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Derrick for Loading Hay.

This engraving is a representation of a novel and useful machine for loading hay on wagons. It facilitates and lessens the labor and is readily and easily operated by any one not skilled in the use of machinery. This last feature is one of considerable importance at the present time when the "help" farmers hire seem to be a little more stupid than any other class of men on earth.

The machine, or derrick, is intended to perform the whole labor of transferring the hay from the field to the cart, and this it does with great ease and certainty. The details are as follows:—The framing, A, carries a circular table, B, which revolves on a spindle in the center. The timber, C, is fastened to the table and moves with it; the boom, D, has a fork at the upper end, which is loaded by lowering the boom and taking on the hay. The boom is raised and lowered by the rope, E, which runs over a roller at the top of the upright, and it is retained in place while the hay is being thrown off by a catch, F, fitting in a recess at the bottom of the upright, as shown. After the fork is unloaded the catch is thrown out by working the lever, G. The shank of the fork is at H, and is provided with an orifice on the end in which a pin works, as at I. This pin holds the fork together while the load is on, and can be withdrawn to trip the fork by the rope, J. The derrick is provided with wheels to draw it to different points where it is to operate, and one of the wheels, K, is made to turn on a center so that it can be thrown out of line and thus act as a drag or anchor, to preventthe whole derrick from moving when a load is to be taken on. The circular table can be turned in any direction by the handle, L, and the rollers, M, keep it from tipping up and also ease its motion. When the machine is to be drawn the brake, N, is turned out so as to bring it in line with the central hole in the guard, O; this jams the hauling line below, so that the derrick can be drawn over the field, as mentioned. The inventor takes the hay from the swath just as it was left by the machine or after tedding, and deposits it on the wagon, thus saving the expense and labor of raking and piling it up

In this machine all the usual operations are combined in one and it will doubtless prove a valuable assistant to getting in crops.

It was patented through the Scientific American Patent Agency on the 10th Jan., 1865, by S. R. Higgins, of Parma, Mich., for further information address R. E. Aldrich, at that place.

HIGGINS'S DERRICK FOR LOADING HAY.

An Ice Factory.

We paid a visit, day before yesterday, says the New Orleans *Times*, to the ice factory, corner of Orange and Tchoupitoulas streets, and are indebted to one of the members of the firm of Chas. A. Hensler & Co., for the pleasure of inspecting the same.

They are turning out about two hundred pounds per hour of ice, equal to any ever manufactured by dame Nature herself. The entire strength of the machinery does not exceed two-horse power, and consumes about two-thirds of a cord of wood and one pound of coke in twenty-four hours. The process of manufacture is quite simple. A large retort contains concentrated aqua ammonia, which, being moderately heated, passes, in the form of gas, through a worm surrounded by a bath of water, of the temperature of the atmosphere, and there by pressure it is liquified. This liquified gas is then passed in very small quantities through a worm in a bath of highly concentrated salt, where it is volatalized. To acquire that state it is obliged to deprive the bath of all its caloric. By constant passage through the worm the temperature of the bath is reduced from 15 to 25 degrees below zero—centigrade. The ice is formed in moulds. We saw large piles composed of it, each block measuring twenty-seven inches in length, nine in width, and about three in thickness. A visitor to this establishment can almost realize an Esquimaux's conception of heaven, which is to sit without breeches on a cloud and such icicles.

The Manufacture of Glue.

Ordinary glue is made by boiling the scrapings and clipings of hides, hoofs, horns, or feet of horses, cows, sheep and pigs, which has the effect of converting a certain substance, known to chemists as *osseine*, and existing naturally in these parts of the animal into gelatine or glue.

The raw material is first placed in large pits or tanks, containing milk of lime. The lime, being a strong alkali, removes the hair from the skin in the course of a few days, the time varying with the heat of the weather and the age of the stuff. When all the hair is removed, the skins are taken out of the lime pits, washed with large quantities of water to free them from the lime, which would act upon the skin in the same way it acted on the hair. When sufficiently washed, they are placed under a powerful hydraulic press and as much of the water as possible sqeeezed out of them. Sometimes, instead of being washed after their immersion in the lime bath, they are simply spread upon frames in the open air to dry. The action of the atmosphere soon converts the lime into common chalk, which being perfectly neutral, has no further corrosive action on the skin. Manufacturers appear to be divided as to which of these methods of preparation is the better one.

The whole of the hair and most of the fat being removed from the skins, they are next thrown into a huge wrought-iron boiler full of water, which has a false bottom provided with a light framework of iron, to prevent the smaller pieces from sticking to the bottom and sides. Some manufacturers put the skins into a large network bag, made of rope, which is wound in and out of the boiler by a windlass, but generally they are thrown in without this accessory.

The hair and waste pieces of the skin and fat left in the lime pits are collected into heaps, allowed to rot, and then sold to the manure manufacturers.

