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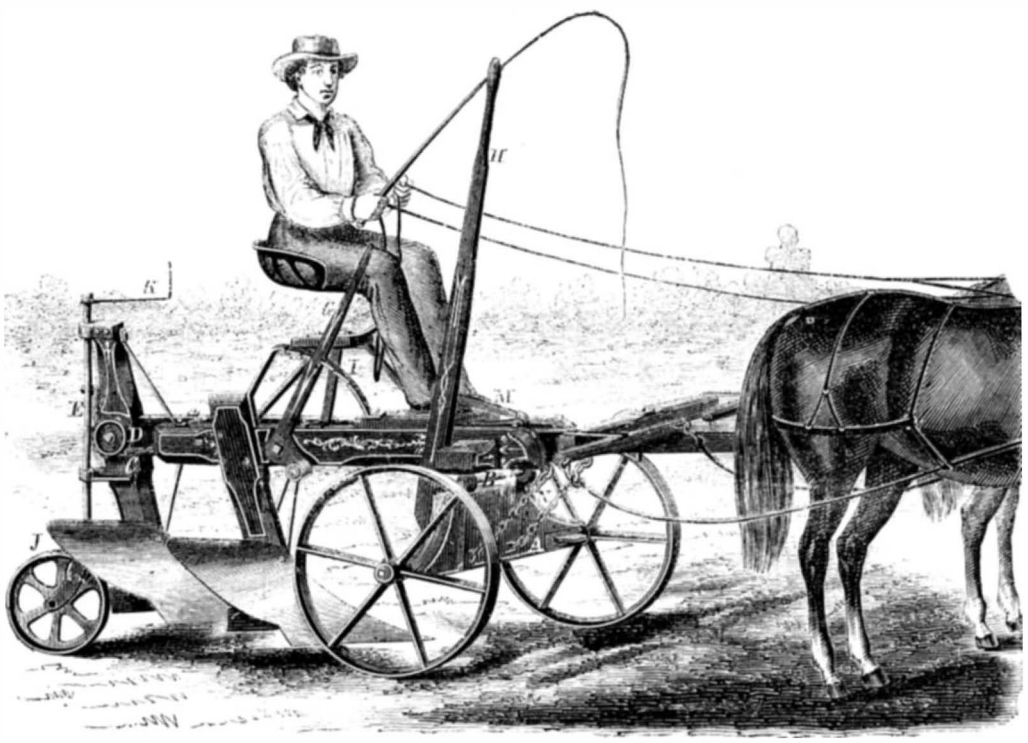
Improved Gang Plow.

This machine consists of a frame supported upon three wheels—two in the front and one in the rear. The front wheels are attached to a swing or hinged axle, A, Fig. 1. It will be observed that one of these wheels is attached to the front side of the axle, A, and the other to the back, in such a manner that when the axle is turned down in a horizontal position, to lower the plows to the ground, the wheel that runs in the furrow will be as much lower than the other as the depth of the furrow may require. This axle swings upon the hinge, B, Fig. 1, and is connected with the hind wheel by means of a lever (not shown) and connecting rods, to the end of which are attached a chain, C, which passes under the wheel, D, and is made fast to the vertical shaft, E, by an eye-bolt. The depth to which the plows penetrate the ground is regulated by the small side lever, G, fitted with a roller, upon which rests the long lever, H; the lever, G, is secured in the required position by a notched quadrant, I. By these details the driver has entire control of the depth of the furrow without moving from his seat or stopping the machine. The caster wheel, J, supports the plows by means of the connecting chain, C, Fig. 1, and allows them to swing round at the ends of the furrow. By means of the handle, K, the plows may be guided to the required position for starting or backing.



DAVENPORT'S GANG PLOW.

Fig. 2 is a front view of the axle when the plows are in operation. The tongue is perfectly free to work up or down, which prevents all possibility of up or down draft on the horse's neck; it is adjusted sidewise by a bar furnished with holes in the front end, to give the required land to the plows. The front axle is secured in its vertical position by the pawl or catch, M (as shown in Fig. 1). To liberate the axle the pawl may be raised by placing the foot on the back part of it.

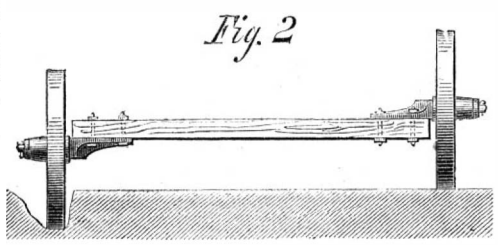
In reference to the caster wheel, it will be seen that it runs upon the bottom of the furrow, and its connection with the front axle is shortened or lengthened by a turn buckle, which is fitted with a right and left-handed thread attached to the chain, C, for that purpose.

Every experienced plowman knows that when the ground is hard, weight is required to keep the plow to its work. With this machine part of the driver's weight is used for that purpose, and when the soil is in such a condition as not to require it, the weight can be transferred to the caster wheel by screwing up the tightener until the caster wheel relieves the plows of the unnecessary weight. The front chains, N, are to prevent the axle swinging too far back.

Some of the main advantages claimed for this machine are, that the plows lift point first, which greatly facilitates the operation of raising them out of the ground when in motion. The driver can control the depth of cut without stopping or moving from his seat. The tongue being perfectly limber the plows will yield freely to any unevenness of the ground. Its general accessibility in all parts is such as to recommend it to agriculturists.

This plow was patented through the Scientific American Patent Agency, by F. S. Davenport, on February 9, 1864. For further information address

Fig. 2



Goodrich & Newton, Agricultural Machine Manufacturers, Jerseyville, Ill.

New Mineral.

A new mineral of lead has been discovered in Chili, containing 10 per cent of iodine. Iodine has lately become very valuable, on account of its extensive use in photography, and of the discovery, by Dr. Hoffman, of a new dye, having this element among its constituents. It is said that one cargo of the new mineral will represent a fortune. As a further illustration of the progress that mining adventure is making in South America, a mine of bismuth ore has recently been opened in Bolivia, about two-thirds up the highest of all the peaks of the Andes—the Iljampu Mountain. Bismuth also, has lately increased in value; and 15,000 feet above the level of the ocean, only slightly beneath the line of perpetual snow, men are setting to work to obtain it.

A COMPANY proposes erecting a factory at Norwalk, Conn., for the manufacture of ginghams; 500 ooms will be run, employing 300 hands.

Patent Zinc Smelting.

An invention has been provisionally specified by Mr. A. Reynolds, of Bagillt, Flintshire, which consists in the arrangement of a furnace (such as a blast furnace), a flue, and condenser, as hereafter described, so that zinc, otherwise called spelter, can be smelted from its ores in it, instead of in the retorts that are ordinarily employed. The zinc passes off in vapor with the smoke, at the top of the blast furnace, and in order to retain the zinc in the metallic form air must be carefully excluded at the top of the furnace, or, preferably, coke must be placed in the flue, or charcoal may be employed instead. The coke may be heated by the smoke, or it may be heated otherwise, so as to reduce the zinc to the metallic form. The inventor leads the flue into a chamber, or series of chambers, for condensing the zinc from the smoke. This condensing chamber may be either a large room or a series of spaces, or of pipes, or otherwise, and may be cooled externally by water. The smoke, after leaving the condenser, may still carry some zinc with it, which should be removed by passing the smoke through a condenser with water in it, or otherwise. The blast furnace may be of the same construction as that generally used for smelting lead slags. The coke in the flue would be placed near the part where it leaves the blast furnace, and the flue would be a little larger in this part than in others, to prevent stopping the draught. It would be better to throw in the zinc ore at stated intervals through a door at the top of the furnace, and to moderate the blast while the zinc is passing off.—*London Mining Journal.*

[This is essentially the same plan as that now pursued in this country.—EDS. SCI. AM.

Economic Magnesium Light.

In a communication to the Paris Academy of Sciences, Prof. Carlevaris, of Mondovi, Italy, stated that when magnesium wire was ignited in atmospheric air, or in pure oxygen, the most luminous effects were not manifest till a certain quantity of oxide had been formed, and was raised by the heat produced to an excessively high temperature. The light in this case, as in the combustion of carbureted hydrogen, as in that of hydrogen in contact with platinum, and as in the Drummond arrangement, is derived from the solid particles raised by the flame to a great heat—a heat which dissolves and volatilizes platinum, but leaves the oxide of magnesium solid, fixed and intact. To raise this oxide to the temperature necessary to give the greatest light, it should be presented to the flame in as small a quantity and in as large a volume as possible, which is done by employing a spongy oxide thus obtained:—A piece of chloride of magnesium is exposed to the flame of the oxyhydrogen blowpipe, in contact with a piece of carbon. The chloride of magnesium is rapidly decomposed, leaving the spongy oxide, which gives the light in ques-

tion; or, by simply replacing the chloride with the carbonate of commerce, the same effect can be produced.

MANUFACTURE OF ULTRAMARINE.

We take the following extracts from a long article in the last Smithsonian Report, translated from *Aus Der Natur*. The translation was evidently made by a German, as instead of "soda" he gives us the original "natron." His "sulphuric acetical natron" we take to be sulphate of soda, and "sulphuric natrium" the sulphide of sodium. The acid that escapes in roasting we suppose must be sulphurous, and not sulphuric acid, as translated:—

THE ANCIENT LAPIS LAZULI.

The idolatry of classical antiquity finds its chief antagonism in the natural sciences. It would be easy to show how many illusions, nestling in the heads of the admirers of the olden time, have been dispelled by modern chemistry alone; and, although our present purpose is to deal with two objects of subordinate importance, yet these also serve to show how very broad is the line of separation between our own times and the remote ages, to whose languages and ideas so much of the time and training of our youth are commonly devoted.

The colors of *azure* and *purple* were among the most highly priced as well as the most highly prized productions of antiquity. The former was sold for its weight in gold, and the latter was especially reserved for the noble and the powerful; its use was, in some ages, even forbidden to all beneath those of the highest rank on pain of death. Science and art have wrought here a striking change; being no longer limited to the direct gifts of nature, we are able, from the most apparently unpromising raw material, to furnish for the use of the whole community what could then be but scantily produced for the ruling few. The contrast is certainly suggestive.

As early as three hundred and fifteen years before the Christian era, Theophrastus drew a distinction between natural and artificial azure, the latter of which, he tells us, was manufactured in Egypt. It seems most probable, however, that the terms natural and artificial indicate in this case only the greater or the less degree of care with which the color was prepared from the beautiful stone which we call *lapis lazuli*, to which the ancients gave the name of sapphire. While in some cases the stone was merely reduced to a fine powder, in others, probably, the coloring matter was more carefully separated, as is done in our own day.

The lapis lazuli, or sapphire, is found in the least accessible parts of Little Bucharest, Thibet, China and Siberia, in layers or strata of granite or limestone. Of old, as at the present day, it was polished and wrought as a gem, and it is almost the only member of the large family of gems that has an intrinsic value. This distinction it owes to the fact that, in combination to its great beauty, it yields for the use of the painter one of his most beautiful colors, which, moreover, is unaffected by air or heat; that color is ultramarine.

DISCOVERY OF THE MODERN PROCESS.

As lately as the commencement of the present century, ultramarine, or azure blue, was not simply a fine powder of the gem, but the result of a long and troublesome process. The stone was first broken into small pieces, and even this first step in the process was no easy one, the stone being exceedingly hard. The pieces, of the size of a hazlenut, were cleaned by means of lukewarm water. then made red-hot, and afterward slaked in a mixture of water and acetic acid. The cohesion of the particles is so great that this process must be repeated from six to ten times before the mineral can be transformed into a fine powder. It is afterward rendered still finer by trituration with the muller stone of the painter, having been first mixed with water, honey and dragon's blood, then treated with the lye of the ashes of the grapevine, and finally dried. The powder is next compounded into a mass with turpentine, rosin, wax and linseed oil, melted together, and kneaded under water. By this process the fine powder is washed out, and in time sinks as a sediment in the liquid. The mineral yields not more than one-fourth of its weight of coloring material.

Up to a very recent time Italy continued to be the chief, as it had been the original, manufactory of ultramarine, and thence the finest shades were derived. The tediousness, the difficulty, and, consequently, the costliness in both time and money of the old process of producing ultramarine from the lapis lazuli, naturally excited great desire among scientific chemists to find some cheaper and readier artificial means of producing that color, doubly precious to the painter for its beauty and its permanency; but so invariable, from different causes, were the failures of all attempts in that direction, that the solution of the problem was well nigh despaired of, when hope was as suddenly as accidentally revived. In 1818 it happened that in France a sandstone furnace for the melting of soda was taken down, and a beautiful colored substance, never seen there before, was discovered. It was remarked that formerly the furnace for the melting of soda had been constructed, not of sandstone, but of brick. The mass of matter thus discovered was examined by Vauquelin, who observed in its appearance and composition points of great resemblance with ultramarine; but still no clue offered itself to guide him through the perplexities of the investigation. Similar observations were made in the soda manufactories, as, for instance, by Hermann, in Schoubeck, who had thrown away above a hundred weight of the colored mass, found in a similar furnace when the latter was pulled down; and by Kuhlmann, at Lille. We shall not venture to decide whether or not the "blue material" mentioned by Goethe in his "Italian Travels" (1781), as being taken from limekilns in Sicily and used for the adornment of altars and other objects, was homogeneous with this product of the soda furnace, and whether both were, in fact, an artificially and accidentally produced ultramarine.

The question still remained unanswered, how was this substance in the case of each furnace produced? In what did it originate? At length, in 1828, the solution of this important question was found and published by Professor C. Gmelin, of Tuebingin. During eighteen years he had been occupied with researches on the lapis lazuli and its kindred minerals, the products of the volcanic eruptions of Vesuvius. Reflecting on the recent circumstance, he was led to believe that, notwithstanding there had been so many unsuccessful attempts, the production of an artificial ultramarine was not an impossibility. Further study of the natural coloring substance disclosed to him the sulphurous portion of the components, and, holding that clue, he at length succeeded in producing a most brilliant ultramarine.

While at Paris, in 1827, and previous to the publication of his discovery, he unreservedly communicated his ideas on the artificial production of ultramarine to several chemists, especially to Gay Lussac. And, behold! on the 4th day of February, 1828, Gay Lussac made a report to the French Academy that Guimet, at Toulouse, had succeeded in manufacturing ultramarine of all kinds. Did the discovery originate in the open and disinterested communication of Gmelin, or did it not? Who shall decide? Guimet, it is but just to say, warmly defended himself against such a suspicion; he affirms that he was prompted to his experiments by the examinations of lapis lazuli, made by Desormes and Clement, and claims that he had produced artificial ultramarine before Gmelin's visit to Paris.

Whether the method of Guimet is essentially different from that of Gmelin cannot be determined, for, while the latter published his discoveries with every particular, Guimet, on the contrary, has kept his method a secret to the present day. In so far as profit is concerned, Guimet, it must be confessed, has maintained the advantage over Gmelin, and France over Germany; for Guimet forthwith made his discovery lucrative to himself and others. As early, even, as the same year, 1828, he had erected a manufactory at Paris for the production of artificial ultramarine, which he sold at two dollars and sixty-six and a half cents per pound, while the natural article was a little more than double that price. Guimet succeeded in having his product adopted for the painting of the beautiful ceiling of the museum of Charles X., and thenceforth hiss fortune wasmade. In 1834 the price had risen to from four to fiveand one-third dollars per pound, but in 1844 had againfallen, and ranged from two and one-sixth to two and one-third per pound, thoughthe best quality for oil painting was still sold at six dollars and forty cents. The cheapness of the ordinary article enhanced the demand, and the product of Guimet's factory speedily rose from twenty thousand to one hundred and twenty thousand pounds, of which twenty thousand pounds were exported to foreign countries. Not only did Guimet amass immense wealth; he was the recipient also of many public honors. From the French "Society for the Encouragement of Industry" he received a premium of five thousand francs, and medals from various French industrial exhibitions; and this as early as 1834, when the real importance of this eminent discovery could have been scarcely appreciated. In 1851, at the London exhibition, Guimet received the large gold medal.

In 1842, the celebrated French chemist, Dumas, in his "Manual of Chemistry," had expressed the opinion that chemical purity of materials might very well be dispensed with in the manufacture of artificial ultramarine, and that common clay might be used, provided it did not contain too much iron. Professor Engelhardt, of the Polytechnic School, Nuremberg, while translating the work of Dumas into German, was especially impressed by that statement, and was induced thereby to make new experiments, but his labors were terminated by death before he had obtained any positive and satisfactory results. His assistant and successor, Leykauf, continued the deceased professor's experiments, and was fortunate enough to succeed, where all previously had failed. By means of potter's clay, Glauber's salt, and coal, he manufactured the most beautiful ultramarine, in the renowned manufactory of Ley Rauf, Heine & Co., at Nuremberg; and in a very few years the firm counted its wealth by millions. Nowhere else has this branch of industry acquired such an extension—being conspicuous even among the diversified activities of Nuremberg, and justifying, therefore, a brief description in this article.

THE NUREMBERG MANUFACTORY.

In the vicinity of the Nuremberg railroad depot the attention of the observant traveler is pretty sure to be attracted by a stately and spacious mass of buildings of white and red sandstone. The long rows of structures, with their streets and yards, cover a space of some eighteen acres. Surrounded as the whole is by a rampart, one might at first fancy himself to be looking upon a fortress. But the smoke from numerous tall chimneys would speedily correct this error and betray the abode of ingenious and successful industry. It is to be regretted that visitors are rigidly excluded from the interior of this industrial hive; a useless exclusion, as the manufacture of ultramarine can no longer by any possibility be considered a secret. The visit of the King of Bavaria, in 1855, to this equally interesting and important factory, so far lifted the vail that we possess something like a reliable description, instead of the strange surmises which were previously in circulation with respect to it. On a first glance at the exterior we perceive that the vast erection has been built piecemeal, additions having been made from time to time to meet the necessities of the increasing business. It required the long period of seventeen years to render the whole what it now is—a structure heterogeneous, indeed, in appearance, but really possessing the highest conceivable adaptation to the purposes for which it was designed.

Three rows of the buildings are devoted solely to the preparation of the raw material, the motive power consisting of two steam engines conjointly possessing a 38 horse-power. So various and well contrived are the stampers, crushing and sifting machines, etc., which are set in motion by these various works, that a small amount only of human labor is required to furnish abundant raw material to employ elsewhere a vast number of hands.

Groups of buildings surrounding those just mentioned contain water-works, and consist of five divisions of vaulted galleries, supported by iron pillars. Near these are the drying stoves. Close by these three principal divisions are the buildings for storing, packing and weighing, and the clerks' offices and repairing shops. Here is a scene of continual activity, the human labor being greatly aided by a high-pressure steam engine of 20 horse-power. The communication between these various and extensive buildings is facilitated by a railroad 6,000 feet, or considerably above an English mile in length, crossing from east to west, and from north to south, and

similar tram roads of timber connect the buildings in the upper stories. The iron railroad leads to the depot of the public railroad; thus placing the factory in easy and speedy communication with the principal high roads of Germany. The weight annually carried on this little railroad amounts to nearly 2,000 tuns; about one-tenth of which consists of the manufactured article.

About 200 laborers are constantly employed in this establishment, and it is greatly to the credit of the proprietors, Zeltoner & Heyne, that they have established a savings bank, a sick fund, and a fund for the support of widows and orphans.

We have spoken of the remarkable fall in the price of ultramarine. Competition and improved machinery and modes of operating have effected so much in that respect, that the whole price of the best article at the present time does not exceed that paid for the mere grinding only eighteen years ago. This continual fall of price necessarily compels a corresponding expansion of the manufacture and sale to compensate for the deficit in profit. On this account scarcely a year passes without the addition of new buildings to this vast establishment. Considerably more than 5,000 tuns are manufactured here yearly, at the average cost of from 25 to 37 cents per pound. The cheapness and exceeding beauty of the color cause it to be profitably and largely exported to France, in spite of the absurdly heavy import duty levied upon it there.

