat required in the Manufacture of Steel; Composition for Welding Cast Steel; Directions for Making and Sharpening Mill Picks; A Composition for Tempering Cast Steel Mill Picks; Governors for Flouring Mills; The Governor or Regulator; The Pulley; Of the Velocity of Wheels, Pulleys, Drums, etc.; On Friction; Belting Friction; Of the Strength of different Bodies; Falling Bodies; Of the different Gearings for Propelling Machinery; The Crown or Face Gearing; On matching Wheels to make the Cogs wear even; On Steam and the Steam Engine; Of Engines—their Management, etc.; Prevention of Incrustation in Steam Boilers; Double Engines; The Fly Wheel; Table of Circumference and Areas of Circles, in Feet, suitable for Fly Wheels, etc.; To calculate the effects of a Lever and Weight upon the Safety-Valve of a Steam Boiler, etc.; Of the Slide Valve; Boilers; Chimneys; Explosion of Boilers; On the Construction of Mill Dams, Rock Dam; Frame Dams; Brush or Log Dam; Gates, Description of Water Wheels; Of Non-elasticity and Fluidity in Impinging Bodies, Motion of Overshot Wheels, The Breast Wheel; Overshot or Breast Wheels; Table of the number of inches of water necessary to drive one run of Stones, with all the requisite Machinery for Grist and Saw Mills, under heads of water from four to thirty feet; Table containing the weight of columns of water, each one foot in length, and of various diameters; The Undershot Wheel; Tub Wheels; The Flutter Wheel; The Laws of Motion and Rest; Power of Gravity, Percussion, or Impulse, with the Reaction Attachment; Table of the Velocities of the Combination Reaction Water Wheel per minute, from heads of from four to thirty feet; Tables to reckon the Price of Wheat from Thirty Cents to Two Dollars per Bushel.
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RESULT OF THE VAN DE WATER CHALLENGE.
—MESSRS. EDITORS:—The readers of your valuable paper will recollect that in your issue of Nov. 11, 1865, Mr. Van De Water challenged any water-wheel builder to compete with his make of wheel for $500. In your issue of Dec. 9, 1865, I accepted his challenge, and named $5 000 as the competing sum and appointed Fairmount Water Works, Philadelphia, Pa., as the place of trial, where not only the relative merits but the actual percentage of each wheel (large or small) would be made known to the public.

Mr. Van De Water evaded this by proposing the test should be made in Rochester, N. Y. I had some thirty of my wheels at work in Rochester—one of them in G. W. Burbank's mill, that had been running three and a half years, which had three or four buckets knocked out. Mr. Van De Water put one of his wheels in the same mill, and by running against my wheel in that condition, deluded himself into the belief that his wheel was equal to mine. Hence the challenge. I replaced my wheel in Burbank's mill with one that was in order. Without my knowledge a test was recently made; for the result I refer you to the article below, signed by six responsible millers and mill owners of Rochester. This, Messrs. Editors, we suppose is the reason Mr. Van De Water evades the test after having made a public challenge. JAS. LEFFEL & CO.,
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ROCHESTER, N. Y., Feb. 28, 1866.