The boiling gradually converts the *osseine*, which, as we have before stated, exists in the skins already formed, into gelatine, which dissolves in the water. The solution of gelatine thus made is, when suf.

ficiently strong, run off into a settling vat, where, while still being kept warm, the mechanical impurities gradually fall to the bottom. When pretty clear the solution is run off into a long trough, which communicates with a number of smaller ones, 6 feet long by 2 deep, and 1 broad. As it runs into the trough a little alum is added, which appears to have the effect of clarifying the solution still further. As the solution cools in the trough, it formes a firm mass of the consistency of ordinary calf's foot jelly. The troughs are then carried into the cutting-up shed, where a man runs a knife round the sides to separate the glue from the wood, and, afterwards, divides it into "bricks," 2 feet deep by 1 long by about 8 or 9 inches wide. These "bricks" are then taken out, and cut with a wire or a sharp knife into slabs about two inches thick. The slabs are carried on piles to the drying-houses, where they are laid upon network frames, a thorough draught of air being constantly maintained over their surface by the sides of the shed being open to the four winds of heaven. The slices are turned from time to time, and gradually dry into the hard compact form in which glue enters the market.

This part of the process is a most critical one, a slight variation in temperature being sufficient to spoil a whole batch in a very short time. In winter a sudden sharp frost will do a hundred pounds' worth of damage in a few hours by freezing the soft cakes, and cracking them into an infinite number of fissures. A sudden rise in temperature will have a disastrous effect from the opposite cause. The rise in the heat will sometimes increase the solvent power of the water contained in the glue to such an extent, that the cakes partially liquefy and drop through the meshes of the network. Again, in damp foggy weather, a sort of fungoid vegetation is apt to form on the surface of the cakes, destroying the transparency of the glue, and rendering it unsaleable. Several remedies have been tried for this latter misfortune, but none appear to answer perfectly.

To transform glue into the gelatine of the shops, it is simply necessary to dissolve it in water and allow it to settle. Clarifying agents are also used to destroy the last vestiges of color. But this is a branch of manufacture which does not concern the ironmonger.

There is almost as much fashion in glue as there is in bonnets, workmen showing themselves absurdly ignorant and capricious in their choice of various *forms* of glue. We say forms designedly, for many carpenters are not aware of the fact that the best glue is that which is made with the greatest care, whether in London, Salisbury, or Scotland, whether it is in long, broad, or thin cakes, has a piece of string run through it, or is destitute of that appendage. Others, again, have a fancy that the *darkest* glue is the strongest; but this is also a decided error. Thus, the principal difference between "Scotch" and "London" glue is, that the former is cut a little narrower than the latter, and has a string run through several cakes.

Size hardly comes within the province of the ironmonger; we shall therefore merely mention that it is a weak solution of glue allowed to gelatinize. About size, too, the most erroneous notions have obtained credence among workmen, most of whom fancy that the *darkest* size is necessarily the best. This absurd notion has led certain manufacturers to adopt artificial means of coloring their size.

The cakes being dry and hard they are taken off the nets, the marks made by the meshes appearing in cross-barred impression on the surface. If the glue has "caught the mildew," or has become dusty, each cake is scrubbed with a brush and hot water to give it a clean and polished appearance. The cakes are then stacked in stores, in which every particle of moisture is driven out of them by artificial heat.

Such is the simple process of glue-making, the real secret of success in which is care and cleanliness.—*The Ironmonger.*

Rag Cats.—A lady informs the *Maine Farmer* that she saved her cherries from the birds by making some cats out of old rags. "Be sure," she says, "to make the eyes out of large, yellow beads or bright brass buttons, and the birds will not come near when one of these cats is perched in the tree."

[N. B. This cat is not patented.—Eds.

PATENTS AND MONOPOLIES.

Many of us enter this world on a Patent bed. If we are "brought up by hand," it is on Patent food administered through a Patent feeding-bottle. Those who, when ill, imprudently attempt to cure themselves by taking a so-called "Patent" medicine, are almost certain to die, and are likely, if rich enough, to be enclosed in a Patent coffin, and transported to their last and least unhappy home in a Patent hearse. Thus, with all the incidents of life and of death, articles or processes for which Her Majesty has granted her Letters Patent, are intimately associated. There is but one striking exception. No Patent has yet been obtained for an improvement on the old-fashioned plan according to which the earth is replenished. Before long, this matter will doubtless attract the attention of Patentees ambitious of showing how to do by artificial means what is assuredly nobler, as well as more difficult, than to cause two blades of grass to grow where but one grew before.

There can be no question, then, as to the universality of the interest attaching to Patents. Hardly any man, woman, or child, is unaffected by them. Yet among the multitude whom they concern, there are but few who think seriously about the expediency of granting or withholding them; and, among those who have made up their minds on the subject, there are very great differences of opinion.