What we have said of this single manufactory, vast as it is, gives but a very inadequate idea of the extent and importance of the ultramarine manufacture in Germany. At the Industrial Exhibition at Munich no fewer than seven extensive manufacturers received medals, and two were honorably mentioned.

THE PROCESS.

With regard to one point in the procedure, there is a vast difference between the French and the German manufacture. In the latter, Glauber salt or a mixture of that salt and natron is always used; in the former, only soda. The German mode is the more economical, because the sulphuric acetical natron is, by the agency of the coal, converted into sulphuric natrium, and thus the sulphur can be wholly or partially dispensed with if soda be added at the same time. It is true that a somewhat greater quantity of coal will be required, but there can be no comparison between its price and that of sulphur. As to the result, it does not seem that the one or the other method is very greatly preferable.

There is great difference in the proportions of the several components of this mixture; but the following may serve as a general rule:—

GERMAN METHODS.

First.

	Parts.
White potter's clay, free from water	100
Glauber salt, free from water	85 to 100
Coal	17

Second.

White potter's clay, free from water	100
Glauber salt, free from water	41
Soda, free from water	41
Sulphur	13
Coal	17

FRENCH METHOD.

White potter's clay, free from water	100
Soda, free from water	100
Sulphur	60
Coal	11

The next operation to be performed is that of what is called the over glowing of this mixture. It is placed in melting pots of potter's clay, formed to withstand intense heat, and slowly dried till burned. Absolute exclusion of air being indispensable, it is especially requisite that the melting pots be so tempered that they will neither burst nor become softened in the intense heat requisite to burn the mass within them. They may vary from 4 to 12 inches in hight, with the like diameter. When filled they are packed one on the other in a furnace resembling in form a flattened brick-kiln. They occupy the whole center of the surface, while the space on each side of them is used for the burning of similar pots. The furnace being properly filled, the mouth is walled up, and the firing commences. The burning continues during from seven to eight hours up to three days, according to the size, construction, and contents of the furnace. Fuel must be added till the mass is thoroughly incorporated and begins to melt. Upon this operation everything depends. If it be not properly conducted, the best and most accurately proportioned raw material will not yield a profitable result. The temperature must be of a certain hight, which is to be ascertained beforehand by trials in a small testing oven. It approaches a bright red or incipient white heat, and must be kept at the same point during a specified time; and it must be made to heat the whole mass as thoroughly as possible. When the furnace is cooled, the glowed mass is taken out and cooled with water, and then repeatedly washed and drained to remove any salt still remaining. The now dried and spongy mass is next removed to the mill and broken and pulverized to the utmost possible degree of fineness; the powder is repeatedly washed with water, and after being thoroughly dried, again ground and nicely sifted. It has now reached the first stage of ultramarine, or what is called green ultramarine, and is ready for sale or for transmutation into the blue colored or proper ultramarine. Hitherto, however, the green ulramarine has been in no very great request, as compared with the blue. It varies through several shades, from apple green to blue green; and in beauty it is far excelled by the copper color and even by the cobalt. Its chief, if not its only recommendations, are its cheapness and innoxiousness; and those qualities, important as they undoubtedly are, seem insufficient to counterbalance its want of brilliancy.

The next important operation is the transmutation of the green into the blue color. Here there is but one cause for anxiety. To obtain a perfectly beautiful blue, we must previously have a perfectly beautiful green. The latter is roasted with sulphur, air being freely admitted during the process. It sometimes happens that the change of color takes place without any interference. The sulphuric natrium contained in the mass causes spontaneous ignition on the admission of air, and when it ceases to glow we have still sulphuric acid present, and the green color is thus self-changed into a beautiful blue.

As to this process also of transmuting the green color into blue, the French and Germans have their peculiar methods. The Germans use small iron cylinders for roasting; the French small hearth ovens, into which, however, the flame cannot enter. Hitherto cylinders of potter's clay have not been adopted, though we doubt not that they would serve just as well, and be even more durable. The cylinder being filled with from twenty-five to thirty pounds of green ultramarine, a vane is set in motion so that the contents of the cylinder may not be burnt without being first thoroughly roasted within. A pound of sulphur is now passed through an upper opening into the cylinder, and while the wind vane continues in motion the sulphur is gradually consumed. The addition of sulphur may be continued as long as the color improves in purity and brilliancy, but care must be taken not to continue it too long. After the color has been thus roasted it must once more be washed, dried, ground and sifted.

The French method of roasting possesses this advantage, that, by allowing a freer access of air, the green mass is the more speedily transmuted into blue. But, on either the French or German method, a large quantity of sulphuric acid escapes, which renders the factory a nuisance to its neighbors, while, were that quantity of sulphuric acid preserved, it would suffice for the production of all the Glauber salt used in the manufacture.

Manufacturing Peat for Fuel.

In performing this invention, Mr. R. M. Halloway, of the Strand, first breaks up and destroys the cellular spongy conformation of the peat, and although this could be effected by such machinery as the farmers' ordinary clod crusher, or by the pugging mill, or by other suitable means, yet, for the sake of economy, he prefers to effect this operation by apparatus of the following construction:—He constructs a circular or ring-like inclosure by means of rough poles, palings, or hurdles; the ground within, or the bottom of which, he provides with a ring-like or circular trough, or, for the convenience of removal, with two or more sectional troughs, which may be formed of wood or of iron, and within this inclosure, and upon the said trough or troughs, when supplied with raw peat, he causes cattle to be driven round, so that, by their weight and the action of their feet, the part of the operation of manufacturing peat, which consists in mashing and breaking down the peat, may be effected. After this part of the operation has been effected, the peat so treated is to be removed and loosely pressed together, and molded into such pats or small-sized "sods" as may be desired, which may be effected by hand, for which purpose young boys and girls may be employed. This being effected, the peat is placed on tables to dry in the open air; and, in order that the atmosphere may have free access to all parts, he constructs these tables in the following manner:—The legs of each table are of wood, or of iron, and they should be three feet in hight. On the tops of these tables is a framework of strong laths, or of posts of wood, or of bar-iron, or other suitable material, covered with a lattice-work of laths, or with a netting of wire of twine, or any other suitable material, which is secured to the framework aforesaid. These tables should be from two feet to four feet wide, as may be convenient, and of any suitable length, according to the circumstances of the place or size of the works. The peat, when sufficiently dry for removal from the tables, should be placed in store-houses with open-work sides, whether of woodwork or otherwise, or with ventilating passages, so that the process of air-drying may be effectually carried on and completed.

Water Power in Warehouses.

We have on several occasions alluded to the application of turbines to hoisting purposes in Manchester and other Lancashire towns, which have the advantage of a high-pressure water service; and Mr. Pearce, of Bradford, has now adopted another very ingenious arrangement in the shape of a water-engine, which was put down by Messrs. Rumsbottom & Co., of Blackburn. The engine is supplied with water from the corporation mains on a pressure of 60 or 70 lbs. to the square inch. The water enters a pair of water engines, each of which possesses a pair of cylinders and pistons. The cylinders oscillate upon trunnions, and the effect of this oscillation is to reverse the valvular arrangement, thereby causing a continuous rotary motion, which puts the hoist in action. The engine has been applied with success to printing machines, to a mortar grinding machine, and other apparatus requiring a motive power on a small scale. The experiments made on this occasion were quite satisfactory. The hoisting of three sheets of wool or opa, each weighing about 5 cwts., did not occupy more than seven minutes, and the quantity of water consumed in the process was about 120 gallons. A series of experiments followed, and, including the sheets raised in the first experiment, no fewer than fifteen sheets of wool, weighing in the aggregate 3 tuns 15 cwt., were raised from the ground floor to the highest story in the warehouse in the short space of forty-five minutes. The entire quantity of water consumed was only 570 gallons, the cost of which was about 6½d.

PUTTING UP ENGINES BY PIECE WORK.—An engineering firm in Greenock, Scotland, have intimated to their workmen that in future the giving out, putting on board, and fitting up of new engines in new steamers shall be paid by piece, instead of by day's wages. At a meeting of operative engineers, held on the afternoon of Saturday, it was unanimously agreed that no man should work with the firm in question, as the system would, in all likelihood, keep orders from the town, as the work would be inefficiently done under the proposed arrangement.

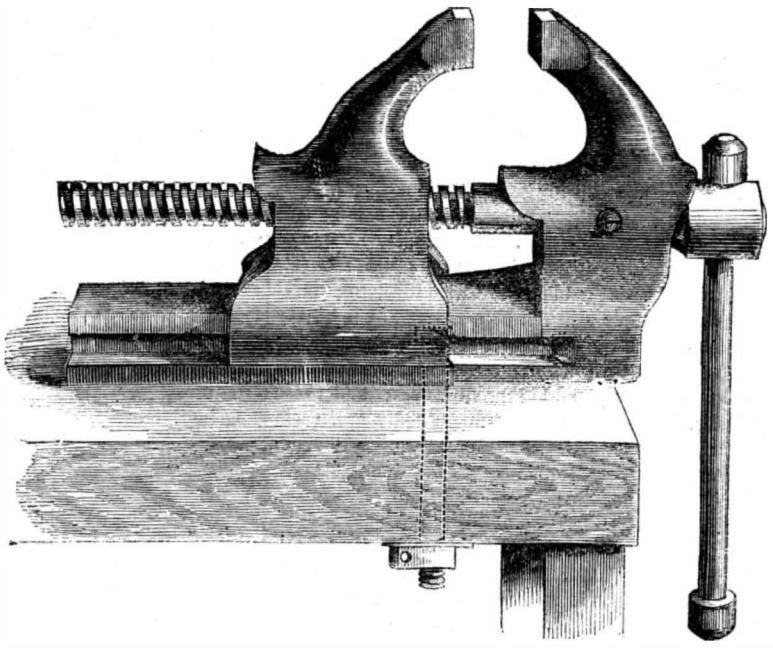
THE COMET.—Biela's double comet, which in 1846 occasioned extensive fears, ultimately allayed by the publication of Arago's treatise, is again nearing the earth. Two comets were seen in England on the 27th ult., but they were much brighter than Biela's and their position was not in accordance with its calculated place. The comet will, according to the astronomers, continue to approach until the end of February next, when it will be 18,000,000 miles distant, and invisible in this latitude.

OUR readers will observe the advertisement of Messrs. Stimers & Allen on the advertising pages of this number. These gentlemen have recently established an office for the transaction of all business connected with steam engineering at No. 45 William street, and solicit the favors of the mercantile community.

A TRAIN of nearly 120 coal cars, each containing from five to ten tuns, passed through Elizabeth, N. J., on the night of the 7th instant. They were all drawn by one engine, and the exhaust of the same sounded like the explosions of a six-pounder rifle.

Improved Traversing Vise.

In introducing this vise to the manufacturing community, the proprietors claim that it is one of the most convenient, durable and popular in the market. For ease of adjustment, or the facility with which it can be adapted to work of various kinds; also the means afforded for turning it at any required angle so as to accommodate long jobs, it is asserted that this vise has peculiar claims to consideration. It is made of the best cast iron with steel jaws, furnished with a square-threaded screw, and a solid nut let into the back jaw. The holding-down bolt fits in a slot below, like that commonly made in a foot-lathe rest, and the vise can be set and the nut screwed up so as to hold the former at any point; the vise can also be easily blocked up to raise it without removing it, when peculiar jobs have to be executed. They are made in various styles, and are manufactured by the Union Vise Company, No. 57 Haverhill street, Boston, Mass., where all further information can be obtained. Patented Jan. 3, 1865.



BRAINARD'S PARALLEL TRAVERSING VISE

Improved Velocipede.

This invention is a carriage to be propelled by the passenger or rider himself, and it is driven by levers and treadles worked by the hands and arms, the levers being attached to the cranked axle behind, in the usual way. This vehicle is designed to supersede the old-fashioned velocipede entirely. It attains a much higher speed and is easily controlled. It can be run, it is said, at from eight to twelve miles per hour. It was first invented in England, and is patented in that country and the United States. It is made of wrought iron, in different sizes and styles, and is designed both for youths and adults. A young child can work one of these machines, adapted to its size, unaided, and propel it at a high velocity. It is highly popular in England, and is called by the proprietors a gymnasium in miniature, since it calls most of the muscles in the body into action.

It was patented in the United States, through the Scientific American Patent Agency, on September 13, 1864, by Joseph Goodman, and assigned to C. P. Button, of New York. For further information apply to J. R. Pomeroy, No. 192 Broadway, or at No. 248 Canal street, where a working model can be found. The patent for the United States is for sale.

THE "RANTOONE."

New Method of Photo-relievo Printing.

A method of producing, by means of the printing press, transcripts of photographic negatives with any approximation to delicacy, definition, detail and true photographic half-tone, is a process which must interest every one; first, by its elegance and ingenuity, and next, with its economic importance. In our last Mr. Walter Woodbury gave a succinct account of the method by which he is able to effect his object, and on Saturday last we had the pleasure, in company with about a dozen gentlemen, distinguished in connection with photography, art and science, assembled for the purpose, at our private residence, of witnessing the operation. Mr. Woodbury demonstrated, as far as improvised apparatus would permit, the method of securing impressions on paper and glass, by pressure only, from an intaglio plate, obtained by the process described, by the aid of a photographic negative.

The new system of printing consists in a combination of the principle upon which intaglio or copper-plate printing is based, and that upon which the image in carbon printing is obtained. An image in which the shadows are in relief, and the whites depressed, is obtained by exposing bichromated gelatine under a suitable negative to the action of light, and afterward to water. The details of the process may be varied, but we need not enter into them here, as the principle is well known. From the gelatine an electrotype is obtained with the lights in relief, and the shadows depressed, as in an engraved copper-plate. This is the block or cliche from which impressions have now to be obtained by mechanical means. It must be borne in mind that the intaglio so obtained represents by degrees of depth the gradations of the image. This intaglio is now to be filled with a thick solution of gelatine, containing indian ink, or other coloring matter mixed with it; when slightly set, and the surface cleaned, as in copper-plate printing, it is placed in contact with paper, the surface of which would be best prepared with gelatine, albumen, or collodion, to prevent it being absorbent; the block is then brought into firm contact by steady heavy pressure. The set gelatine and color will be thus delivered on to the paper, much in the same way that the cook delivers a shape of jelly from its mold. The gelatine and color so delivered on to the paper will in all respects resemble a carbon print. The deepest shadows will consist of a thick opaque layer forming blacks, each gradation from these to white consisting of a thinner layer of the translucent material.

We have said that in demonstrating on Saturday Mr. Woodbury was confined to the use of improvised apparatus and material, his press, etc., from a misunderstanding, not having come to hand. A brief description, however, of these improvised arrangements may better aid those disposed to experiment in this direction, than would an account of the working of more perfect appliances. The intaglio plates, one in copper produced by electro-deposit, and one in type metal produced by pressure, Mr. Woodbury brought with him. The electrotype mold, which was most suited for printing on paper, was in tolerably deep intaglio, the greatest depressions being about the depth of a thin card; the whole presenting somewhat the effect of an engraved copper-plate, but with less crisp or sharply cut lines. The type-metal cliche was much less deeply impressed, and was prepared with a view to printing on glass. In order to print a little gelatine was first covered with water for a few hours; when the gelatine had imbibed thoroughly the water, it was melted by heat and a little of the prepared indian ink used for carbon printing added and mixed. A little of this gelatine, kept in a fluid state by warmth, was poured on the center of the intaglio mold, covering about one-eighth of its surface. A piece of fine, hard photographic paper was placed on the gelatine, and a stout piece of plate-glass was then laid on the paper. In the absence of a press, a twenty-eight-pound weight was then placed on the glass, and left for a minute or two to allow the gelatine to set. The pressure was then removed, and the print lifted up; the gelatine slightly set, leaving the intaglio as jelly delivers from a mold, and adhering to the paper, giving a print in varied gradations, just in proportion to the thickness of the layer of colored gelatine. After taking a few impressions it is found desirable now and then to slightly grease the mold to insure the print delivering perfectly without adhering or leaving any of the colored gelatine behind.

A considerable degree of excellency has even now in the infancy of the process been obtained, and we are very sanguine that results will shortly be secured which will give the process an immediate practical economic value wherever large numbers are required. Mr. Woodbury thinks that with three or four presses going, which could be easily worked by one person, the prints could be produced at the rate of about one hundred and twenty per hour. It will be readily seen that in this respect this method might compete without much disadvantage with copper-plate printing. If, instead of merely using an ordinary water color in combination with the gelatine, a vitreous color were employed, we have a ready means of producing a print in enamel color which, transferred to glass or China vessels, might be burnt in without difficulty. Other pictorial and decorative applications will readily suggest themselves as the process comes into use, increasing its value and interest.

Another application of the same principle, and that to which we believe Mr. Woodbury, at the outset of his experiments, attached the most importance, is the production of transparencies in porcelain, the image being produced by the various degrees of relief, and, consequently in semi-transparent material, in degrees of transparency or opacity. From the intaglio molds already described it will be seen, such images in porcelain could be easily produced.—*London Photographic News, Aug. 25.*

A STEAMER of 200 tuns is about leaving Hamburg, under the command of Captain Hagemann, on an exploring tour to the Arctic Ocean, and is said to be the pioneer of an expedition upon a large scale. The expedition will proceed to the eastern coast of Spitzbergen, possibly also to Gillis Land, from which point the actual object of exploration will be entered upon. This is to ascertain by careful examination of the seas between Spitzbergen and Nova Zembla, whether Dr. Petermann's conjectures as to the direction of the gulf stream are correct. The funds for the exploration have been partly raised by subscription among the Senate and citizens of Hamburg.

Correspondence

Hard Rubber Violins.

MESSRS. EDITORS:—I would like you to inform me if any of the patentees of hard rubber or gutta-percha goods have tried the manufacture of violins and bows of this material, and, if so, why they did not succeed; what were the objections to the same, as dampness will not have any effect on them, and nothing but heat will, I think. This is a good point in their favor. Provided the sound is all right, they could be finished up finely. As to the bows, I can see no objections. I would like to see the experiment tried, or to get a violin and bow of this material.

E. I. HUGHES.

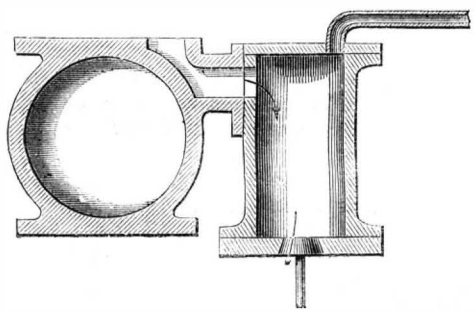
Pittsburgh, Sept. 5, 1865.

[Hard rubber flutes have been made, but we never heard of a violin of this material. Something besides hardness is required. Resonance would be wanting in hard rubber; it seems to us that the sound and quality of it would be harsh and dissonant.—EDS.

Condensing Engine without an Air Pump.

MESSRS. EDITORS:—I send the following description, which may be interesting as a novelty and also useful in cases where water is abundant and steam of moderate pressure is used:—

Upon the exhaust of a high-pressure engine I screwed a vertical pipe of more than twice the area of the exhaust passage, and half filled with long wires; the top end of the pipe was closed and an injection entered into it, the water running from a hight above the pipe, so that it would at all times run into



it when the injection cock was open; the bottom end of the pipe had a large valve opening downward; the exhausted steam condensed on the cool wires and the bottom valve closed, forming a partial vacuum in the pipe and the cylinder; at the end of the stroke the valve opened and the water dropped out. This apparatus increased the velocity of the engine several revolutions and was not expensive to apply to the machine. T. MCDONOUGH.

