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Improved Carriage and Car Spring.

In the carriage springs here shown, the inventor has greatly simplified the construction, and retained all the desirable qualities of such appurtenances.

That in Fig. 1 is intended for wagons or carriages, and is much lighter than the common elliptic spring, and quite as strong. It consists of two leaves or bows, A, curved elliptically, as shown, and connected at the ends to a casting, B. At C, is shown the ordinary method of attaching the two bows, and it is claimed that by the inventor's plan, as at B, the spring is rendered more durable and equable in action.

As springs commonly break across the holes by which they are affixed to the axle of the vehicle, it is desirable to avoid perforating them. Therefore these springs are clamped to a saddle-piece, D, as shown, and this saddle-piece is so constructed as to bear first on the center only; the ends being raised clear from the bows. By this method sudden strains to the spring are avoided, as the action of jolts upon it are distributed more evenly, and the spring is rendered stiffer as the load increases, by the weight being nearer the supports.

In Fig. 2 a car-spring is shown, which explains itself. It is constructed on the same principle as the one first described, but the form has been modified to suit the work required of it. It is used as a bolster spring on cars, and many of them are now in operation on the Delaware and Lackawaxen Railroad. They have been in use for two years with good results.

It is, we believe, justly claimed that these changes and improvements are of great benefit. A patent was granted through the Scientific American Patent Agency to George Douglas, of Scranton, Pa., on May 26, 1863. For further information address as above.

Fig. 1

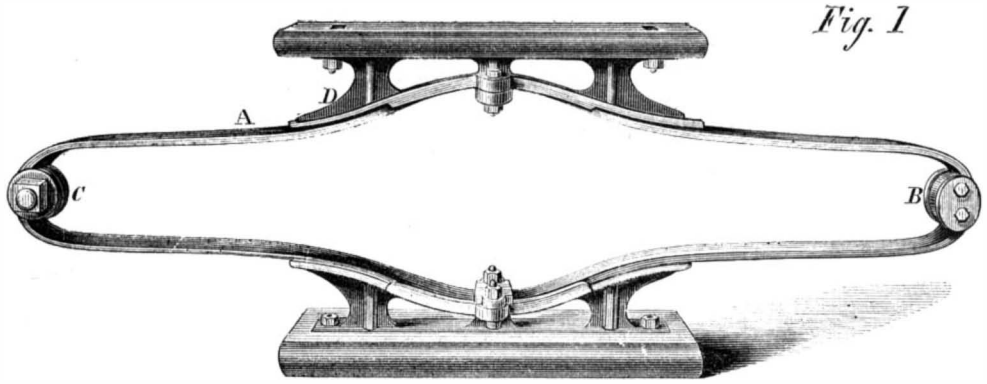
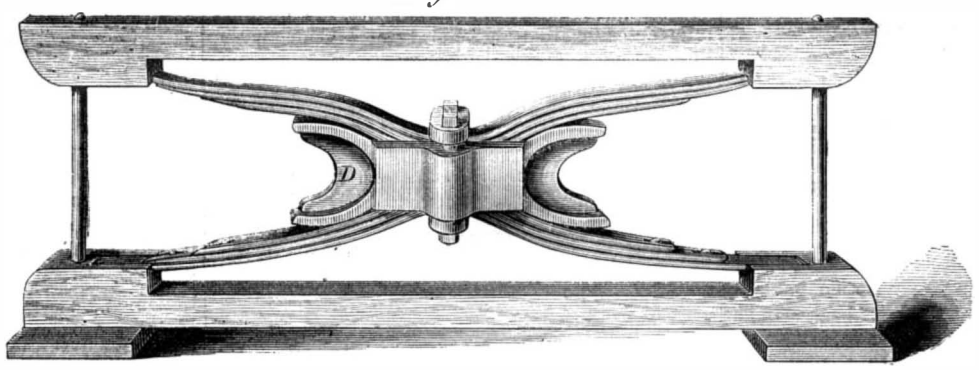


Fig. 2



DOUGLAS'S CARRIAGE AND CAR SPRING.

The Present Yield of Gold.

We have been making our final studies of the mining business of the Pacific States here among the mines and mills at the famous Mariposa estate of Col. Fremont. And the occasion is a proper one to sum up my various notes and observations in California on that subject, and, so far as possible, represent the state of the business in the whole region west of the Rocky Mountains. The gross production of gold and silver of all these States was probably never greater than now. There are no very exact figures to be had; those of Wells, Fargo & Co.'s Express and the San Francisco Mint furnish the best data, and are before me in detail. They indicate a total yield for 1864, of about $60,000,000, and for this year at least an equal, probably a greater, sum, perhaps $65,000,000 or $70,000,000. California herself produces now but about one-third of this amount; she has fallen off from forty and fifty millions a year to twenty and twenty-five; while Nevada now offers from fifteen to twenty millions a year, mainly of silver; Idaho and eastern Oregon sent forward nine millions last year, and will probably increase this to twelve or fifteen millions this year; and the British Provinces and Arizona furnish perhaps five millions. The gold of Montana mainly finds its way east through Colorado; but this is the first season of any large production there. But the production of all the States and Territories this side of the Rocky Mountains comes to San Francisco; one-third of it, or about twenty millions, is coined at the United States Mint there, and the rest is exported in bars or dust, mainly in bars, to New York, China, and England, but chiefly now to England.

The western or California slopes of the Sierra Nevada yield no silver ore—here the mining is of gold alone, and it is divided into two general classes; that which seeks the metal from the solid rock, or quartz, and that which finds it in sand, gravel, or soil. The former process is the universal and familiar one of all rock mining, following the rich veins into the bowels of the earth with pick and powder, crushing the rock, and seducing the infinitesimal atoms of metal from the dusty, powdered mass.—*Editorial Correspondence of the Springfield Republican.*

LEAD pipe, sheet lead, and shot manufactories in the United States, by returns for the eighth census, (1860) are given as follows:—Fourteen establishments, 346 hands employed, $1,739,963 capital invested, $2,697,453 cost of material, $103,050 cost of labor; annual value of products for the year ending 1st June, $3,166,029.

PROF. SNELL, of Amherst, Mass., states that he has not, during twenty-seven years, recorded so small an amount of rain for a single month as during the month of September last. The water measured only thirty-eight hundredths of an inch.

Non-explosive Gunpowder.

Mr. J. N. Hearder, of Plymouth, delivered a lecture on "combustion" before the members of the Devonport Working Men's Association on the 11th of October and, in reference to attempts to lessen the danger of explosive and combustible materials, alluded to a fallacy with regard to the prevailing idea that Gale's new patent rendered gunpowder perfectly safe, and that it was free from all objections. He took a mixture containing four parts of powdered glass (the same as that which Mr. Gale uses) and one part of gunpowder, which were thoroughly mixed together. These were thrown into a glass vessel. A portion of the mixture was put into a pistol, and the percussion cap being snapped, the mixture was blown out without producing any report. The vessel containing the mixture was then gently tapped on the table for a few seconds, when a considerable quantity of gunpowder rose to the top. A portion of this was poured off and put into the pistol, where, on being fired, it exploded just like ordinary gunpowder. The lecturer left the remainder of the mixture in the hands of the audience, that they might be satisfied of the correctness of the proportions employed. The experiment is a very important one, as it serves to show that the gunpowder will regain much of its explosive power by the simple shaking which it receives in carriage. The lecturer stated that even the process of rolling the mixture forward and backward would cause a partial separation of the two powders.—*Mechanics' Magazine.*

VALUE OF PATENT LAWS.—We have recently secured Letters Patent in this country for a large silk manufacturer in Switzerland for some valuable improvements as applied to his business. He remarked to us that these improvements would be of great value to him in his home business if he could secure them by Letters Patent, but, there being no patent laws in Switzerland, his rivals in business could, at once, appropriate his improvements, without liability of prosecution for infringing his rights. Such would be the case in this country but for our admirable patent laws. There are persons mean enough to desire the repeal of all laws protecting the rights of inventors.

THE new bridge about to be suspended over the Ohio river at Cincinnati will be the longest structure of the kind in the world, being more than two hundred feet longer than that over the Niagara river, and five hundred and forty feet longer than the Menai bridge, England. Its total span will be one thousand and fifty-seven feet. The stone piers rise one hundred and ten feet above the floor of the bridge, and two hundred feet above their foundations. One year is allowed for building it.

TYNDALL ON RADIATION.

We give this week some further extracts from Professor Tyndall's lecture on radiation, recently published in cheap form by D. Appleton & Co.:—

THE ATOMIC THEORY IN REFERENCE TO THE ETHER.

"The word 'atoms' has been more than once employed in this discourse. Chemists have taught us that all matter is reducible to certain elementary forms to which they give this name. These atoms are endowed with powers of mutual attraction, and under suitable circumstances they ccalesce to form compounds. Thus oxygen and hydrogen are elements when separate, or merely *mixed*, but they may be made to *combine* so as to form molecules, each consisting of two atoms of hydrogen and one of oxygen. In this condition they constitute water. So also chlorine and sodium are elements; the former a pungent gas, the latter a soft metal; and they unite together to form chloride of sodium, or common salt. In the same way the element nitrogen combines with hydrogen, in the proportion of one atom of the former to three of the latter, to form ammonia, or spirit of hartshorn. Picturing in imagination the atoms of elementary bodies as little spheres, the molecules of compound bodies must be pictured as groups of such spheres. This is the atomic theory as Dalton conceived it. Now, if this theory have any foundation in fact, and if the theory of an ether pervading space, and constituting the vehicle of atomic motion be founded in fact, we may assuredly expect the vibrations of elementary bodies to be profoundly modified by the act of combination. It is on the face of it almost certain that both as regards radiation and absorption; that is to say, both as regards the communication of motion to the ether and the acceptance of motion from it, the deportment of the uncombined will be different from that of the combined atoms.

ABSORPTION OF RADIANT HEAT BY GASES.

"We have now to submit these considerations to the only test by which they can be tried, namely, that of experiment. An experiment is well defined as a question put to Nature; but to avoid the risk of asking amiss we ought to purify the question from all adjuncts which do not necessarily belong to it. Matter has been shown to be composed of elementary constituents, by the compounding of which all its varieties are produced. But, besides the chemical unions which they form, both elementary and compound bodies can unite in another and less intimate way. By the attraction of cohesion gases and vapors aggregate to liquids and solids, without any change of their chemical nature. We do not yet know how the transmission of radiant heat may be effected by the entanglement due to cohesion, and as our object now is to examine the influence of chemical union alone, we shall render our experiments more pure by liberating the atoms and molecules entirely from the bonds of cohesion, and employing them in the gaseous or vaporous form.

"Let us endeavor to obtain a perfectly clear mental image of the problem now before us. Limiting, in the first place, our inquiries to the phenomena of absorption, we have to picture a succession of waves issuing from a radiant source and passing through a gas; some of them striking against the gaseous molecules and yielding up their motion to the latter; others gliding round the molecules, or passing through the inter-molecular spaces without apparent hindrance. The problem before us is to determine whether such free molecules have any power whatever to stop the waves of heat, and if so, whether different molecules possess this power in different degrees.

"The source of waves which I shall choose for these experiments is a plate of copper, against the back of which a steady sheet of flame is permitted to play. On emerging from the copper, the waves, in the first instance, pass through the space devoid of air, and then enter a hollow glass cylinder, three feet long and three inches wide. The two ends of this cylinder are stopped by two plates of rock salt, this being the only solid substance which offers a scarcely sensible obstacle to the passage of the calorific waves. After passing through the tube, the radiant heat falls upon the anterior face of a thermo-electric pile, where it is instantly applied to the generation of an electric current. This current conducted round a magnetic needle deflects it, and the magnitude of the deflection is a measure of the heat falling upon the pile. This famous instrument, and not an ordinary thermometer, is what we shall use in these inquiries, but we shall use it in a somewhat novel way. As long as the two opposite faces of the thermo-electric pile are kept at the same temperature, no matter how high that may be, there is no current generated. The current is a consequence of a *difference* of temperature between the two opposite faces of the pile. Hence, if after the anterior face has received the heat from our radiating source, a second source, which we may call the compensating source, be permitted to radiate against the posterior face, this latter radiation will tend to neutralize the former. When the neutralization is perfect, the magnetic needle connected with the pile is no longer deflected, but points to the zero of the graduated circle over which it hangs.

"And now let us suppose the glass tube, through which pass the waves from the heated plate of copper, to be exhausted by an air-pump, the two sources of heat acting at the same time on the two opposite faces of the pile. Perfectly equal quantities of heat being imparted to the two faces, the needle points to zero. Let the molecules of any gas be now permitted to enter the exhausted tube; if these molecules possess any sensible power of intercepting the calorific waves, the equilibrium previously existing will be destroyed, the compensating source will triumph, and a deflection of the magnetic needle will be the immediate consequence. From the deflections thus produced by different gases, we can readily deduce the relative amounts of wave motion which their molecules intercept.

"In this way the substances mentioned in the following table were examined, a small portion only of each being admitted into the glass tube. The quantity admitted was just sufficient to depress a column of mercury associated with the tube one inch; in other words, the gases were examined at a pressure of one-thirtieth of an atmosphere. The numbers in the table express the relative amounts of wave motion absorbed by the respective gases, the quantity intercepted by atmospheric air being taken as unity.

RADIATION THROUGH GASES.

Name of Gas.	Relative Absorption.
Air	1
Oxygen	1
Nitrogen	1
Hydrogen	1
Carbonic Oxide	750
Carbonic Acid	972
Hydrochloric Acid	1,005
Nitric Oxide	1,590
Nitrous Oxide	1,860
Sulphide of Hydrogen	2,100
Ammonia	5,460
Olefiant Gas	6,030
Sulphurous Acid	6,480

"Every gas in this table is perfectly transparent to light; that is to say, all waves within the limits of the visible spectrum pass through it without obstruction; but for the waves of slower period, emanating from our heated plate of copper, enormous differences of absorptive power are manifested. These differences illustrate in the most unexpected manner the influence of chemical combination. Thus the elementary gases, oxygen, hydrogen, and nitrogen, and the mixture atmospheric air, prove to be practical vacua to the rays of heat; for every ray, or more strictly speaking, for every unit of wave motion, which any one of them is competent to intercept, perfectly transparent ammonia intercepts 5,460 units; olefiant gas, 6,030 units, while sulphurous acid gas absorbs 6,480 units. What becomes of the wave motion thus intercepted? It is applied to the heating of the absorbing gas. Through air, oxygen, hydrogen, and nitrogen, on the contrary, the waves of ether pass without absorption, and these gases are not sensibly changed in temperature by the most powerful calorific rays. The position of nitrous oxide in the foregoing table is worthy of particular notice. In this gas we have the same atoms in a state of chemical union that exist uncombined in the atmosphere; but the absorption of the compound is 1,800 times that of the air."

An enormous fire-proof safe, for the Bank of North America, was recently made by Messrs. Evans & Watson, of Philadelphia, Pa. The safe weighs 20 tuns, and took eleven horses to draw it. It is 8½ feet high, 7½ feet wide, and 3 feet deep, made of chilled and wrought iron and steel.

Adjusting the Compasses of Iron Ships.

The President and Council of the Royal Society, England, have addressed a communication to the Board of Trade on the subject of the magnetism of ships, in which they make the following statements:—

"It is now recognized that every iron ship must have its compasses 'adjusted.' Hitherto two totally different modes of adjustment have been practiced, each of which has its advantages and disadvantages.

"1. The system recommended by a committee of men of science and naval officers, appointed by the Admiralty in 1837, and which has been uniformly followed in the Royal Navy from that time. In this system each ship has a 'standard compass,' distinct from the steering compass, fixed in a position selected, not for the convenience of the steersman, but for the moderate and uniform amount of the deviation at and around it. The ship is navigated solely by that compass. The deviation of that compass on each course is ascertained by the process of 'swinging' the ship; a table of deviation is formed, and the deviations given by the tables are applied as corrections to the courses steered.

"2. The system proposed by the Astronomer Royal in 1839, and which is understood to be generally followed in the mercantile marine. In this system the deviations of the compass are compensated by magnets (and occasionally soft iron). The ship is navigated by the compass so corrected—generally the steering compass, and generally without any tabular correction.

"It would not be right, considering the weight of authority on each side, to pronounce any decided opinion against either of those modes of correction when properly used. The first system has proved in the Royal Navy to be one which can be used without danger. The same cannot be said of the second method as regards the mercantile marine; but the principal danger of the method arises from what is in truth an abuse of the method. It is that, in reliance on the power of correcting any amount of original deviation, however great, the navigating compass is placed in a position in which the original deviations are excessive and vary rapidly, and in which no navigating compass should be placed.

"In merchant ships the most convenient place for the steering compass is generally near the upper end of the stern-post, the rudder-head, the tiller, and the iron spindle of the steering-wheel—all, from their shape and position, powerfully magnetic. The constructor and owner, for the sake of economy, desire that the steering compass should be the navigating compass. The compass adjuster fears that any objection on his part would be considered a confession of incompetence, and that some less scrupulous adjuster would not hesitate to undertake the correction. The correction can only be made by powerful magnets. The compass is then held, as it were, in equilibrium by powerful antagonistic force; and when the changes take place, which, it is known, do take place in all new iron ships, or when any changes take place in the magnets, large errors are introduced, which are the more fatal because the shipmaster is taught to believe that his compass is correct.

"This abuse of the method is one, the temptation to which is unfortunately so strong that it is believed it can only be effectually prevented by prohibiting the use of the steering compass as the navigating compass; or, rather, by requiring that the ship shall have a navigating compass distinct from, and in addition to, the steering compass.

"It is, therefore, recommended that every iron passenger ship should be required to have a standard compass distinct from the steering compass in a selected situation, at a certain distance from all masses of iron; that, whether corrected or not, the original deviations of the standard compass should not, in ordinary cases, exceed a certain limited amount; and that on each occasion of the compass being adjusted, a table of the deviations should be furnished to the master, and returned to the Board of Trade; and if corrected by magnets, a return should be made of the position of the magnets and of every subsequent alteration of their position. Provision may be made for exceptional cases, in which it may be found impracticable to place the standard compass in a position where the original deviation is within the limit, by requiring in such cases, a special certificate from the central authority."

AN INSECT SHOW.

In the month of September of this year there was a novel and exceedingly instructive exhibition at the Palace of Industry in Paris—an exhibition of insects; those that are useful to man, such as the bee and the silkworm, and those that are injurious, as the curculio, the apple moth, the devouring caterpillars, etc. So far as possible, at that season, each insect was exhibited in its several stages—the egg, the larva, the chrysalis, and the moth or butterfly.

We hope to see this idea taken up in this country, and insect exhibitions made a prominent feature at all our agricultural fairs. In nearly every neighborhood, there are naturalists who would be very willing to present such collections, and they would certainly prove exceedingly instructive and attractive to visitors. If arrangements could be made for a lecture at a certain hour each day, describing the habits of the insects, the value and attractiveness of the exhibition would be greatly increased.