It is held by the opponents of Patents that to grant them at all is both a mistake and an injury; a mistake in principle, and an injury to trade. Only a few days ago, we read in *The Times* that the fact of a certain French firm having been able to supply locomotives to an English Railway Company at a lower price than any firm in this country, was chiefly owing to the operation of our Patent laws. It was not alleged that French or Belgian manufacturers were freed from the operation of such laws; but it was maintained that they did not suffer nearly so much from them as all English firms do. The short and conclusive answer to this is, that in France to every million of the population, there are at present one hundred and sixty-two Patents in force; in Belgium three hundred and twelve, and in England one hundred. As the number of manufacturers is much less in those countries than in this, the restrictive action of Patents must be infinitely greater there, than here. Hence, Patents cannot hamper the action of English firms exclusively. Even if they did have that effect, it would not follow that to grant them was as error. This proposition has, however, been gravely advanced in an elaborate article in the current number of *The Edinburgh Review*. Moreover, it is stated that Copyright is as defensible a privilege, as Patent rights are oppresive monopolies. We consider the distinction drawn between them to be wholly illusory. For the present, however, we shall confine ourselves to an examination of the arguments, contained in that article, against granting Letters Patent for inventions.

These arguments are based on two theories; first, that Patents, being monopolies, are injurious; second, that they are hindrances to free competition. We admit that monopolies, properly so called, "are odious." We desire that every enactment tending towards protection, as opposed to freedon of trade, should be swept away. We maintain, however, that modern Patents differ so essentially from the old Monopolies, as to be necessary in order to insure unrestricted competition.

The article in *The Edinburgh* begins by referring to the effect produced when the list of Monopolies granted by Queen Elizabeth was read over in the House of Commons. A member exclaimed, with justifiable indignation, that bread would be soon included among the number of the things for which monopolies were accorded. We are then told by the writer in *The Edinburgh* that "if the list of such monopolies were now read over in the House, it would be found that the case of which the mere imagination once provoked such wrath in Parliament has been realized—bread is among their number, and a man shall hardly mix flour and water and bake them into bread in any manner which has not been granted by the Crown to the exclusive use of some patentee." If this statement were wholly accurate, then it would be impossible for any one to bake bread without a licence. Is this a fact?

Taking the illustration thus furnished, let us endeavour to dispel the confusion of ideas which the writer seems to labor under, as to the difference between a monopoly such as that granted by Queen Elizabeth, and a Patent for making bread granted by Queen Victoria. Her Majesty has empowered Dr. Dauglish to have the sole right of making aerated bread for a fixed period, in consideration of his having paid certain fees and disclosed the nature of his invention. Having paid the fees and obtained the protection, he is entitled to sue anyone who shall infringe his Patent. He cannot interfere with any baker who chooses to bake bread in a manner different from his own. He may charge what he pleases for his loaves; but no one is obliged to buy or eat them. In fact, his whole power is limited to bringing a new sort of bread into the market, and persuading consumers to purchase it in preference to all other sorts. In enabling Dr. Dauglish to do this, Queen Victoria does not, we think, render him any unfair assistance.

Queen Elizabeth would have acted otherwise. She would have bestowed upon him the "Monopoly" of making bread, and have empowered him to hinder anyone from interfering with his exclusive right. Dr. Dauglish would then have had nothing to fear from competition. Whether his bread were good or bad, the public would have been compelled by necessity either to purchase it as his own price, or else to dispense with the "staff of life" altogether. Moreover, no family would dare to make bread for home consumption, because to do so would be to interfere with his monopoly. The result would be that under Queen Elizabeth, Dr. Dauglish would rapidly accumulate wealth, to the detriment of his fellow men, whereas under Queen Victoria he cannot acquire any money without benefiting his fellows. The modern Patent means the power to compete; the ancient Monopoly the power to restrain. To characterize both Patents and Monopolies, as alike oppressive, is to assert that which cannot be substantiated.

An inventor who trusts in the honor of his fellows is like a banker who refuses to lock up his safe. To discover a process, and apply it in practice, involves not mental labor only, but an expenditure of money also. For instance, a man invents a steel pen which will write, if not spell better than any other ever made. This would be a useful discovery; and it would be the means of largely remunerating him who had the good fortune to make it. Let us suppose that he sets to work to produce the improved pens without first having acquired the privilege of making them during a period of fourteen years. He would fail frequently before attaining the desired result. Much of his time and means would have to be bestowed on erecting the proper machinery and making his invention generally known. If it answered perfectly, the demand for the pens would be great. Rival pen-makers would be unable to find customers for their inferior articles. Would they placidly watch the rising reputation of the clever inventor? We should regard them as very bad men of business if they did. They would be obliged either to produce a better pen, or else to manufacture that which had proved to be so good, and had become so popular. Starting with the knowledge imparted to them by the ingenious inventor, and thus released from the necessity of wasting their time and energies in disheartening failures, they would be able to erect machinery at a less cost than he had incurred, and, consequently, to sell pens at a lower price, and yet at a greater profit than he could sell them. The inventor would starve, and the pirate would grow rich. Hence, in these days, without Patent Laws there could be no competition. Competition implies equality. It is a monopoly of the most obnoxious kind, if one man have the opportunity of snatching from another the fruit of his toil and the result of his outlay, if one may reap where another has sown. A Patent Law prevents this.