Newburgh, N. Y., Sept. 1, 1865.

Query.

MESSRS. EDITORS:—"Which is the left side of a round pudding?" I am reminded of the above by an article in your last number, describing a process of extracting corks from bottles. The left side of a round pudding is that which is not eaten; but can you tell us which is the "right side" of a round bottle? The right *end* was probably meant by your correspondent. CRITIC.

Boston, Mass., Aug. 26, 1865.

[Our critic is not familiar with bottles. The top is the right side—the other end is the wrong side (up).—EDS.

Washing Recipe.

MESSRS. EDITORS:—Seeing an article in your paper of the 2d inst., headed "Improvements Suggested," in which the writer states that chemistry instead of mechanics should be referred to in making washing easy, I thought I would send you a recipe which my wife has used for more than a year, without damage to the clothes. If you will give it a place in your paper it may be the means of preventing a great many lame backs and sore fingers from hard rubbing:

To 16 quarts of rain water add 3 lbs. of sal soda and $\frac{3}{4}$ths of a lb. of unslacked lime. Set it over the fire until it is just warm, then stir it well and set it away for use. Take one pint of the fluid to two pails of water, and boil the clothes in it. The dirtiest of them will come out white and clean with very little rubbing. There is no danger of its rotting the clothes, as we have thoroughly tested it. It is within the reach of all, and costs only about two or three cents for a common washing. A SUBSCRIBER.

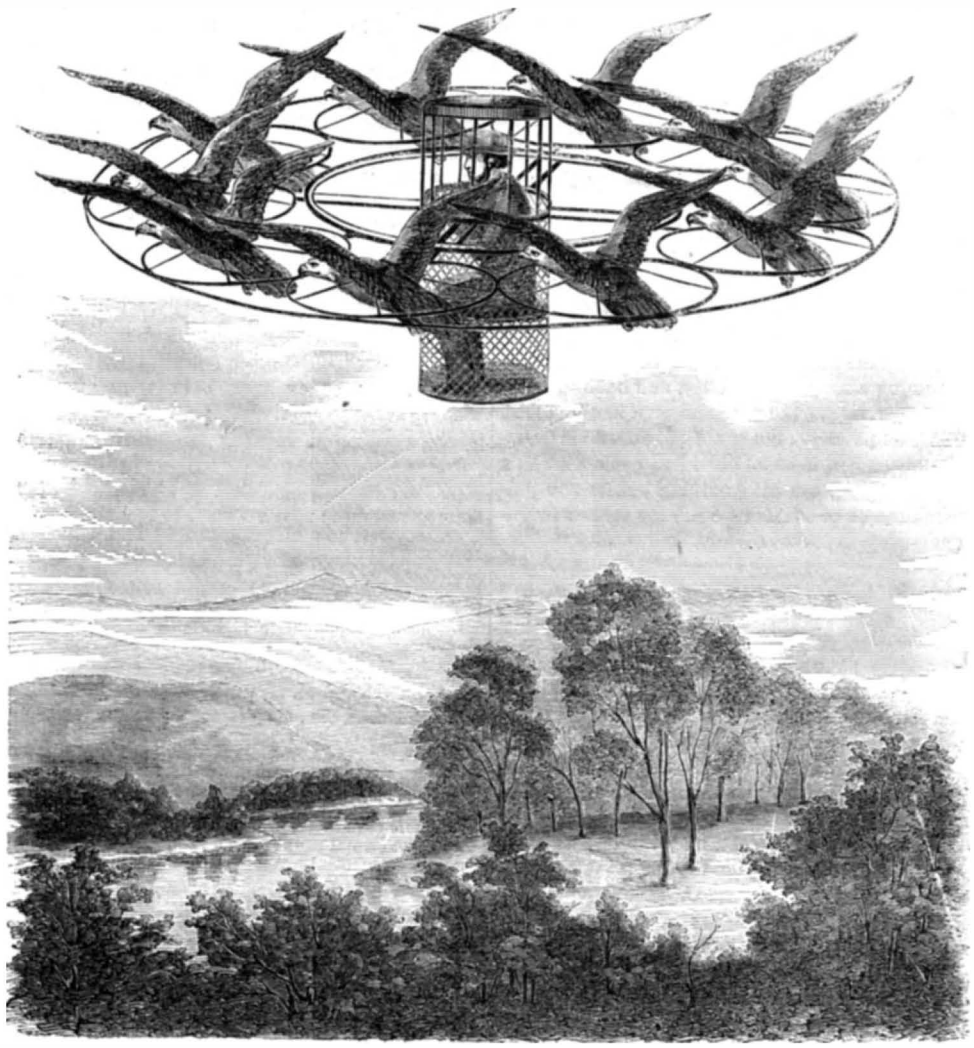
Milwaukee, Wis., Sept. 5, 1865.

A Natural Flying Machine.

MESSRS. EDITORS:—You have of late published several articles on the subject of flying machines, and are, it is therefore to be presumed, disposed to invite discussion of the question, believing, doubtless, that the time will come when man will subject the air, as he has the other elements, to his control. I venture to submit for publication a plan, to me apparently simple and feasible, that occurred to me many years ago, but that I have never found opportunity to put to the test of experiment. It is to do what man has already done upon the earth—make use of the powers of the inferior animals given to him to be his servants to effect his purposes. There are many birds noted for strength of wing and endurance in flight. The brown eagle and the American swan particularly suggest themselves. I propose to obtain a number of such birds (swans would probably be the most easily entrapped, but it might be a question whether they would bear our summer heats); ascertain by experiment their power of raising and sustaining additional weight to that of their own bodies, and attach them by jackets fitted around their bodies and cords to a frame work, which shall sustain a basket large enough to hold a man standing or sitting, so that the greater part of his body shall be below the points by which the basket is to be swung, precisely as a chronometer is swung with free play in all directions. The frame work should be hollow, as well to give the greatest strength with least weight as to afford passage way for cords which should lead from the man occupying the car to a light apparatus fitted upon the back or wings of each bird, by which the driver could, at pleasure, compress the wings to compel a descent or release them for flight. A similar arrangement of cords might regulate the direction of flight, by drawing the head of the bird to one side or the other.

I have attempted to give a sketch of my plan, which may be comprehensible to a draughtsman, and, if remodeled by him, may be presentable (with the explanation) to the public, if you see fit to introduce them.

I have drawn the figure to admit the use of ten birds, estimating that each could carry twenty pounds, as it is stated that eagles often carry off lambs and kids in their talons. The circle could easily be enlarged, or another circle could be added on the outside, and each bird might swing in all directions within its circle, as does the basket car in the center.



Baltimore, Aug. 30, 1865.

Transmitting Power.

MESSRS EDITORS:—I notice a mechanical question asked by T. J. Cornell, Esq., of Decatur, Ill., in the issue of last week, and answered by yourselves, which seems to me to be treated too lightly. Very many of the readers of the SCIENTIFIC AMERICAN rely upon the opinions of its editors, and take them for law and in this case might be led into an expensive error. About eight years since I was running three saws by water power; the building being small and inconvenient, I wanted to move them to another at about one hundred feet off, but hesitated on account of this very question; to wit, "Does it take more power to move a load when the power is twenty feet from the load than when it is two feet?" A question which all practical men maintain and all scientific deny. I propounded the question to the venerable President of Union College and to its distinguished Professor of Engineering. Both of course ridiculed it, and gave the usual scientific answer, that "the loss would be but the weight of the connection," which influenced me to make the change; but to my sorrow I found this weight so great that it used up the power of the wheel, so that I could not drive one saw with sufficient speed—though the volume of water and hight of head remained the same, and the wheel undisturbed. As I could not increase either, I had to move back again, when away went the wheel with all three saws and a surplus.

Your correspondent can prove the correctness of my experience and assertion, that any given power can be used up or lost, by increasing the length of the connection between that power and load—by

taking a rope (say a clothes line) one hundred yards long, and attaching to one end a weight of about one hundred pounds (say a bag of grain) and at the other a man; let the man try and drag the bag, and after failing in which, let him drop the rope on the ground, and go to the bag end, and take hold at two feet, and pull in the opposite direction, letting the hundred yards of rope drag—to balance the dragging in the first instance. He will find, though he may keep his hand down on a level with the bag, that he can drag it quite readily.

If the connecting material was perfectly non-elastic, the scientific theory would be in a measure correct, but as that material has not as yet been discovered, the practical world must continue to lose power in overcoming its elasticity; hence the shorter the connection the less elasticity there is, and the more effective will be the power.

J. V. Henry Nott.

Guilderland, N. Y., Sept. 4, 1865.

[There is no doubt that the friction of a bag on the ground would be increased by the sagging of the rope by which it was drawn along, and power may be rapidly consumed in friction, especially where the direction is repeatedly changed. Let our correspondent try the experiment of raising a bag vertically by passing a rope over a pulley, and hauling alternately on ten feet of the rope and on a hundred feet, and see if he perceives much difference. So in transmitting his power, if he had had had one open belt a hundred feet long, touching nothing but its two pulleys, we suspect he could have run his three saws.—Eds.

THE CONGRESSIONAL REPORT ON ISHERWOOD'S MACHINERY.

[From the New York World.]

In every attempt which has been made to find out the actual performance of the screw-propeller machinery which Isherwood has proportioned and thrust into nearly all our new naval vessels, he has managed to so engineer the reports and statements of the work done by his machinery that the truth has been wholly disguised. The case in point, and the one which it is now propose to analyze, are the bogus tables which Isherwood furnished the Naval Committee, who were instructed to examine into the performance of the steam machinery planned by the Steam Bureau of the Navy Department. These tables, officialy furnished to the committee, and published by them in their report, were received without a doubt as to their truthfulness. In order that the incorrectness of these tables may be understood, extracts are given below (copied from the Congressional Report), together with the same particulars of the machinery of other naval propeller vessels, planned before Isherwood's reign commenced, and of several British naval vessels.

NAVAL SCREW-PROPELLED VESSELS WITH ISHERWOOD'S MACHINERY.

	Pitch of Screw.	Revolution of Screw.	Speed of Vessel.
Lackawanna, Ticonderoga, Sacramento, Shenandoah, Monongahela, Adirondack, Juniata, Ossipee, Housatonic, Canandaigua ..	16½ to 18½ ft. mean, 17½ ft.	70	12 knots.
Napsic, Shawsmit and *Nyack*	14 to 16 ft. mean, 15 ft.	82	12 5 knots.
Penobscot class (19 of these)..	11½ to 13½ ft. mean, 12½ ft.	87	10 knots.

The screw propeller of the *Lackawanna*., etc., at the above number of revolutions, advances 70 number of turns, multiplied by 17½ feet mean pitch, multiplied by 60 minutes in an hour, divided by 6,086 feet in a knot—12 7 100 knots per hour; thus, according to this untrue statement, the vessel is going within 7-100 of a knot as fast as the propeller itself, and not only that, but the forward part of the propeller, which is but 16½ feet pitch, is actually being dragged through the water.

On page six, of Congressional Report, the maximum speed of these vessels is stated to be 12½ knots per hour.

The *Nyack's*, etc., propeller, according to the revolutions given by Isherwood, advances 12 1-100 knots per hour; the speed of the vessel he states to be 12½ knots; thus she is going 38-100 knots faster than her propeller—the forward part of propeller of course dragging.

The *Penobscot's*, etc., propeller, according to revolutions given by Isherwood, advances 10 7-10 knots per hour, 7-10th of a knot faster than vessel the forward part of propeller being dragged through the water.

This performance is like that of the man who attempted to lift himself up by standing in a tub and pulling on the handles.

It is known that the *Nyack*, in smooth water, makes with 35 pounds of steam 78 revolutions, and goes 10 knots, which gives a slip of 13 per cent, about what it should be.

It is also known that the *Penobscot*—a sample of her class even if she could make 90 revolutions, would not go 10, nor even 9½ knots per hour, under steam alone. The *Lackawanna* class will be discussed presently.

SEVERAL NAVAL VESSELS WITH MACHINERY OF THE USUAL PROPORTIONS, BY VARIOUS STEAM ENGINE FACTORIES, EXTRACTED ALSO FROM ISHERWOOD'S TABLES.

Vessel.	Pitch of Propeller.	Revolutions.	Speed of Ship.
Iroquois..	19 ft.	77	11 7-10 knots
Dakotah	17 to 19 ft., mean 18	80 28-100	12 knots
Kearsarge	19 ft.	73½	11 2-10 knots

The screw propeller of the *Iroquois*, at the above number of revolutions per minute, advances 14 4-10 knots per hour, which is 2 7-10 knots per hour faster than the vessel progresses.

The screw propeller of the *Dacotah* advances, at the above number of revolutions per minute, 14 25-100 knots per hour, which is 2 25-100 knots per hour faster than the vessel progresses.

The screw propeller of the *Kearsarge* advances. at the above number of revolutions per minute, 13 76-100 knots per hour, which is 2 56-100 knots per hour faster than she progresses.

SEVERAL VESSELS OF SIMILAR CLASS IN THE BRITISH NAVY.

Doris—Screw-propeller, 30 feet pitch, 51 49-100 revolutions per minute; speed of ship, 12 4-100 knots.

Flying Fish—Pitch of propeller, 20½ feet, 81 8-10 revolutions per minute; speed of ship, 11 17-100 knots.

Curacoa Pitch of propeller, 20 feet 1 inch, 64 revolutions per minute; speed of ship, 10 7-10 knots.

Dauntless—Pitch of propeller, 16 feet 4 inches, 70½ revolutions per minute; speed of ship, 10 1-100 knots.

Doris (propeller) goes 3 16-100 knots faster than ship.

Flying Fish (propeller) goes 5 33-100 knots faster than ship.

Curacoa (propeller) goes 1 97-100 knots faster than ship.

Dauntless (propeller) goes 1 35-100 knots faster than ship.

RECAPITULATION OF THE SLIP OF ALL THE VESSELS.

Lackawanna, etc., (Isherwood), no slip, forward portion of screw dragging.

Nyack, etc., (Isherwood), vessel goes 3 per cent faster than screw, forward part dragging.

Penobscot, etc., (Isherwood), 7 5-10 per cent slip, forward part dragging.

Iroquois (the usual proportion), 18 per cent slip.

Dacotah (usual proportion), 16 per cent slip.

Kearsarge (usual proportion), 18 per cent slip.

Doris (English), 20 per cent slip.

Flying Fish (English), 32 per cent slip.

Curacoa (English), 14 8-10 per cent slip.

Dauntless (English), 11 8-10 per cent slip.

Slip, it should be remembered, is the difference between the progress of vessel and propeller.

Such results, as Isherwood has thus officially state, are obtained in the screw-propelled vessels fitted with machinery of his proportions, are thus clearly shown to be impossible. Such results cannot be accounted for by the anomaly, which in some rare instances has been observed in screw vessels, namely, "negative slip;" the stern lines of the *Lackawanna*, etc (Isherwood), and those of the *Iroquois*, *Dacotah* and *Kearsarge* are practically the same. It should be remarked that these revolutions of propeller and speeds of the several vessels, as given by Isherwood, are, of course, those supposed to be obtained in perfectly smooth water, the vessels uninfluenced by either wind or tide. This being the case any difference in the surface of the propellers, by different diameters, etc., cannot come to the aid of his disingenous tables, particularly as the proportion of the propeller's disk—*i. e.*, the circle equal to its diameter—to the midship section in both the *Lackawanna*, *Juntata* etc. (Isherwood's), is nearly the same as that of the *Iroquois*, *Dacotah* and *Kearsarge*. This proportion in the *Lackawanna* is as 1 to 2 6-10; in *Juntata*, as 1 to 2 8-10; in *Iroquois*, as 1 to 2 4-10; in *Kearsarge*, as 1 to 2 8-10; In *Dacotah*, as to 2 97 100.

Unfortunately for himself, in another sense than the wickedness of the deceit itself, Isherwood. in his statement of the revolutions, speed and power developed by the vessels with his engines, has supplied data from his own figures, which prove at once the utter inefficiency of the machines he has proportioned Marine engineers throughout the world have an expression for comparing the performance of engines, hull and propeller collectively, called the "coefficient of performance." This coefficient, as may be seen in any engineering primer, is found by multiplying the area of the midship section in square feet by the cube of the velocity in knots, and divided by the indicated horse-power.

Of course the *higher* this coefficient the better the performance.

Performing this simple operation on the several United States vessels already mentioned, using Isherwood's statement, the following result is obtained:—

Lackawanna and *Ticonderoga* (Isherwood's), 613; *Sacramento* (Isherwood), 609; *Monongahela* (Isherwood), 614; *Adirondack*, *Juniata*, *Ossipee* and *Housatonic* (Isherwood), 604; *Canandagua* (Isherwood), 628; *Shenandoah* (Isherwood), 628; *Iroquois*, 747; *Kearsarge*, 771; *Dacotah*, 733; *Oneida*, 747.

Now, as the hulls of these vessels are of practically the same model, they offer relatively, with the power which Isherwood states they exert, the same resistance in passing through the water. This being so, the comparison, as shown by their coefficients, appears to be solely between the engines, "*per se*," (as Isherwood would say), so it is clear that the only way to account for the inferior performance of those vessels with his machinery, is in the mal-proportion of the engines "*per se*."

Although this gentleman states that the power developed by his engines, in the above vessels, was 1,304 horse-power, it is plain that but a small portion of this power could have been expended in pushing the ship through the water; the rest was wasted in the friction and heated bearings, which are inseparable—at the number of revolutions he says they make—in engines of such outrageous mal-proportions. Now, the *Iroquois*, well known as one of the fastest and most successful vessels in this or any other navy, according to Isherwood, exerts 813 horse-power, with boilers of the same style and almost exactly the same amount of grate and heating surface as the *Lackawanna*, etc., fitted with the machinery of his proportions, which he asserts exerts 1,304 horse-power. It is plain that the boilers of the *Iroquois* will boil off nearly as much water, consuming the same amount of coal as her sister's, with Isherwood's proportions, yet he makes a difference of 491 horse-power—nearly 40 per cent—in these vesse's, a result which, "*cæteris paribus*," is simply impossible; such a difference in the steam power of these vessels cannot exist. No doubt he has the assurance to assert, judging from his "precedents," that his *Lackawanna* engine gets from 30 to 40 per cent more work out of the steam than the *Iroquois* engine, which is fitted with a good *independent cut-off*.

If, according to his own tables, his sloops cannot create the power he states, what becomes of his twelve knots? By a triumph of arithmetic, his 1,304 horse-power is just about what his engines would give if they carried forty pounds pressure in the boilers, and seventy revolutions; but with this power the mean pitch of screw only advances twelve knots, and the forward part is being dragged through the water.

Isherwood himself says in one of his "papers" in the *Franklin Journal:*—

It must be distinctly remembered that a negative slip (the vessel progressing faster than the propeller) can only happen when the vessel has a high speed, *and owes a considerable portion of it to a power additional to that applied to the screw*—that of the sails for instance; though it has frequently been reported to exist, when the vessel was being propelled by the screw alone. In these cases, it was manifestly the result either of *inaccurat observations of distance gone and revolutions made*, or of a mistake in the pitch of the screw, reckoning it less than it really was.

The only conclusion which can be arrived at is, that in order to exaggerate the performance of his own vessels, he has overstated both their power and speed, and underrated that of the others, the engines of which are built on the usual plans. For this transparent trick he should be subjected to the severest censure.

It is generally known that it was with great difficulty the engines of the *Lackawanna*, etc., could be made to go at all, on account of the defects in the main valves, and that these engines are so overloaded with unnecessary material, that the friction and chronic state of heat of the principal bearings entirely precludes the possibility of working off the steam; which the boilers, if in proper order, should supply them.