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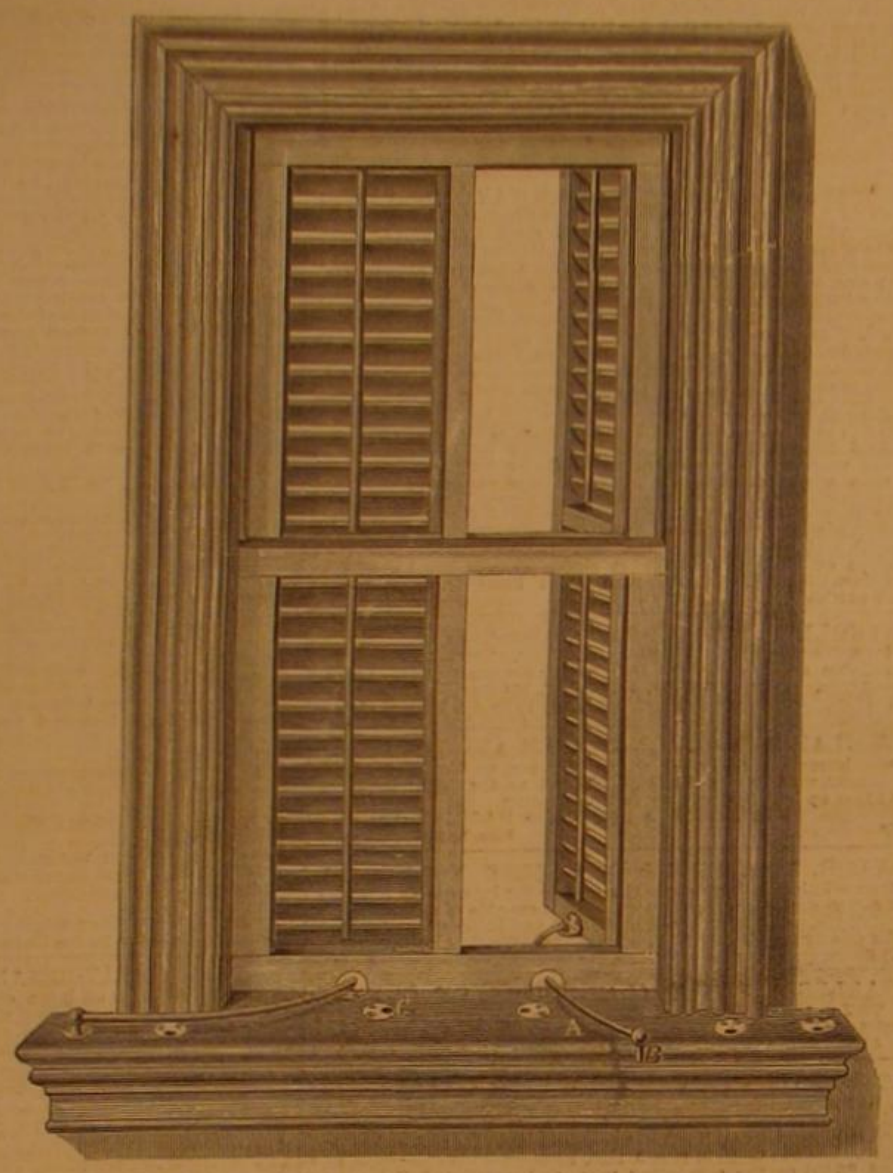
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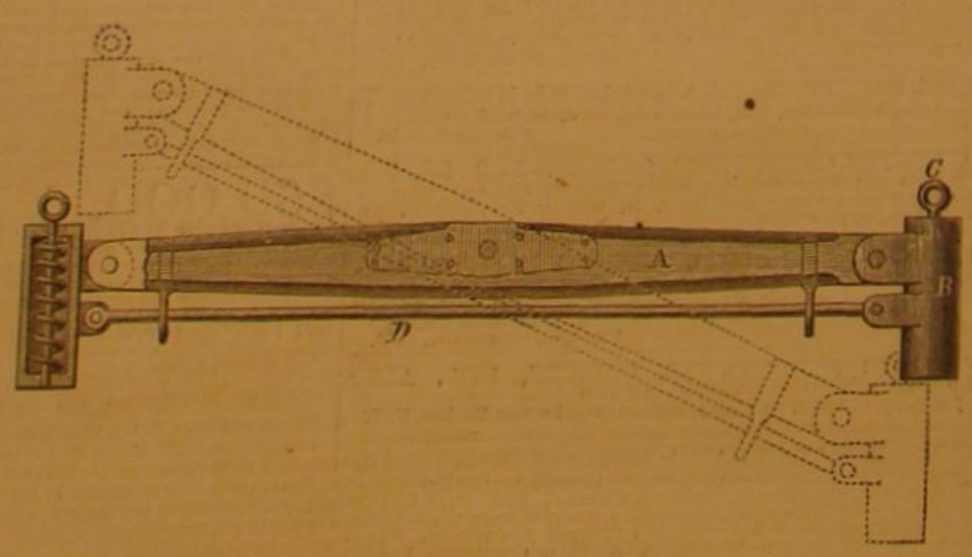
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It was patented through the Scientific American Patent Agency on March 25, 1862, by Frank Chase, of South Sutton, N. H., for further information address him at that place.