If this inventor were working under the protection of a Patent, he would have the same difficulties to overcome as before. But he would be freed from the apprehension of losing all return for his outlay. Whilst his Patent continued in force, he would have the sole right of manufacturing a particular article, a right which would be useless unless he could manufacture that article so cheaply as to compete with all others of a similar kind. Thus, his Patent privilege

would merely give him the opportunity of competing on equal terms with everyone else.

These are the leading principles according to which the bestowal of Patents can be defended. But the provisions of our Patent Laws cannot be supported on these or any other grounds. Our Laws, as now framed, give the greatest possible amount of annoyance to the public with the least possible protection to the Patentee. Because a Law is bad, it does not follow that its principle is erroneous or obnoxious, any more than it follows that, because a man is a fool or a lunatic, therefore he ought to be tortured or slain.

So long as inventors can obtain Patents, the public gains quite as much as inventors can do. By taking out a Patent, they bind themselves to disclose the nature of their invention, and also to make it over to the public after the lapse of a few years. If they cannot receive legal protection, they make no disclosure, because unless they work in secret, the fruit of their labors will be filched from them. In the one case, it is their interest to strive to furnish the public with the most perfect machine, process, or article they can produce. In the other, their energies must be chiefly expended in concealing from the public their methods of working, or the construction of their improved machinery. The absence of a Patent Law is a premium on secresy.

We are disinclined to cite the example of any other country in support of the course which should be pursued in our own. But in the present case, we must make an exception in favor of the United States. There, if anywhere, Patent Laws would not be maintained for a day, if they proved so detrimental to trade as some would have us believe. Now, the Americans have afforded us as much reason for concluding that they desire the dissolution of the Union, as for maintaining that they are dissatisfied with the operating of their Patent Laws. In his report for last year, the Commissioner of Patents assures Congress, with reference to what had been said in England against Patents, "that to most inventors in this country [America] it would seem not less preposterous to question the right of property, or the fundamental laws of morality, than to inquire into the right and policy of granting Patents for inventions."

The cases of individual hardship which are constantly urged as reasons for abolishing Patents, have nearly always arisen from the defectiveness of our Patent Laws, and the inefficiency of the tribunals which decide questions relating to Patents. Thus, we should support any well-considered plan of reform of those laws as heartily as we should oppose their injudicious repeal. Bad though they are, yet they do less harm than would ensue were there no law in operation. To abolish those Laws, in place of amending them, would be at once unwise and indefensible.

REPORT OF THE SMITHSONIAN INSTITUTION.

We have before us the Annual Report of the Board of Regents of the Smithsonian Institution for the year 1863. It is a book of 418 pages, and being a Congressional document we presume may be obtained gratis by any of our readers on application to their Representative in Congress. From the report of the Secretary we make a few extracts —

FINANCES OF THE INSTITUTION.

It will be seen by the report of the Executive Committee that the finances of the Institution are in as favorable a condition as the state of public affairs would authorize us to expect. First. The whole amount of money originally derived from the bequest of Smithson is still in the treasury of the United States, bearing interest at six per cent, paid semi-annually, and yielding $30,910. Second. Seventy-five thousand dollars of an extra fund are in bonds of the State of Indiana, at five per cent interest, also paid semi-annually, yielding $3,750. Third. Fifty-three thousand five hundred dollars of the same fund are in bonds of the State of Virginia, twelve thousand in those of Tennessee, and five hundred in those of Georgia, from which nothing has been derived since the commencement of the war. Fourth. A balance of upwards of $32,000 is now in the hands of the treasurer of the Institution.

INFLUENCE OF THE SUN AND MOON ON THE MAGNETIC NEEDLE.

In several of the preceding reports an account has been given of a series of reductions of the magnetic observations made from 1840 to 1845, inclusive, at Girard College, Philadelphia, by Professor Bache. The first two of the papers of this series related to what is called the eleven-year period of the variation of the needle, which corresponds with the recurrence and frequency of the spots on the sun. The third paper relates to the influence of the moon on the variation of the needle. The fourth refers to the change in the horizontal part of the earth's magnetism coinciding with the eleven-year period of the spots on the sun. The fifth relates to the effect of the sun in producing daily and annual variations in the horizontal component of the magnetic force. The sixth relates to the lunar influence on the horizontal magnetic force.