The importance of insects, and the importance of studying their habits, are thus forcibly set forth by the Paris *Moniteur:—*

"Noxious insects are to the human race what an invading army is to the territory invaded. We are assailed day and night by three hundred thousand species of insects armed with augers, pincers, and saws, which invade our fields, granaries, barns, and dwellings, and would destroy everything before them were they not prevented. Our vines, trees, grains, and buildings are each the prey of a separate class of destructive insects. Our neighbors are subject to the attacks of twenty-six species of insects belonging to four different orders. During a period of ten years, the vine-growing districts of Macon and Beaujolais, suffered a loss of thirty-four millions of francs through the ravages of these insects. This does not appear so astounding when we reflect upon the prodigious fecundity of insects and their insatiable appetite. A female termite has been known to lay the seemingly incredible number of 86,400 eggs within twenty-four hours, being at the rate of one egg each second, and a single female of the *tenthredo pini*, if allowed to multiply without hindrance, would give birth in the space of ten years to two hundred billions of its species. The plant louse is even still more prolific. The learned, Dr. Ratzburg states that the trunk of a fir tree sometimes affords shelter to 23,000 couples of the *bostrichus typographus*. In 1839, in Saxe-Altenburg, 500 acres of forest land were ravaged by the *liparis monacha*, when upward of twenty millions of insects were destroyed. In 1856, 33,540,000 beetles were collected in the environs of Inedlingburg, Prussia. Between 1813 and 1824, Provence was overwhelmed by such an immense host of traveling crickets that the authorities of Marseilles and Arles offered a reward of fifty centimes per pound for the eggs and twenty-five centimes per pound for the insects themselves, at which rates they expended 20,000 francs for eggs and 25,000 for the insects. In 1837, 38 and 39 the forests in the vicinity of Toulouse were overrun for a space of twenty-five square leagues by the *liparis dis par*. The noise made by the caterpillars in gnawing the leaves is said to have resembled that heard in silkworm nurseries. The *bombyx monacha* has been known to devastate over 200,000 acres in three or four years time. St. Augustin mentions an invasion of crickets in Numidia, whose dead bodies created a pestilence by which 800,000 persons perished. Every year the Laplanders migrate northward until they come to a region cold enough to keep off the *œstrius*, a species of gad-fly, whose buzzing alone is sufficient to strike terror into a whole herd of reindeer. Livingston states that in settling in certain parts of southern Atrica, the first enemy to be ousted is a venemous fly called the *tsete*, which is more dangerous to large cattle than the lion. In South America, settlers have sometimes been obliged to use cannon in order to destroy the gigantic mounds built up by the termite. This insect, improperly styled a white ant, belongs to the same entomological order as our *libellula*.

"This insect creation is so powerful that we are only enabled to restrain it by having allies in its ranks, for fortunately a large number of these little creatures have interests identical with our own, and, consequently, we enjoy their aid. What a reflection upon human pride! our most formidable enemy is not to be found among the lords of the animal kingdom—it is neither the lion, the elephant nor the crocodile, but a diminutive insect, or rather embryonic insects, in the shape of larvæ. We are held in check by a host of larvæ. Agricultural prosperity, and, consequently, all social progress, are involved in the existence of a certain number of insects perpetually hungering after other insects. Twenty-two kinds of coleoptera, neuroptera, diptera, hymenoptera and orthoptera make the *pyrale*, or vine insect, their prey. The larvæ of the calosomus invade caterpillars' nests, pierce through their bodies, and continue to feed upon them, until they can hold no more. The larvæ of the ichneumon fly are hatched in the very body of the caterpillar, where they live until metamorphozed into *nymphæ* or eggs. A certain variety of insect called the *asile* is accustomed to watch almost continually for little butterflies, common flies, and drones, which it seizes on the wing by means of its long feet. Wherever carabes abound they speedily exterminate an insect called the *maus*, the hideous and formidable offspring of the black beetle. It is to our interest to ascertain which classes of insects are useful to man, and these should be protected and increased in number, but our farmers establish no distinction between the insects which ravage our crops and those created by Providence to prey upon and limit the number of the former. Whether useful or noxious, they all suffer the same fate as nocturnal birds of prey and insectivorous birds; muskrats, and moles among mammiferous animals, and snakes and toads among reptiles and amphibious animals. It has been calculated that the preservation of night birds would save annually from twelve to thirteen million bushels of cereals which are now devoured by rats and field mice. It may, in truth, be said that man has an enemy far more dangerous to him than those we have specified—and this enemy is his own ignorance."

A Great Change.

The *Temps*, of Paris, contains a high eulogium on the Washington Cabinet. "On the cessation of the civil war, the American Government had 1,000,000 of troops under arms, perfectly disciplined, and proud of their recent triumphs. A single word from the War Office has sufficed to disperse this mass of military. In less than three months every camp has been cleared—those immense groups of men who, it is said, were lost to the arts of peace, having quietly returned to their homes, and are restored to agriculture, commerce, and industry. There have only been retained a sufficient number of men and officers to complete the work of pacification and consolidate order in the South, which is struggling with the difficulties inseparable from a state of transition from slavery to the institutions of a free country. Having disbanded its troops, the American Government not only sells its locomotives, steam-engines, horses, and beasts of burden, but its whole war equipments. An advertisement published in Philadelphia, states that there will be an auction of cannon, bombs, pistols, swords, powder, shot, etc., while another announces the public sale of wharf-boats, transports, etc." Other governments leave their cannon and war accouterments to rust in their arsenals, but the sharper practice of the United States has promptly converted these useless materials into ready money, a system which the *Temps* strongly recommends to the practical statesmen of Europe, and especially to the apostles of political economy.

Descent Into a Mine.

The Gould & Curry Mine, has several miles' length of tunnels and shafts, and it is a full half day's journey to travel through it entirely.

We entered this mine through a long tunnel, that strikes the vein several hundred feet below the surface. There were half a dozen of us in the procession, each with a lighted candle, which would go out under the outgoing draft, and so we soon contented ourselves with groping along in the dim, cavernous light. It seemed a very long journey, and the nerves had to brace themselves. The most stolid person, stranger to such experience, will hardly fail to find his heart beating a little quicker as he goes into these far-away, narrow recesses in the bowels of the earth. I never failed to remember the principle that "nature abhors a vacuum," and to wonder if she wouldn't take the present occasion to close up this little one that I was in. At last we reached the scene of the ore and the work after it; and among these we clambered and wandered about, down shafts to this or that level, and then out on the tunnels through the vein in both directions; up again by narrow, pokerish ladders to a higher set of chambers, in and out, up and down, till we were lost in amazing confusion. Here was, indeed, a city of streets and population far under the surface of the earth. Many of the chambers or streets were deserted; in others we found little coteries of miners, pecking away at the hard rock, and loading up cars of the ore, that were sent out by the tunnels, and up by the shafts to the surface above. Here, too, was a building in a wide hall under ground, and steam engine to help on the work. Some of the chambers had closed in after being worked out of ore; others have been filled up to prevent caving in and cause great disaster overhead; but many of the open passages were stayed or braced open still with huge frame-work of timber; more lumber, indeed, as I have told you, I believe, is used for this purpose in this single mine than has been put into all the buildings of Virginia City itself, with its 10,000 to 15,000 inhabitants. And in many of the passages such is the outward pressure into the vacuum, that these timbers, as big as a man's body, are bent and splintered almost in two. Great pine sticks, eighteen inches square, were thus bent like a bow, or yawned with gaping splinters; and the spaces left in some places for us to go through, were in this way reduced so small, that we almost had to craw to get along.

Do you wonder that we began to grow weary, and thought we had seen enough? Beside, the mine was oppressively hot and close; the mercury was up to 100 degrees and more, and the sweat poured from us like water. One of our party grew faint and feeble, and we voted to take the nearest way out. This happened to be the most perilous and trying, but we did not realize that, and our miner guide, unsensitive from experience, did not think of it. So he started us into a long shaft, running straight up and down for several hundreds of feet, dark and damp as night, with no breaks or landing-places, and set us going one after another, up a perpendicular ladder fastened to its side. We only took in a sense of the thing after we had got started; each must carry his lighted candle, hold on and creep ahead; a single misstep by any one, the fainting of our invalid or of any of us, all weary and unstrung, would not only have plunged that one headlong down the long fatal flight, to become a very Mantilean cold body at the bottom, but would have swept everybody below him on the ladder, like a row of bricks, to the same destination and destruction. There was, you may well believe, a stern summoning of all remaining strength and nerves, a close, firm grip on the rounds of the ladder, a silent, grave procession, much and rapid thought, and a very long breath and a very fervent, if voiceless, prayer when we got to the daylight and the top. Our part of the shaft and the ladder was about 150 feet; it seemed very long; and we were content to call our day's work done when it was over. Brains won the victory over body; but both were weary enough at the end.

But if I prolong this story any further you will almost wish I had never got out of that shaft.—*Editorial Correspondence of the Springfield Republican.*

FROM the report of the eighth census it appears there are seven establishments in the United States for copper rolling. These establishments employ 413 hands, and have a capital invested of $2,470,000. The cost of material consumed by them is valued at $2,537,000, the cost of labor at $157,080, and the annual value of products for the year ending 1st of June, $3,198,768.

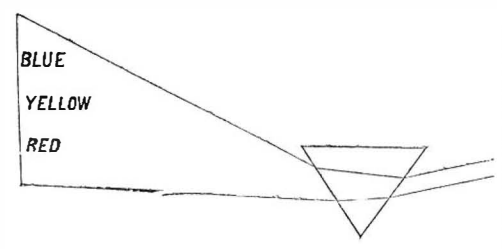
A WOOLEN factory on a magnificent scale is to be erected in Chicago, with a working capital of a million of dollars, and a capacity which will make it equal to a competition with any other mill in the country.

A MINE of black lead, or plumbago, has recently been discovered in the town of Richmond, Me. Experts pronounce the mine one of the best in the United States.

COLORS.

There are three simple colors—red, yellow and blue—and, by a mixture of these, all others are made. The way these are mingled to form the seven colors of the rainbow, is best seen by observing their position in the solar spectrum. When light passes from one medium to another of different density, it is always bent or refracted from its straight course, some of the rays being refracted more than others. Of the primitive colors, the red ray is refracted the least, yellow next, and blue the most. By passing the light through a triangular prism, it is twice refracted in the same direction, and as the more refrangible rays are, of course, bent the most at each refraction, the colors are in this way as widely separated as they can be by any process, though they are not completely separated even by this plan, for the different colors lap over each other on their borders. It is by this lapping over and consequent intermingling, that the other four colors of the spectrum are formed. The position in the spectrum of the three primitive colors is illustrated in the annexed diagram, and a glance at this will show which of them mingle at their boundaries, and what, consequently, should be the position of the secondary colors of the spectrum resulting from the mixture.

Orange is a mixture of red and yellow, and the position of orange in the spectrum is between the red and yellow. Green is a mixture of yellow and blue, and the position of green is between the yellow and blue. Indigo and violet are mixtures of blue and red, and the position of these is beyond the blue. This is the most curious and mysterious thing in the spectrum; while the red are the least refrangible rays of light in the sunbeam, a portion of them are found beyond the blue; indigo and violet are formed as they would be if the spectrum were bent in a circle, and blue were thus made to touch red at the opposite end of the spectrum. Most observers now recognize a third color resulting from the mixture of red and blue, which they call lavender; the position of this is beyond the violet.



Beside the seven or eight colors of the spectrum, a great many others are found in nature and art, and all these are seen on examination to be mixtures in various proportions of red, yellow and blue; scarlet is a mixture of red and yellow, with a larger proportion of red than in orange; by adding blue to red in increasing proportions we have, first, pink, then crimson, then purple, then indigo, while violet and lavender seem to be tainter shades of the mixture. By looking at the trees of a forest, we see that there are not merely several shades of green, but innumerable colors of green, resulting from the different proportions in which blue and yellow are mingled.

The endless variety of colors with fancy names, invented by traders who sell dry goods, or women who purchase them, will be seen on examination to result from mingling in different proportions of red, yellow and blue. Finally, white results from blending the three primitive colors in the exact proportions in which they occur in the sunbeam, while pure black is simply the absence of any light whatever.

MUSICAL cigar stands imported from Paris are now for sale. A knob at the top of the octagon case opens eight doors, displaying the cigars, and, at the the same time, sets a music box running. But it is necessary for the owner to keep good cigars in it, if he wants to have it play melodiously.

MEN of ability and enterprise are often severe taskmasters, from mistakingly requiring from their employees a measure of energy and capacity equal to their own.

NEWHALL'S LAMP ATTACHMENT

This engraving represents a device for increasing or diminishing the flame of a kerosene lamp instantaneously. It is so contrived that, by touching a lever, a cap or hood is thrown over the wick so as to diminish the flame and the light given out from it.

Fig. 1 represents a burner with its cone or deflector

turned back, in order to exhibit the attachment placed on the wick tube as for a night light. To increase the light, press upward on the wire lever which will open the attachment, as shown in Fig. 2, and uncover the wick. Fig. 2 represents a rear view of the attachment, showing the clasp with its draft holes, the hinged cap, thrown back in the position for a full light, with the aperture in the top of the same, and the wire lever for operating the hood from the outside of the burner. This attachment is a simple, cheap, and substantial auxiliary to the kerosene lamp, and can be instantly placed on any style of burner. It is not complicated or liable to get out of order, consisting of but three pieces of brass firmly fastened together in a neat and tasty form. Those who have given it a trial declare they could not now dispense with it.

This invention was patented Dec. 20, 1864, by W. P. Newhall. For further information apply to Reuben H. Plass, the assignee in full, and manufacturer, No. 110 East 29th street, New York. [See advertisement in another column.

THE DOUBLE MAGIC LANTERN.

To sit before a large sheet of white canvas, and to see suddenly come forth upon it a distinct and beautiful picture of the *Alhambra*, with all the delicate tracery of the moresque architecture presented in minute detail; to see this picture fade away as suddenly as it came, and its place on the canvas occupied by the Laocoon group, standing out with the roundness of marble itself; to see thus one famous work of art follow another on the same piece of canvas, seems indeed like magic, and it is not strange that those who first witnessed these effects should name the instrument by which they are produced the *magic* lantern. The simplicity and cheapness of this instrument have brought it into common use, and like "The morning and eve with their pomp of hues," and all other things with which we are familiar, it ceases to excite our wonder.

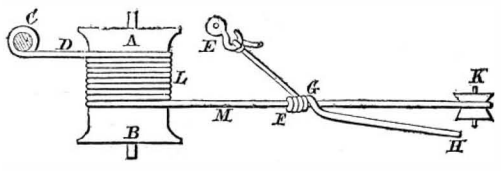
It is doubtless understood by most of our readers that a magic lantern is simply a box containing a very bright light, the rays of which are passed through a small transparent picture, and then dispersed by a lens so as to throw a magnified image of the picture upon a canvas; a parabolic mirror is placed behind the light to throw the rays forward in parallel lines, and they are condensed by a convex lens before passing through the picture. The calcium light is generally employed.

After people had become familiar with the single magic lantern, a new sensation was created by directing two of the instruments upon the same canvas, each provided with its appropriate picture. For instance, one would have a picture of a church empty, and the other a picture of the same church filled with people. The light would be first sent through the picture of the empty church, and then gradually turned off from this, and, at the same time, gradually turned on through the other. The spectator would consequently see the empty church before him slowly filling up with people, till the whole congregation had silently came forth upon the canvas. This impressive exhibition was shown through all our principal cities under the name of dissolving views.

Photographic pictures are peculiarly adapted to the magic lantern, as, from their accuracy, they bear magnifying to any extent without distortion. A double magic lantern is now being exhibited by M. Nelson, in the church, corner of Grand and Crosby streets, in this city. The lantern is placed in the gallery at one end of the church, and the canvas is hung upon the wall behind the pulpit, at the opposite end, so that the picture traverses the length of the church over the heads of the spectators. Mr. Nelson has several hundred well-selected views, and makes an agreeable and instructive exhibition.

How the Atlantic Cable was Broken.

A statement of very great importance has been laid before us on excellent authority, well supported by collateral evidence. Our readers will, of course, understand that we in no way pledge ourselves for its strict accuracy. In order that the matter may be fully comprehended, it will be necessary to consider the method of picking up the cable actually adopted. The accompanying diagram will give a clear idea of the apparatus:—A B is the drum of the picking-up machinery, and, with each revolution of this, the coil approached one diameter of the cable nearer to the extremity of the drum, at B, and receded at the same rate from the extremity, A, as it unwound itself on that side; consequently, the incoming cable never kept its place on the center of the drum, at L, in a line with the wheel over the bows, at K. After the cable came out from the picking-up machinery, at D, it was, for safety, passed once round the foot of one of the large cranes on board the *Great Eastern*, at C. The cable was next finally coiled away on deck, in a very damaged state, although it came in over the bows in very good condition. At short intervals of about four minutes it was found necessary to bring the incoming line of cable to the center of the drum, at L. To do this what is known to sailors as a "rope stopper," with a "rolling hitch," was used, to hold the cable safely, and prevent its running out too far. One end of the rope was tightly secured to an iron hook, E, on the deck of the vessel; it was then passed round the cable twice, at F, two other turns being given, at G, and the other end of the rope held forward parallel with the cable, or nearly so, at H. Oc



casionally a sailor might hold the rope and cable with his hand at G. Every time it was necessary to bring the incoming line of cable to the center of the drum, at L, the cable was slacked for a few inches at the crane, C, and the end, D, being thus loosened, the outer coil of cable, M, instantly flew to the center of the drum with a jerk that made the whole of the machinery shiver at the same time the remainder of the coils slipped over the surface of the drum nearer to the extremity, at A. This plan was pursued every time it was necessary to haul in the cable; but once, the rope having worn smooth, so that it would no longer hold the cable securely while the jerking operations were going on, the officer in charge substituted a chain for the rope, which would never have been done by any practical sailor to secure a hawser of any value. The first time the cable was slackened after this chain was put around it, the cable finally parted and sank, and an eye-witness attributes the parting to the use of the chain, and not to abrasion against the hawse-hole in the stem. With such conflicting testimony, with no independent witness, and the solitary reporter—who could not be everywhere at once—in the cabin at the time of the breakage, there is reason once more to ask the company for the engineer's report, which should not be withheld from the public or the shareholders.—*London Engineer.*

AT Amiano, in Italy, petroleum has been extracted for two hundred years. The supplies from this source were used for lighting the cities of Parma and Genoa.

IT has been estimated that every horse employed in farming consumes one-sixth of what he cultivates.

FARMERS' CLUB.

The Farmers' Club of the American Institute held its regular weekly meeting at its rooms at the Cooper Institute, on Tuesday afternoon, Oct. 31st, the President, N. C. Ely, Esq., in the chair.