The *Wyoming*, a vessel of the *Iroquois* class, is fitted with one of the very finest pairs of engines in the navy, of the usual proportions adopted by the most successful makers in America, France, England, Sweden and Russia, and arranged with a good *independent* cut-off.

A comparison, therefore, between these engines and these proportioned by Isherwood, for the *Lacka-*

wanna, etc., will illustrate his professional ignorance.

The *Wyoming* has two cylinders, fifty inches in diameter by thirty inches length of stroke; the *Monongahela* (*Lackawanna* class, Isherwood's) has two forty-two inch cylinders by thirty inches length of stroke. Assuming that the former carries twenty-five pounds of steam and the latter thirty-five pounds, the strain put on the *Wyoming's* engines is five thousand nine hundred and fifty-eight pounds greater than on the other, yet Isherwood has put into the *Monongahela*, etc., seventy-eight per cent more cast-iron, sixty-eight and a half per cent more wrought iron, one hundred and seven per cent more brass, and sixty per cent more weight in the reciprocating parts than the *Wyoming* engine, which, as before stated, is one of the most perfect in the naval service. There is no doubt (see his specifications) but that he intended these sloop engines to make a greater number of revolutions than those of the sloops *Iroquois* and *Wyoming*, as he employed a propeller of finer pitch, but in consequence of his mal-proportions, so much power is absorbed in excessive friction when running, as he states, at 70 revolutions, developing 1,304 horse-power—587 more than the *Wyoming*—he is not able to make as many revolutions as that vessel does with a screw of much greater pitch. Mr. Bartol, one of our first marine engineers, said, before the naval committeee, " I do think putting in engines of excessive weight *has been fatal to the naval engines.*" These facts are conclusive as to the professional incapacity of the chief of the Naval Steam Bureau. Perhaps Isherwood will meet these damaging statements by insisting that his tables are right, and producing, as he did once before, letters from dependent contractors and engineers, stating that his vessels, under steam alone, advanced through the water faster than their propellers were progressing. But this question is one of easy determination. Let one of these sloops, with the naval committee on board, be run from New York to West Point and back; the evidence of any intelligent person, noting the speed and number of revolutions, would be just as reliable, and perhaps more so, than any number of "expert" affidavits obtained under the circumstances which he obtains his. This trial would give much more valuable information than a trip on the Potomac with an old-fashioned American poppet valve-expansion paddle-wheel engine (the same as has been used in the merchant service for twenty-five years)—a trial got up for the purpose of throwing dust in the eyes of his superiors.

RHADAMANTHUS.

RECENT AMERICAN PATENTS.

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

Apparatus for Putting up Work on Knitting Machines.—This is an apparatus for setting up work on knitting machines, by the aid of which the work may be set up in a knitting machine almost instantly, without the aid of old work. By this means a great saving of time is secured upon any knitting machine to which it may be adapted, in renewing the work, when, by accident, it may have run off a machine; but its value is especially apparent in the facility it affords for knitting the heels of stockings. Isaac W. Lamb, of Rochester, N. Y., is the inventor.

Watch and Purse Safe.—The object of this invention is to protect watches, purses, and other articles of value from being stolen from one's person by pickpockets or other thieves. It consists in constructing a safe which fits within, and is sewed or riveted fast to, the pocket of a garment, and which is made in two parts that become separated in order to receive the watch or other article to be placed in it for safe keeping. C. W. Devereux, No. 180 Ninth avenue, New York, is the inventor.

Insoles for Boots and Shoes.—This invention consists in coating, in any proper manner, the inner side or surface of the sheep-skin, used for the insoles of boots and shoes, with a suitable enameling or protective composition. By this means the skin is not only prevented from wrinkling or stiffening, but it is also rendered impervious to moisture, either from the perspiration of the foot or from the penetration of water through the leather, or other material, of which the boot or shoe is made. John K. Gittens, of Brooklyn, N. Y., is the inventor.

Opening the Veins of Oil Wells.—This invention consists in opening the veins and crevices of oil wells, by forcing the water and other liquids which are in the well into the said veins and crevices, and thereby removing the obstructions thereout, so as to permit the gases and oil to resume their flow. Isaac Relf, of Minago, N. Y., is the inventor.

Packing for Tubes of Oil and other Wells.—This invention relates to packing the tubes of oil and other wells which are to be protected from the inflowing of surface water, and of water from springs and other sources. It consists in applying a series of flat springs, arranged lengthwise, in the form of a cylinder, about a well tube, the latter being divided or made in two sections, within the points inclosed by the springs, and their ends connected by a coupling in such a way as to make a sliding joint. The ends of the springs are fixed to the different sections of the pipe, and the several springs are inclosed by a cylinder of gutta-percha or other suitable elastic material. Francis Martin, No. 52 Barrow street, New York, is the inventor.

Folding Seat for Wheel Vehicles.—This invention relates to a folding seat for wheel vehicles—such as are provided with a back and sides—and it consists in attaching the back and sides of the seat to the latter, and arranging the same in such a manner that the back and sides will automatically fold and unfold as the seat is turned up for use and turned down when not required for use. Henry A. Gilbertson is the inventor, who has assigned it to Wood Brothers, 596 Broadway, New York.

Rigged Oar or Boat Fin.—This invention relates to a means for propelling small boats—row boats, commonly so termed—and is designed as a substitute for, and an improvement upon, the common oar now used for such purposes. This propeller, which the inventor terms a rigged oar or boat fin, consists in attaching to each side of the boat, by joints, one or more blades or paddles, arranged with rods in such a manner that the operator may work said blades or paddles to propel the boat forward while sitting with his face toward the bow, and, at the same time, have perfect command over the boat, and apply his power in a direct and far more favorable manner than by the ordinary oar. Ralph Smith, of Brooklyn, N. Y., is the inventor.

Automatic Press.—This invention relates to a press designed for striking up or swaging articles into various forms, and consists in the employment of a feed wheel in connection with a driving wheel, a bolster plate, a slide and a cam, all arranged in such a manner as to admit of the work being performed automatically and expeditiously. Peter Hayden, of Pittsburgh, Pa, is the inventor.

Let-off Motion for Looms.—This invention consists in making the reed, or that part of the batten which comes in contact with the woven fabric in beating up, yielding, and combining it by means of levers, pawl and ratchet wheel, with the yarn beam, in such a manner that, when the batten moves forward, and its yielding portion comes in contact with the woven fabric, in beating up, the pawl is drawn back more or less, according to the force which said yielding part of the batten has to overcome in beating up, and when the batten falls back the yarn beam is turned in proportion to the motion previously given to the pawl, and, consequently, the let-off motion is regulated by the force of the blows exerted by the batten in beating up, and the texture of the fabric produced is of uniform density throughout. Samuel Estes, of Newburyport, Mass., is the inventor.

Steam Boiler.—This invention consists in placing the furnace or fire-place of a steam boiler at or near the top of the same, in such a manner as to have there the highest heat, causing, at the same time, the hot gases to descend toward the bottom of the boiler, either in a zig-zag direction or otherwise. By these means different degrees of heat are produced in the water, the highest degrees being always on the top, and the lowest at the bottom of the boiler, and, consequently, no circulation of the water will take place, as in ordinary boilers, whether the water is made to pass through the tubes or outside of them, and whether those tubes are placed in a horizontal, vertical, or any other convenient position; and, furthermore, the heated gases being brought in contact with water of gradually decreasing temperature will be deprived of all their heat, or nearly so, before they are allowed to escape through the chimney. R. Rafael, of the Delamater Works, New York City, is the inventor.

Fresh-water Apparatus.—This invention relates to an improvement in that class of apparatus known as "Lighthall's Fresh-water Apparatus," its object being to condense a sufficient quantity of steam to obtain water for injection which is free from all air and other impurities. In Lighthall's apparatus the exhaust steam from the cylinder passes into a box which is filled with a large number of pipes terminating in chambers which communicate with an unlimited supply of cold water. If used on board a vessel, said chambers communicate with the open sea. By coming in contact with the cold surface of these pipes, the steam is condensed, and a sufficient quantity of pure water, free from air, is obtained for the injection. This water, however, is not cooled down to the desired degree of temperature unless the apparatus is made very long and expensive. The improvement which forms the subject matter of this present invention consists in passing the pipe, which serves to draw the injection water from the condensing chamber through the chamber or chambers at one or both ends of the condensing chamber, either in a direct or in a serpentine line or coil, in such a manner that the injection water, while passing through said chamber or chambers filled with cold water, is cooled down several degrees without increasing the size or capacity of the condensing chamber or without materially increasing the cost of the apparatus. Thomas Callan, of Philadelphia, Pa., is the inventor.

Cornet.—This invention involves, or rather creates, an entire change in the construction and shape of the cornet. It involves also a different manner of holding the instrument in playing, and the operator has great facility in sustaining it, in operating the keys, and in relieving the instrument of water. The invention will be understood by an expert from the claims alone, without an elaborate explanation. Louis Schreiber, of New York city, is the inventor.

Production of Steel by Means of Gases.

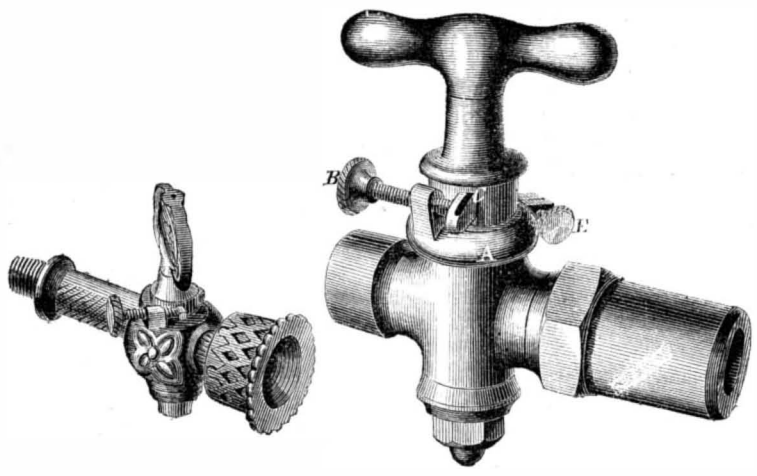
M. Aristide Berard brought before the Academy of Sciences, at its sitting on June 26th, his method of forming steel by means of gases. It consists in alternately oxidizing and reducing cast iron in a furnace suited to the purpose. The oxidation is produced on one portion of the cast iron, by the introduction of atmospheric air, and the reduction on another by a mixture of hydrogen and carbonic oxide, previously freed from sulphur. After twelve or fifteen minutes the processes are reversed, the portion subjected to oxidation being submitted to reduction, and *vice versa*. Any oxygen evolved is absorbed by burning coke placed in a suitable position. When this alternate action is found by trial to have been continued long enough the operation stops, decarbonization being the terminating process. During oxidation the bases of the metals proper and of the earth are oxidated; the sulphur, phosphorus, etc., form acids, and escape. During reduction, the iron is brought to the metallic state, and the earths separate as scoria, any remaining sulphur, phosphorus, etc., being eliminated as acids, and some carbon is restored to the iron. A high temperature is produced during oxidation, a low during reduction. Ten or twelve tuns are manipulated at each operation in the establishment which has been formed by the inventor; and the steel produced is said to have all the properties of the ordinary kind. —*Trade Circular.*

CATERPILLARS FOR WELDING IRON.—The Pittsburgh *Chronicle* says:—"Workers in iron, when they wish to weld a joint, use borax as a flux. An intelligent gentleman of this city, who is curious in facts of natural history, says that on one occasion a blacksmith near his residence having no borax, a man hanging round the shop told him he could get a substitute, and brought him a number of caterpillars, which, being applied to the heated iron, made as strong and firm an adhesion of the metal as the borax."

[Workers in iron who understand their business can make "a strong adhesion" of iron without either caterpillars or borax.—EDS.

Improved Self-regulating Faucet.

This engraving represents an attachment to a faucet for regulating the flow of liquid through the same, so that the fluid can be drawn off, and the faucet closed properly to prevent leakage. This is useful where inflammable liquids have to be drawn, such as naphtha. No light can be carried near this liquid, as it explodes instantly if brought in proximity to a lamp. The attachment consists of a collar, A, provided with a screw, B, and a pin, C, let into the plug of the faucet. The collar is fast on the shell, being secured thereto by the bolt, E, and the screw, B, can be run in or out, so as to allow the opening to be varied at will, as shown in the engraving. For gas fixtures this arrangement is very desirable, as



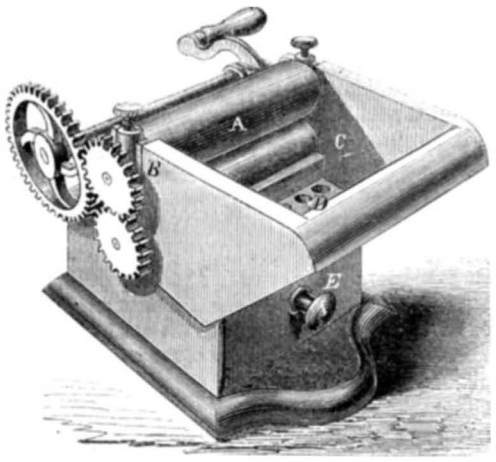
PERCIVAL'S SELF-REGULATING FAUCET

the amount of light can be adjusted to a nicety thereby; a full head of gas can only be turned on by setting the screw at a certain point. As this is not likely to be tampered with, hotels or boarding-house keepers can secure themselves against extravagance in this respect. This arrangement is also applicable to gas stoves, where a fixed heat is desired.

It was patented through the Scientific American Patent Agency on July 25, 1865, by Dr. George G. Percival; for further information address him at Waterville, Maine.

PRICE'S PEA SHELLER.

This machine is intended to perform a tedious operation now done by hand—that is, to shell beans and peas. The details of this machine are simple enough, being merely a pair of rollers, A, covered with india-rubber, similar to those used in wringing machines, and mounted in a wooden frame, B, in the same general way. These rollers are connected by gearing with a shaft and crank, so that when the

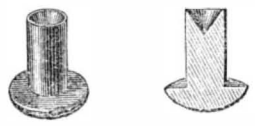


same is turned the rollers will revolve also. In the bottom of the compartment, C, in which the rollers work, there are holes, D. These holes let the peas and beans fall into the drawer, E, below. By turning the rollers, the pods are drawn in, and the compression causes them to burst open and deliver the peas on the other side in good order. Where large quantities of the vegetables in question are to be shelled, the inventor provides an endless apron, not shown—one on each side—so that the peas are carried into the rollers regularly, and the pods thrown out on the other side.

For hotels and boarding-houses the machine will effect a saving of labor. It was patented through the Scientific American Patent Agency Aug. 16, 1864, by G. B. Price; for further information address patentee at Watervliet, N. Y.

SMITH'S RIVET.

In riveting with the common solid-end rivet, it is a common experience, even with the greatest care, to have the rivet "cant" over and spring the whole job out of shape. It is also common for a mechanic or other person to strike from five to twenty-five blows before he can form a proper head, or clinch, on a rivet, even under the most favorable circumstances; and also when riveting on leather or other soft material, to have the rivet "dance round" so as to render it almost impossible to form a head at all. All these difficulties are entirely obviated by this improvement, which consists in countersinking the end of a rivet, as shown, so that when this rivet is struck with a stunt punch, or set or squeezed with an eyelet nipper or other suitable stool, the outer edge will easily turn over so as to form a handsome and substantial head, as compared with the bad jobs which frequently disfigure all kinds of articles on which rivets are used.



The improvement is applicable to all kinds and sizes of rivets; the countersink can be made of any required depth, and, in the opinion of experts, with very slight alteration in the common rivet machine, be made as cheaply and quick as common rivets are now made.

This invention was patented Feb. 21, 1865, by John W. Smith; for further information address him at No. 152 Washington street, Boston, Mass.

Pothooks.

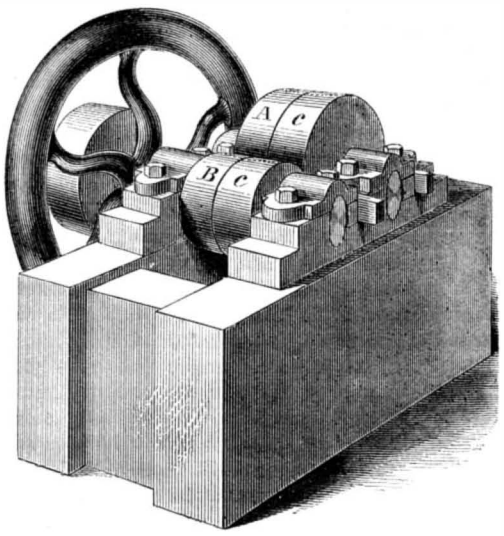
In the last century, the original Crawshay, then a farmer's son, rode to London on his pony (his sole property) to seek his fortune. He began by sweeping out the warehouse of an ironmonger, who was of a discriminating mind, and saw that young Crawshay had good stuff in him. The ironmonger had been speculating successfully in sending out iron pots to America, and his astute apprentice observed that if the Americans used so many pots they must want hooks to hang them on. Whereupon his master not only took the hint, but kindly determined that Crawshay should send them out, and that he would lend him the money for the purpose. Upon this venture £100 was realized, and from that time the farmer's son moved rapidly upward, being first taken into partnership by his master, and ultimately becoming an iron king in South Wales.—*Once a Week.*

HITCHCOCK'S ROLLER QUARTZ MILL.

It is asserted by those familiar with the subject, that after many years of experiments and experience in grinding ores for procuring the precious metals, there has never been a machine produced that equals the Cornish rollers for speed and capacity of work. But there is an objection to them on account of their wearing out rapidly; that is, when two plain cylinders are used in reducing ores to the condition of coarse sand, the middle of the cylinders are worn concave on their surfaces, which prevents them from being set up to grind to the required fineness.

By a very simple device in the present machine this difficulty is entirely overcome, as may be seen by referring to the engraving. A and B are two rollers, divided transeversely through the middle into two sections, as shown by the lines, C C. When the middle of the rollers become worn by use, as shown by the dotted lines, then one or both of the rollers are taken off of their respective shafts and reversed—the out end or largest diameter of each section is placed in the middle, while the smallest diameters are at the outer ends. Each cylinder now presents a convex surface, and they will first touch in the middle, where nearly all the grinding must be done. By this arrangement they may be reversed indefinitely, and made to last any length of time.

Other parts of the machine are too well known to need description, except in a few minor points, as making the roller, B, about one-half the diameter of A; and making the driving pulley twice the diameter of the roller, B, using a very heavy belt with fly-



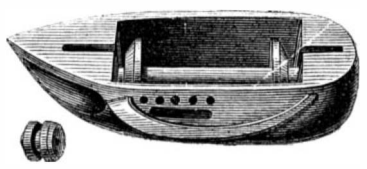
wheel and no gearing. But those machines with no gearing are not intended to be used as breakers except for desulphurized ores, or for hard quartz, after it has been passed through a breaker. To make this machine a breaker, would require gearing.

The patent having been allowed, further information may be had by addressing A. Hitchcock, Nos. 4 and 6 Pine street, New York.

CUTTER'S SHUTTLE.

The bobbins in sewing machines are liable to various contingencies, whereby their efficacy is impaired—such as getting out of the centers, wearing of the journals, battering of the same, and displacement of one end of the bobbin, so that the head wears against the end of the recess in which it works. It has been customary to make shuttles with one bearing solid and the other to spring, also with both bearings solid; these methods are objectionable and give great trouble, it is asserted, to keep the bobbins in repair. It is claimed for this shuttle that by making both of the bearings to yield or spring, all the objections noted are obviated, and that some advantages are secured. As for instance, a longer bobbin can be inserted, because both bearings spring apart; the bobbin cannot fall out of the centers unless both bearings yield in opposite directions, which is not likely to occur; the tension is more uniform, and it is easier to put the bobbin in place or remove it. The small figure represents one of the bearings removed.