A particular account has been given of the result of all these investigations, which tend fully to carroborate the conclusions arrived at from observations in other parts of the world, that both the sun and moon are magnetic bodies, and exert an influence upon the polarity of the earth; and also that the magnetism of the sun has variations in intensity which are in some way connected with the appearance of spots on its surface, giving rise to the variations in those perturbations of the needle which have been called magnetic storms, and which present a periodical recurrence at an interval of about eleven years.

The influence of the moon is much less marked than that of the sun, and appears to be more analogous to the temporary magnetism induced in soft iron.

In an appendix to this paper the connexion of the appearance of the aurora borealis with the disturbances of the direction and force of the earth's magnetism is discussed. From the result of this discussion it appears that there is a periodicity of about eleven years in the recurrence of the aurora, as well as in that of the great disturbances of the needle, and that these are coincident with each other and with the appearance of the spots on the sun.

FORETELLING STORMS.

For several years previous to the commencement of the war a large map was exhibited in the Smithsonian Institution, on which was daily represented the direction of the wind and face of the sky over the greater portion of the United States; and in previous reports we have frequently called attention to the fact that a properly organized system for giving daily changes of the weather in distant parts of the United States would be of great practical importance to the shipping interests of the country; we have also stated the fact that we are much more favorably situated for predicting the coming weather than the meteorologists of Europe. The storms in our latitude generally move from west to east, and, since our seaboard is on the eastern side of a great continent, we can have information of the approaching storm while it is still hundreds of miles to the west of us. Not so with the meteorologists of Europe, since they reside on the western side of a continent, and can have no telegraphic dispatches from the ocean. The proposition, however, to furnish constant information of this kind could not be carried out by the limited means of the Smithsonian Institution, and, indeed, can only be rendered properly and fully serviceable under the direction and at the expense of the government.

New and interesting features have been introduced into the daily meteorological bulletin published by the Imperial Observatory at Paris. As mentioned in the last report, these bulletins are lithographed each day from records of the barometer, thermometer, wind, and face of the sky, compiled from telegraphic reports transmitted to the observatory from various parts of Europe. In addition to these, they now contain daily a small outline chart of Europe upon which are drawn diagrams showing the barometric curve of the day through the various stations, together with the temperature and direction and force of the wind. For the use of vessels about to leave port, a statement is also given of what will probably be the direction of the wind the next day, Chambers of commerce and intelligent seamen have acknowledged in strong language the benefit of these daily bulletins, thus adding to the ever-accumulating testimony in favor not only of the speculative interest but also practical benefits of meteorology. At Bordeaux, Havre, and other important ports, as soon as the bulletins are received, the telegraphic announcement of the weather and the probable direction of wind for the following day are posted in public places and furnished to the principal newspapers for publication.

Improvement in Amalgamating Gold.

Mr. Crooke, editor of the London *Commercial News* has discovered a peculiar action of sodium in mercury.

One of the difficulties met with in the extraction of gold and silver from their matrices by amalgamation is what is known amongst miners as the sickening and flouring of the mercury used for that purpose. In this state the mercury is tarnished on the surface, its amalgamating action is greatly reduced, and when triturated in the amalgamating machines it breaks up into minute particles, which will not again unite, and are carried off with the slimes, so that with many ores the loss of mercury forms a considerable item in the cost of extracting the precious metals. Mr. Crooke has found that if 1-20,000th part of sodium is added to the mercury, this flouring is prevented. Mr. Thomas Belt has made a series of experiments on the amalgam, and we find the following results in the *Mining Journal:*