ENGLISH AND AMERICAN HOPS.

Mr. Collins, of Otsego County, N. Y., being called on to give an account of his recent visit to the hop fields of England, said that hops are raised only in the eastern portions of England, the climate of the western parts being too bleak and rainy. He called on a London firm of hop growers who have a large estate at Maidstone, and they told him that they had begun to adopt the American system of training; last year they tried five acres and liked it so well that this year they had ninety-five acres trained on the system. They requested Mr. Collins to go to Maidstone and see if the plan was correctly carried out.

Mr. Austin inquired, what is the American system.

Mr. Collins replied that he gave a full description of it to the Club last winter. The old plan of training hops was on upright poles twenty feet high; but within a few years the hop growers of Otsego county have practiced the plan of setting a stake in each hill seven and a half feet high, and leading strings from the top of each stake to the top of the next, the vines growing horizontally along these strings. This enables the hops to be picked without cutting down the vines—the cutting causing the vines to bleed, which injures the root.

Mr. Collins said that the hop fields in England, like all other fields there, are cultivated far more highly and thoroughly than with us, but, notwithstanding this, he was suprised to find that the yield was much less than in this country. This he attributed to the difference in the climate—that of England being more cloudy and rainy. Alsop, and other large brewers, told him that American hops were much superior in quality to the English. The average yield of the hops in England for twenty years, as shown by the very accurate excise returns, was 6 cwt. 3 qrs. 4 lbs. to the acre. Mr. Collins thought that the yield in this country could not average less than 800 or 900 lbs. to the acre.

GAS-HOUSE LIME FOR MANURE.

Mr. Robinson read an inquiry in relation to the value of gas-house lime for manure, and replied that if the inquirer had Canada thistles, or any thing else that he wanted to kill, he had better cover it with gas-house lime.

Mr. Quinn did not agree with this opinion. He had used, in the last ten years, more than 500 bushels of gas-house lime, and if previously exposed to the air, and applied in proper quantities, say twelve bushels to the acre, he thought it a very valuable manure.

[One step in the process of purifying illuminating gas is to pass it through thin strata of quicklime. The lime absorbs several impurities, but the principal one is sulphureted hydrogen—a chemical compound of sulphur and hydrogen. When this is brought in contact with lime, both substances undergo decomposition, the metal calcium of the lime combining with the sulphur and forming sulphide of calcium. On exposure to the air, both the sulphur and the calcium absorb oxygen—the sulphur forming sulphuric acid, the calcium forming lime, and the compound becoming sulphate of lime, which is the same as plaster of paris, the well known fertilizer. Gas-house lime should, therefore, be spread thinly upon the surface, where it may be acted upon by the atmosphere. —Eds. Sci. Am.

EFFECT OF PUMPKIN SEED ON DUCKS.

Mr. Robinson, in reply to a correspondent, said that it is generally supposed that pumpkin seed, given to cows, increases the secretion of urine and diminishes that of milk.

Dr. Trimble remarked that the effect of pumpkin seed on ducks is very extraordinary. He had watched them feeding repeatedly, and the effect is a sudden paralysis. The duck on attempting to walk away falls down and is unable to get up.

One of the buoys left by the *Great Eastern* to mark where the Atlantic cable parted, was lately seen by a vessel in longitude 34° 48′, over 500 miles east of the point where it was planted.

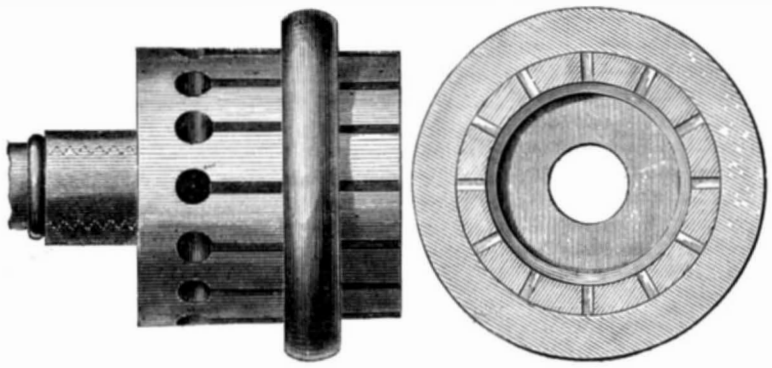
Correspondence

Smiling, and Sandpaper Finish.

Messrs. Editors:—I, too, could not "repress a smile," as I read M. L. B.'s criticism, in your number of Oct. 21st, on the description of my "solder chuck," which you deemed worth insertion in your number of Sept. 30th.

Your correspondent asserts that I use sandpaper as a "finisher." I had no such idea, and my words must be greatly distorted to bear any such interpretation.

I commenced the article alluded to by stating that it was difficult to turn a disk of sheet metal, and mill its edge on the lathe by the usual process; and I then described my plan of doing it. I added—"To disconnect the finished disk from the washer,



you heat it over the lamp, and separate the two while hot, rub off most of the tin with a piece of newspaper, and when cold, the rest of it with sand paper."

The operation of cutting out the disk and of milling it, was "finished," but I certainly had no intention of saying that nothing else was to be done with the disk; this was an incipient step, and, had your correspondent read the next paragraph, he would have seen an instance of employing two metal disks, to make an ornamental match box. I send herewith a sealing-wax impression of the top and bottom of that box, for your correspondent, which will relieve his mind. He will hardly suppose one who uses eccentric chucks, a[redacted] cutters. to form loops, finishes his w[redacted]paper alone.

To clinch his conc[redacted] the writer of the article is no workman, M. L. B. asserts "he cannot do it in the lathe, for he has no means of holding it;" meaning, that a disk cut out of sheet brass cannot be sandpapered and finished in the lathe.

Here again our critic is at fault; nothing is easier than to hold the disk, when once cut out in the lathe, enabling the workman to sandpaper, polish, and ornament it. The chuck employed must be familiar to almost every turner who reads the Scientific American.

I have in my shop more than one hundred of such chucks; one series of them can hold disks of metal, beginning with five inches diameter, decreasing by one-twentieth of an inch down to one quarter of an inch diameter. They are called split or spring chucks, with rings. They are made of box-wood, brass, or steel. The chuck is turned hollow, the outside slightly tapering toward its end; holes are drilled through the chuck, near the female screw, and cuts are sawed longitudinally, to meet those holes, as shown in the engraving; a brass or iron ring, slightly tapering, slips on the outside of the chuck, and draws the jaws together. When the face of a very thin disk is required to be turned, you place a smaller disk behind it, resting against a shoulder in the jaws, and then push up the ring, until the disk is held as tight as in a vise.

Sandpaper is not the only abrasive material I use in finishing my work. Emery, sand, pumice stone, hematite, tripoli, Dutch reed, oil-stone powder, cuttle-fish, crocus, Venetian lime, chalk and tin putty, and, for metals, finished by steel and agate burnishers, will produce a polished surface on ivory, hard woods, brass, steel, and iron, equal to that which M. L. B.'s friends, "the English mechanics," ask at his hands; but, after all, a magnifying glass will show that even the polish on a telescope speculum consists of an infinite number of fine scratches. There are degrees of abrasive power in different sands, and the last step at the Paris mint, before bronzing their finest medals, is to "finish" them with fine sand and water.

E. J. W.

Lenox, Mass.

Negative Slip.

Messrs. Editors:—Referring to the articles copied into your journal from the London *Times* and other English papers on the peculiar development of what the writers term "negative slip" in the late trials of the new iron-clad British ship of war, *Bellerophon*, I think there is but one feasible, and, I believe it will be found, correct explanation of the phenomenon. It appears that this ship outruns her screw by about one and a half nautical miles an hour; that is, while the vessel herself is making thirteen and three-quarter knots—nearly sixteen English miles—an hour, the screw blades travel only twelve and a quarter. This difference, probably for want of a better term, is called "negative slip."

Now, the very idea of negative slip is a fallacy, and the peculiarity must be accounted for in some other way. We must look for it, I think, in the replacement of the water in the ship's wake. Those who have closely investigated the law of resistance, and the subject of displacement of the water by the ship's entrance, have, no doubt, observed that the displaced water is raised above the surrounding surface in the shape of a series of swells, which, in a smooth sea or river, are sent off to a great distance on each side. The replacement must, therefore, be effected largely by the water falling into the wake from behind. It, in fact, flows in from the sides and stem in converging currents, striking directly against the screw blades. These currents, so meeting the screw, are more or less strong, according to the velocity of the ship. The greater the so-called negative slip, the stronger the common current. This "set" of the replacing water in the direction of the ship's course, if she is going fourteen knots, and has a pretty full run, as most screw ships have, I estimate to be three and a half to four knots an hour. If we add this to the distance traveled per hour by the *Bellerophon's* screw, we have what is equal to sixteen knots, or two and a half knots of positive slip.

In high speed screws, which necessarily have fine lines, there will be a diminution of this peculiarity, for the reason that the replacement takes place more from the sides than from abaft the screw.

H. B. Willson.

New York, Oct. 30, 1865.

[Mr. Willson is the author of "Science of Shipbuilding," published in London in 1863. This work contains a great deal interesting to persons engaged in the business, and should be carefully read.—Eds.

Effect of the Sun on Fire.

Messrs. Editors:—Will you be kind enough to explain in your paper the reason why a heated stove loses much of its heat when the bright sun is shining upon it? The sun seems to deaden the air at the draft of the stove so as to prevent it from drawing well. It is a well-known fact that flat irons standing in the sun upon the stove will not become hot enough to use with much effect. I have been a constant reader of your valuable journal for several years, but I do not remember to have seen anything respecting this phenomenon.

John N. Clarke.

Chicago, Ill., Oct. 21, 1865.

[We strongly suspect that this is one of the numerous cases of careless observation. Has our correspondent measured the time required to heat a flat iron both when the sun was shining upon it and when it was in the shade? Or has he made any other experiment which demonstrates to a skeptical mind that the light of the sun diminishes the activity of a fire? Is not the effect merely physiological, the

bright light of the sun making the light of the fire appear dim? In short, is it not all in your eye?—Eds.

New Blasting Powder---Mill Bugs.

MESSRS. EDITORS:—My father, who is in England, thinks I might contribute this little article on blasting powder, to what he truly styles your highly "interesting paper." He has successfully used it in blasting hard quartz, brown hematite, and iron rock; its superiority consists in being at least three times more powerful than the best blasting powder, comparative freedom from smoke and smell, which is a most important consideration in most mines, and the fact that the two compounds, viz., three of chlorate of potash to one of powdered Aleppo galls, can be kept separate till used, when they must be thoroughly mixed. Economy in price was also in its favor at the time he used it; he managed to obtain the ingredients at wholesale price. In blasting it should be used in cartridges, and a little more caution observed in ramming down the charge at first, as percussion explodes it; though, when the tamping is once laid on the charge with ordinary care, he found no danger. With a rifle no cap is needed if a portion shows itself on the nipple; the hammer will dispatch the ball. I tried one-third of a charge in my rifle, and it dispatched the ball, the nipple also. I thought it had the fault of gun cotton, that of being much too sudden for a rifle. I also tried it in rock without cartridges; it did its work finely.

I have noticed, of late, frequent inquiries as to the best plan to keep mill bugs from flour-bolting cloth. I am a miller, and this is my idea; I think the inside of a bolting chest should be so constructed that no flour can remain long enough to get musty, or get flour worms in it. The gathering boards should be steep, and the conveyer should be made to run nicely in its box; more attention should be paid to finishing a chest of bolts inside than outside; the chest should also be ventilated, so that if the meal is not properly ventilated the steam may escape. The meal had better go through a sifter or be shaken before going into the bolts, to take out barrel nails, elevator caps, or whatever else might accidentally slip in. If these little precautions were attended to it would amply repay. WM. HILL.

Noblesville, Ind., Oct. 23, 1865.

Negative Slip.

MESSRS. EDITORS:—I notice in the SCIENTIFIC AMERICAN of Oct. 21st, page 257, an article headed "Negative Slip," noticed in the trial of the English iron clad ship *Bellerophon*. In explanation of the phenomenon stated, I have thought that it may proceed from the following causes, viz.:—

The average revolutions that the engines make are stated to be less than sixty. Now these revolutions being very irregular, must, undoubtedly, travel a partion of each revolution at a much greater velocity than sixty, and at other parts fall far short of sixty; but the power of the screws, being more than equal to the resistance of the vessel, she is forced through the water at a rate equal to the travel of the screw when at its greatest velocity, and the great weight of the ship having obtained the same speed, moves with a momentum and power sufficient to overcome the resistance offered by the screws at the slower point of its revolution—the resistance being greatly lessened by the water in which the screw is submerged, it being drawn along by its adhesion to the stern of the ship at a speed greater than the average revolutions would give, until the accelerated motion of the screw would again be brought to bear. E.

Bangor Me., Oct. 24, 1865.

Green and Red Lights on Carriages.

MESSRS. EDITORS:—I am a constant reader of your valuable publication, and have a suggestion to make in reference to lighting the highways on the land, as on the sea, by colored lights. It will not be necessary to have a center or "mast-head" light, only a red light on the left-hand side, and a green light on the right-hand side of your carriage, although the rule is for every one to keep to the right in this country. In dark nights, it will be very convenient, if this rule be adopted, to know the relative position of the vehicles you meet. One advantage will be that, if the rule be adopted on shore, it will be useful to all who go to sea, as a reminder that "port" side is red, and "starboard" is green. NAUTICUS.

Boston, Oct. 26, 1865.

The Vortex Problem.

MESSRS. EDITORS:—In a late number of your paper an inquiry was made why a vortex was formed over the outlet of an orifice pipe; as, for instance, in a bath tub, when the water is running out. If the water be first started, the explanation will be on the same principle that a ball and string will, if started, wind itself up upon the hand; the ball being attached to the string will, as the string winds up, get nearer the hand, and, consequently, will have less far to go to make one revolution, and thus the momentum, though perhaps not great enough to carry it around in the great circle, is still sufficient to make it revolve in the smaller one. Therefore, as the string is continually winding up, and the ball continually nearing the hand, it will, if the resistance of the air is not too great, continue to revolve until the string is wound up. Now, in the case of the water, each particle of it will represent the ball, the force of the water rushing toward the outlet will be the string, and, the water running out, and thus causing the particles to come nearer the center at every revolution, will represent the winding-up process. Thus, we see this case is analogous to the preceding, and the same reason that will apply to one will apply to the other. I suppose that some slight motion existing among the particles of the water, united to the motion produced by the outlet, causes the vortex to begin, and, once begun, it will continue until the water is exhausted. Such motion could either previously exist, or might be produced by the power of the vessel, which would cause the water, in running to the outlet, to assume a certain direction. H. A. R.

Troy, N. Y., Oct,, 1865.

Important Discovery in Painting.

[For the Scientific American.]

Mr. James Trippe, of Orange, N. J., has discovered, after a long series of experiments, an agent, which, when mixed with the white oxide of zinc renders it *elastic* or *flexible* as a paint.

As all intelligent painters are aware, the common oxide of zinc is objectionable for outside painting, inasmuch as, by hardening, it peels off in a short time after being exposed to the weather. It is also objectionable for painting ships and steamboats, for a similar reason.

The great objection [redacted] that it oxidizes and washes off in a few [redacted] being applied; it is also expensive and [redacted]

The "elastic zinc," as the patentee calls his improvement, entirely obviates all of the above objections. It will not become so hard as to fall off like common zinc; neither will it harden under water, or oxidize and wash off like lead. When applied to wood, iron, tin, or any similar substance, it produces a beautiful surface, which will withstand the action of the elements much longer than either lead or common zinc. It is the most durable white paint in use. The price is twenty dollars per tun less than lead, and it will cover fifty per cent more surface.

R.

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:—

Machine for Crushing Quartz, Etc.—This invention relates to a machine for crushing quartz and other hard substances, in which two segments are employed with smooth or corrugated faces, said segments being hung on rock shafts or gudgeons, and connected at or near their peripheries to a lever or other suitable device, in such a manner that, by the action of said lever or other device, a very powerful oscillating motion can be imparted to the segments, and quartz or other materials placed between their faces are crushed with ease and facility. If a lever is used to impart to the segments the desired motion, the crushing power can be increased to any desired extent, and the motion of the segment can be easily adapted to the material to be crushed. Andrew Buchanan, of Brooklyn, N. Y., is the inventor.

Box for Shafting, Etc.—This invention consists, first, in the application of a raised or sleeve bearing to a shaft, instead of turning the shaft down, as usual, said sleeve bearing being made of composition, steel, gun metal, or other suitable material, in such a manner that the shaft, instead of being weakened by the journal, is rather strengthened, and that the bearing, when worn out, can be easily replaced without injuring the shaft; it consists, further, in combining with the sleeve bearing a perforated box, inclosed in an outer shell, intended to hold oil or other lubricating material, in such a manner that a portion of the circumference of the sleeve bearing is continually in a reservoir of oil or other lubricating substance; it consists, finally, in the arrangement of a ball joint on the inner box, and also on the shell, in such a manner that the box or shell is free to accommodate itself to the bearing of the shaft, and entire freedom of motion is effected. John Sparrow, Portland, Me., is the inventor.

Harrow.—This invention relates to a new and improved harrow, of that class which is allowed to rotate when coming in contact with any obstruction, and, thereby allowed to clear or free themselves. The invention consists in having a wheel attached to the rear end of the draught pole to bear against a wheel attached permanently to the harrow, said wheel being provided with a central spindle, which passes through an oblong slot in the draught pole, whereby the harrow, under the draft movement, is left free to rotate and clear itself from obstructions. J. D. Parrot, Morristown, N. J., is the inventor.

Steam Valve.—This invention relates to a steam valve, which is divided into four distinct parts, two of which are intended to control the supply of steam to the cylinder and two the exhaust, the valve chest being divided into two distinct compartments, one of which contains the supply and the other the exhaust valves. The supply valves are secured each to a distinct and separate valve stem, one of which is hollow and bored out to admit the end of the other stem. The two stems are connected by a spring, and the hollow stem is made with a large loop, through which passes a revolving shaft carrying a cam, which acts alternately on the end of the solid stem and then on a projection on the inside of the loop of the hollow stem, in such a manner that by the combined action of the cam and of the spring which connects the two stems the two supply valves are alternately opened and then suddenly closed, so as to cut off the steam at the desired point. By making the cam movable on the revolving shaft and connecting it to the governor, the cut-off is rendered self-adjusting. The two exhaust valves are connected to a common stem, which is also provided with a loop to straddle a cam mounted on the revolving shaft in such a manner that by the action of said cam and loop the valves are held firmly in the desired position, and suddenly opened and closed at the desired intervals. George Thackray, of Mystic Bridge, Conn., is the inventor.

THE JEWELRY MANUFACTURED AT BIRMINGHAM, ENGLAND.