Improved Doubletree.

When a team of horses is hitched to a heavy log or any other load that needs a strong and steady pull to start it, they draw willingly at first, but if it does not move they become restive and "pull altogether one after the other," as the saying is. This makes them fret so that a great deal of time is consumed in doing very little work. Moreover, it tends to make the horses balky.

In this engraving we have shown an invention which is claimed to be a remedy for these evils. The inventor provides the doubletree, A, with two cylinders, B, which have springs, either spiral or of rubber, within. The whiffletrees are attached to the eye bolts, C, as shown in the section of one of the cylinders. A cross rod, D, is also connected to the cylinders so that they are always in line in the direction of the strain, as shown in the dotted lines. This renders both horses effective in pulling on the load, for if one gets a little the start of the other the spring is not cramped but acts the same as when both are in line. On rough roads this attachment is likely to prove effectual in saving horses and harness from shocks and sudden strains which are injurious to both. It may be used on plows or on vehicles of any class, and will encourage the horses to draw under disadvantageous circumstances. Rights for sale on reasonable terms.



DOWELL'S DOUBLETREE.

For further information address W. Dowell, Hicksville, Ohio, by whom it was patented through the Scientific American Patent Agency on June 23, 1863.

Southern Cultivator.

We welcome among our many exchanges the return of this valuable monthly, which is devoted to the interests of Southern agriculture. It advocates recuperative prosperity for the South through industrial agencies—by which alone those States can hope to gain and far surpass their former renown. The *Cultivator* will prove a strong auxiliary to the promotion of these ends, and deserves a liberal patronage. W. N. White, Athens, Ga., publisher.

Utilizing the Heat of Steam.

Mr. D. E. Blacke, of Belfast, Ireland, has invented an apparatus which consists of a vessel in the form of a cylinder, or otherwise, to suit the form and position of the engine to which it is to be attached, into which he introduces tubes of any requisite size and number, making them fast in the ends of the vessel in such a way that the interior of the vessel will be steam-tight, the tubing being open at the ends for the purpose of allowing the steam and water that are blown into them to pass through. The said vessel is supplied with water from the boiler or boilers to which the engine is attached, and, if necessary, from the source whence the feed water is obtained, but either of these sources of supply may be used separately. To this tubular vessel he attaches a pipe leading to the boiler or to the engine, for the purpose of allowing steam free egress or ingress. He places the said tubular vessel in such a position with respect to the engine, that the steam after passing through the engine will, before it is allowed to entirely escape pass into the tubes, his object being to communicate to the contents of the tubular vessel the heat of the steam; the steam being used over and over again for the purpose of heating.

This *is* a novelty.—EDS.

A Natural Curiosity Made Useful.

On the South Farralleone Islands, on the coast of California, is a remarkable subterranean passage, connected with a rocky *gulch*, open to the ocean. Through this passage the waves of the sea force the air with much violence, and an observation of the peculiar character of the wind current some years ago induced Colonel Bache, of the engineer corps, United States army, to undertake to arrange a fog whistle which would give an alarm to mariners approaching the place. This he succeeded in doing, and the wind instrument performed at nearly all times, but with different degrees of force—sometimes "piano passages," and at others fortissimo ones. About the time of low water, when the waves do not enter the gulch, it would cease for about two hours, when its shrill music would begin again. The force of the wind in stormy weather is so great that the first whistle erected by Colonel B. was carried away, and he subsequently constructed one of a disk of iron perforated with a hole six inches in diameter. This was securely fastened by heavy bolts to the solid rock, and it proved entirely successful.

MECHANICS

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