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

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

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

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

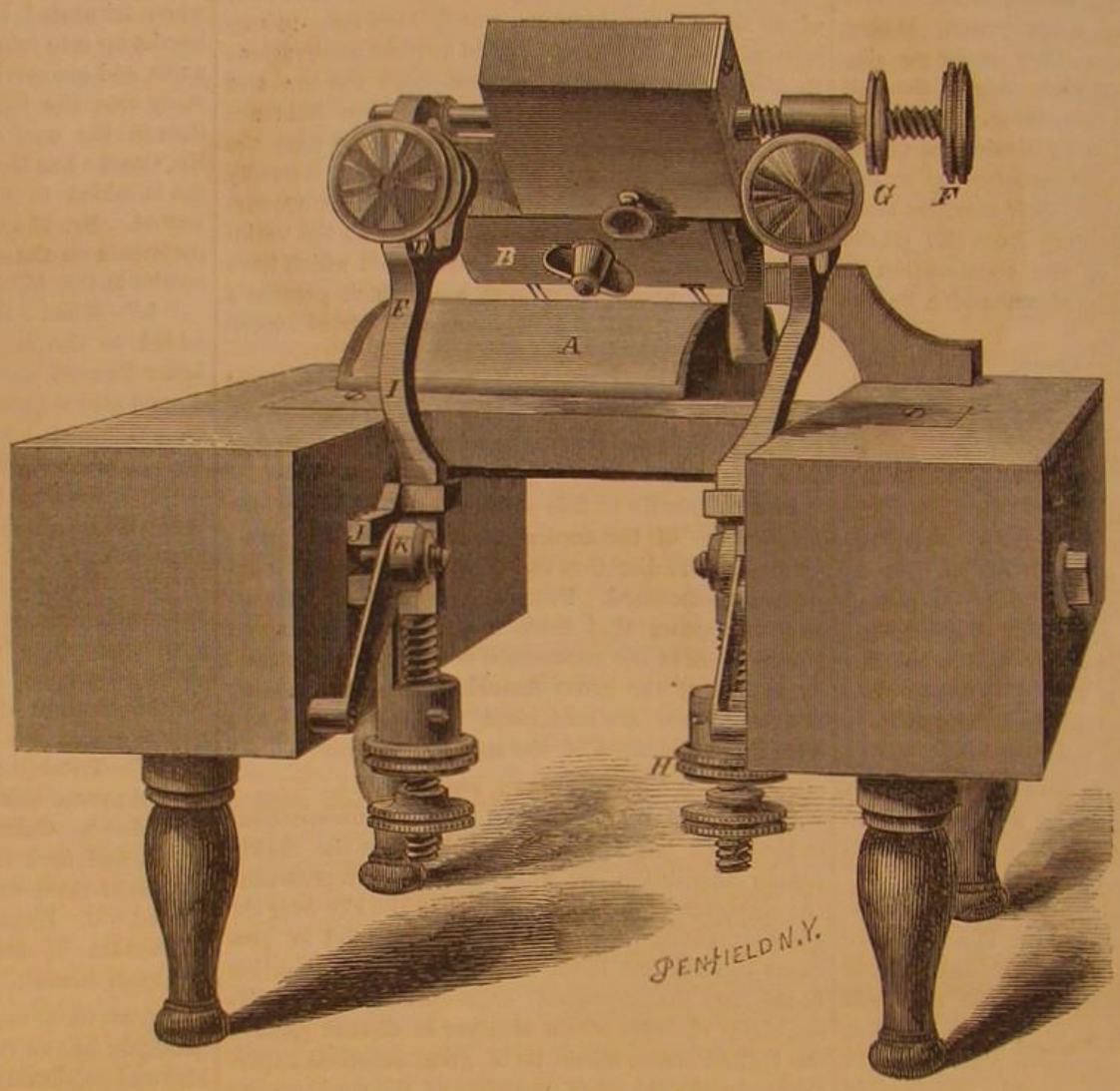
"From these experiments it appears that sodium amalgam has an energetic action upon both the oxides and sulphurets, reducing both ; and as the sickening and flouring of mercury is supposed to be due to the formation of the protoxyde and the sulphuret of mercury its beneficial effect appears to lie in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

A $1000 race between a horse and a steam carraige, at New Haven, lately, resulted in the signal defeat of the latter. But they are going to try it again, as the steam man allegest hat bad fodder, which means coal, injured the speed of the locomotive.

Improved Ruling Machine.

This attachment to paper ruling machines is intended to expedite and facilitate the process by providing simple and reliable mechanism for regulating the pens, both in the angle at which they work on the paper, and also laterally, so that they may be set at any distance apart or otherwise adjusted, as the work may demand. The pens are also made to work properly, or with their faces on the paper, and can be used on fine ruling, such as railroad and commercial work, without danger of blotting or blurring the heads or double lines.

The following description explains the principal parts and the operation of them. The paper to be ruled is placed on the cylinder, A, and the pens which rule it are set in the beam, B. This beam has to be placed in different positions, to conform to the work to be done or the habit of the workman who is ruling; this latter is quite a feature, for if a man is obliged to work on a machine which is unsuited to his peculiar tastes, he gets nervous, and is unable to accomplish so much, or do it as well as if he had every thing to suit him. The pen beam can be set at any angle by simply moving the screws, C, in or out. These screws work a nut, D, in the bracket, E. The pen beam shaft sets in this nut, so that by moving the screws, C, in or out the beam is altered accordingly. The lateral or side adjustment of the pen beam is effected by another screw, F; by turning this the beam is drawn over to one side, and can be held at any point by bringing the jam nut, G, up to the screw shank. Vertical alteration can be made in the pen beam by the screws, H, at the bottom; these latter raise the standards, I, which support the pen beam, and in this way change the angle which the pens have with the paper to be ruled. The standards are carried in slides, J, which are held in place by a nut, K; by slacking this nut the slides can be moved in also, thus giving a very wide range of alteration to the pen beam.



FORMAN'S RULING MACHINE.

The advantages of this attachment are a great saving of time in adjustment both in setting the pens and securing it to the machine, also great accuracy in ruling complicated work in fancy inks. The pens also work with much freedom, and give clear distinct lines through being properly adjusted with the paper or working with their faces instead of their edges. The inventor is a practical ruler of fourteen years' experience and finds great advantage in this machine, which he has in daily use.