Perhaps no branch of trade better exemplifies the nature of the work carried on in Birmingham than the ornamental jewelers, by which I mean both the real and the sham work, for a great deal of each kind is made. I will not pretend to say which is most largely manufactured; very probably it may be the spurious, but then, let it be remembered, the Birmingham men do not for a moment attempt to palm off their imitation gems and gilt settings as jewels of the first water and pure gold. They simply make these things to get a fair profit, and even in those extreme cases which occurred some years ago, when it was found that some base Turkish coin had been here, the profit was upon the piastres, considered as so many gross of buttons, and the rogues were the subjects of his Ottoman Majesty, who passed the false money. The point is, as I think, that if there are people in the world who will buy a twopenny razor, a sixpenny brooch, or a seven and sixpenny musket, or any other mortal thing that takes a name without having the qualities of the genuine article, Birmingham is ready to supply the demand. There may be those who stamp their razors as "best cast steel," and ticket their jewelry as "all real gold," but these are a style of traders that abound in London quite as much as in Birmingham. From some considerable acquaintance with the workshops and the

masters of the place, I should not hesitate to say that they are as straightforward and fair as any manufacturers in the world.

In the large manufacturing jeweler's establishment of Messrs. T. & J. Bragg, which is one of the principal sights of the kind shown to the members of the Association, and where there are usually from thirty to forty apprentices in the workshops, none are accepted without signing an indenture by which they are bound to attend the School of Design, and without they are able to show some amount of skill in drawing. This is demanded as a qualification for good handiwork in all the artisans, but a special artist is constantly employed here in making new designs, and I recognized many which were familiar to me in the shop windows of Regent street and Bond street—one in particular was the design for the brooch presented to the Princess of Wales by the ladies and gentlemen of Wales, which was exhibited at the house of one of the great jewelers in London.

All jewelry of the best class has risen in price of late years, and this is due, not, of course, to the gold used, but to the increased amount of labor bestowed upon the work. It is true, at the same time, however, that good gems have immensely increased in value; an amethyst, which, in the Birmingham trade was once worth about 30s. is now worth £80. Pearls and turquoise have also increased much in value since the fashion for setting them in bosses has come into vogue. The jewelers of Birmingham often buy their own jewels, traveling all over the world for the purpose—their pearls and amethysts perhaps at Ceylon, their turquoise at Alexandria. Their cameos are purchased largely at Rome and Naples, where also they buy coral in large quantities. I do not mean to say that the Birmingham jewelers have the enterprise to do this to get possession of the finest jewels—this is not their object, but, rather, to obtain the largest quantity at the lowest price; their trade, as I understand it, as a rule, requiring jewels of moderate value. The more costly gems, however, are constantly sent to Birmingham to be set, and, I saw to-day, at Messrs. Bragg's, several very splendid brooches set with brilliants and enameled, the value of which in their warehouse, would be from four to seven hundred pounds. But necessarily where a stock of 7,000 cravat pins is the average on hand the gems cannot be of the first water. These, however, as indeed is to be understood of all the objects made at this factory, are not imitation jewelry; the articles may vary in quality, but none are sham; that is to say, if a very pale amethyst is used for a brooch or pin, and given the look of a fine purple by placing a piece of metal foil of that color behind it in the setting, the price tells at once what it is.

It may be interesting to know how in working with these precious materials of gold and gems the manufacturer protects himself both against loss by theft and loss by waste. Of course gold in the hands of a workman is dealt with as if it were a *corpus vile*—literally "vile body"—so far as hammering, filing, chiseling, firing, and shaping it into any ornamental form a very tough metal can be got to assume. It is startling to see it lying about on the benches in unworthy looking sheets and plates, no brighter than the dullest brass; but there is a close check kept upon theft or waste. Every workman has an account kept against him in a book, and in this is set down the precise weight of gold he asks for in the work set him, and of which he is usually furnished with a drawing traced from the artist's designs or a pattern in metal. The weight of the gold is taken in shot, not in any regular weights; and on one side of the foreman's window, whose duty it is, there is a nest of drawers, each one labeled with the name of a workman. These all contain, more or less, shot of all sizes, so as to enable the weigher to take the exact weight to a part of a grain, and stand, in fact, as the debtor side of the account against the workman; when his work has progressed sufficently he brings it to be weighed against his shot, and the balance is struck, he being allowed a proportion of 1-20th for chips or waste. This, however, would be a very serious loss to the manufacturer if he were not to collect every atom of filings and cuttings by placing below the bench at which every man works a leather apron into which the man brushes with a hare's foot all the chips and filings. These are easily freed from dust and refuse by burning, and the gold melted again for use. There is seldom, however, any irregularity among the accounts, as the workmen are a very superior set of men, well educated, and disposed to cultivate themselves in every way, speaking frequently French and German, though English natives, and many of them taking their holiday every year with a trip to the Continent. The pay of these superior artisans, however, is not so high as might be expected—it is rarely above £3 a week, and seldom lower than £2. I have heard of glass blowers in Birmingham getting as much as £5 a week, if they choose to work every day, which they never do, for St. Monday is most religiously worshiped in Birmingham, and often another day or two in the week is canonized by these first-rate hands.

It is extremely interesting to see the very same process of enameling on metal work as those known to have been followed by the ancients, and even the identical drill is used by these jewelers that may be seen in the museums as a relic of the arts of the Egyptians. All the work of setting bosses with turquoise and pearls is done by this, the jewel being fixed in the little cell drilled for it by tapping the metal gently all round it, and so folding it in upon it. Diamonds are all set in this way in a layer of silver soldered on to the gold, and then cut away where required. Messrs. Bragg are probably the largest enamelers in jewelry in the kingdom, and their work is quite equal in quality to the best done by the French workers in enamel; and I have no doubt whatever that the artist workmen that I saw here at their work could do anything that has been accomplished with so much succes by M. Rudolfa and his clever workmen in imitation and reproducing the mediæval ornaments of this kind.

Indeed, we must no longer think of Birmingham jewelry as "all laquered shams" after the excellent specimens of gold work and enamel with fine jewels to be seen here. I should be more disposed to say, from what I have seen here, that the "great houses" in the trade find it very much to their advantage to keep up the term "Brummagem shams;" it enables them to buy upom this bad reputation and sell upon the merits and good qualities of the real Birmingham article.

But it remains to say one other thing in defense of Birmingham from the old calumny of shams, and that is, that although so much imitation gold work is made, both by rolling thin film of gold upon brass, as well as by depositing it upon a yellow metal by the electro process, yet the style of ornament adopted is necessarily improved by the means. All the best patterns in the old T[illegible]k are very closely imitated by the use of the[illegible] prettiest lockets and brooches are made wholesale at [illegible]nny and some half penny each, and sold retail at about sixpence. This is certainly cheapening the beautiful as well as the ornamental, though I am by no means prepared to say that it is a good thing to see our poorer and working classes wearing tawdry ornaments, and spending even the penny, much less the sixpence, in these "coarse vanities."—*London Daily News.*

An Immense Iron Railway Bridge.

The new iron bridge across the Connecticut River at Warehouse Point, now being erected by the New-Haven, Hartford, and Springfield Railroad Company, will, when completed, be probably the finest railroad bridge in the United States. It is built on the "truss" principle, of the best procurable material, and in the most approved style. It consists of seventeen spans, the longest being 177 feet, extending over the river, the carriage road, canal, and towpath. The entire length of the structure is 1,525 feet.

The total weight of iron used in its construction is about 700 tuns, and cost in England, where it was made, £11,231. The plans for its construction were designed by Mr. James Laurie, one of the best known civil engineers in this country, and were at first tendered to a prominent iron firm in Philadelphia, but at that time nearly all the large iron workers in the country were engaged on Government work, and it was finally determined to procure the construction of the bridge in England. The contract was awarded to the celebrated bridge builders, Wm. Fairbairn & Co., of Manchester, but afterward a portion of it was assigned to the London Engineering and Ship Building Company, some of the managers of which were the builders of the famous Britannia bridge over the Menai Straits. The bridge being built in sections and fitted together, was then taken apart, and shipped to this country.

About 175,000 rivets are employed in fastening together the various pieces. The great difficulty encountered in putting the bridge in its place arose from the fact that the new bridge is to occupy the same position as the present wooden one, and it was desirable that the traffic of the road should not be interrupted while substituting the one for the other. A good deal of planning and study were required to effect this object, but the skill and ingenuity of Mr. Laurie has hitherto overcome all obstacles, and most of the spans are now in position, without, we believe, a single interruption to any train. The erection of the bridge was commenced about the 1st of July last, and it is expected that the entire structure will be in position and completed by the last of January next.

MISCELLANEOUS SUMMARY.

THE valve of the great steam whistle at the Western Railroad shops, in Springfield, happened to be open recently, when the fireman lighted his fires at 5 o'clock, and when enough steam had been generated it began to scream. The fireman did not know how to stop it, the result was a general fire alarm; all the bells in the city were set to ringing at their loudest, and the firemen got into a white heat before they found out what was the cause of the pother.

THE ABBE LABORDE has been investigating the spectrum produced by the lightning flash, and states, as the result of his experiment, that he has seen on three or four occasions the several bright lines of which the spectrum is composed. The lines seen are all of a dull white or lead color, but one of them is always more distinct than the others, and is sometimes the only one observed. This line seems to be situated close to Fraunhofer's line E.

THE EXPLOSION OF THE "ST. JOHN" BOILER.—The examination into the causes of this disaster, by which fourteen persons were killed on the steamer *St. John*, is going forward, but nothing has been published at the time we go to press throwing any light upon it. When the evidence is printed, we shall lay it before our readers.

RYE-STRAW AND TOW PAPER.—Mr. M. A. Cushing, of Glenn's Falls, N. Y., sends us samples of paper made from three parts coarse tow, shoove and all, and one part rye straw. The paper is very white and of good quality, and devoid of that harsh, brittle feeling and texture which is common to straw papers. The company is now making two tuns per day.

WATER-WHEEL CHALLENGE.—H. Van De Water, of Buffalo, N. Y., offers to put up $500 and match his jonval turbine wheel against any other patent turbine wheel in the United States. Here is a chance for something exciting. Mr. Van De Water wishes to put the money into our hands, which we decline to hold.

THE destruction by fire of the Coscob bridge, on the New Haven Railroad, suggests the importance of painting wooden bridges of railroads with some mineral paint that will be a protection against fire. Iron is best for such bridges, but wood is mostly used; hence the necessity for some fire-proof paint.

AN antiquarian discovery of much interest has been made in Fife, Scotland. On the wall of a cave were found sculptured the forms of elephants, birds, and fish. It is supposed that in the early ages of Christianity the cave was used as a place of worship by anchorites, and that St. Adrian dwelt in it.

THE most valuable lot of furs ever brought to St. Paul was lately received from the Hudson Bay Co.—6,000 mink skins, worth $50,000. The skins filled twelve ordinary sized boxes, and the St. Paul *Press* says they are worth more than their weight in silver.

PINK, buff, mauve, and green starch is now made, and by its aid any delicate fabric may be colored as well as stiffened.

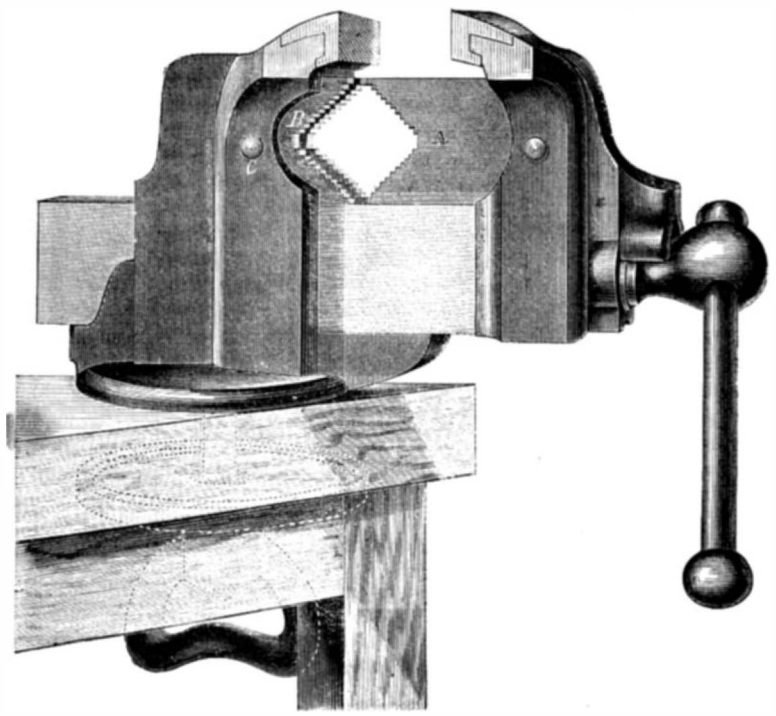
THE best locomotive engines now cost $30,000; passenger cars, that formerly cost $2,000, now cost $4,000.

Improved Combination-pipe Vise.

Gas fitters, plumbers, and metal workers generally, know how difficult it is to hold a pipe in a common vise with parallel jaws. The surfaces in contact are so small that the pipe is often squeezed flat, somewhat, before it will hold at all, and is always a source of annoyance. If a thread has to be cut on a large pipe, it is almost impossible to hold it without jamming or defacing it. The same is true where a pipe has to be cut off.

In this engraving a useful modification of the common vise is shown. It is simply a set of dies, A and B, fastened to the vise jaws by pins, C, and sliding in each other. By this means the vise can be used either for pipes or other common work. The jaws are serrated, as shown, and will take a pipe three and a half inches in diameter. These vises can be swung around in any direction, being attached to a swivel bolt, as shown; they are made of different sizes.

This is an extremely useful tool, and was patented through the Scientific American Patent Agency on August 1, 1865, by H. B. Dart. For further information address N. B. Smith & Co., assignees, No. 634 Broadway, New York.



DART'S COMBINATION-PIPE VISE.

Machinery for Rice Culture Wanted.

Mrs. Jane Pringle, of Georgetown, S. C., who owns two thousand acres of rice and cotton lands, desires to call the special attention of inventors and patentees to the necessity which now exists in the rice districts of the South for certain labor-saving machines. The following extract from Mrs. Pringle's letter will explain the kind of machinery wanted:—

"There are three machines which will save labor and be immensely advantageous to the rice-planting interests, if successfully carried out. These are, a machine for thoroughly cleaning ditches; one for sowing rice, which shall not make the lines sowed too compact, but which shall scatter the grain a little in sowing so as to allow room to tether as it grows. A cradle or other instrument to reap with, is of imperative necessity; the difficulties, the rice heads are so heavy that, as the sickle strikes the stalk, it being top-heavy, falls and sheds the rice on the ground, which, besides the loss, injures the next crop in the form of volunteer rice.

"The machines referred to would be of vital importance to us as substitutes for expensive free labor of an intermittent character."

Pneumatic Dispatch.

Recently, a small goods train was driven through the company's tube from the central station in Holborn to the terminus at Euston station, passing beneath Holborn, New Oxford street, Tottenham court road, Hampstead road, and Drummond street on to the Euston station, a distance of about two miles, having some sharp curves on approaching the Northwestern station. The width and hight of the tube were 4 feet 6 inches respectively, rails being fixed in it for the carriage wheels to run upon. At the central station in Holborn two tubes were carried beneath the footway and ground floor of the building; one connecting Euston station with the central station, and the other being intended to connect the latter with the post-office in St. Martin's le Grand. This tube has only been carried to Holborn hill. In the Holborn station the back portion of the building was occupied by three boilers, each of which could be worked up to a pressure of 30 pounds per square inch. As a rule only one boiler will be worked at a time, though all three could be used if necessary. Between the boiler room and the arrival and departure platform is the engine room, fitted with two 24-horse power engines, which work the shaft of the circular disk or fan, 22 feet in diameter. This revolving rapidly upon its axis, having inclosed air chambers, could be used either for propelling the laden trains forward by atmospheric pressure behind them, or for drawing them back through the tube by forming a partial vacuum before them. The trucks of goods, accompanied by one of the attendants, were blown through the tube to Euston in about five minutes, showing the ease with which a portion of the goods and parcels traffic of the metropolis would shortly be conducted. Wheatstone's telegraphic apparatus was used at the stations, and was found to act well. The entrances to the tubes in the stations were opened or closed as required. In the stations there were two main lines of rails being, 3 feet 8½ inches. There were also two traversing platforms for shifting the trucks from one part of the station to another. The Duke of Buckingham, the chairman, and some of the directors of the company, were blown from the Holborn station, under the supervision of Mr. Rammell, the engineer, through the tube to Euston, which distance was accomplished in the short space of five minutes. The tube between Holborn and Euston station is now complete, and ready for opening.—*London Times.*

LOSIE'S [illegible] THIMBLE.

This engraving represents a new invention intended to be used where stove pipes pass from one room to another or into the walls of rooms. As it sometimes happens that stoves of different sizes are put

in the same room, according with the tastes or convenience of parties occupying the premises, the hole for the pipe, if not made so that it can be varied at will, must be enlarged or reduced. This is a work of much time and trouble, and is wholly obviated by the use of this device. It is merely a casting, A, with a series of rings, B, fitting each other as the cover of a stove does. Each aperture, covered by these rings, fits a pipe of a certain size, so that by merely removing one ring, or adding one, as the case may be, the pipe hole can be graduated at will. When the stove is taken down in summer the hole is closed by a register valve, C, which serves to ventilate the room. The dotted lines, D, indicate cleats which hold each ring in place, so that they cannot fall out. The article is very cheap, and the inventor will supply castings to dealers, or sell exclusive rights. Circulars sent to any address on receipt of stamp. For further particulars address T. M. Losie, Elmira, N. Y., by whom it was patented through the Scientific American Patent Agency on Feb. 14, 1865.

LOCK UP THE THROTTLE VALVE

We notice occasionally, in looking over our exchange lists, casualties arising from persons getting on locomotives and running away with them. Here is a case in point:—

"A curious incident occurred recently at Kane Station, on the Philadelphia and Erie Railroad, as related in the Williamsport *Bulletin*. A locomotive was standing on the track while the engineer was at breakfast. An Irishman, to gratify curiosity, stepped on and opened the valve, letting on a full head of steam. For a moment the rush of steam drove the wheels around so rapidly that the engine stood still, and the Irishman jumped off. Then, with a bound, away it went down the road at the rate of seventy or eighty miles an hour, for about three miles, when it ran into two cars loaded with lumber, scattering them like chaff, at the same time smashing itself into a useless heap. No one was killed, but it was our opinion that the Irishman ought to have taken the ride and the chances of the engine, smash and all."

This accident cost the company thousands of dollars. If a passenger train had been in the line, instead of two empty cars, no amount of money could have paid for the loss of life. "An ounce of preventive is better than a pound of cure;" the throttle valve should be locked up by some simple device, so that the engineer could put the key in his pocket. The arrangement should be secure, and such that the lever could not be budged unless released. This lock would be an insurance against mischief by accident or design, and be adopted by railroads generally.