The inventor has also patented an improvement in the shuttle drivers of sewing machines, whereby they are made to yield slightly, so that if the sewing ma-



chine is run rapidly the percussion will not be so great on the shuttle or the driver, and the parts will consequently last much longer without repair.

These inventions were patented through the Scientific American Patent Agency, on Aug. 1, 1865, by Volney Cutter, of Cincinnati, Ohio; address him at No. 270 Central street, that city, for further information.

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Contents:

(Illustrations are indicated by an asterisk.)

INEXPLICABLE BOILER EXPLOSIONS.

We have before us an exchange which gives an account of a boiler explosion, and ends, as usual, with this remark: "Everything was in good order about this boiler and it was considered one of the strongest in the place." To this the impertinent skeptic might reply, how could it be in good order when it burst! And if this was the strongest, how is it that the weak ones are still in existence?

It would be curious to know how many boilers in use at the present day are inspected. *Inspected*, not smelled of, superficially criticised, or jocularly allowed to be "a pretty good boiler." How many inspectors are there who take off their coats, roll up their sleeves and go in where they can get in, crawl where they cannot stand, and lie down, doubled up, where they cannot crawl, in order to see what the actual state of things is—the real condition of the boiler? We venture to say there are but few boilers thoroughly inspected in this country, and the frequent recurrence of disaster shows that stringent examination is necessary. It is almost useless to look at a boiler after an explosion to see the cause; it ought to have been examined and predicted before, and the proprietor whose works are destroyed is himself to blame for the disaster which, in most cases, he might have prevented by care.

In England they have an association of sensible men who examine boilers and insure them against explosion for a small premium, and the system has been found to work admirably. At last accounts neither president nor subordinate had run away with the funds. We have no such system in this country, but we might have, with a little organization and energy; good results would be sure to follow.

We should thus, doubtless, be spared the pain of reading such an avowal as a police inspector of boilers made recently. "I examine the engines and give them certificates," quoth he, "but I am not a practical engineer myself."

On board ship the chief engineer is the inspector, and that he does his duty as a representative of his class is to be inferred from the rarity of accidents at sea from the explosion of boilers. Every explosion so caused—that is, by neglect of inspecting the boiler—can be counted on the fingers. With the commonest prudence most of the boiler explosions might be prevented.

MISS FANNY R. PURVES, of Philadelphia, proposes, as an improvement in school desks, the setting of a slate in the lid or cover of the desk, flush with the top of the desk.

GREAT IMPROVEMENT IN SUGAR MAKING.

The two properties which most broadly distinguish grape sugar from cane sugar are the inferior sweetness of grape sugar and its disposition to absorb moisture. Cane sugar is very easily converted into grape sugar, but it is not known that the reversed process has ever taken place. When juice is expressed from the sugar cane its sugar always contains two per cent or more of grape sugar—the proportion being greater if the growing canes have been bruised or wounded. In the process of evaporation the proportion is generally increased to at least 15 per cent, and every pound of grape sugar prevents the separation of a pound of cane sugar, thus causing the loss of 30 per cent. This goes mostly into the molasses.

The proportion of cane sugar converted into grape in the evaporation depends mainly on the length of the process, hence the great economy of rapid evaporation.

Grape sugar may be boiled down dry, but if exposed to the air it gradually absorbs moisture, and becomes clammy or sticky. This property of maple sugar is mainly due to the large proportion of grape sugar which it contains—this having been formed in the process of evaporation. In India and in the interior of Cuba there is a similar article of sugar made from cane—the whole mass having been boiled down to dryness instead of separating the cane sugar by granulation in the usual way. The principal difficulty with the sorghum in this country is the large proportion converted into grape sugar in the process of evaporation.

We are informed by a very intelligent sugar manufacturer from Cuba, that an improvement has recently been introduced by which the formation of grape sugar in the process of boiling is almost wholly prevented; it is simply the introduction of superphosphate of lime into the cane juice before boiling. If this is as effectual as is represented, it must be of incalculable value, not only to the sugar growers of Cuba and Louisiana, but also to the refiners of this city, and to the growers of sorghum and the manufacturers of maple sugar. The author of the improvement is Mr. Reed, an Englishman.

The several kinds of sugar are composed of carbon and water, or rather of carbon and the elements of water—hydrogen and oxygen—united in the same proportion as that in which they combine to form water. The authorities differ somewhat in regard to the composition, but the following table is from Muspratt, probably taken from the most recent determinations.

Name.	Composition.
Cane sugar, or sucrose	$C_{12}H_{11}O_{11}$
Fruit sugar, or fructose	$C_{12}H_{12}O_{12}$
Starch sugar, or glucose	$C_{12}H_{14}O_{14}$
Milk sugar, or lactose	$C_{12}H_{12}O_{12}$
Manna sugar, or mellitose	$C_{12}H_{14}O_{14}$

POWER REQUIRED TO DRIVE MACHINES.

One of our correspondents writes us:—"I should like to get a table giving the number of horse-power required for the different sizes of circular saws," and we have no doubt that many others who are about to start machinery would like to know what sized engines it is necessary to provide to drive their machines. For the benefit of these persons we should like to collect a large number of facts in reference to the power employed in driving different kinds of machinery, and if any manufacturer, superintendent or engineer will send us a statement of the facts in his own case, we will, if approved, publish it, thus making our paper the medium for collecting and disseminating a great mass of knowledge in regard to this important matter.

Where an engine is employed we should like the diameter and stroke of the piston, the point of cut-off, and the average pressure carried; the dimensions of the boiler would also be interesting; then a statement of the machinery driven. Where machinery is driven by water power it would be of no interest to learn anything in relation to it unless enough can be known to enable the horse-power to be computed. This would require the hight of the fall, and the quantity of water, either in pounds or cubic feet, passing through the buckets in a minute. Where this can be furnished, then a full description of the machinery in motion would be acceptable. We suggest that many manufacturers may find it to their interest to forward us a statement of these facts in relation to their establishments, while they will, at the same time, be disseminating very valuable information.

CHANGING ALCOHOL INTO VINEGAR.

By fermentation sugar is changed into alcohol, and alcohol into vinegar. An atom of grape sugar is composed of 12 atoms of carbon, 12 of hydrogen and 12 of oxygen, $C_{12}H_{12}O_{12}$, and by the vinous fermentation it is converted into 4 atoms of carbonic acid, CO_2, and two atoms of alcohol, $C_4H_6O_2$.

4 atoms of carbonic acid.....C_4 O_8
2 atoms of alcohol.....C_8 $H_{12}O_4$

1 atom of sugar.....$C_{12}H_{12}O_{12}$

Then, by the acetous fermentation, alcohol absorbs oxygen from the air and is converted into acetic acid and water—1 atom of alcohol absorbing 4 of oxygen, and forming 1 atom of acetic acid and 3 of water.

$$C_4H_6O_2+O_4=C_4H_3O_3+3HO.$$

It has long been known that the vinous fermentation is caused by yeast—a low order of vegetable—the invidual being too minute to be seen by the naked eye, and it has been suspected that the acetous fermentation was caused by the action of a similar organism. The well-known French chemist. M. Pasteur, has been making some researches, which are said to settle the question. In a paper, published in the *Annales de l' Ecole Normale*, he says:—

"Acetic fermentation is always produced by the exclusive influence of an organism—the *mycoderma aceti*—one of the most simple vegetables, consisting essentially of frames of articulations slightly compressed toward the middle, measuring about $\frac{1}{5000}$th part of a millimeter in diameter, and double that in length. However much charged with albuminoid matter, no alcoholic liquid has ever been known to give the appearance of acetification without the presence of this mycoderm. On the contrary, if a trace of the mycoderm is spread on the surface of an albuminoid liquid, alcoholic or slightly acid, it is immediately seen to develop, extend like a vail over the surface, and, by a correlative action, the atmospheric oxygen in contact with the liquid disappears and the alcohol acetifies. It is not essential for the liquid to contain albuminoid matters; provided the mycoderm finds there, besides the alcohol, a small quantity of alkaline and earthy phosphates, it will live and its action be the same as before; and this identity proves that the albuminoids which have been employed were merely nourishment for the ferment, and not the ferment itself.

"If, in the actual process of vinegar making, acetification takes place without the previous spreading of the mycoderm, it must have been without the knowledge of the experimenter; it is this organism which forms the gelatinous mass which was formerly, with a vague idea of the truth, called mother of vinegar; it is this which, by spreading over large surfaces of the beechwood chips used in the German process, produces acetification. By pouring an alcoholic liquid on these chips, well washed and scoured, and thus deprived of the ferment, no trace of vinegar is obtained; but, the circumstances being favorable, acetification is produced by depositing a little of the mycoderm on the surface of the chips, where it rapidly develops.

"While alcohol is present the small vegetable produces acetic acid; but what happens if the alcohol is wanting? M. Pasteur shows that the vegetable can in this case bring its burning action to bear on the acetic acid itself, and reduce it to the state of water and carbonic acid. This effect seems to be produced only when no alcohol is present, when there is alcohol the combustion is effected by the preference on it.

"Such is the action of the mycoderm under the ordinary conditions; but it sometimes alters, and, having no longer the same appearance or the same consistence, its action is different. It is then incapable of effecting the combustion of the alcohol to the acetic stage, and gives intermediary products with a suffocating odor, and causing the eyes to water, and which have already been obtained in the oxidation of alcohol and ether by platinum black. This black, under other conditions, will give acetic acid, and here between platinum black and *mycoderma vini* there is a resemblance of effects from which

it would be unsafe to infer a resemblance of causes. The only inference to be drawn is that both are means of transporting the oxygen of the air on to certain combustible matters.

"For the production of acetification it is necessary that the mycoderm should be at the surface of the liquid; the process is arrested by submersion, and only recommences on the formation of a fresh film on the surface.

"The absorption of oxygen by this film is complete, and not a trace of this gas enters the liquid through it. When there is, as in Orleans' vinegar, a quantity of small eels—animalculi needing air to support life—a curious contest takes place between them and the mycoderm, the latter t ending to engross the whole of the surface, while the former combine all their efforts to submerge it and expose the liquid in which they live to free contact with the air.

"The complete study of the manner in which this ferment acts and of the last interesting particulars will, perhaps, cause some progress to be made in the industrial preparation of vinegar; but the study of possible improvements must be left to the manufacturers."

THE OPENING OF THE FAIR.

Now is the harvest of the year, and now does the farmer gather in the crop he has so long toiled over. The fields give up their bounty; the orchards droop with their luscious loads; from the vines the clusters hang purpling in the sun. Why then should not the mechanic, who toils with a different steel from the farmer, reap his reward also, and in the fall of the year make harvest time of the fruits of his ingenuity? Let us all have our time of rejoicing together, and, by friendly competition, endeavor to work to mutual advantage and interest.

No reflective person can enter the Fair of the American Institute, which opened on Tuesday last, without feeling, in some degree, the immense interests and the importance of them gathered there. The machines, products and materials shown comprise but a small part of our immense resources, for in all parts of the country—North, South, East and West—the same scenes are being enacted, and each district has something novel which the others have not. Yet from this exhibition we can realize in a degree the importance, extent, and versatile character of the inventions annually made public. To classify them would be impossible. There are in the Fair machines for so many different objects; fabrics of so many different materials—combined and distinct, raw and finished; works of art so beautiful, and specimens of ingenuity to be met with so frequently, that the beholder is compelled to give each its due share of attention. The consequence is, that a long time can be usefully spent in examining the attractions, and not one, but several, visits made profitable.

The large armory of the Seventh Regiment, on Fourteenth street, near Sixth avenue, has been fitted up by the American Institute for the exhibition this year, and it is an excellent building for the purpose—the view in the main room being uninterrupted by massive columns, while the general character of the building renders all parts easy of access.

On entering the room the visitor beholds a large square apartment full of machines in active operation. In the character of a visitor we wandered down the aisles formed by the various tools, and noted what was to be seen. It is not our intention to give an exhaustive account of the contents of the building, but to simply note such things as seemed to us novel and of a useful character. We naturally went to the machines and among the tools we saw.

JAMES STEWART & SON'S LATHES.

These tools have won a great reputation for the makers by reason of the excellency of the workmanship on them. They are intended to be run by the foot, but are adapted to power as well. They are made of the best materials, well finished, with or without back gears and slide rest, and set on a neat work-bench with a chest-of-drawers for tools, etc. They are superior lathes in all respects, and will last "forever" with care.

We noticed, a little further along, "Pomeroy's Aerial Governor." This is intended for steam engines, and is an ingenious and excellent thing for the purpose. It was illustrated on page 17, Vol. X., of the Scientific American. The controlling agent in the governor consists of two circular metallic disks at the extremity of two horizontal arms. These arms are attached to a spindle and have two steel rollers near the center, set so as to run on inclined planes formed on the column which supports the governor. When the disks are revolved with rapidity, they run up on the inclined plane, with any change in the original speed, and close the throttle valve—opening it as they descend again by gravity. Numerous testimonials from parties using them show the estimation they are held in. J. H. Pomeroy & Co., Syracuse, N. Y., are the manufacturers.

TUBE EXPANDERS.

Messrs. Thos. Prosser & Sons, of this city, exhibit some of their well-known tube expanders, for expanding the flues of tubular boilers. These articles have been in use for many years, and are indispensable. These gentlemen also exhibit wire brushes, and a general assortment of implements useful to engineers.

SNOW'S GOVERNOR.

This governor is on exhibition at the Fair, and the proprietors show many certificates of its utility. It is in appearance an ordinary two-ball governor, with the exception that the arms are very short; it is without the central spindle and diagonal arms common to the old kinds, and connects directly to the throttle. A large-sized governor, for marine engines, is shown; it consists of a flat bar with balls on the end, set at an angle in a shaft running horizontally. When set in motion the centrifugal action tends constantly to throw the bar at right angles with the shaft, and this action is taken advantage of to control the engine. G. W. Lascell, of 437 Broadway, is the exhibitor.

TWIST DRILLS.

The Manhattan Fire-arms Company, of Newark, N. J., exhibit a beautiful case of their tools. These drills, as is well known by our mechanics, are made in a machine specially constructed for the purpose, and are of uniform size and quality. They do beautiful work, and no shop should be without them.

SODA FOUNTAINS.

Mr. William Gee exhibits a set of his soda fountains in working order. By recent improvements in such apparatus, Mr. Gee furnishes a very different article from that commonly offered. Thirsty persons may have noticed that the rush and sparkle of soda water is soon lost generally, and the mighty "fiz" with which it issues, turns to a vapid "fizzle" at the close, long before the bottom of the glass is seen. Mr. Gee's soda water is quite another thing. It issues as placidly from the fountain as a jet from a pump, but the sparkle and effervescence of the gas escaping is mighty, and the beverage is pungent to the last. We never before tasted soda of such excellence.

ROOT'S STEAM ENGINE.

The machinery was not in operation at the time of our visit, but will be before this article is published. Root's engine, which was at the Sanitary Fair last year, is to be seen this year, and of all the compact engines, this is the thing. In the space of about 18 cubic inches a machine, capable of giving out 15 horse-power, is placed; and that they give great satisfaction is shown by the number sold. Some of these engines are in Government cutters. Manufactured by the Root Steam Engine Co., New York.

THE NAVAL ENGINE CONTEST.

The trial of the two vessels—the *Winooski* for the Navy Department, and the *Algonquin* for Mr. E. N. Dickerson—has not yet begun in earnest. There have been some preliminary experiments, but what the result is we are unable to state. At the time of our visit, however, on the 15th inst., the *Winooski* was turning her wheels with great ease and rapidity, while the *Algonquin's* engine was stopped, and had been for some time. Boiler-makers were at work on board, and some engineers were examining the piston, but the cause of this delay and repairing was not given, as the engineer interrogated, prudently knew nothing about what was going on. On visiting the naval vessel we were informed that the 96-hour trial would come off next week, possibly Tuesday. The conditions are, that each vessel, having the same sized wheel and draught of water, shall receive 1,600 pounds of coal per hour, and make fifteen revolutions per minute. Of course the engine that can make this speed with the least fuel will be the victor. This point being decided, the vessels will proceed to Sand's Point, and run from thence three times around Fisher's Island, a distance of about 750 miles; then the contest will be ended and the result made public. We shall publish the facts and figures of the trial when the same is concluded.

A SENSIBLE GOVERNOR.

Brown University, at Providence, R. I., enjoys the honor of having commenced, under the direction of its former able President, Dr. Wayland, that great reform in education which is spreading through all our colleges—the establishment of a scientific department in addition to the regular classical course. The sound practical sense evinced by this reform seems to be broadly diffused among the people of that State. At the commencemant of Brown University, on the 6th inst., Lieutenant-Governor Duncan C. Pell, spoke as follows:—

"I thank you, Mr. President, for your courteous introduction; and if any thing could console me for the absence of the Governor it would be your kindness. The State, so far as I have served it, has prosperd finely. Governor Smith takes charge of the Providence Plantations, and I take charge of the State of Rhode Island. From the day I was inaugurated to the present, I have not heard the slighest complaint. I consider it to be a great honor to be the Lieutenant-Governor of the State of Rhode Island. But I felt it to be a greater honor to be President of the Board of Education of the City of Newport—an office I held for some time. During that period I had an opportunity of ascertaining the character of the literature read at the firesides of many different classes of our citizens; and I tell you that I never have been more amazed than in witnessing the sound nature of the reading matter I have found in the houses of comparatively humble people. I sometimes, when the great cares of State will permit, go a fishing; and I have put up at the houses of plain farmers, where I have found complete sets of the Scientific American, and the owners have mastered me on every article contained in it."

NEW BOOKS AND PUBLICATIONS.

Second Edition of Gesner's Coal Oils.—Messrs. Balliere Brothers, No. 520 Broadway, New York, have published a second edition of Dr. Abraham Gesner's treatise on coal, petroleum and other distilled oils. As the death of Dr. Gesner has occurred since the publication of the first edition, this second edition is prepared by his son, George W. Gesner, consulting chemist and engineer. It is a book of 181 pages, containing a history of petroleum and distilled oils, with the modes of refining, and a summary of the principal patents relating to the manufacture of aniline dyes, all illustrated by wood cuts of the apparatus employed.

Poetical Tributes to the Memory of Lincoln.—This is a compilation in one elegant volume, by J. V. Plott, of many beautiful poems, by different authors, upon the occasion of the death of the immortal Lincoln. The work contains poems by Bryant, Bickerstaff, Alice Carey, Duganne, Gurley, Holmes, Stoddard, Mrs. Stebbins, Tuckerman, Willis, and a host of excellent writers. The book should have a place in every library. J. B. Lippincott & Co. publishers.

Trial of the New Jersey Flying Machine.

We are informed that the flying machine which has been in process of construction in Jersey City, and which has been incorrectly called the Government flying machine, as the Government had nothing to do with it, has been completed and tried. It of course failed as every body of any judgment knew that it would. They could not get it off the ground.

A wagon which was passing through the Rue de Rivoli, Paris, one day last month, was seen to be suddenly enveloped in ghastly blue flames. It was loaded with phosphorus, which had caught fire from the friction occasioned by jolting over a rough piece of new macadamization. One of the passers-by, who hastened to render assistance, was himself covered with the half-melted substance and severely burned.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING SEPTEMBER 12, 1865.

Reported Officially for the Scientific American.

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

49,845.—Cultivator.—J. A. Bardel, Freeport, Ill.:

First, I claim the plow beams, F F, attached to the front part of the frame, C, by universal joints, a, in combination with the laterally swinging extension bar, D, and levers, H H', all arranged to operate substantially as and for the purpose herein set forth.