A patent is now pending on this machine through the Scientific American Patent Agency by J. C. Forman; for further information address him at No. 20 Hamilton street, Cleveland, Ohio.

THE fact that there are no less than fifty tunnels to be passed between Bologna and Pistoja will suffice to give a tolerable idea of the engineering difficulties encountered upon the line of railway which at present forms the sole means of communication (omitting, of course, the old postal road,) between the northern and the central provinces of Italy. Some of these tunnels are very short, it is true—a mere momentary plunge into the darkness of the abyss; but others are of considerable length—one about a quarter the length of the Mont Cenis tunnel.

A 62-INCH Fourdrinier machine, at Elizur Smith's paper mill in Lee, recently turned off 4,479 lbs. of paper in 24 hours, running 103 feet and 4 inches per minute, or 20 miles in 24 hours.

Deterioration of Bituminous Coal.

The leading article in the last number of *Newton's London Journal* commences thus:—

With every shipment of coals at Newcastle, it is customary for the fitter to make a declaration to the effect that the article then shipped is "fresh wrought" from the mine: a tacit acknowledgment on his part that his coal is supposed, in some way or other, to deteriorate by keeping. Nor is this supposition the result of mere prejudice, for it is an established fact, although, like many other facts, it is far too little known and appreciated by the public at large. Coal of every description deteriorates by being kept in contact with the air, and some kinds suffer much more rapidly than others; but all are liable to damage from two causes, that might not inaptly be called the "dry" and the "wet rot." Thus, when coal is exposed to the air, its surface, and to a certain extent its substance, becomes oxidized, by which it gains in weight, but loses in calorific value; in fact, we might say that a part of it is burnt, but not removed: this is the "dry rot." Then, again, when coal in large heaps or masses is moistened, it undergoes a sort of fermentation or heating, which expels a portion of the hydrogen, and oxidizes a part of the remainder, so as very much to diminish the heating power of the coal; this is the "wet rot." Upon some varieties of coal these changes are extremely slow, whilst upon others they take place with great rapidity, and, to an extent that may well be regarded as very serious in a pecuniary point of view. The fact itself, however, appears to be altogether ignored by our governmental authorities, for it is never once alluded to in any of our "blue-book reports" upon fuel; and it unfortunately happens that there are no physical or external indications in the appearance of the several descriptions of coal by which we might, upon inspection, form an opinion of the keeping quality of any particular sample. We ourselves have made many experiments upon this deterioration, and are therefore able to say, that generally speaking the heating power of dry coal is diminished in the ratio of 13 to 12 by a six months' exposure to the air and the ordinary action of daylight; but when the coal is moistened, the loss becomes much greater, and even this is evidently increased if the bulk of the material is very large, so that in such a case the coal seems gradually to be converted into mere lignite, at the expense of nearly one-half of its calorific value. That a list of the different kinds of coal, with a well-authenticated table of their deteriorating quality, would be a great boon to the coal-consuming public, needs no argument at our hands. The practice of the coal-fitters at Newcastle is a sufficient proof of the importance and necessity for some such guide, and there we leave it.

The article is signed L. T., and the author announces himself as the L. Thompson, some of whose experiments on fuel are cited by Ure. He says that the deterioration of the coal is due to oxidation, but he does not say whether this explanation is founded on direct observation, or whether it is an inference only from analogous changes in similar substances.

Velocities.

A heavy body falling from a hight, for instance from a balloon, falls during the first second 16 1/2 feet, 3 times as far the next, 5 times as far the next, and so on, with increasing velocity, in the ratio of the successive odd numbers 7, 9, etc.; hence it will fall 1,200 feet in 9 seconds, and three miles in 31 1/3 seconds. A cannon ball fired perpendicularly ascends with decreasing but falls with increasing velocity, and describes each portion of its path upward and downward, respectively, in identically the same period of time.

Sound moves at the rate of only 1,142 feet per second. Therefore we see a train of cars at a distance fairly across a bridge long before the sound of their crossing reaches the ear.

Light moves with a velocity of 192,000 miles per second, which, for terrestrial observations, is instantaneous. But so remote are the fixed stars that the light of the nearest occupies more than three years in its journey to the earth of twenty billions of miles. Some idea of the inconceivable velocity of light may be obtained by comparing its speed with that of a cannon ball. The latter moving at the speed of 1,200 feet per second would require upwards of one million three hundred and eighty thousand years, to accomplish the distance of ten millions of millions of miles, the probable distance of Sirius from the earth. The light of Sirius is supposed actually to be 60 times greater than that of the sun. X.

Plow Attachment.

The *Country Gentleman* says, Messrs. J. & A. Kilmer, Barnerville, Schoharie Co., N. Y., have patented a device for regulating a chain attachment to plows, so as to enable them to turn under and cover all growth of whatever kind, which may be standing on the soil. We witnessed its operation on a field thickly covered with a rank growth of coarse weeds, three or four feet high. Its success was complete, every particle of the weeds being entirely put out of sight by the furrow.