A Feat in Boiler Making at Hartlepool.

The screw steamer *Wearmouth* is being fitted up with new boilers, just now—"under high pressure," at least as to the speed with which they have been constructed. The result has been one of the most expeditious pieces of boiler making we have heard of in the district. Within 16 days from the boiler plates being put into the hands of a batch of efficient workmen, under the superintendence of Mr. George Duncan, an experienced Clydesdale manager, at the Hartlepool Ironworks, the boiler was completed, tested with 48 lbs. to the square inch water pressure, and again with 25 lbs. steam, ditto, and declared perfect. Persons who know anything of boiler making, or who have observed the labor incident to building a boiler 13 feet 4 inches, by 13 feet 6 inches by 10 feet 6 inches, adapted to a marine steam engine, to be heated with four furnaces, will know that this is indeed a feat of rapid execution; and it is creditable alike to foreman and workmen to say that the work has been done by time, and not by "piece."—*Stockton and Hartlepool Mercury.*

"No-ink Pen."

We exposed this petty swindle on page 216 of our present volume. The swindler at that time operated in the name of Morton. We are beginning to hear of him again; he has now assumed the name of Blake, and seems to be again plying his trade with renewed vigor. We wish to state distinctly that we never recommended a "No-ink Pen" in our paper, and that the whole thing is a cheat. We hope the rascal may be apprehended.

THERE were 23,000 persons weighed on the scales at the Boston Mechanics' Fair. The average weight of men was 141½ pounds; average weight of women was 124½ pounds. The largest man weighed 293 pounds. The largest woman weighed 274½ pounds.

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NEW YORK, SATURDAY, NOVEMBER 11, 1865.

Contents:

(Illustrations are indicated by an asterisk.)

TO OUR READERS ON THE PACIFIC COAST.

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

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

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

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

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

SMALL BOILER AND ENGINE.

Many of our readers are amateur mechanics and apprentices who make small steam engines and boilers for the sake of the experiment. The inquiry contained in this letter, with the answer, will probably be read with interest by others than the writer of it.

MESSRS. EDITORS :—Will you answer these few questions? I have an engine, the cylinder of which is two inches in diameter and the stroke of the piston is four inches and three-quarters. What I want to know is, how much power it has, and much steam it will take to make it work; also the capacity of the boiler. A. O.

The power of this engine depends on the revolutions and the pressure of steam. It will work up to 0·6 of a horse power at 50 lbs. pressure, and 120 turns per minute.

The boiler should be vertical, for small boilers, where there is limited steam room, are less apt to prime than when horizontal It should be fourteen inches high, eight inches in diameter of shell, seven inches internal diameter of fire-box, eight inches from grate to crown of furnace, one-eighth inch thick, and contain forty-eight tubes, half an inch in diameter by four and a quarter inches long. The furnace must all be cast in brass of one piece, or brazed up in copper, and the shell riveted to it at the bottom. The tubes must be expanded in the crown of the furnace and in the upper tube sheet, and the latter must be riveted to the shell at the top. The upper tube sheet may be dished so that the top of the tubes will be under water, though this is not necessary. Such a boiler exposes a total heating surface of 337·01 superficial inches, exclusive of fire-box sides, which is ample for this engine, although small steam boilers require a much greater proportion of heating surface per horse-power than larger ones. Combustion is less perfect and radiation is greater in them than in those of larger size.

The grate to this boiler should be set one inch from the bottom, and air holes, one-quarter of an inch in diameter, must be inserted two or three inches *above* the grate, so as to let air in over the fire. This is a great advantage to a small boiler, since it insures a more perfect burning of the fuel. The air holes are made by screwing quarter-inch brass pipe quite through the shell and the furnace wall; they also serve as stays. The furnace door must be let in five inches above the grate, so as to prevent small sticks, or the fuel, from poking out when the fire is started; also to allow a good heavy fire to be carried.

There must be a smoke jacket on top, two inches above the tops of the tubes, which will make the boiler just fourteen inches high, as we stated. The smoke pipe must be two inches in diameter and four inches long. If thought advisable, a steam jet may be put in. We have used steam jets with pipes no larger than a pin in the bore.

The safety valve must be one-half inch in diameter, and the lever one inch from the short end to the center of the stem, and four inches from the center of the stem to the end of the lever; the weight on the end must be one pound. The lowest gage cock must not be less than two inches from the furnace crown.

Charcoal is good fuel, and anthracite, where it can be burned. We have made many small steam boilers, and many experiments with them, and we have succeeded in burning anthracite coal in lumps about the size of a rifle ball in a grate four inches square. It is proper to add that the fuel was first ignited by charcoal urged by a blow-pipe, but burned freely to ashes when once s[redacted]

The shell should b[redacted]heet brass three thirty-seconds thick, and the fire-box crown should be three-sixteenths thick, so as to carry the tubes. There is no brazing or solder about the boiler, and, if well made, would be as tight as a bottle.

In place of expanding the tubes in the furnace crown, as directed above, they may be screwed in. The threads should not be coarser than twenty-eight to the inch, and great care must be taken not to make the threads too deep, otherwise the tube will be weakened. The tubes must not be over one-thirty-secondth of an inch thick. This thickness will carry twenty-eight threads easily.

There will be plenty of steam room if the water is carried three inches over the furnace crown, for the upper ends of the tubes being bare will superheat the steam and prevent priming. This boiler will take some time to make it, and will test the workmanship of the maker.

A common boiler without flues may be made by taking a teakettle, soldering a steam pipe on the top, and putting a tight cover on, with a hole left to put the water in. Such a boiler is good for nothing, since it will not bear any pressure.

Small boilers, made to work by alcohol or spirit lamps, are rather costly things to use just now, when alcohol is $4 per gallon. Petroleum burns well under small boilers when properly arranged, but there is always fuss with oil, wicks, smoke, and muss generally, where, with a boiler such as described previously, a good working pressure can be maintained, fuel that costs little or nothing can be burned, and more *learned* about burning it in an hour than with liquid fuel for any time.

The cost of such a boiler will be, for the tubes, five dollars; for the shell and castings, whatever founders charge per pound where the boiler is built; the total will not exceed twenty dollars.

WHAT IS SUPERHEATED STEAM?

A correspondent, writing from Tan Farm, Pa., asks us, "What is superheated steam, and how is it obtained?" Those of our subscribers who know all about superheated steam can pass over this article; they will find, we trust, in the variety of matter presented in this number something to interest them all, and will recognize the propriety of our devoting this small space to the gratification of our correspondent and others, who, like him, do not understand the difference between superheated and saturated steam.

When heat is applied to a steam boiler under the surface of the water, the steam that is formed is saturated. Steam thus formed and heated has always the same density and pressure at a given temperature; for instance—omitting fractions—at a temperature of 243° one pound of saturated steam occupies fifteen cubic feet, and exerts a pressure of eleven pounds to the square inch; and at a temperature of 280°, one pound of steam occupies eight cubic feet, and exerts a pressure of thirty-four pounds to the square inch—the density and pressure increasing by a fixed law with the temperature.

If a quantity of steam be inclosed in a tight boiler or other vessel, and heated out of contact with water, it becomes superheated steam. It is manifest that, in these circumstances, the density can no longer increase with the temperature, as there is no additional water to be formed into steam and forced into a cubic foot of space. The pressure, however, increases with the temperature, but in a different ratio from that of saturated steam.

If superheated steam be allowed to expand, its density will, of course, be diminished, and the pressure will decrease with the density; thus superheated steam may have any density and pressure at any temperature, less than those of saturated steam at the same temperature.

To form superheated steam, it is not necessary to inclose it in a vessel separate from that in which it is formed. If a pipe is led from the steam space of a boiler through a flame, so that heat may be imparted to the steam without passing through the water, the steam will be superheated; in this case the density of the steam will be diminished, but its pressure must plainly be the same as that of the saturated steam in the boiler with which it communicates.

If the temperature of saturated steam is reduced the least fracti[redacted] of a degree without reducing the pressure, a p[redacted] of it is condensed to water; but the temperature of superheated steam must be reduced below the point of saturation before any condensation takes place. Superheated steam is, therefore, better adapted than saturated steam for working at high measures of expansion.

THE PRODUCE EXCHANGE AND THE COURSE OF THE GRAIN TRADE.

In the lower part of the City of New York, at the corner of Pearl and Whitehall streets, there is a large, new, brick building, of massive, peculiar, and questionable architecture, called the Produce Exchange. It is one of the few large buildings erected in this city during the war, having been built by an association of capitalists for the accommodation of the dealers in domestic produce. Here, from eleven o'clock to half past twelve every day, are to be seen some three or four hundred of the solid men of New York, who are engaged in buying and selling flour and grain—hook-nosed Jews, big-nosed Scotchmen, pug-nosed Englishmen, and sharp-nosed Yankees—all the noses, whatever their shape, employed in the useful task of ascertaining the quality of the great staples in which these men deal.

The object of building the Produce Exchange was to provide a place where the dealers in produce might meet daily, so that every man who had flour or grain to sell might offer it to every purchaser in the city, and every man who wished to purchase might easily and quickly ascertain what lots were offered for sale, and for what price. At each entrance to the building is stationed a doorkeeper, who admits none but members, the several members paying twenty-five dollars a year for this privilege; then tables are prepared for the display of samples, and are rented to such dealers as choose to hire them. Each dealer covers his table with a shallow box, divided into compart-

ments about the size of a brick, to hold the various samples of wheat, rye, barley, flour or meal which he may have at the time for sale, and on each sample he lays his business card, with a minute of the number of bushels or barrels which he has corresponding with the sample, as, for instance:—

HILL & THOMAS,
No. 27 Pearl street.
2,392 barrels—Rochester mills.

The buyers, passing round from one table to another, are able to see what lots of produce are for sale at the time in the city much more easily and quickly than they could by going to the several stores, and the sellers are enabled to present their lots to all the buyers.

Each table having specimens of flour is provided with a little block-tin teapot of water for mixing the flour into dough, in order that it may be examined in that state, and gentlemen are seen in the crowd molding and pulling little pieces of dough, some of them with dabs of flour on their coats or faces received in the operation.

The course of the trade in grain is essentially the same as that in dry goods, but it is more largely for cash, and where credits are given they are for shorter periods. Proprietors of flouring mills throughout the country consign flour to commission merchants in New York, who charge 2½ per cent for selling it. A large portion of the manufacturers get advances from the commission merchants, but there is a material difference in the system of making advances from that which prevails in the dry-goods trade. With the latter it is a general rule not to advance on any consignment until the goods are in store, but the grain and flour dealers make a regular practice of paying advances so soon as the goods are shipped. The mill owner puts a quantity of flour on board a canal boat, steamer, or railroad car, and gets a bill of lading, which is the carrier's receipt agreeing to deliver the flour to a certain commission merchant in New York, and, at the same time, he draws on the commission merchant for a large part of the value of the flour, generally within a dollar per barrel of the market price, and, on the receipt of the bill of lading, the commission merchant pays the draft if it is drawn at sight, or accepts it if it is on time. The drafts are drawn as may have been previously agreed upon—at the present time they are usually drawn payable at sight, or within ten days.

Commission merchants sell in large lots of 50 to 1,000 barrels of flour in a lot [redacted]bers, who sell by the single barrel or more to retailers. The regular credit to jobbers is seven days. Grain is collected from farmers by traders throughout the country, from whom commission merchants in the city receive it for sale.

This is the way that, in the present organization of trade, grain and flour are first collected in the great marts and then distributed to consumers.

The National Debt.

Secretary McCulloch has promulgated the statement of the public debt as it appears from the books of the Treasurer's returns, and requisitions in the department on the 31st of October, 1865. The recapitulation shows the following:—

Debt bearing interest in coin	$1,161,137,691 80
Debt bearing interest in lawful money	1,191,819,787 46
Debt on which interest has ceased	1,373,920 09
Debt bearing no interest	386,523,359 51
Total amount outstanding	$3,740,854,758 86

The total interest is $138,938,078 59, of which $67,670,340 50 is in coin, and $71,267,738 09 is in lawful money.

The Legal-tender notes in circulation are as follows:—

One and two years five per cent	$32,536,901
United States notes, old issue	392,070
United States notes, new issue	427,768,469
Compound-interest notes	173,012,131
Total	$633,709,581

The following is the amount in the Treasury:—

In coin	$34,554,987 15
In currency	33,800,591 54
Total	$68,355,578 69

Fractional currency on hand, $26,057,469.

The above exhibit of the National Debt shows several gratifying facts. The principal is reduced $4,000,000 since September 30th. The aggregate interest is increased $1,400,000, owing to the conversion of Legal Tenders into Gold-bearing 5-20s. The debt bearing interest in coin is increased $44,479,100, being the amount of 5-20s thus far issued in exchange for Legal Tenders.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING OCTOBER 31, 1865.

Reported Officially for the Scientific American.

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

50,671.—Machine for Pressing Beefsteak, Paring Apples, and Sharpening Knives.—Benjamin F. Alexander, Glen Hope, Pa.:

I claim the combined machine consisting or an apple-parer, steak-tenderer, and knife-sharpener, arranged and constructed and described and represented.

50,672.—Cutter Sleigh.—Alfred Arneman, Guttenberg, Iowa:

I claim the combination of two pairs of S-shaped runners of different hights, with a sleigh, the body of which is constructed of the form substantially as described.

50,673.—Buckle.—Henry Aschenbach, Washington, D. C.:

I claim the buckle, substantially as herein described, to wit, constructed with a convex portion, a, and with a pivoted loop, B, which has a holding bar, p, formed on it so as to bind upon the strap, as shown, all substantially as described, and for the purpose set forth.

50,674.—Stand for Preserve Jars.—Kate E. Ashley, Williamsburgh, N. Y.:

I claim, First, The stand, A, composed of one or more disks or their equivalents, capable of supporting the jars while the latter are introduced in or lifted from the vessel containing boiling water, substantially as and for the purpose set forth.

Second, Making the holes, e, in the disk, a, adjustable by cams, f, or their equivalents, substantially as and for the purpose described.

[This invention relates particularly to a stand to be used for lifting jars in and out of hot water, when they are to be used in the process of preserving fruits and vegetables.]

50,675.—Apparatus for Carbureting Air.—John A. Bassett, Salem, Mass.:

I claim, First, The impregnation of air or gases with the vapor of a hydro-carbon evolved from the surfaces of the perforated fans partially immersed in the hydro-carbon, and operated in the manner substantially as shown and specified.

Second, The use of an air-holder, either at a distance from or connected with a gas generator, when used in combination with the valve, as described.

50,676.—Attaching Cross-cut Saws to their Handles.—David Bearly, New[redacted]d.:

I claim the construction [redacted] fastening, B, in combination with the knob, G, [redacted]scribed, and for the purposes set forth.

50,677.—Cutter for Barrel Heads.—Wm. H. Bennett, Utica, N. Y.:

I claim an improved hand tool for making barrel heads, consisting of the working bar, B, central pivot, C, adjustable cutter, F, and gage, E, the said parts being combined and operating substantially as herein described.

50,678.—Gas Heater.—John Q. Birkey, Philadelphia, Pa.:

I claim, First, The combination of the hollow, inverted, aruncated cone, B, the wire gauze or perforated plate, F, and a suitable tip, G, the whole being arranged substantially as and for the purpose herein set forth.

Second, In combination with the above, I claim the concentrating tube, H, for the purpose specified.

50,679.—Vegetable Cutter.—A. T. Bleyley, Ottumwa, Iowa:

I claim the vegetable cutter, arranged and operating substantially as shown in the drawings, and herein described.

[This invention relates to a novel construction of a vegetable cutter, whereby many important advantages are obtained.]

50,680.—Making Chilled Castings.—George W. Bollman and William Neemes, Pittsburgh, Pa.:

We claim the use of thin metallic molds or chills, for making chilled rolls, shafting, and other large castings, when the exterior of the chill in which the casting is formed is surrounded with cold water, for the purpose of abstracting the heat from the surface of the roll, thus preventing the warping of the chill, and of chilling the casting from the surface more rapidly and to a greater depth, a constant stream of cold water being applied to take the place of that which, having become heated, is allowed to escape, in the manner substantially as hereinbefore described.

50,681.—Photographic Lens.—Charles B. Boyle, New York City. Antedated Oct. 25, 1865:

I claim constructing a photographic lens of three pieces of glass, as described in the specifications, and laid down in the drawings.

I also claim the mode, herein described, of flattening or bending back the focal plain of the photographic lens, by plusing the chromatic dispersion of the flint glass over that of its associate crown glass lens.

50,682.—Attaching Traces to Whiffletrees of Vehicles.—Edwin Brown, Leominster, Mass.:

I claim, as a new article of manufacture, spring botes for attaching to and detaching traces from whiffletrees arranged within a casing, which is provided with bearings and a protecting cap for operation, substantially as shown and described.

50,683.—Quartz Crusher.—Andrew Buchanan, Brooklyn, N. Y.:

I claim, First, The employment of two segments, C, with curved crushing faces, either plain or corrugated, in combination with a mechanism for imparting to the same an oscillating motion, substantially as and for the purpose set forth.

Second, The oscillating lever, D, in combination with the segment, C, constructed and operating substantially as and for the purpose described.

50,684.—Churn.—Thomas J. Burke and S. B. Gassette, Chicago, Ill.:

We claim, First, The combination of the frame, G and D, with the standards, I, and crane, B, as set forth.

Second, The combination of the flange, F, with the barrel of the churn, A, as set forth.

Third, The combination of the dashers, N, with the arms, N, all substantially as described and for the purposes set forth.

50,685.—Combined Coal Scuttle and Ash Screen.—A. F. Carling and L. Rockwell, Ellenville, N. Y.:

We claim the combination of the cylindrical screen, E, with a coal scuttle, A, provided with a partition plate, B, having doors, C C', and all arranged substantially as and for the purpose specified.

[This invention consists in combining with a coal scuttle a cylindrical oscillating screen and an ash receptacle, arranged in such a manner that ashes may be screened with the greatest facility, without allowing the dust to escape from the device, and the cinders discharged into the scuttle compartment from the screen, so that they may be thrown upon the fire from the scuttle; the whole forming a very convenient and economical device for household use.]

50,686.—Filter for Artesian Wells.—John Clary and Elijah B. Torrey, Ithaca, N. Y.:

We claim the filtering jacket or inclosing coil which surrounds the lower section of the well or pump tube, forming a strainer for that portion into which the water enters, substantially as described.

50,687.—Mechanical Movement.—Josiah A. Clippinger, Newton, Iowa:

I claim, First, The employment of the self-adjusting friction brake, or its equivalent, in combination with a train of wheels and a spring, substantially as and for the purpose set forth.