Second, The treadles, I I, in combination with the plow beams and extension bar, D, as and for the purpose specified.

49,846.—Button.—E. T. Barnum, Waterbury, Conn:

I claim a button attached within the cloth or garment by means of a stem and cross-piece, the latter entering a slot in a disk and resting in a groove transverse thereto, all substantially as shown and described.

[This invention consists of an improved article of manufacture, to wit: a button, which is attached to a garment by means of a washer.]

49,847.—Steam Generator.—J. D. Beers, Philadelphia, Pa.:

First, I claim the combination of the tubes, a, with the plate, b, the stays, d, and the shell of the boiler, A, as described and set forth.

Second, I claim the combination of the heating surface, N, with H F and A, as described and set forth.

49,848.—Gun Wiper.—Hiram Berdan, New York City.:

I claim, as a new article of manufacture, the expanding gun wiper, constructed with elastic leaves grooved upon their exterior surfaces, as herein specified.

49,849.—Invalid Chair.—T. J. Blackburn and E. P. Terrel, Spring Hills, Ohio:

First, We claim the arms, b, extending from the rock shaft, a, serving as adjustable braces and stops, in combination with the back, D, arranged to operate substantially as herein shown and described.

Second, Pivoting the back, D, to the frame at a point near the center of its length, so as to bring its lower part in the path of the arms, b, substantially as herein specified.

Third, The slide board, E, forming an extension seat, in combination with the rod, e, and back, D, arranged to operate substantially as herein shown and described.

[This invention consists in pivoting the back to the frame in such manner that the person using the chair may regulate its inclination to a position for sitting or reclining by means of suitable arms attached to a rock-shaft, which arms bear against the lower portion of the back, and are operated by a hand lever easily reached by the occupant of the chair; and it also consists in arranging a slide-board on the front part of the chair, connected to the back by a rod in such manner that it may be slid out or drawn in according to the inclination of the back.]

49,850.—Carpet Fastener.—W. B. Blaisdell and J. E. Atwood, Lynn, Mass.:

We claim the combination of the fastener, A A, groove and tongue, E E, and pins, g g, when made and used for the purpose herein described.

49,851.—Evaporator.—John Bogue, Auburn, Wis.:

First, I claim the arrangement of the hollow float, F, plug, f, tubes, D and F, reservoir, C and pan, A, substantially as described.

Second, I claim constructing the float with a ventage tube, f', or an equivalent aperture, for the purpose explained.

49,852.—Floor Clamp.—John L. Bryant, Logansport, Ind.:

I claim, First, The described arrangement of the jaws or tugs, F F, inclined plane or planes, H H, or their equivalent, to form a clutch, for the purpose described.

Second, I claim the application of the lever, A, ratchet, B B, pinion, E, and pawl, C, in combination with the clutch, for the purposes set forth in the specification.

49,853.—Piston Packing.—William Buchanan, New York City:

First, I claim, in combination with a piston, A1 A2, the single bull-ring, B, formed separate from the spider of the piston, and having the three ridges, b b1 b2, with suitable packing in the spaces between the ridges, substantially as and for the purpose herein set forth.

Second, I claim a tongue-piece, D, adapted to defend the joint in the packing ring, C against the passage of steam both longitudinally and radially, substantially in the manner and for the purpose herein set forth.

Third, I claim the surfaces, d' d*, on the tongue-piece, D, in combination with the surfaces, c' c*, in the packing ring, C', arranged substantially in the manner and for the purpose herein set forth.

Fourth, I claim the groove, E, under the tongue-piece D, and adapted to insure the admission of the fluid, substantially as and for the purpose specified.

49,854.—Fastening for Shoes.—Carl Burchardt, New York City:

First, I claim the slide, M, way, L, and surface, K, arranged close to the line of the cord, I, or its equivalent, to be retained substantially as and for the purpose herein set forth.

Second, The heads, J, or equivalent eyes, cord, I, and retaining clasp, M k, arranged relatively to each other and to an article of clothing, substantially in the manner and for the purpose herein set forth.

49,855.—Condenser.—Thomas Callan, Philadelphia, Pa.:

I claim passing the pipe, d, through which the condensed water is drawn off from the chamber, A, through one or both cold-water chambers, B B', substantially as and for the purpose set forth.

49,856.—Corn Cultivator.—Jasper Chapman, Linn Co., Iowa:

First, I claim the double bars, d, constructed and operating as and for the purpose set forth.

Second, The combination of the lever, L, the plate, k, and the beams, h h, in the manner and for the purpose herein specified.

49,857. Sounder Magnet.—J. J. Clark and Henry Splitdorf, New York City:

We claim the rod, C, or its equivalent, in combination with the anvil, D, arranged in the manner and for the purposes as hereinbefore specified.

49,858.—Valve for Steam Engines.—Thomas Clark, Cohoes, N. Y.:

I claim the valves, e e* e' e', fitted into suitable seats in the bottom or ends of the valve chest, in combination with the partition, a, and with a rocking lever, k l m, constructed and arranged substantially as and for the purpose set forth.

[This invention consists in a valve chest which is divided by a longitudinal partition into two compartments, each of which contains two ports and two valves, the ports in the first compartment forming the steam ports, and those in the other compartment forming the exhaust ports, in combination with three armed levers, one in each compartment, and connected to the valves by springs or other yielding connections, and to each other by a rocking lever, in such a manner that by imparting to said lever a rocking motion the steam is alternately admitted from one and exhausted from the opposite end of the cylinder, and a valve is obtained which operates with comparatively little loss of power, and which is easily fitted and kept tight.]

49,859.—Flour Packer.—Isaac Cook, St. Louis, Mo.:

First, I claim the platform, B, the rock shaft, f, the cams, g g, the lever, f', the toothed pawl, f'', and the pin, f''', when constructed and operating as and for the purpose set forth.

Second, I claim a flour packer, constructed with two augers, one of which has a rotary motion only, while the other has both a rotary and a vertical motion, so it may descend into the barrel, and, as it revolves, pack the flour beneath it, and can, at the same time, rise to the top of the barrel.

Third, I claim passing the head, F', between the stationary guide, G, and the adjustable guide, G, for the purpose of producing the requisite amount of pressure on the auger, F', the guide, G', being drawn toward the guide, G, with more or less force, as may be desired, by means of the weighted lever, H', as recited.

49,869.—Self-acting Mule.—A. G. Cumnock, Lowell, Mass.:

I claim the combination of the rod, i, spring, k, arm, l, and the fork, i', and plug, h h, or other equivalent clamping device, the whole applied in combination with the mule carriage and belt, e, to operate substantially as and for the purpose herein specified.

49,861.—Self-acting Mule for Spinning.—A. G. Cumnock, Lowell, Mass.:

First, I claim the mangle wheel, D, having its inside gearing and guard constructed substantially as herein described, applied to a mule in such manner as that it is made to check the movement of the carriage and the winding-on movement of the spindles, as the carriage strikes in, without the use of a scroll friction brake or binders.

Second, Combining the shaft, k, of the carriage, from which the spindles are driven, with the drum, N, on which the chain, p, from the quadrant gear, is wound, by means of gears, L Q P, a disk, L', or its equivalent, a pawl, K, and a ratchet wheel, m, the whole applied and operating substantially as herein specified.

49,862.—Hot-blast Apparatus.—Robert Denholm, Newburg, Ohio:

I claim the sectional flues, A, mounted on the blocks, D, in combination with the curved pipes, C, arranged within a furnace, E, having its throat, H, opening into the chimney near its base, as and for the purpose herein set forth.

49,863. Watch Safe.—C. H. Devereux, New York:

I claim the safe above described constructed and operated substantially as and for the purpose herein set forth.

49,864.—Railroad Rail.—John A. Dickson, Scranton, Pa.:

I claim the construction of a compound rail or bar, consisting of an upper portion in the form of a T-rail, with or without a tongue projecting from the bottom, and an under portion being flat or slightly concave in the bottom, and with a narrower or wider groove on the upper side to receive the tongue on the bottom of the upper portion on the entire base thereof, as above described.

49,865.—Machine for Combing Cotton, Etc.—Ira Dimock, Florence, Mass.:

First, I claim the arrangement of the two nipper cylinders, d' d'*, the doffer, f', for the combed fiber, the two combed cylinders, b b2, the rotary brush, a2, and oil doffer, c substantially as herein described, to operate as set forth.

Second, Applying friction to counteract the momentum of the nipper cylinders during the latter part of each movement, substantially as and for the purpose herein specified.

Third, So arranging a rotary series of combs of different degrees of fineness in relation to a nipper cylinder that the fibers will be acted upon, first, by a coarse toothed comb, and afterward successively by combs, each having finer fibers than its predecessor, substantially as herein specified.

Fourth, The comb, K2, applied in connection with the feed rollers, and in relation to the nipper cylinder of a combing machine, substantially as herein described and operating as herein set forth.

49,866.—Fruit Box or Basket.—J. H. Doolittle, Ansonia, Conn.:

I claim a fruit box or basket, made smaller at the top than at its bottom, so that the bottom of each box may rest upon the top edge of the box beneath it, when a series are packed together, substantially as and for the purpose set forth.

49,867.—Harrow.—M. Easterbrook, Geneva, N. Y.:

I claim the employment or use of the self-locking hand lever, h, whereby the axial bars to which the teeth, t, are attached, may be controlled and adjusted while the harrow is moving, substantially in the manner and for the purpose shown and described.

49,868.—Saw Teeth for Saws.—J. E. Emerson, Trenton, N. J.:

I claim the curved tooth, a c b, constructed and applied to a saw plate in the manner herein specified.

49,869.—Method of Preventing Insects from Injuring Fruit Trees, Etc.—Cyrus Fisher, Leesville, Ohio:

First, The mode herein described of protecting trees or vines from insects, by the combined use of the three distinct applications, substantially as set forth.

Second, Pouring a boiling solution of lye and salt around the roots of trees and vines, for the purposes specified.

49,870.—Flour Sifter.—Nathaniel W. Foye, Cambridge, Mass.:

I claim the removable rubbing or brush shaft, C, with its shouldered head or disk, D, in combination with the box or hopper, A, and sieve, B, substantially as and for the purpose set forth.

49,871.—Method of Constructing the Acid Chambers of Soda Water Apparatus.—William Gee, New York City:

First, I claim making an acid chamber or vessel to hold acid for a soda water apparatus or generators, lined with one piece of sheet lead, having a flange turned at the bottom as well as at the top, with a valve seat of pure lead bolted between the flange of the acid chamber and the flange of a generator, making a chamber or vessel free from all solder tin, burned seams or rubber joints where acid comes in contact.

Second, I also claim the wrench, K, in combination with the stuffing box, H, for releasing the packing when the valve is to be raised, and to tighten the packing and make a friction, and keep the valve from blowing up when the valve is down, as herein described.

49,872.—Folding Seat for Wheel Vehicles.—Henry A. Gilbertson, New York City:

I claim a folding or hinged seat for wheel vehicles, provided with a back and sides, either or both, arranged and applied in such a manner as to admit of folding automatically by the folding or turning up or down of the seat, all constructed substantially as herein shown and described.

49,873.—Gate.—Sylvanus M. Gillett, Homer, N. Y.:

I claim the use of the jointed bar, F, in combination with the slats, c c so formed as to make a folding gate, as and for the purpose specified.

49,874.—Insole for Boots and Shoes.—John K. Gittens, Brooklyn, N. Y.:

I claim as a new article of manufacture, an insole for boots and shoots made of sheep skin, with a wooly surface upon one side and any suitable enameling or protective covering or coating upon the other, substantially as described.

49,875.—Telegraphic Repeater.—William H. Hamilton, Albany, N. Y.:

I claim the batteries, P R P' R', applied in combination with sounders, A A', receiving magnets, L L', registering levers, D D', and main wires a a', substantially as and for the purpose set forth.

[This invention consists in the application of an electric current formed from a main or local battery alternately to two receiving magnets, by any suitable mechanism, on a receiving magnet, register, or sounder, simultaneously with the removal of the main current, in such a manner that impulses can be repeated from one telegraph wire to another automatically, and without liability to errors.]

49,876.—Grain Separator.—Theophilus Harrison and William C. Buchanan, Belleville, Ill.:

We claim, First, The construction of the riddles, consisting of transverse slats, f, with double beveled upper sides and with projecting wires, g, spanning the intervening spaces, the successive slats descending as they recede from the fan, substantially as described.

Second, The boards or flaps, h, attached to the strips or bars, f, to operate in combination with the bar, D, in the manner substantially as and for the purpose set forth.

49,877.—Automatic Press.—Peter Hayden, Pittsburgh, Pa.:

I claim the feed wheel, G, provided with holes, g, to receive the work to be operated upon, and moved by means of the rotation of the driving wheel, C, through the medium of the teeth on the feed wheel and a pin attached to C, or other equivalent means, in connection with the bolster plate F, and the pins, I J, and operated from wheel, C, through the medium of a cam, substantially as and for the purpose herein set forth.

49,878.—Pen and Pencil Case.—William S. Hicks, New York City:

I claim, First, The case, A, consisting of a single tube, and provided with the cap, c, and tube, e, constructed and arranged to operate as herein shown and described.

Second, In combination with the case, A, as above described, I claim the pencil, B, constructed and arranged to operate in the manner and for the purpose set forth.

49,879.—Car Coupling.—Alvin J. Hobbs, Kokomo, Ind.:

I claim, First, Connecting the jaws of a self-acting car coupling of two transverse bars D and D', supported firmly in front by breasting upon the solid portion of the draw head, substantially as set forth.

Second, The construction of a double extension cam, C, for the purpose of separating the jaws, D and D', in such manner that being suspended at the center, c, it may be operated from the extremity with any advantage of leverage that may be necessary.

Third, The combination of the draw head, A, the transverse bars, D and D', the elastic bands, M, or equivalent springs, the double eccentric cam, C, rods, E, and cross-head, F, with the shackle bar, B, substantially as described and for the purposes set forth.

49,880.—Soldering Fruit Cans.—Robert J. Hollingsworth, Cincinnati, Ohio:

I claim the plate, C, constructed and operated substantially as described, for soldering the joints of metallic fruit cans.

[The object of this invention is the soldering of the joints of tin cans, such, for instance, as fruit cans. It consists in the construction and manner of using a heating or soldering plate on which the can is placed, and by the communication of heat from which solder applied in the inside of the can is melted, and the joints securely soldered together.]

49,881.—Machine for Cutting Wood Gear.—Christopher R. James, Jersey City, N. J.:

I claim the arrangement of the sliding cutter carriage, the revolving cutter stock, M, and cutter, P, and the revolving dividing plate, E, substantially as and for the purpose herein specified.

49,882.—Grain Drill.—James D. Jones, Pittsburgh, Pa.:

First, I claim the arrangement of the hopper, E, agitator, F, gage plates, G H, cut-off plate, i, adjustable hangers, j, lever bar, k, and connecting rods, l, constructed, arranged and operating substantially as herein described, and for the purpose set forth.

Second, The combination of the reversible shute, x, with the adjustable drag bar, y, and tooth, n', as described, and for the purpose set forth.

49,883.—Adjustable Drag Bar for Grain Drills.—James D. Jones, Pittsburgh, Pa.:

I claim a new article of manufacture, to wit, an adjustable drag bar for grain drills, said bar consisting of parts, A and B, constructed, arranged and operating in the manner herein described, and for the purpose set forth.

49,884.—Machine for Making Paper Board.—John F. Jones, Rochester, N. Y.:

I claim, First, The combination of two wire mesh aprons, B E, between which the pulp passes, with suitable pressure rollers, G G a a, or equivalents, for forming board in a continuous or indefinite length.

Second, The construction and arrangement of the frame, H, made up of the parts, and adjusted in the manner hereinbefore set forth, and used in connection with the endless apron, B, and cylinders, G G, substantially as and for the purpose herein specified.

Third, The double boxes, S S, in combination with the endless aprons, B E, substantially as and for the purpose herein set forth.

Fourth, The employment of the adjustable rollers, u u, in combination with the deckle straps, s s, and boxes, q q, for the purpose of holding said straps to their work, substantially as described.

Fifth, The arrangement of the soft coucher, T, felt, Y, first press, U V, wash tank, V, and felt beater, W, used in connection with the endless apron, B, and roller, D, in such a manner as to take the web from the said apron and convey it upward to the press without injury or loss of pulp, substantially as herein set forth.

49,885.—Railroad Car Brake.—Joseph Jones, West Albany, N. Y.:

I claim the combination and arrangement of the sleeves, A A, with the brake bars, c c, shoes, D D, and jaw braces, m m, operating substantially in the manner and for the purposes set forth.

49,886.—Composition for Tanning.—Eli Keith and Barclay Thorn, La Fontaine, Ind.:

We claim the combination of ingredients, in the proportions and in the manner substantially as described and for the purpose described.

49,887.—Manufacture of Ice.—C. M. Keller, New York City, and J. Henderson, Brooklyn, N. Y.:

We claim exposing water in a series of pans or vessels made of some good conductor of caloric, and suspended by their rims so as to expose their outer surface to the action of the atmosphere, substantially as described.

And we also claim combining with the series of freezing pans the means substantially as herein described for causing a more energetic action of the air on the surface of the said pans, as described.

49,888.—Machine for Wiring Window-blind Rods.—Daniel Kelly, Grand Rapids, Mich.:

I claim, First, In machine for wiring blind rods, the sliding box, c, constructed and operating substantially as above described.

Second, I also claim the driver, d, fitted over the back end, f, of the sliding box, as above set forth, and with a rebate on its lower front edge to overlap the staple, substantially as described.

Third, I also claim the combination of the sliding box, c, with the driver, d, substantially as described.

[This invention consists in a novel arrangement of devices for forcing wire staples into the rods of window-blinds, whereby the work is greatly facilitated, and at the same time performed in a workmanlike manner.]

49,889.—Binding Attachment to Reaper.—James M. King, Quincy, Minn.:

I claim, First, In combination with the seat, F, and inclined board, G the rake, E, when attached by the elastic cord, e, and the rake stand, D, substantially as described.

Second, In combination with the carriage, A, the adjustable caster wheel, H, arranged, operated and operating substantially as described.

49,890.—Chimney Cap.—J. H. Kirkwood, Cleveland, Ohio:

I claim the chimney cap, when constructed of a series of fixed rectangular slats, p, arranged on the sides and ends in an inclined position, overreaching each other, and each series connected at the ends to the single obliquely-set standards, E, in combination with the bonnet, c, furnished with a rectangular opening upon its top, and the flange, d, in the manner and for the purpose set forth.

49,891.—Manufacture of Fertilizer.—Frederick Klett, Philadelphia, Pa.:

I claim the making of a fertilizer, substantially as herein set forth.

49,892.—Knife Cleaner.—W. T. Kosinski, New York City:

I claim, First, The leather-lined throat, E, and inside block, c, in combination with each other and with the box, A, platen, G, and screw, H, substantially as herein described.

Second, The throat lining, F f, composed of one piece of leather, folded and seared at its edges, and provided with slits, a a, substantially as herein specified.

Third, The flexible flap, b, in combination with the opening, p, at one end of the platen, substantially as and for the purpose set forth.

49,893.—Barbers' Apparatus for Brushing Hair.—Conrad P. Kroll, New York City:

I claim a revolving brush for brushing and dressing the hair of the head, arranged upon a shaft provided with suitable handles for holding the same by the hands, and connected with the driving power used, by means of an elastic belt or band, substantially as herein described, and operating as specified.

[This invention consists in arranging around and upon the periphery of a cylindrical drum placed upon a shaft having suitable handles at each end for holding the same in a person's hands, a series of brushes of any desired stiffness, to which brush cylinder—by means of an elastic band or belt passing around the same and over a pulley, receiving motion through any suitable devices connecting t with the driving power used—a rotary movement is imparted, the elastic band permitting the brush to be freely moved about from place to place, or to any desired position, without disconnecting it from the driving power.]