Second, So constructing a friction brake that its action will be controlled automatically, and its resistance diminished in proportion as the force of the power exerted by the spring to be overcome diminishes, substantially as described.

Third, The combination of a driving wheel, D, which is adapted to serve as a crank wheel for winding up the spring, C, with the adjustable pinion, E', and a train of wheels, substantially as and for the purpose set forth.

Fourth, Arranging the shafts of the wheels, D and G, so as to operate at right angles to each other, when these parts are operated by springs and controlled by a brake, substantially as described.

50,688.—Strap Ring or Clamp.—Joseph Cogan, Boston, Mass.:

I claim a halter, or strap ring, or clamp, in which the strap is confined between clamping surfaces or plates, substantially as and for the purposes described.

50,689.—Gaging and Ullaging Casks.—Wm. W. Cooper, Washington, D. C.:

I claim an instrument, constructed substantially as herein described, for gaging or determining the capacities and interior dimensions of casks, by the combined use of one or more diagonal angles, with linear measures of the cask diagonal.

Second, In connection with the process of gaging, I claim the invention as herein described, of a scale adapted to casks of all sizes, for ascertaining by inspection the per centage wanting in any given cask that may not be full, in particular the application of the said scale to the outer surface of a tube, in which case, the scale taking a spiral arrangement, may be applied inside of the cask.

Third, As a necessary adjunct for the angular measurements peculiar to my system of cask gaging, I claim the invention of the implement described and shown for use in the bungs of casks.

50,690.—Stump Extractor.—Thomas Crane, Fort Atkinson, Wis.:

I claim, First, The combination of the tripod lifting frame, G G F, triangular base, A, and windlass, D, operating substantially as described.

Second, Sustaining the lower end of the lifting beam, F, upon a rope or chain, c, of the windlass, D, substantially as described.

Third, The combination of the pulley, E, draft rope, a, windlass, D, stirrup chair, c, and the lifting beam, F, of the tripod, substantially as described.

50,691.—Scroll Chuck.—A. F. Cushman, Hartford, Conn.:

I claim the combination of the head, A, with its disk, D, and scroll collar, C, with the jaws, c, the latter provided on its outer surface with teeth, which engage the scroll of the collar, as described and represented.

[This invention consists in combining the jaws of scroll chuck with a revolving cap and stationary scroll in such a manner that, by turning the cap, a double motion is imparted to said jaws, viz.: a revolving motion with said cap, and a radially sliding motion by the action of the scroll, and by these means said jaws are rendered self-tightening; that is to say, if a drill, for instance, is placed between them, and the point of the drill begins to act, imparting to it a tendency to turn in the jaws, the effect is to tighten the jaws, and the liability of a spontaneous disengagement of said drill or other tool or piece of work held between the jaws is avoided.]

50,692.—Sabot for Projectiles.—Edward A. Dana, Brookline, Mass.:

I claim, First, The combination of a shot or shell, the hinder part of which is shaped as above described, viz.: with a sloping or wedge-shaped portion, C, and also with a straight or cylindrical portion, D, of less diameter than the body of the shot, with a rifling cup or packing of softer material, adapted thereto, but cast separately therefrom, which can be detached for the purposes of storage or transportation, and placed on the projectile when wanted for use, the whole of which is driven forward on the shot when the gun is fired.

Second, I also claim, in combination with the above, the circular groove, B, on the rear part of the projectile, this groove being so placed that the metal of the rifling cup may be driven into it by the discharge of the gun.

50,693.—Harvester.—John S. Davis, Tiffin, Ohio:

I claim, First, The construction and arrangement of the drag bar, A A', and the standard, B, for the purpose of balancing the machine upon the axle, substantially in the manner and for the purpose set forth.

Second, I claim the gearing, P H J J', in combination with the drag bar, A A', and frame, F F', for working the cutters, and allowing the finger beam to rise and fall, substantially as specified.

Third, I claim the frame, F F', contructed as set forth, and hinged to the shoe and drag bar, substantially in the manner described.

Fourth, I claim the construction and arrangement of the shoe, G, substantially as and for the purpose set forth.

Fifth, I claim the spring, t, in combination with the hinged shoe, G, constructed and arranged in the manner and for the purpose set forth.

50,694.—Barrel for Holding Petroleum.—Lester Day and Henry Chapman, Buffalo, N. Y.:

We claim a combined metal and wood barrel, made in a bilge barrel form, the metal part having a flange or rim, K', formed thereon, which, with the wood head, enters the crozing of the wood barrel, for the purposes and substantially as described.

50,695.—Reciprocating Crank Motion.—Benjamin R. Dorwart, Lancaster, Pa.:

I claim, First, The cross-slotted head or disk, D, with the prolonged arm, D A, in combination with a double-ended crank, C, and lugs, S S and S2, constructed and operating substantially in the manner and for the purpose specified.

I claim the lever arm, L, with its short side arm, L, in combination with the connecting rod, C R, constructed and operated substantially as and for the purpose specified.

I also claim the rod, L A, in combination with the lever, L, and prolonged arm, D A, o the disk or slotted cross head, D, arranged in the manner and for the purpose specified.

50,696.—Case for Inclosing Stoves.—John P. Driver, Marengo, Iowa:

I claim, First, Inclosing cooking and other stoves within a double-walled case fitted with air conducting pipes, for the purpose of carrying off the heat of such stoves, substantially as and for the purposes shown.

I also claim the provision in the above described double-walled case, of the passages, c c, for conveying off the fumes made by cooking as herein described.

[This invention consists in inclosing a cooking stove within a case of sheet metal, say tin or iron, for the purpose of intercepting heat

which radiates from the stove, and so keep the kitchen cool in summer, and for the further purpose of enabling one to conduct hot air from the stove to another apartment in the cold seasons, the same conducting pipe which serves to lead the hot air out doors in summer serving also to conduct it into other rooms when it is desired to keep the hot air in a house.]

50,697.—Metallic Packing for Steam Pistons.—Henry D. Dunbar, Springfield, Mass.:

I claim, First, The segmental packing ring, C, in combination with a spring, or equivalent, placed between two contiguous ends of the segments for the purpose set forth.

Second, In combination with the segmental packing ring, C, the L-shaped plate, d, to cover the joints, substantially as described.

Third, The link, F, in combination with the packing ring, C, substantially as described.

Fourth, The arrangements of the parts by which to vary the relative areas of the frictional surface, and steam pressure surface of the segmental packing ring, c, for the purpose of regulating and reducing the effect of such pressure to the lowest point consistent with the proper action of the packing ring, substantially as described.

Fifth, In combination with the elastic packing ring of a steam piston head, the stop, p, with its stop or pin, for the purpose of allowing a limited circular motion of said ring, substantially as described

50,698.—Railway Bag Receiver.—Charles D. Everett, Cleveland, Ohio:

I claim, First, Pivoting the arms, B and D, together, and hinging the same to the side or door frame of the car, substantially as and for the purpose specified.

Second, I claim automatically taking off from mail stations on railroads, the mail bag, and conveying the same to the mail car, while the train is in motion, substantially as set forth.

Third, I claim the arms, B and D, the spring, H, the lever, g, and spring, h, or their equivalents, arranged substantially as, and for the purpose described.

Fourth, I claim the brace, P, and spring, n, in combination with the arms, B and D, substantially as and for the purpose set forth.

50,699.—Toy Watch.—Lysander Flagg, and Geo. D. Briggs, Pawtucket, R. I.:

We claim the toy watch herein described consisting of the case, A, back, a, dial, b, mica covering, c, and retaining lips, d, all constructed and combined as specified.

[This invention consists in the employment or use of mica in place of glass, as a covering for the dial of a toy watch, clock, or other article in which a dial is used, covered with some transparent material, also in the use of points punched out of the flange or plate which supports the dial and its transparent covering, and turned up and over the edge of said dial and covering in such a manner that when these points are punched out and turned up the dial and its covering can be readily adjusted in their places, and by the simple operation of turning these points down, the dial and its covering are secured in their places without requiring an extra ring or an increased amount of stock, and at a trifling expense in time and labor.]

50,700.—Shaft Coupling.—George H. Fox, Boston, Mass.:

I claim the coupling constructed substantially as described, that is to say, with the central and elongated keyhole in the coupling, and the central keyholes in the shafts, the shaft ends being made of tapering form, and the keys wedge-shaped as specified.

50,701.—Scrubbing Brush, Mop, and Wringer.—Lucas Frey, and John Hahn, Chicago, Ill.:

We claim the combination of the scrubbing brush, M, rollers, D E, mop C, and wiper, L, arranged and operating substantially as specified.

50,702.—Feathering Paddle Wheel.—Stephen F. Gates, Boston, Mass.:

I claim the construction of a paddle wheel, by which its floats are feathered by means of a motor, independent in its action from the motor by which the wheel is rotated.

50,703.—Ore Crusher.—Alexander W. Hall, New York City:

I claim a stamping mill having an air-tight battery, into which air is forced or drawn through one or more inlets, and from which the pulverized material is carried with the escaping air, to a suitable receiver, substantially as, and for the purpose specified.

50,704.—Mills for Rolling Iron and Steel.—Daniel Hall, Pittsburgh, Pa.:

I claim, First, The use in one set of housing of two pairs of rolls, arranged with their axes all in the same vertical flame, the upper pair being geared together so as to pass the iron or steel through between them in one direction, and the lower pair being geared together so as to pass the iron or steel through between them in the opposite direction, for the purpose of enabling a continuous strip or band of metal to be passed backwards and forwards between the rolls and thus operated upon at several points at the same time, and for other purposes herein set forth.

Second, Also the combination of the guide roller, v, and adjustable guide, w, and curved guide box, z, with one or more pairs of rolls, in the manner and for the purposes hereinbefore set forth.

50,705.—Wind Wheel.—A. M. Hansen, Stockton, Cal.:

I claim the combination and arrangement of G, C and R, for the purpose as herein described.

50,706.—Buckle.—Charles B. Hatfield, Boston, Mass.:

I claim the improved buckle made substantially as described, viz., of the two plates, A B, hinged together, and formed with the tongue, a, and the recess, b, and the slot, d, arranged as specified.

50,707.—Carriage Jack.—Aaron Higley, South Bend, Ind.:

I claim the forked arm, E, pivoted to the plates, F, resting and turning upon the shoulder, g, and the lever B, when jointed to and constructed with the pedestal, A, arranged so as to operate conjointly in the manner and for the purpose specified.

50,708.—Candlestick.—William H. H. Hinds, Groton, Mass.:

I claim the hand regulator, I I, for the purpose set forth.

50,709.—Annunciator.—Henry Horsfall, New York City:

First, I claim the stand or pillar affixed to the lever, c, and projecting through the face in combination with the pendulum that hangs in front of said face for the purposes and as specified.

Second, I claim the arm, 5, at the end of the rock shaft, i, connected to the slide, k, in which is the dog, f, in combination with the hammer, t, and bell, m, as and for the purposes set forth.

Third, I claim the toes on the slides, t f, in combination with the rock shaft, i, and mechanism connecting with the bell, said toes acting against the rock shaft to move the same as set forth.

50,710.—Oil Ejector.—Wm. Wheeler Hubbell, Philadelphia, Pa.:

First, I claim the inverted coned cup or deflector, with its cone opposite the mouth of the air tube and within the case, r' r'', as and for the purpose described.

Second, The coned mouth, c, of the air tube inside of the inverted cup, to assist the air to sweep around from a descending to an ascending column in the cup as described.

Third, The open mouth of the vertical air tube, discharging downward, and coned or otherwise opposite the base of the cup, with its sides, f f, extending up around the end of the air tube, to discharge the air down into the cup in a solid column, and discharge it upward in an annular column, inside of the oil or outer case for the purpose as described.

Fourth, The enlarged case, r', with the channel, l, around and above the inverted cup, in combination with the air tube and the annular space, o, around it, formed by the contracted case, r, with its statical resistance over the air current of the cup, to supply and force up the oil as described.

Fifth, The gas and oil separator and accelerator, 8 8, inside of the case r' r', and operating as described.

Sixth, The hollow foot, 4, to support the ejector and allow the oil to enter its base, as described.

Seventh, The air tube and flowing tube side by side in the well, with a double bend at the parts, t and p, Fig. 2, and the air tube entering the flowing tube, to a concentric position over the inverted cup, for the purposes and as described.

Eighth, The braces, g, placed below the inverted cup, to support it to resist the great force of air exerted on it, and allow the air to descend and pass out of it again, in solid columns, as described.

Ninth, The combination of the accelerating surface j j, the enlarged case, r' r', the inverted cup and the air tube, with the annular space, o, o, formed over the cup, to accelerate the oil and gas from the enlarged case, to the space, o, aided by the air from the tube and cup, as described.

50,711.—Incendiary Shell.—William Wheeler Hubbell, Philadelphia, Pa.:

First, I claim casting the cast iron of the shell on to a wrought iron tube, to form an inner and outer chamber, separable when the explosion occurs, as and for the purpose described.

Second, The composition or filling of wood, quickmatch, sulphur and meal or gunpowder in the inner chamber of wrought iron, constructed and applied as described.

Third, The firing chamber of gunpowder, q, surrounded by the burning composition for ignition as described.

Fourth, The quick match and sulphur prepared and used in the inner chamber, or in any equivalent manner in the explosive shell within a wrought iron chamber, as described.

Fifth, The combination of the exploding or gunpowder chamber, H H, with or around the firing chamber of wrought iron, constructed and secured as described, so as to combine the explosive destructive effect with the firing or suffocating effect in a practical manner as set forth.

50,712.—Cover for Rollers of Washing Machines.—R. B. Hugunin, Cleveland, Ohio:

I claim the rubber or other non-absorbent cloth-supported coverings, A A A, etc., Figs. 1 2 and 4, etc., whether made or vulcanized directly upon the shaft as described or separately and afterwards applied to the shaft, substantially as and for the purpose specified.

50,713.—Bed Bottom.—Platt C. Ingersoll, Green Point, N. Y.:

Having fully described my improved slat for bedsteads and its operation, I make the following claim slat, B, standards, a, and metallic strips, b, as shown and for the purpose set forth.

50,714.—Propeller.—Fritz Jacob, New York City:

I claim the combination of fins, D, with the hollow wings, B, of a screw propeller, substantially as and for the purpose set forth.

[This invention relates to a certain improvement on that class of propellers which are constructed with hollow wings, and on which a patent was granted, Jan. 24, 1865. This improvement consists in the application of fins formed by a prolongation of the rear side of each wing in such a manner that the propelling surface of said wings is increased, and that a propeller of the ordinary construction can be easily converted into a hollow wing propeller, simply by securing to its blades the hollow wings either by rivets or any other suitable means.]

50,715.—Hand Stamp.—Albert Jones, Buffalo, N. Y.

I claim, First, The combination and arrangement with the inked ribbon and spools of the ratchet wheels, G G', and reversible pawl, H, in the manner, and for the purpose described.

Second, The combination of the mortised die, c, notched dating type, c2, and retaining rod, c1, in the manner and for the purpose described.

Third, I claim the double curved arm or bracket B B', the one part stationary and the other movable, and carrying the die and ribbon spools as described.

50,716.—Fire Shrinking Machine.—J. M. Kellogg, Duquoin, Ill.:

I claim, First, The construction of the immovable slotted jaws, A side abutment, A', slotted bed plate, A3, and end abutment, A2, in combination with a movable slotted jaw, B, substantially as described.

Second, The combination with the subject matter contained in the first claim, of the hooked tenon, b', and tenon guide, b, and wedge, J, substantially as described.

Third, The combination of the movable back support, G, in the side abutment, A, and jaws, A B, substantially as described.

Fourth, Adapting the concave faced back support, G, to serve for tires of different diameters, substantially as described.

Fifth, The use of forked and wedged keys, C C, for securing the tires to the jaws, A B, substantially as described.

50,717.—Furnace for Treating Ores.—W. Kendrick, New York City:

I claim the arched base, N or N*, between the fire-place or fire-places and the calcining or oxydizing chambers, substantially as and for the purpose set forth.

Second, The flues, j m n or j* m* n*, and dampers, k l or k* l*, in combination with the chambers above and below the arched base, N or N*, constructed and operating substantially as and for the purpose described.

Third, Causing jets of steam and [illegible] air to issue between the flames and the heated ores, substantially as and for the purpose specified.

Fourth, The arrangement of a partition wall, c or c*, containing one or more water chambers, g or g*, and one or more air chambers, h or h*, in combination with the fire-place or fire-places and with the hearth or base on which the ore is placed, substantially as and for the purpose herein set forth.

Fifth, The water chambers, x, with jets, a, in combination with the heated base, N, and fire flues, q, constructed and operating substantially as and for the purpose described.

Sixth, The arrangement of the radiating flues r or r*, in combination with fire flues, q or q*, escape flues, S or S*, and with a suitable suction blower, substantially as and for the purpose set forth.

Seventh, The annular air flue, b, in the furnace wall, M, in combination with the radiating flues, r, and escape flue, S, constructed and operating substantially as and for the purpose described.

Eighth, The arrangement of air flues, f, in combination with the fire flues, q or q*, partition wall, c or c*, and with the hearth or base of the furnace, constructed and operating substantially as and for the purpose specified.

Ninth, The employment of one or more condensers, Q, in combination with the escape flue, S or S*, leading from the furnace and with a suitable suction blower, constructed and operating substantially as and for the purpose set forth.

50,718.—Reverberatory Furnace.—W. Kendrick, New York City:

First, I claim the arrangement of one or more fire-places, on the same or on opposite sides of the hearth, Q, in combination with said hearth, and with one or more bridge walls, e, containing steam and water channels, by which jets of steam and air can be thrown between the ore and the flames, substantially as and for the purpose described.

Second, The chamber, t, below the hearth, in combination with suitable fire flues, constructed and operating substantially as and for the purpose set forth.

Third, The flues, q x y z and a', in combination with the hearth, Q, and with or without the chamber, t, constructed and operating substantially as and for the purpose described.

Fourth, The arrangement of a suitable suction below, with or without a condenser, in combination with the escape flue, S, and with the flues, r q and n, and hearth, Q, constructed and operating substantially as and for the purpose set forth.

Fifth, The arrangement of air flues, g, in combination with the fire-place, or places, a', bridge wall, e, and hearth, Q, constructed and operating substantially as and for the purpose described.

50,719.—Lubricator.—S. E. Kleinschmidt, Cleveland, Ohio:

I claim, as an improved article of manufacture, an oil cup or lubricator, composed of feed cup, A', faucet, E, opening, d, chamber or reservoir, C, faucet, E, and openings, h and g, when the latter are extended by means of a tube, g', to near the top of chamber for the passage of steam through it above the oil.

50,720.—Snap Hook.—Homer W. Knowlton, Saratoga Springs, N. Y.:

I claim the snap hook herein described, the same being composed of a single piece of wire, and formed with the convolution, A, and check loop, a, substantially as and for the purpose set forth.

[This invention relates to a new and improved snap hook, for harnesses and for other purposes, and it consists in constructing the hook out of a single piece of wire, and in such a manner as to form a very simple, strong, and durable hook, suitable for all purposes to which said hooks are generally applied.]

50,721.—Die for Curving Springs.—A. Komp, New York City:

I claim a female die, with one or more longitudinal grooves wide enough to receive the wire to be curved, and with one or more cavities, intended to receive the blade or blades or the pin or pins of the punch, substantially as and for the purpose set forth.

Second, A die, with transverse grooves and one or more longitudinal grooves, wide enough to receive the wire to be curved, in combination with a suitable punch, constructed and operating substantially as and for the purpose described.

[This invention relates to an improved method of curving such springs as are extensively used, for the purpose of strengthening or stiffening the brims of hats. Such springs are generally made of narrow strips of sheet steel, bent like a hoop, and, in order to accommodate them to the desired shape of the brim, they must be curved edgeways at those places which correspond to the sides of the hat.]

50,722.—Catarrhal Syringe.—A. P. Lighthill, Boston, Mass.:

I claim the construction of the bulb, a, elliptical or oval in its longitudinal and transverse sections; and I also claim the improved arrangements of the bulb and its stem, or the construction of the latter with the sudden bend at its junction with the bulb, whereby the axes of the bulb and stem are caused to be at, or nearly at, right angles to each other, as represented.

50,723.—Wrought-iron Bridge.—J. H. Lenville, Pittsburgh, and John L. Piper, Altoona, Pa.:

First, We claim the use of posts for wrought-iron truss frames, having a curved or polygonal section, composed of two or more plates of rolled or wrought iron, with flanged edges secured together by means of rivets passing through such flanges, and through ferrules interposed between them, to give any desired enlargement to the posts, and leave space for the passage of the counter braces without cutting any or weakening the posts, such posts being completed with my bases and capitals of wrought or cast iron riveted thereto, substantially as and for the purposes hereinbefore described.

Second, The use of upper cords or compression beams, formed by a combination of L-shaped rolled beams or channel bars, or both riveted at top and bottom to plates of wrought iron, so as to form in each cord or beam a series of rectangular tubes or cells, for the purpose of affording great transverse strength to support the weight of passing trains in railroad or other bridges, combined with great resistance to compressive force, substantially as hereinbefore described.

Third, The use for the lower cords of truss frames of wide and thin-rolled bars, with enlarged ends formed by upsetting the iron when heated by compression into molds of the required shape, for the purpose of increasing the density, toughness and strength of the eye of the rod, and enlarging the eye without diminishing its transverse section, substantially as hereinbefore described.

50,724.—Meat-pounder and Potato-masher.—John A. McNiel, Grand Rapids, Mich.:

I claim an instrument for pounding meat, mashing potatoes, working butter, etc., constructed substantially as herein shown and described.

50,725.—Lantern.—R. M. Merrill, Chicago, Ill.:

I claim, First, As an article of manufacture, the within-described lantern globe or protector, having its maximum diameter at its base or lower part, substantially as and for the purpose shown and described.

Second, The globe or protector, B, in combination with the frame or casing of a lantern, and a device for holding it in position, substantially as shown and described, and for the purpose set forth.

Third, Operating the connecting springs of a lantern by a partial rotary movement of one part of the same upon the other, substantially as shown and described, and for the purpose set forth.

Fourth In combination with a spring or springs secured to one part of a lantern, the slots, h, or their equivalents, on the other part, so that the two parts may be firmly locked together, or released from their connection by a partial rotary motion of one part upon the other, substantially as and for the purpose herein described and shown.

Fifth, Attaching the burner to the lamp by means of a hinged collar, e, or its equivalent, in such a manner that it can have no material lateral or rotary motion in its collar, substantially as shown and described, and for the purpose set forth.

Sixth, In combination with the burner, D, and regulator, f, the worm wheel and its spindle, arranged and operating substantially as described and for the purpose set forth.

50,726.—Sorghum Evaporator.—L. N. Myers, Wilmington, Ohio:

I claim the application of the steam generated in the evaporation of sorghum and other juices, for imparting or assisting to produce a gentle heat, for finishing concentrated sirups, substantially as and for the purpose herein specified.

I also claim the arrangement of a series of three or more evaporating pans, one over another, or otherwise, in a suitable and equivalent manner, so as to use the steam arising from the evaporation in one for heating another, in succession, the steam being applied either alone or in combination with other heat, applied in any way for the purpose herein set forth.

I also claim the sheet-metal perforated partition, H, between the pans, F and G, arranged and operating substantially as and for the purpose herein specified.

I also claim the combined arrangement of the two chimney flues, C D, situated respectively at the ends of the evaporator, and of the dampers connected therewith, substantially as herein described.

I also claim the side flue, I, with its damper, i, connecting the furnace chamber, A, and the heating chamber or chambers under the upper pan or pans, substantially as and for the purpose herein specified.

50,727.—Pepper Box.—A. H. Newton, Worcester, Mass.:

I claim the use of a valve beneath the top or cover of spice boxes and bottles, to exclude air from their contents when in a state of rest, substantially as above described.

[This invention consists in applying a valve in the cover or top of a spice box, in such a way as that the valve will be open when the box is turned, for the purpose of sprinkling its contents through the perforations in its cover, and be closed when the box is brought back again, thereby preventing such contents from losing their strength by exposure to the air.]

50,728.—Apparatus for Clasping Hoop Skirts.—C. L. Olmstead, Brooklyn, N. Y..

I claim the combination of the feeding plate of the hoop-clasping machine and needle, substantially as set forth.

Also, The combination of the feeding plate of the hoop-clasping machine and gate, substantially as set forth.

50,729.—Rotary Harrow.—J. D. Parrot, Morristown, N. J.:

I claim the wheel, B, attached permanently to the harrow, and provided with a spindle, C, which passes through an oblong slot, d, in the draught pole, D, in connection with the wheel, E, at the rear end of the draught pole, bearing against the fixed wheel, B, substantially as and for the purpose herein set forth.

50,730.—Cartridge Box.—John Pease, Boston, Mass.:

I claim the cartridge box, A, provided with the pocket, D, and flap, B, and with the lower compartments, E E, and their securing flaps, E E, the arrangement and adaptation being substantially as described and represented.

[In this implement the cartridge-box case has attached to it not only a box for containing ammunition, but also other boxes for carrying percussion caps, oil, bullet patches, swabs and other conveniences desirable for the soldier or sportsman.]

50,731.—Stock for Holding Screw-cutting Dies.—Wm. Pimlott, Syracuse, N. Y.:

I claim the eccentric guide or bearing, A, substantially as described and for the purposes set forth.

50,732.—Cake Cutter and Rolling Pin.—I. N. Pyle, Decatur, Ill.:

I claim the combination of a cake cutter with a rolling pin, substantially as described.

[This invention consists in the combination with an ordinary or any other suitable rolling pin, of a cake cutter, the latter being a case carrying any desired number of cutters of various shapes and styles, into which the roller is to be inserted when the cakes are to be cut out.]

50,733.—Blind Fastening.—L. V. Quimby, Boston, Mass., and Wm. G. Marston, West Fairlee, Vt.:

I claim the combination of the catches, n. and blocks, g, and lever, a, wheel, k, shaft, b, and pulley, c, all substantially as herein shown and described, and for the purpose specified.

50,734.—Flour Sifter.—Uriah Rice, Cincinnati, Ohio:

I claim the combination of the sieve, B, receiving tank, A, receiving clamps, a, bracing bar, c, shaft, e, and brush, g, all constructed as above described and for the purpose set forth.

50,735.—Vapor Inhaler.—Dwight Russell, Milford, Mass.:

I claim the improved inhaler, as made of one entire piece of glass, in manner substantially as specified.

50,736.—Milk Stand.—Zenas Sanders, West Windsor, Vt.:

I claim the combination of the notched board, E, and its inclined pins, with its cross bars, and the post, A, provided with holes or recesses for reception of such pins, in manner as specified.

I also claim the combination of the supporter, G, with the milk stand, made substantially as described, such supporter being for sustaining a curtain, H, about the pans, as set forth.

50,737.—Stove-cover Lifter.—Chas. E. Seavey, Boston. Mass.:

I claim the fixation of a cover lifter, a shovel or tool to its handle, is the combination and arrangement of the piece, d, and the shoulder, b, with the shank handle and ferrule of the lifter, substantially as specified.

50,738.—Bed Bottom.—G. N. Seidler, Hartford, Conn.:

I claim the oscilating ratchet plate, B, in combination with the fixed catch plate, E, cord, F, and folding bed bottom, substantially as and for the purpose described.

50,739.—Hot-air Furnace.—J. H. Shedd and Benjamin Worcester, Waltham, Mass.:

We claim, First, The use of heated gaseous products of combustion as a circulating medium, to convey the heat of the fire through channels, whereby the heat can be given off to the surrounding air, these products then returning to the fire and passing partly through it, and partly near and around it, for reheating and further combustion, substantially as and for the purposes set forth.

Second, The application of watery vapor or steam to the gaseous products of combustion, to increase their efficacy and beneficial effect as a medium of heat to radiating surfaces for the heating of air, substantially as and for the purposes set forth.

Third, The device for connecting the direct valve of a smoke pipe with the fire door, by rod or chain, in such a manner that when the door is opened the smoke pipe valve will also be open, and when the door is closed the valve will be closed.

50,740.—Corn Sheller.—H. F. and G. F. Shaw, West Roxbury, Mass.:

I claim the employment of a bell-shaped rotating sheller, in combination with a guide bar or bars, arranged diagonally, both in a horizontal and in a vertical plane with the axis of the lever, substantially as and for the purpose described, viz., for giving the ears of corn a very rapid rotation around its own axis at the larger end of the lever, before the main part of the shelling takes place at the smaller end thereof.

50,741.—Hod.—James Short, Roxbury, Mass.:

I claim, First, The rubber tubing, B, or an equivalent thereof, in combination with a hod, substantially as and for the purpose herein specified.

Second, The folding handle, C C', in combination with a hod, substantially as and for the purpose herein specified.

[This invention consists in applying to the under side of a hod, where the same rests upon the shoulder, a flexible bag, for enabling the workmen to carry the hod with much more ease than heretofore; it also consists in the combination with said hod of a folding handle.]

50,742.—Oil Can.—Samuel Short and E. S. Scripture, Brooklyn, N. Y.:

In combination with the flexible bottom, A, we claim the loop-shaped thumb-piece, B, and spring, C, when the same shall be combined in the manner and for the purpose specified.

50,743.—Method of Treating Peat.—J. H. Smith, New York City:

I claim treating peat with superheated steam, substantially as and for the purpose described.

[The object of this invention is to separate from peat all sulphur, or salts containing sulphur and other impurities, and to render peat fit for the manufacture of illuminating gas.]

50,744.—Coal Scuttle.—Thomas Smith, Cincinnati, Ohio:

I claim the construction of a coal-scuttle bottom, in the manner and for the purpose set forth.

50,745.—Box for Shafting.—John Sparrow, Portland, Me.:

I claim First, The application of a sleeve bearing, a, to the shaft, A, substantially as and for the purpose described.

Second, The combination of the perforated box, C, with the shell, D, and sleeve bearing, a, of the shaft, A, constructed and operating substantially as and for the purpose set forth.

50,746.—Slide Valve.—Henry Spengler, Philadelphia, Pa.:

I claim the within-described valve when so arranged as to permit the steam to pass to the cylinder around its upper and lower edges, by which arrangement a full area of opening is made by slightly more than one-half the motion usually given to such valves, substantially as described.

Second, The combination of the posts in the valve, A, with the posts, F, and supplementary post, K, substantially as and for the purpose set forth.

Third, I claim arranging the within-described valves between two parallel seats, when such seats are duplicates the one of the other, substantially as shown and described.

50,747.—Chuck.—Mathias Staub, Philadelphia, Pa.:

I claim the combination of the perforated plate, A, the perforated back clamp, F, and pins, H, substantially as described and represented.

50,748.—Pipe Tongs.—Daniel C. Stillson and John C. Chapman, Charlestown, Mass.:

I claim the gripe, D, pivoted eccentrically in the sliding block, C, in combination with the springs, f, or their equivalent, arranged and operating substantially as set forth.

50,749.—Plow.—Chester W. Sykes, Suffield Conn.:

I claim, First, In combination with the other parts of a plow, a mold-board hung on the top of the share in such a manner that it may be moved from side to side and fastened, substantially in the manner and for the purpose described.

Second, The peculiar form of the mold board, C, substantially as herein set forth.

50,750.—Slide Valve for Steam Engines.—George Thackray, Mystic Bridge, Conn.:

I claim the adjustable cam, H, applied in combination with the valves, E E', solid stem, d, and hollow stem, d', with loop, e, substantially as and for the purposes set forth.

50,751.—Traveler's Night Lock.—Alfred V. Thomas, Frederick, Md.:

I claim a portable or pocket door fastening, composed of triangular plates, which are pivoted together, so as to operate substantially as described.

50,752.—Fumigator.—Samuel Vanstone, Providence, R. I.:

I claim the combination of the retort, A, or its equivalent, with the blower, and suitable devices for operating the same, constructed substantially as and for the purposes described.

50,753.—Apparatus for Bending and Punching Truck Irons.—Peter L. Weimer, Lebanon, Pa.:

I claim, First, Providing the frame, A, with perforated guide and holding down blocks, C C D, substantially as described.

Second, The construction of the central bed, a', of the frame, A, with side guides, e e, and a key post, A', in combination with the movable block, D, and key, d, substantially as described.

Third, Constructing the movable guide block, D, with lugs, f f and adapting it to receive handles, g g, substantially as described.

Fourth, The combination of the punch with the machine, substantially as described, for the purpose set forth.

50,754.—Apparatus for Punching.—Peter L. Weimer, Lebanon, Pa.:

First, I claim the combination of adjustable die blocks, b b, with adjustable perforated guide blocks, h h, and a movable frame, D, substantially as described.

Second, The vertically adjustable end supporters, C C, and guide frame, D, in combination with the die blocks, b b, substantially as described.

Third, The combination of the side guides, e e, abutment, d, and guide and pressure blocks, h h, with the lower supporting die blocks, b, substantially as described.

50,755.—Apparatus for Bending and Punching the Frames of Draw-heads for Railway Cars.—Peter L. Weimer, Lebanon, Pa.:

First, I claim the improved apparatus or machine substantially as herein described, for the purpose set forth.

Second, The perforated lever, G, in combination with the punching bed, B, and the recess, c, substantially as described.

Third, The bending bed, F, in combination with the key post, D, and key, E, substantially as described.

Fourth, The combination of punching bed, C, and transversely slotted and vertically perforated lever, H, substantially as described.

50,756.—Bending and Punching Draw-head Plates.—Peter L. Weimer, Lebanon, Pa.:

First, I claim the construction of the anvil block, A, with a projection, B, in combination with the former, C, and holding down bar, D, substantially as described.

Second, The curved-faced mortised shelf, G, applied to the anvil block, substantially as described.

Third, The bed piece, L, and movable bolt, N, applied to the anvil block, A, substantially as described.

50,757.—Machine for Bending and Punching Hooks.—Peter L. Weimer, Lebanon, Pa.:

First, I claim the construction of the pattern, C, shoulder, c, and key posts, B B, with the supporting bed, A, for the shank of the hook blank, and forming the hook, b, thereon, substantially as described.

Second, The construction of the punching bed, D, with a pattern, D', and die block, g, substantially as described.

Third, The perforated lever, G, in combination with the die block, g, and punching bed, D, and the hook pattern, D', substantially as described.

Fourth, The combination of the shaping and punching contrivances for finishing car hooks, substantially as described.

Fifth, The combination of a tapering punch, J, with the perforated lever, G, and a punching bed, having an open space beneath it, substantially as described.

50,758.—Apparatus for Bending Chain Links.—Peter L. Weimer, Lebanon, Pa.:

First, I claim the combination of a link former, b, with a turning mandrel, D, substantially as described.

Second, The link former, b, and key-holding head, c, applied to a turning mandrel, D, which can be removed from its bearings at pleasure, substantially as described.

Third, The recess, g, in the former, b, in combination with the holding keys, d d', and head, c, substantially as described.

Fourth, Providing the standard, A, of the link-forming contrivance with an anvil, C, substantially in the manner and for the purposes described.

50,759.—Rotary Steam Engine.—George Westinghouse, Jr., Schenectady, N. Y.:

First, I claim in rotary engines the combination of the fixed hollow shaft, C, and fixed center piece, B, with the rotating disk, A A', and independent pistons, E F, substantially as described.

Second, I also claim constructing the pistons, F, in the manner substantially as above described, with leading guides, f, connected by plates, c, the convexity of whose outer edge fits the outer curve of the cylindrical space, substantially as and for the purposes above described.

Third, I also claim the combination of the sliding bolts, i and j, with the traveling pistons, substantially as above described.

Fourth, I also claim the combination of the valve, D, with the disk or cylinder, A A', to which it is attached, constructed and operated substantially as described.

[This invention consists in a novel construction of a rotary engine, the cylinder of which is annular, and is contained in a disk, which is made to revolve about a hollow stationary shaft, through the opposite ends of which the steam is admitted and exhausted. The engine is made in the form of a disk whose weight and thickness will be or may be made sufficient to make it serve for a balance wheel.]

50,760.—Breech-loading Fire-arm.—Henry F. Wheeler, Boston, Mass.:

I claim the construction of breech-loading fire-arms, by which the cartridge shell is expelled by a combined rotative and longitudinal movement of the barrel upon the base pin, substantially as set forth.

50,761.—Fastening Wheels and Pulleys to Shafts.—Zenas Wheeler, San Francisco, Cal.:

[claim the mode herein described of fastening wheels, pulleys, drums, etc., to their shafts, the same consisting in the combination of one or more feathers, c c, and wedge, h, arranged and operating together as specified.

[This invention consists in using in connection with the wheel or pulley and its shaft, for the purpose of fastening the same to it, one or more feathers, so called, and tapering cross ties or keys, the keys being driven into the wheel in such a manner as to bring the feathers to a close bearing against the shaft. This mode of fastening enables pulleys to be placed much closer together upon a common shaft than by the mode heretofore practiced.]

50,762.—Wagon Brake.—Jesse F. Wilson, Lewisville, Ind.:

I claim the toggle, H, connected with the rod, G, at the under side of the draft pole, and which rod is attached to the shoe bar, C, and cranks, c c, of the shaft, K, in combination with the bar, M, pivoted in the draft pole and connected with the toggle, and all arranged to operate in the manner substantially as and for the purpose set forth.

I also claim the lever, O, connected by a rod, N, with the bar, M, in combination with the toggle, H, as and for the purpose specified.