49,894.—Stop Valve for Faucet.—William Krull, New York City:

I claim the stop valve, composed of a shell, h, of hard metal, having on its back a hemispherical test, g, fitted to a corresponding cavity, n, in the screw or spindle, g, and a filling, i, of soft metal, part of which forms the face, substantially as herein specified.

49,895.—Apparatus for Setting Up Work in Knitting Machines.—Isaac W. Lamb, Rochester, N. Y.:

I claim the setting-up apparatus, made substantially as before described, having fingers, B, to be placed between the needles of a knitting machine with hooks, or their equivalents, on the ends of such fingers, for the purpose of holding on to the yarn between the needles, and thus setting up the work on a knitting machine without the aid of the old work.

49,896.—Traveling Valise.—Frederick Lamoureux, Binghamton, N. Y.:

I claim, First, A traveling valise, so constructed that it can be readily converted into a couch or bed, for the purpose shown and described.

Second, In combination with a convertible valise, the hooks, or their equivalents, for the uses and purposes set forth.

Third, In combination with the convertible valise and the suspending hooks, the straps, G G, for keeping the lower half in proper position.

Fourth, The canvas bottom, constructed as shown, when used in connection with the convertible valise, for the purpose described.

49,897.—Horse Hay-fork.—S. F. Leavitt, North Fairfield, Ohio:

I claim, First, The arrangement of the plates, a a, shank, e, with the grooves, c, and grooved washers, c', substantially as and for the purpose set forth.

Second, I claim the catch, P, spring, n', and levers, m, in combination with the head, E, and rod, C, arranged as and for the purpose set forth.

Third, I claim constructing the arm, D, of one entire plate or plates, with a space between, as and for the purpose set forth.

49,898.—Hammer.—J. H. Littlefield, Cambridge, Mass.:

I claim the within-described implement, constructed substantially as described, as a new article of manufacture.

49,899.—Damper and Ventilator.—J. H. Littlefield, Cambridge, Mass.:

I claim the disk, A, constructed and arranged in combination with the wire hook, H, the spindle, B, and the slide, G, as and for the purpose set forth.

49,900.—Syringe.—Hamilton D. Lockwood, Charlestown, Mass.:

I claim an elastic bulb syringe, in which the flexible induction and eduction pipes are connected to the elastic bulb by a lateral pipe-extending form and integral with said induction and eduction pipes, substantially as set forth.

49,901.—Transportation of Petroleum.—H. J. Lombaert, Philadelphia, Pa.:

I claim the use for transporting petroleum of truck cars and portable metal tanks, when the latter are of such weight, dimensions and capacity that one tank will form an appropriate load for an ordinary two-horse oil wagon, and when the truck cars are so constructed as to hold and steadily retain a given number of said tanks, all as set forth.

49,902.—Machine for Making Bolts.—Charles Lusted, New York City:

I claim, First, The reciprocating cutter, H, in connection with the stationary perforated plate, I, when said parts are constructed as herein described, and used in combination with the intermittingly rotating bed or die, R, and reciprocating female die, K, for the purpose specified.

Second, The rod, B, operated through the medium of the yoke, C', tappet, D', and spring, E', and provided with the rod. B, all the said parts being constructed as herein described, and arranged in relation with the perforations of the bed or die, R, as herein shown, for the purpose of discharging the bolts or rivets from the bed or die R, as set forth.

49,903.—Deep Well Packing.—Francis Martin, New York City:

I claim, First, In packing the tubes of oil and other deep wells, connecting the end of the packing device or apparatus to separate or disconnected sections of the well tube, so as to inclose the joint within said packing device, substantially as above described.

Second, I also claim connecting such separate sections of the well tube to each other by means of a coupling, one end of which slides on one of the sections, substantially as described.

Third, I also claim the elastic leaves, B, arranged as shown about the well tube, so as to inclose the slip joint above described, substantially as above set forth.

Fourth, I also claim the elastic covering, I, in combination with the spring leaves, B, which it incloses, substantially as above described.

49,904.—Sewing-machine Shuttle.—James S. McCurdy, Bridgeport, Conn.:

First, I claim the bar, C, constructed with a projection, C', entering a recess, b', at one end of the cavity, a, of the shuttle, and with a notch, e, or its equivalent, in the said projection, for the reception of one of the journals of the bobbin, and otherwise applied, in combination with the shuttle, substantially as and for the purpose herein specified.

Second, The arrangement of the holes, i i, in the bar, C, in a line transverse to the length of the shuttle, substantially as and for the purpose herein specified.

Third, The tension device, consisting of a screw, D, a slotted plate, m, and a spring, t, combined and applied to operate within a recess, n, in the face of the shuttle, substantially as and for the purpose herein described.

Fourth, A sewing-machine shuttle, which is constructed with a pivoted bar, C, adapted to form a bearing for one end of the bobbin, in combination with a tension device, consisting of an adjusting screw acting directly upon a slotted spring plate, substantially as described.

49,905.—Mechanical Movement.—Wm. C. McGill, Cincinnati, Ohio:

I claim combining with an ordinary crank and pitman, the link, E, and yoke, F G, arranged and operating as set forth.

49,906.—Machine for Making Nails.—C. H. Merrick, Pittsburgh, Pa.:

I claim the combination of devices by which this is effected, substantially as herein described and set forth.

49,907.—Table for the Sick.—Anselm Millhauser, New York City:

I claim a table for the sick, constructed with an adjustable swinging top, capable of projecting over a bed, and steadied by means of an extensible foot, substantially in the manner herein specified.

49,908.—Fruit Box.—Edmund Morris, Burlington, N. J.:

First, I claim in a fruit box, constructed as described, the dovetail and wire rod or equivalent.

Second, The bottom, provided with its pins for insertion, in combination with the sides, jointed and constructed as described.

49,909.—Device for Closing and Opening Shutters.—G. G. Morton and Edwin Lamasure, Philadelphia, Pa.:

We claim, First, The casing, D, constructed and arranged as and for the purpose set forth.

Second, In combination with the subject matter of the above, we claim the worm wheels, b and H, pintle, G, and crank shaft, I, substantially as set forth

49,910.—Machine for Cutting and Scoring Pasteboard.—Samuel Orth, Philadelphia, Pa.:

I claim the adjustable carriers, E, with their scoring cutters, e, and the adjustable carriers, E', with their severing cutters, e', in combination with the rollers, H, and their cutting edges, m, the whole being arranged and operating substantially as and for the purpose herein set forth.

49,911.—Gang Plow.—J. S. Padon, Summerfield, Ill.:

I claim, First, The side bars, C, C, seat standards, D D, slotted axle, A, and slotted brace, C', in combination with the pivoted plow beams, F F, and rocking levers, G G, all arranged and operating substantially as described.

Second, In a wheel cultivator, I claim providing for expanding or contracting for plow beams, F F, the supporting frame thereof, and the contrivances for elevating or depressing the said beams, substantially as described.

Third, Supporting the plow beams, F F, in an elevated position by means of levers, G G, links, d d, and a spring catch lever, g, which is pivoted to a post projecting from the draft pole, substantially as described.

Fourth, Pivoting the plow beams, F, to side beams, C C, which are susceptible of being separated or contracted without detaching them from their axle, A, substantially as described.

Fifth, The use of slotted standards, J J, in combination with the slotted sector plates, j j, and fastening, k k', substantially as described.

Sixth, The clamps, K, applied to the standards, J, substantially as described.

49,912.—Umbrella.—Geo. L. Peabody, New York City:

I claim, in combination with a tubular tip, A, the handle, B, when the same shall be combined, constructed and operated substantially as described, for the purpose specified.

49,913.—Wood-splitting Machine.—B. F. Penny, Rochester, N. Y.:

I claim the relative arrangement of the stripper, D, vertically adjustable rest, C, ax, A', and stock, B, in the manner and for the purposes specified.

49,914.—Water Elevator.—Peter Perrine, Little Falls, N. Y.:

I claim the combined arrangement of the crank, B, the pawl, E, and the hooked pawl, D, substantially as set forth.

49,915.—Catamenial Sack.—Edward L. Perry, New York City:

I claim forming with, or attaching to, a catamenial sack lappels or wings, substantially as and for the purpose herein shown and described.

[This invention consists in attaching lappels or wings to each side of a catamenial sack, said sack being a rubber pouch, somewhat like a canoe in form, and having a long mouth, into which may be placed a sponge or some other substance for absorbing the menstrual discharge, which absorbent material may be removed when occasion requires and replaced by new. These lappels or wings lie close against the thighs of the female, and effectually prevent any of the catamenia getting upon the clothes of the female.]

49,916.—Artificial Cork.—Edward L. Perry, New York City, and E. D. Lazell, Brooklyn, N. Y.:

We claim a cork for chemical and apothecaries' use, and for hermetically sealing fruit and preserve jars, and for other purposes, made substantially as herein specified.

[This invention provides a cork or stopper for apothecaries' use, for hermetically sealing jars of fruit and preserves, for bungs for barrels, casks, kegs, etc, made of a composition which will not be affected by acid or any heated fluid, and which can be manufactured and sold very cheaply. The corks can be withdrawn in the usual way, and used again and again for different purposes.]

49,917.—Saw-mill.—Stuart Perry, Newport, N. Y.:

I claim, First, The use of the strap and shoulder thereon, in combination with a cam nut or washer for tightening up the box or bearing of pitman, or connecting rods-heads, substantially as described.

I also claim the joint between the pitman or connecting rod and saw arm, composed of the metal head and strap, and the hook and tongue, uniting with a common pivot, and made adjustable, substantially as described and represented.

I also claim uniting the cross-head to or with the joint between pitman and saw arm, so that either may have motion independent of the other, subssantially as described.

49,918.—Valve for Steam Radiator.—Fred. Presser, Philadelphia, Pa.:

I claim, First, The application of a tube, b, to the expanding vessel, B, substantially as described, so that the liquid in said vessel can be replaced while steam is up, and without interrupting the operation of the radiator.

Second, So arranging the channel through which the cold air enters the chamber, A, that said air, on rushing in, has a tendency to open the valve, instead of to close it, as heretofore.

Third, Placing the vessel, B, which carries the valve, d, looseiy into the chamber which contains the valve-seat, as described, so that the valve can at all times be re-gronnd whenever desired.

[This invention relates to valves of that class which open and close by the expansion or contraction of water or other liquid in a vessel, one or more sides of which are expansible or flexible, the expansion or contraction of said liquid being dependent upon the heat of the atmosphere surrounding the said vessel.]

49,919.—Automatic Boiler Feeder.—R. Rafael, New York City:

I claim the reciprocating plunger, A, provided with a series of cells, a, and operating in combination with a supply chamber, B, and feed chamber, C, substantially as and for the purpose described.

49,920.—Washing Machine.—L. E. Ransom, Trenton, Mich.:

I claim the combination of the tangential rubbers on disk, A, the bearing, F, the perforated disk, B, and bearing, M, so arranged that the whole can be adapted and applied to and used in common washtubs, substantially as herein set forth.

49,921.—Clasp for Lamp Shades.—Christian Reichmann, Philadelphia, Pa.:

I claim the elastic grooved or flanged band, A, holding the top of the paper shade by its own expansion, and employed in combination with a frame, c c, constructed and applied as and for the purposes set forth.

[The object of this invention is to obtain a clasp or support for lamp shades, which may be cheaply constructed and applied to the shade with the greatest facility.

49,922.—Expelling Oil from the Veins of Wells.—Isaac Relf, Mina, N. Y.:

I claim forcing the liquid in an oil or other well into the veins and crevices thereof by means of blows and concussions, as and for the purposes described.

49,923.—Bird Trap.—Rudolph Rex, Charles City, Iowa:

First, I claim the use of netting frame, which is applied to pivoted guide posts, C C C C, and provided with props, G G, or their equivalents, substantially as described.

Second, The combination of the posts, A C, and loaded cords, C, with the netting frame, D D E E, substantially as described.

49,924.—Coal-oil Hand Lamp.—Edwin Roberts, Moorestown, N. J.:

I claim the jacket, C, constructed as described and set forth, in combination with the cylindrical wick tube, B, of a coal-oil hand lamp, the said jacket and tube being arranged to operate together as described for the purposes specified.

49,925.—Cornet.—Louis Schreiber, New York City:

First, I claim in cornets and similar musical instruments placing the mouth-piece tube vertically above the valve tube, substantially as above described.

Second, I also claim constructing the key or keys, f, of a straight piece, and placing them in a position parallel with the axis or axes of the rotary valve or valves operated by them, substantially as above described.

Third, I also claim placing the tuning pump, D, in a vertical position at the termination of the mouth-piece tube, substantially as described.

Fourth, I also claim the water valve, F, in the end of the tuning pump, substantially as and for the purpose above described.

Fifth, I also claim the combination of the finger ring, C, with the tuning pump, for the purpose of providing means for holding the instrument, substantially as above described.

49,926.—Horse Rake.—Frederick Seidle, Mechanicsburg, Pa. Antedated Sept. 6, 1865:

I claim the arrangement of the staples, A, and coiled springs, B, embracing the staples, and their lower ends resting upon the teeth, while their upper ends pass through the upper ends of the staples in connection with the wire teeth, E", attached separately by means of the brackets, D", to the bar, C", in the manner and for the purposes specified.

49,927.—Paper Collar Machine.—Samuel Shepherd and Ammi M. George, Nashua, N. H.:

We claim a machine for cutting out, punching the button holes in and embossing an imitation of stitching on paper collars, composed of a pair of rollers, C C', furnished with steel bands, d d', cutting rings, e e', embossing rings, i i', packing rings, t n n', punches, s s', and dies, t t, the whole constructed and operating substantially as therein specified.

49,928.—Grindstone.—John F. Shillaber, Portsmouth, N. H.:

I claim so arranging the lower water-box or receptacle of a grindstone that it can be raised toward, or lowered from, the stone, substantially as herein described and for the purposes specified.

[This invention consists in so arranging the receptacle or vesse containing the water, and through which the grindstone passes when revolved, in such a manner that it can be readily adjusted to any desired hight with regard to the stone, according to the quantity of water necessary to be supplied to its surface, or set entirely away therefrom, so that the stone when not in use shall not remain in the water, as has heretofore been the case, and which, as is well known, greatly tends not only to soften the stone, but also often seriously injures it, causing it to peel or crumble to pieces.]

49,929.—Coffee and Tea Drawer.—John O. Shriner, Newcastle, Ind.:

I claim a perforated or wire drawer, made of any proper shape, having a closely-fitting perforated lid, and a long handle with a ring on the end, for the purposes herein set forth.

49,930.—Rigged Oar or Boat Fin.—Ralph Smith, Brooklyn, N. Y.:

I claim the arrangement and combination of the blades, B, and rods, C, attached and operated as described and represented.

49,931.—Composition for Preventing Incrustation in Boilers.—G. R. Spannagel, St. Louis, Mo.:

I claim the composition of matters as above described, for the purpose set forth.

49,932.—Coal Scuttle.—William Sparks, New York City: Antedated Sept. 6, 1865.

I claim the combination of the screw, d, and gate, g, at the upper end of the said screen, with the frame work, a, and the elevated platform, b, in the manner and for the purpose set forth.

49,933.—Boring Machine.—Daniel Stanley and George Johnson, Cincinnati, Ohio:

We claim the arrangement of the eccentric, N O, pivoted rack, K, compound spur and bevel wheel, J, slide, E, wheel, G, and auger shaft, F, all constructed and operating substantially as specified.

49,934.—Apparatus for Carbureting Air.—B. Terry, Auburndale, Mass.:

I claim the air-pumping apparatus, made substantially in manner and so as to operate as described, viz, of one or more bellows, G, with its valve openings, i n, valve, h m, levers, K, rod, F, and eccentric, E, the whole being applied to the shaft, D, and the case, A, in manner and so as to operate substantially as described.

And I also claim the combination of each bellows head, e, with the air-receiving chamber, by means of a flexible eduction pipe, p, so applied to the two as to allow of the necessary movements of the bellows heads, e, as described.

And I also claim the combination and arrangement of the chamber, H, with the air-forcing bellows, the flexible eduction pipe or pipes thereof, and the vaporizing chamber, C.

I also claim the flexible or expansive dome, I, made substantially as and to operate as described, with the vaporizing chamber, C, and the apparatus for forcing air into the latter.

I also claim the combination of the flexible or expansive dome, I, and its case, v, with the vaporizing chamber, C, and an apparatus for forcing air into such chamber for the purpose of being carbureted, as described.

I also claim the combination of the force pump, K, its jet tube, y, spray disc, t, air-distributing conduit, a2, and series of discs, f2 g2 h2, the same being used in the vaporizing chamber, C, and with the apparatus for forcing air therein, as specified.

I also claim the arrangement of the tube, b', and its stop cock, c', with the outlet tube, a, the air chamber, H, and the vaporizing chamber, C, provided with an apparatus for forcing air into it, as described, the tube, b, in such arrangement being wholly within the vaporizing chamber, as set forth.

I also claim the improved flowage regulator, constructed as described, viz.: with the flexible tube, K, combined with the disc, c', and the vessel, I, the said vessel, I, having the partition, g, going across it, and the valve, h, suspended from the the disc, c, the whole being arranged and so as to operate substantially as specified.

49,935.—Packing the Shafts of Dry Gas Meters.—Nathaniel Tufts, Jr., Boston, Mass.:

I claim in dry gas meters, and in combination with the vertical shafts therein, and with the packing boxes of such shafts, the cup, s, when secured to such shafts and made to rotate therewith.

49,936.—Artificial Leg.—James Walber, New York City

I claim the construction of the joints of artificial legs with metal-faced supporting bearings on the circular surfaces of the central tenon and of the side cheeks of the mortise of the joint, substantially as herein described, whereby the pins of the joints are relieved of the weight of the body, and cylindrical bearings are obtained both above and below the axles of the joint.

49,937.—Machinery for Punching Metal.—Daniel T. Walker, Brooklyn, E. D., N. Y.

First, I claim the improved punch holder consisting of the driver, a, the cap, a, and a fastening, substantially as described.

Second, The driver, conical cap fastening, and punch, in combination, substantially as described.

Third, The conical bush, in combination with the cap and driver, for the purpose of holding various sized punches in the same punch holder, substantially as described.

49,938.—Cultivator.—Londus B. Walker, Chicago, Ill.:

First, I claim the combination and arran ement of the vibrating bars, C C, with the bars, D D, which draw the cultivating teeth.

Second, In combination with the vibrating bars, c c, I claim the levers, W W, and links, Z Z, arranged to operate them, substantially as described, for the purpose set forth.

Third, I claim making the foot levers, W W, with three arms, and hanging them so that the driver, by applying his foot to either of the upper arms, can work the levers and vibrate the bars, C C, in either direction.

Fourth, I claim making the axle or pivots of the wheels hollow, in combination with the rock shaft and levers marking through them, to raise the cultivating teeth.

49,939.—Mode of Manufacturing Halters.—Hiram B. Ware, Burlington, Iowa:

I claim a halter, made with clasps and rivets, substantially as herein shown and described.

49,940.—Burglar Alarm and Lock.—Elijah Warne, Broadway, N. J.:

I claim a burglar alarm and lock, consisting of the parts herein described, or their equivalents, combined and operating substantially in the manner above described.

49,941.—Feed-water Apparatus.—George J. Washburn, Worcester, Mass.:

I claim, First, The piston valve reciprocating in the chamber, as described, in combination with the openings, K, and their alternate induction and eduction connections, substantially as described.

Second, The rotary steam valve with its steam ports, R R', and exhaust ports, S S', communicating alternately by the pipes, Q Q', with the ends of the piston chamber, G.