I further claim the cross head, F, connected with the rod, N, in combination with the arm, e, of the bar, M, and toggle, H, substantially as and for the purpose set forth.

50,763.—Whiffletree.—Gallus Woeber, Davenport, Iowa:

I claim the socket, C, attached to the cross bar of the thills and provided with the bar, d, and slot, e, to form a guide, in connection with the plate, E, attached to the whiffletree, B, fitted in the socket, C, and provided with an arm, D, to fit in the slot, e, of C, all being arranged and used in connection with the bolt, F, substantially as and for the purpose set forth.

[This invention relates to a new and improved manner of attaching the whiffletree to the cross bar of the thills, whereby the bolt on which the whiffletree works is relieved of the strain to which it has been hitherto been subjected, and the play or turning movement of the whiffletree on the bolt limited, so as to avoid the use of straps, hitherto employed to prevent whiffletrees, when attached to a doubletree, from coming in contact with the wheels, and also to prevent them, whether used single or double, from coming in contact with the legs of a horse in case of one of the traces becoming casually detached.]

50,764.—Loom for Lappet Weaving.—William Aspinall (assignor to himself and James Ledger), Manayunk, Pa.:

First, I claim, in combination with the universal joint, the pattern wheel fastened to the loom frame and independent from the lay, and operated from the main driving shaft, as above described.

Second, I claim the combination of the studs, e e, and slotted brackets, d d, for the purpose of adjusting the needles vertically, as above described.

Third, I claim, in combination with the needles, the tension frame and cords, constructed as and for the purpose described above.

50,765.—Cooking Stove.—F. M. Baker (assignor to Charles Jordan), South Reading, Mass.:

I claim the above-described arrangement and combination of the auxiliary oven, G, and its smoke flue, H, and damper, D', with the main oven, A, of a cooking stove, and its discharge flues, C and F, and dampers, D D', or with the same and the sunken flue space, I, for heating the water vessel, K, the whole being substantially as specified.

50,766.—Boot or Harness Clamp.—Andrew J. Curtis, Winterport, Me., assignor to Benjamin F. Waldron, Boston, Mass., and Charles T. Seavey, Frankfort, Me.:

I claim the above-described improved vise or stitching clamp as constructed with a clamping lever, E, and its shoulder or shoulders, i i, and handle or ring, f, or the equivalent of the latter, arranged and combined with the curved jaw leg, C, and its fellow leg, D, in manner and so as to operate therewith, substantially as described.

I also claim the combination of the spring, g, with the handle, f, the lever, E, and the jaw legs, C D, made and applied in manner and so as to operate together substantially as described.

50,767.—Construction of Iron Ships.—Thomas B. Daft, Mark Lane Chambers, London, Eng., assignor to D. D. Williamson, Jr., Edinburgh, Scotland:

I claim the mode of constructing iron ships or vessels with grooves in the plating, and filling said grooves with teak or other suitable material, to which a sheathing of zinc or other material is attached, substantially as herein set forth.

[This invention consists in constructing iron ships or vessels with grooves or gaps in the plating, and filling said grooves with teak or other suitable material, so that a sheathing of zinc or other suitable material can be secured to the iron plates in an easy and convenient manner, and that by these means the iron plates can be protected against the injurious influences of the sea water, and against the impurities liable to adhere to such plates when the same are in the sea water for a short time.]

50,768.—Machine for Tenoning Spokes.—L. A. Dole (assignor to himself and Albert R. Silver), Salem, Ohio:

First, I claim constructing the cutter or boring shaft, C', with a circular rack, e, and arranging the toothed feed lever, G, to gear with said rack, substantially in the manner and for the purpose herein described.

Second, The arrangement of the arm, E, on the vertically adjustable standard, B, said standard serving to adjust and support the cutter or boring shaft, C', and said arm being adapted for sustaining the holding and centering devices for the poke in front of the cutter, w, or borer, substantially as herein described.

Third, The construction of the adjustable centering plate, g, with a notch in its upper end to receive the spokes, in combination with the pressure lever, J, said parts being arranged in front of a rotary tenon cutter, substantially as described.

Fourth, The arrangement of the rod, j, having a shoulder, j, formed on it, the binding plate, l, and nut, k, in combination with the rack, a, and pinion, h, in the manner and for the purpose herein described.

Fifth, The construction of the frame of a spoke-tenoning machine with a slotted standard, B, a slotted tubular bearing, C, and an arm, E, substantially as described.

50,769.—Cupola Furnace.—Annes A. Lincoln (assignor to Annes A. Lincoln, Jr.), Norton, Mass.:

I claim as my improvement, for the purposes specified, the arrangement of the steam jet and air or blast apparatus, so as to cause the commingling currents of vapor and air to enter the furnace at a point, B, above the grate or fuel base without going through it, meaning specially to claim a cupola furnace as made with the tweers and steam jets, combined together and arranged with respect to its hearth or fuel base, substantially as specified.

50,770.—Artificial Leg.—R. G. Lockwood (assignor to himself and O. B. Jones), Battle Creek, Mich.:

First, I claim securing the ends of the straps, E E', and connecting plates, m m, to the knee section, B, by means of a frame, G, substantially as described.

Second, Attaching the strap, F, to a lever, b, which acts upon the foot, D, through the medium of a pin, c, substantially as described.

Third, Connecting the strap, F, at its lower end to a rocking applied within the hollow section of the leg, substantially lever, b, as described.

Fourth, The combination of the hollow sections, A C, knee section, B, and straps, E E', constructed substantially as described.

50,771.—Railroad Journal Box.—A. B. Nimbs (assignor to himself and John C. Clifford), Buffalo, N. Y.:

First, I claim a journal box for railroad car truck axles, made convex or spherical on its upper side, in combination with a corresponding concave seat formed in the housing, for the purpose and substantially as set forth.

Second, A journal box, made convex or spherical on its upper side, and a removable seat piece, F, with a concave seat formed thereon, in combination with a housing for railroad car trucks, substantially as described.

Third, Projecting a rib, G, from a concave seat formed in the housing, D, or in a removable seat piece, F, in combination with a journal box made concave on its upper side, for the purposes and substantially as described.

50,772.—Press for Baling Cotton.—William Norman, Van Buren, Ark., assignor to himself and James B. Stone, Philadelphia, Pa.:

First, I claim the connecting rod, G, link, I, pressing block, F, cross head, T, and slot, H, in combination with the cord or chain, K, for raising and relieving from pressure the block, F, when arranged and constructed substantially in the manner set forth.

Second, I claim the cross bars, b, with their notches and catches, in combination with the liberating lever, d d', for fastening and freeing the gates, E', substantially as set forth.

50,773.—Preventing Incrustation of Steam Boilers.—George T. Parry (assignor to Robert B. Baker, Philadelphia, Pa.:

I claim, First, Suspending within a steam boiler one or more permanent magnets, for the purpose of inducing an electrical current, to operate as described.

Second, The hollow box, A, with its insulated lining, together with the manner of packing and insulating the rod, C, which passes through the said box.

50,774.—Preventing Incrustation of Steam Boilers.—A. F. Porter (assignor to himself and G. O. Evans), Philadelphia, Pa.:

I claim the above-described apparatus for preventing incrustation in steam boilers, the same consisting of a conductor around at one end, with a series of points, or their equivalents, and connected at the other extremity with the shell of the boiler, the whole being constructed within the boiler at some intermediate point by an insulated attachment, all substantially as herein set forth.

50,775.—Blind Fastener.—Daniel B. Randall, Augusta, Me., assignor to himself and Samuel W. Russell, East Poland, Me.:

I claim the arrangement of the projections, a a c c d e, and the recesses, b b, with the levers, C C, and their case, D, the same being as described.

I also claim the combination and arrangement of the hinge or device, G, or its mechanical equivalent, with the blind and the two catch levers, C C, applied thereto, as explained.

50,776.—Railroad Chair.—John A. Roebling, Trenton, N. J., and John McMurtry, Lexington, Ky., assignors to John McMurtry, Lexington, Ky.:

We claim a solid cast-iron block fitted at one side of the rails, and having an upper chilled surface level with or a trifle above the level of the rails, in combination with a wrought-iron plate at the opposite side of the rails, and all connected by transverse bolts, as set forth, for the purpose of insuring a continuous bearing at the joint of great massiveness and durability.

We further claim the solid and cast-iron block and wrought-iron plate, placed one at each side of the rails, in combination with a

flange or flanges on either side of the base of the cast-iron block or wrought-iron plate, or on both of them, and transverse bolts, substantially as and for the purpose specified.

50,777.—Mode of Operating Boring Tools for Artesian Wells.—Johnston Ross, East Liberty, Pa., assignor to A. H. Gross and C. W. Batchelor, Alleghany Co., Pa.:

I claim, First, The revolving platform, r, with its reel, i i', placed centrally over the bore of the well, and caused to revolve on its axis while the boring tool is being worked, in the same direction as the boring tool and rope in the well, for the purpose of holding the slack or surplus rope outside of the well and preventing it from becoming twisted, substantially as herein before described.

Second, Also the use of the check block, with its wedge, for the purpose of securing the working rope while it is being detached from the walking beam of the engine, substantially as herein before described.

50,778.—Elevator.—Wesley Sawyer, Lowell, Mass., assignor to himself and Francis A. Sawyer, Boston, Mass.:

I claim, in the improved elevator herein before explained, the combination and arrangement of the belt-shifting mechanism, viz., the two levers, h k, and their connecting rod, i, with the bucket, K, its elevating chains, G G, their toothed wheels, C D E F, and gears, b c, driving belt, l, and pulley, g, and fast and loose pulleys, d f, the whole being to operate substantially as specified.

I also claim the combination and arrangement of the guide rollers, H H, with the bucket, K, its elevating chains, G G, and their operative toothed wheels, C D E F, and shaft, A, the whole being substantially as explained.

50,779.—Machine for Facilitating Household and Culinary Operations.—Henry S. Shepardson (assignor to H. S. Shepardson & Co.), Shelburne Falls, Mass.:

I claim the general arrangement of the base, columns and gearing, so that the base will serve to hold any vessel under the gearing, and the gearing be susceptible of driving the different devices herein named, while the devices themselves are interchangable to accomplish the several purposes herein named, substantially as described.

50,780.—Blacking.—Abraham Tomilson (assignor to himself and Charles C. Clements), Cincinnati, Ohio. Antedated Aug. 3, 1865:

I claim the blacking composed and compounded as described.

50,781.—Machine for Finishing Lap-welded Tubes.—Peter L. Weimer (assignor to Aurora Iron Company), Lebanon, Pa.:

I claim, First, Removing the fins from lap-welded tubing as it leaves the pressing rollers, by means of rotary cutters or files, substantially as described.

Second, Providing for giving a vertical movement to the fin cutters at the same time that they receive a rotary motion, substantially as described.

50,782.—Cutting Staves.—John I. Ralya, Alleghany, Pa.:

I claim constructing the knives for stave dressers with a shoulder projecting at an obtuse angle from the outer face of each blade of the knife, substantially as herein before described, for the purpose of breaking off the shavings or slivers as to prevent the riving of the stave.

REISSUES.

2,098.—Grain Separator.—Ezekiel Montgomery, Henry Montgomery, and M. E. Montgomery, Silver Creek, N. Y., assignees of Henry Montgomery and Simeon Howes. Patented Feb. 22, 1859:

We claim subjecting the light grain after it has been separated from the heavy grain and carried over into the utilizing chambers to a counter current of air, for the purpose of further cleaning the light grain, and delivering it from the machine in a fit condition for feed, substantially as set forth.

2,099.—Harvesting Machine.—John Reilly, White Pigeon, Mich. Patented Nov. 20, 1855:

First, I claim a grain guard or cut-off, which remains out of the way of the falling grain until a gavel of proper size has accumulated; is then interposed between the platform and reel to receive and support the falling grain, and remains there until the gavel already accumulated has been removed, when it is withdrawn, the movements of the cut-off being parallel to the path of the machine, for the purposes set forth.

Second, The combination in a harvesting machine of a cutting apparatus and platform with a grain guard or cut-off, the combination being and operating substantially as described.

Third, The combination, substantially in the manner described, in a harvesting machine of a cutting apparatus, a platform and a reel with a grain guard or cut-off, arranged behind and moving in the same vertical plane as the reel, for the purpose of separating the grain swept back by the reel into gavels suitable for binding.

Fourth, The combination in a harvesting machine of a cutting apparatus projecting from one side of the main or gearing frame and a hinged or swinging platform with a grain guard or cut-off vibrating over the platform.

Fifth, The combination in a harvesting machine of a reel, a cutting apparatus, a hinged or swinging platform and a cut-off.

DESIGNS.

2,210.—Coffin Handle.—Alonzo B. Bailey, Middle Haddam, Conn.

2,211.—Inkstand.—John Moore, Warren, Mass.

2,212.—Fork or Spoon Handle.—John Polhamus, New York City.

2,213.—Badge of the Union League.—S. G. Vredenburgh, Mount Vernon, N. Y.

2,214.—Floor Oil-cloth Pattern.—James Paterson, Elizabeth, N. J., assignor to Deborah, Albert E., and Nathaniel B. Powers, Lansingburgh, N. Y.

Notes and Queries

R. B., of N. Y.—The maximum of light in the spectrum is in the middle of the yellow; the maximum of heat is in the dark below the red.

T. A. B., of Ill.—In 1835 and 1837 Messrs. Piobert, Didion and Morin made a series of experiments at Metz, to determine the resistance of air to bodies moving through it, and they came to the conclusion that the resistance of flat surfaces is in direct proportion to the area. They give the following formula:—

$$R = 0 \text{ lbs. } 08002 \text{ A plus } 0{\cdot}1518 \text{ AV}^2,$$

in which R is the resistance; A the area in square yards, and V the velocity in yards per second. Whether the same law would hold in the case of a fixed sail opposed to moving air has not, we believe, been yet ascertained.

J. B. B., of Pa.—A properly made governor is self-acting, and requires no attention from any one, whether half or all the machinery is on.

G. C., of Mass.—If in water two miles deep you attempt to drag a ring along the bottom by a line extending from a ship at the surface, your line must be several miles in length, and in practice it would lie for a long distance upon the bottom. The idea of drawing a ring along the Atlantic cable in this way is preposterous, and the more complicated the apparatus the more manifestly impracticable would be the scheme.

J. S. M. & Co., of Pa.—We are not acquainted with any work that will instruct boys in the art of painting, striping and finishing wood work.

J. McD., of Vt.—On page 40, Vol. VIII., you will find the subject of curing tobacco treated on. You can procure presses from any of the agricultural warehouses.

McD. & Co., of N. S.—The composition of steel bells, as they are called, is kept a secret by the manufacturers. It is supposed by some to be cast iron, with a little franklinite. The bells of Naylor & Co., we believe, are simply cast steel.

G. W. L., of Pa.—You will find many rules in back numbers of the current volume on the horse-power of belting.

A. J. H.—Copper tubes, surrounded by fire, are as liable to be burnt out as iron; more so. Common practice has fixed upon 1¼ and 1½-inch tubes in tubular boilers, though they are made of any diameter

L. S. P., of Pa.—We do not know who manufactures machinery for sugar-coating almonds.

C. B. C., of N. Y.—Buy "Templeton's Pocket Companion."

O. G. B., of Me.—It is owing to the angle of the connecting rod that the cross-head is not at mid stroke when the crank is vertical.

G. D. C., of Conn.—We do not know where you can find such steel as you want, but would advise you to address Naylor & Co., of this city.

E. H., of Pa.—You do not forfeit your right to take out a patent by delaying the application, providing such delay does not amount to an abandonment of the invention to the public. Inventors ought not to delay their application unnecessarily, as by such neglect they often become involved in expensive interference cases.

C. C., of Mass.—A patent cannot be for the function or abstract effect of a machine, but only for the machine itself. You can obtain a patent for a process irrespective of any particular form of machinery used in the process.

T. T., of Ill.—As you are an owner in the patent we do not think you are required to take out a license in order to sell it. You are not an agent, but a principal, in the business.

L. P., of Pa.—You cannot apply to a court to have your Letters Patent corrected. This can only be done by the Commissioner of Patents, who is authorized by law to reissue a defective patent.

TO OUR READERS.

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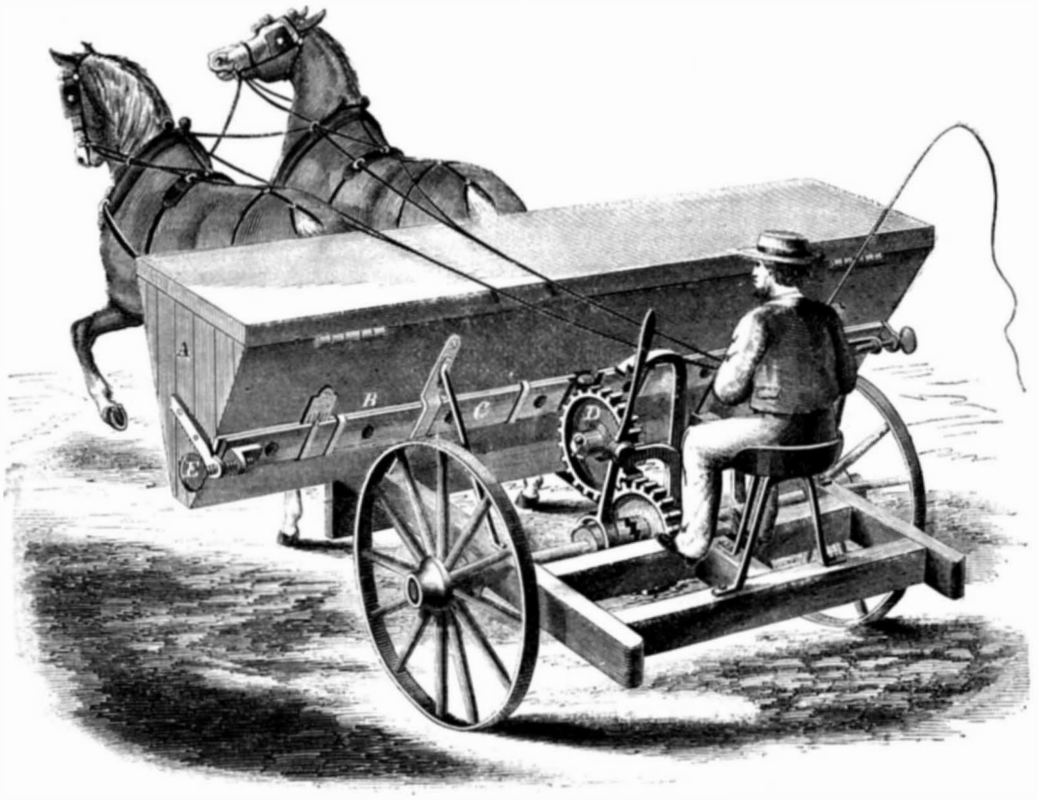

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