Third, The combination of the shouldered plates, P P', with the wheel, N, and the pins on the faces of the latter, by means of which devices the reciprocating motion of the piston valve produces the rotary motion of the valve, M.

Fourth, The arrangement of the pipes and passages for connecting the water chamber, A A', with the water supply from below and the steam from above, without allowing either to pass through the chamber, so as to obtain a raising and falling column of water in said chambers, the upper or surface portion of said body of water always remaining in the chamber exposed to the influence of the incoming steam.

Fifth, The arrangement of the chambers, A C and A' C', communicating respectively by the pipes, K and K', and the orifices in the chamber, G, by which an equilibrium in the hight of water in the connected chambers is periodically established by the weight of the column of water driving the steam from the lower chambers and condensing it during its passage by the described means of communication toward the chambers, C C'.

Sixth, The arrangement of the pipes, U U, which connect the chambers, C' A and C A', respectively, carry a body of water from a chamber under pressure, and discharging it in spray in a steam chamber disconnected with the steam induction, as and for the purposes described

Seventh, Conducting the condenser pipe, K, through a body of water exterior to that in the chambers, so as to avoid impairing the vacuum therein when this is used in combination with the chambers, A A' C C', substantially as described and represented,

Eighth, I claim the arrangement of the valves and ports, by which air, which may be in the chambers, is expelled at each stroke and driven toward the boiler, substantially as described.

Ninth, In connecting with pumps which draw their water by the vacuum caused by the condensation of steam and expel it by the direct action of steam, I claim the method described of regulating the supply of steam to the apparatus by placing the steam pipe with its open end downward in the steam boiler at the water line of the boiler, or in a chamber connected to the boiler, substantially as described and represented.

49,942.—Railway Carriage.—L. A. West, Cambridge, Mass.:

I claim the arrangement of levers, D D, and the spring or springs of each, with the platform frame, A, and the truck frame, B, the same being substantially as and so as to operate as specified.

49,943.—Fertilizer.—J. D. Whelpley, Boston, Mass.:

I claim, as a new article of manufacture, a fertilizer, consisting of finely pulverized feldspar, feldspathic granite, and other potash-bearing rock, in combination with gypsum and bone or phosphate of lime, substantially as described.

49,944.—Horse-power for Sawing Machine.—O. A. White and I. W. Bostwick, Norwalk, Conn.:

We claim a horse-power, arranged and constructed substantially as and for the purposes herein set forth.

49,945.—Lifting Apparatus.—G. B. Windship, Boston, Mass.:

First, I claim the combination and arrangement of the weighted lever, O, yoke, F, and their connecting chains, U U, or their equivalents, substantially as set forth and for the purpose described.

Second, The combination and arrangement of the sliding car, S, rope, Y, and pulleys, d z, or their equivalents, substantially as set forth, for the purpose described.

Third, The dogs, c c, attached to the car, S, and operating in combination with the rope, Y, and the holes in the top of the lever, O, substantially as and for the purpose described.

Fourth, The nut or swivel, R, and rod, Q, in combination with the lever, O, chains, V, and yoke, T, or their equivalents, substantially as and for the purpose specified.

Fifth, The employment of the rubber spring between the top of the lever, O, and the rod, Q, substantially as and for the purpose described.

Sixth, The employment of the large rings or hooks, U U, in combination with the yoke, T, chains, V V, and lever, O, substantially as and for the purpose described.

Seventh, The bars or hand rests, J J, in combination with the hinged and slotted upright studs, K K, and bar, H, whereby said rests are rendered vertically and laterally adjustable, substantially as and for the purpose described.

Eighth, The weight, X, cord, w, either with or without the spring, m, and pulley, N, when arranged and operating in combination with the lever, O, and lifting apparatus, substantially as set forth and for the purpose described.

49,946.—Lining for Boots and Shoes.—John Adams (assignor to himself, A. B. Walker, A. J. Hobbs and William Russell), Kokomo, Ind.:

I claim constructing the lining of a boot or shoe at the point where the front or side slit is formed, in such a manner that it closes the slit against the entrance of water and dust, and also allows the ankle position of the shoe or boot to be expanded in size, but this I only claim when the lining proper is constructed and applied as herein described.

49,947.—Cloth-drying Machine.—Charles F. Bennett (assignor to Maria Bennett), Philadelphia, Pa.:

First, I claim the combination of two or more revolving rims, G G', with the stationary plates, H H, and the system of heating pipes herein described, or the equivalents to the same, secured to the frame by the machine, and arranged in respect to the said rims, substantially as and for the purpose herein set forth.

Second, Constructing each rim with a recess in the inside for the reception of the wheel, F, and the edge of the stationary plate, H.

Third, The central rim, G, and outer rim, G G', the latter being guided by the rods, h, secured to the central rim, and being rendered adjustable to and from the latter by the screw rods, d, or their equivalents, for the purpose specified.

Fourth, The fan, K, and system of heating pipes described, or their equivalents, the whole being secured to the frame of the machine, and surrounded by the revolving rims, substantially as set forth.

Fifth, The combination of the fan casing, J, casing, L, of wire gage or perforated plates system of heating pipes or their equivalents, and the shield, I.

Sixth, The combination of the rims, G and G, their internal wheels, F F, and pinions, E and E, on the grooved driving shaft, B.

Seventh, The combination of the central rim, G, with the retaining wheel, f, on the driving shaft, B.

Eighth, The tentering wheels, P, with their sliding blocks, n, in combination with the disks, q q, on the shafts, N N', and the devices herein described, or their equivalents to the same, whereby the position of the blocks before their hooks seize the fabric is determined by the position of the edge of the said fabric, for the purpose specified.

49,948.—Brake Shoe.—James Christy, Philadelphia, Pa., assignor to himself, Rudolph Dirks and E. H. Bitzman:

First, I claim the holder, A, with its lugs, e e', and the sole, E, with its lug, c, constructed and secured together by the key, F, passing through the lugs, substantially as described.

Second, The key, F, for securing the sole E, to the holder, the said key being curved, as and for the purpose specified.

49,949.—Automatic Boiler Feeder.—Samuel Driver (assignor to himself and Edward Longan), Philadelphia, Pa.:

First, I claim combining the feed pipe with the boiler by means of the box, A, and chests, B H, arranged and operating substantially as described and for the purpose set forth.

Second, The combination and arrangement of the valves, D D', with the chest, B, for opening and closing the communication between the box, A, and the boiler, substantially as described.

Third, Combining and arranging the cams, I I', with the valves, D D' and F, substantially as and for the purposes set forth.

49,950.—Let-off Motion for Looms.—Samuel Estes, Newburyport, Mass., assignor to himself and C. O. Morse, and said Estes assigns his right to Hiram Littlefield:

I claim making that part of the batten of a loom which comes in contact with the finished fabric, yielding and combining it by suitable levers, C D, pawl, E, and ratchet wheel, F, or their equivalents, with the yarn beam, G, substantially as and for the purposes set forth.

49,951.—Machine for Making Paper Bags.—E. W. Goodale, Clinton, Mass., assignor to Benjamin S. Binney, Somerville, Mass.:

I claim, First, Making the side cutters, B, with curved ends, substantially as and for the purpose set forth.

Second, Making the former, C, in two or more parts, substantially as and for the purpose described.

Third, The paster, H, in combination with the adjusiable strap, v, knife, G, and paste roll, I, constructed and operating substantially as and for the purpose set forth.

Fourth, The arrangement and combination of the side cutters, B, former, C, measuring rollers, D, cutter, E, oscillating arm, F, paste roll, I, paster, H, and knife, G, all constructed and operating in the manner and for the purpose substantially as herein shown and described.

[This invention relates to a machine for making paper bags of a novel construction, which, however, cannot be explained without drawings.]

49,952.—Apparatus for Shaping Paper Collars.—W. E. Lockwood and Henry Howson (assignors to W. E. Lockwood), Philadelphia, Pa.:

We claim the three rollers, J K and M, the said rollers being of the form substantially as illustrated, and being arranged and operating in the manner described.

49,953.—Lantern.—Samuel Roebuck (assignor to Roebuck Brothers and Markland), New York City:

I claim a lantern constructed with openings to receive the glass plates by slitting the sheet-metal body, as shown, and bending the metal outward at each side to obtain reflecting surfaces behind the glass plates between them and the main portion of the body, substantially as set forth.

[This invention relates to a new and improved mode of constructing lanterns, whereby the openings and reflectors are obtained to cause the rays of light to be radiated from the lantern in the most favorable manner, and the latter rendered capable of being manufactured at a very moderate expense.]

49,954.—Manufacture of Spectacle Frames.—J. E Spencer and Edwin Want (assignors to J. E. Spencer), New Haven, Conn.:

We claim forming the pivot solidly upon the temple, and otherwise constructing the hinge, and uniting the bore with the temple, substantially as described.

49,955.—Vapor Burner.—James Stratton (assignor to the Petroleum Vapor Stove and Gas-light Company), Philadelphia, Pa.:

First, I claim conducting the fluid from which the gas is to be generated through an annular or nearly annular tube, which communicates with and is arranged above a nipple, substantially as and for the purpose described above.

Second, The detachable deflecting plate, H, adapted to the annular portion, a, of the tube, A, substantially as and for the purpose described.

Third, The nipple, E, with its opening, c, and its valve-seat, in combination with the valve rod, F, and its needle point, e, the whole being construct d and arranged substantially as and for the purpose set forth.

Fourth, The cap, I, with its pointed rod, i, adapted to the nipple, E, substantially as and for the purpose specified.

49,956.—Smoothing Stone or Implement.—J. E. Tucker (assignor to himself and C. H. Moore), Boston, Mass.:

I claim the combination of the stone or steatite body, A, the metallic socket, B, and handle, C, arranged and applied together substantially as specified.

49,957.—Apparatus for Clinching Clasps on Hoop Skirts.—George F. Wright (assignor to himself and H. H. Waters), Clinton, Mass.:

I claim, First, A vibrating hopper, having apertures in the side or sides thereof, of the form substantially as herein described, in combination with one or more suitable guiding bars, and a spiral or any other suitable-shaped delivery tube or tubes, arranged together and operating substantially as and for the purposes specified

Second, The bow, or other suitable springs, g' g', attached to the clinching tool for grasping the clasps, arranged and operating as described.

Third, The toothed feeding wheel, l', for feeding the clasps as they are delivered by the tube to the clinching tool, arranged and operating as described.

Fourth, The sliding bar, s, with hopper and feeding tube attached, arranged and operating substantially as described.

49,958.—Method of Preparing Aniline Colors for Dyeing and Printing.—August Samuel Leopold Leonhardt, Berlin, Prussia:

I claim the rendering of the blue and violet colors of commerce, obtained from magenta, and which are insoluble in water, in a fine state of subdivision, so that without further use of alcohol or other solvent they are in a fit condition for use in dyeing and printing, by first dissolving them in alcohol, or aniline, or sulphuric acid, and subsequently allowing the so utions so obtained under brisk and consistent agitation to drop into cold water alone, or into cold water containing in solution neutral salts, caustic or carbonated alkali; or, as in the second described process, when aniline is used, into cold water containing hydro-chloric acid; or, as in the last process, when sulphuric acid is used, into cold water containing an equivalent amount of alkali to the sulphuric acid employed, and subsequently recovering the solvent used, as described in the first two processes.

REISSUES.

2,070.—Truss Bridge.—Albert D. Briggs, Springfield, Mass. Patented July 27, 1858:

I claim, First, The method of increasing the bearing surfaces for the blocks, d d e e, by the employment of the blocks or keys, c' c', fitted between the chord sticks and between the bearing blocks, d d e e, substantially as described.

Second, The employment of the blocks, h h, fitted between the bearing blocks, d d e e, on the outside of the chord sticks, substantially as herein set forth.

2,071.—Machine for Cutting Splints.—J. C. Brown, Brooklyn, N. Y. Patented June 21, 1864:

I claim, First, The cutter cylinder, C, when the cutters are placed diagonally thereon in the manner described, so that the angle of each cutter relatively to the axis of the cylinder shall be opposite to the next cutter, and alternate cutters parallel to each other, whereby the cylinder revolving as described will cut the splints tapering, substantially as and for the purpose specified.

Second, The cutter cylinder, C, and the fixed cutter, a, when combined and arranged substantially as and for the purpose described.

2,072.—Saw-mill.—John L. Knowlton, Philadelphia, Pa. Patented Oct. 20, 1863:

I claim, First, In combination with the circular frame that holds and turns the saw sash or frame, the guides, j j, between which the sliding block moves that transmits motion to the saw, so that the saw and the block shall always be in the same plane, and always move together, without cramping or binding, substantially as and for the purpose herein set forth.

I also claim so arranging the crank-wheel shaft and the ring frame as that the former shall be in a plane that shall pass through the opening of the ring frame, and as nearly central to said ring as practical with my construction, so that the two, while connected, may move on as nearly common centers as possible, to avoid all binding of the parts and all undue friction to the driving mechanism, substantially as herein described.

DESIGNS.

2,164.—Clock Case.—C. T. Foote, Bristol, Conn.

2,165.—Wind Vane.—A. L. Jewell, Waltham, Mass.

2,166.—Valve Handle.—John Matthews, Jr., New York City.

2,167.—Oil Cloth.—A. E. Powers, Lansingburgh, N. Y.

2,168.—Carpet Pattern.—F. J. Pierce (assignor to Roxbury Carpet Company), Roxbury, Mass.

2,169.—Ox Yoke.—W. T. Remington, Bridgeport, Conn.

2,170.—Stove.—Jacob Steffe (assignor to Cox, Whitman & Cox), Philadelphia, Pa.

2,171.—Hall Stove.—Jasper Van Wormer, Albany, N.Y.

2,172.—Spoon Handle.—Rudolph Wendt, New York City.

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Improved Electro-Magnet.

The telegraph has become so extensive that the manufacture of the apparatus employed is quite an important industry. In the Morse system—which is the one in universal use in this country—the electro-magnet may be called the central, or main part of the apparatus. A short rod of soft iron is wound with a coil of insulated wire, and then, so long as a current of electricity is passing through the wire, the iron is a magnet. The circuit may be a foot or one hundred miles in length, and any break in the wire in any part of its length of course stops the current, when the iron ceases to be magnetic. The magnet may be placed in New York and the current may be broken in Albany, and by successive breaking and reforming, signals may be transmitted. In this way all our telegraphing is done.

The magnet here illustrated is wound with naked wire, the only insulation being the blank spaces between the several convolutions, the courses being separated by a wrapper of thin paper. By this modification a given length of wire gives a greater number of convolutions, and they are brought nearer to the central core, thus, with a given resistance to the current, increasing the power of the magnet.

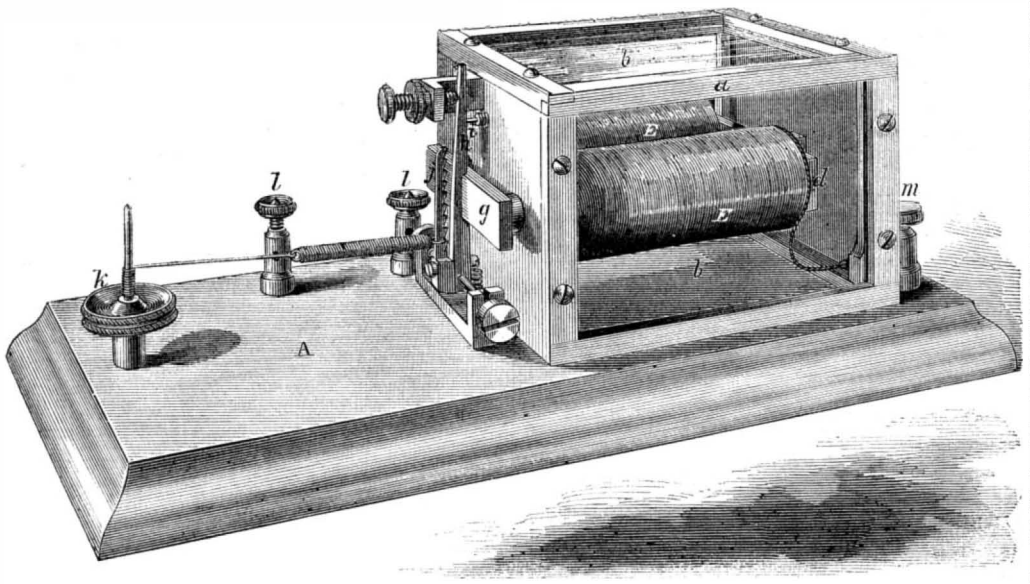
There are also several minor improvements which will be seen by examining the engraving, in which A is the marble base, *a a* the brass frame of the box, *b b* the glass plates forming two sides and the top of the box, *d* the keeper or back bar of the magnet, E E the helices, seen through the glass plates, *g* armature, *h* armature lever, *i i* the platinum points for opening and closing the local circuit, *j* small ratchet bar on which the adjusting spring may be raised or lowered, K adjusting stand, *l l* screw cups for the local circuit, being connected with the platinum points, *m m* screw cups for main circuit (only one visible in the cut), being connected with the fine wire of the helices. The minor advantages are thus set forth by the inventor:—

The anvil which receives the stroke of the armature being in one side of the box, ample sound is given to be read without the use of a local battery and sounder.

The adjustments are effected with ease and facility, the most important of them being enlarged in its range by the ratchet bar, *j*. The adjusting stand, K, is peculiar, having a metal tube passing through the base and about one-fourth of an inch above—that portion above being slotted. A milled-edge wheel, having a hub which is nicely fitted upon the tube and resting upon the base, has a steel wire spindle which extends above the wheel for winding the cord of the spring upon and down through the center of the wheel and hub, and through the tube. The spindle is made fast in the wheel and hub, and turns in the tube. This compound joint of spindle within the tube, and tube within the hub, gives double friction, which may be increased at pleasure by opening or closing the slot in the upper end of the tube.

But the characteristic peculiarity of this magnet is the naked wire of the helices. When the wire is wound with silk the spaces between the convolutions are from the three-hundredth to the one-hundred-and-fiftieth of an inch in width, but in this helix they are only one eight-hundredth of an inch, and have been wound one-thousand-and-seventy-ninth ot an inch. As the power of the current in inducing magnetism in the iron core depends upon the number of convolutions and their proximity to the core, the advantage of this more compact winding is manifest. We are told that Professor Page pronounces this the most valuable improvement that has been made in the electro-magnet since the introduction of the long fine wire.

This invention was patented through the Scientific American Patent Agency, Aug. 1, 1865, and further information in relation to it may be obtained by addressing the inventor, Dr. L. Bradley, at No. 7 Exchange Place, Jersey City, N. J.



BRADLEY'S RECEIVING MAGNET

MARKLAND'S COAL SCUTTLE.

The chief point of novelty in this invention lies in the substitution of one material for another. Very often as much ingenuity, or at least benefit, can be attained in this way as in devising the most costly machine.

It is well known to all who use such articles that common coal scuttles rust out at the bottom, so that, while the other part is perfectly good, the scuttle has to be thrown away. In this utensil the bottom is made of wood, of a proper thickness, and nailed to the body, and it is claimed by the inventor that it will wear much longer, and can be made in half the time; where a galvanized top is used the scuttle is claimed to be almost indestructible. It was patented Nov. 1, 1864, by Thomas T. Markland, Jr., Philadelphia, Pa. For further informaton address Markland & Co., No. 835 Ellsworth street, Philadelphia.

BAT MANURE.—A large deposit of guano, the produce of bats, has been discovered in a natural cave eight miles distance from Vesoul, in the Department of the Haute Saone, France. It is estimated at about 800 cubic meters in bulk. A French chemist has analyzed and pronounced favorably upon it.

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