[This invention was illustrated on page 354 of the last volume.—EDS.

THE boot and shoe manufactories in Massachusetts are now in full operation, and all the workmen find employment with fair wages. Good workmen make from $2 50 to $3 50 per day.

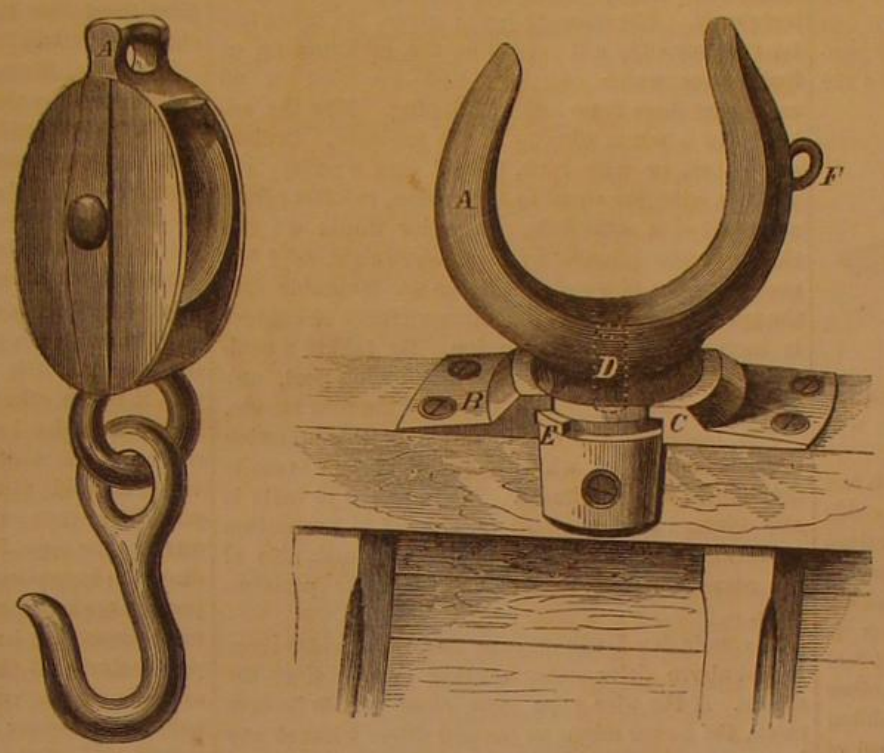
[So much for machinery. Disciples of St. Crispin would have been utterly unable to earn any such sums without the aid of machines.—EDS.

THE wettest place in the world is Cherrapoorjee, situated in the Cossya hills, 25 miles from Calcutta. The rainfall at that spot is upwards of 600 inches in the year, or 20 times that of the very worst climate of western Ireland.

Improved Rowlock and Tackle Block.

The common thole-pins which have been used so long in boats propelled by oars are very rude contrivances for the purpose. They not only add very greatly to the labor of rowing, but they are liable to break, afford inadequate support to the oar, and in a sea way often throw it out altogether.

The rowlock here shown is in every respect preferable to the old-fashioned wooden pins. It is light, neat in appearance, and above all far more efficient than the other spoken of. It conforms to the motion of the oar in changing from one stroke to another, and therefore does not strain the arms and back so much, and tends greatly to lessen the fatigue. This invention is important to oarsmen and boat-builders as the whole strength of the gunwale is retained, which is an entirely new feature in the manufacture of swivel rowlocks. Swivel rowlocks have always been objectionable, especially for light boats with narrow gunwales, as one half or more of the gunwale had to be cut away to put on the rowlock, which impaired the strength greatly. In this invention the plate of the rowlock is fastened firmly on top of the gunwale. It can be easily attached or detached, as occasion may require; it works smoothly and with little noise, and its strength is at the point where it is most needed.



NORCROSS'S ROWLOCK AND TACKLE BLOCK FOR BOATS.

In construction it is a metallic jaw, A, formed in one piece, having a base, B, which is grooved as at C. The body of the jaw has a hole in it which fits over a pin, D, as shown in the dotted lines. The base is screwed fast to the gunwale and the jaw or rowlock turns in it with the pin for a center. There are also two projections, E, one on each side of the rowlock, which work in the groove; by turning the rowlock so that the projections come fair in front between the opening, the rowlock itself can be taken out and laid in the bottom of the boat, a painter or chain in the eyebolt, F, serving to prevent it from falling overboard. The oar can be shipped at the small end near the blade, if desirable, and the neck or opening between the two jaws of the rowlock made so narrow that the oar cannot unship even in the heaviest sea—thus the oarsman can keep all his energy directed to propelling the boat. Patented May 9, 1865.

The tackle block illustrated by the side of the rowlock, is peculiar in construction, inasmuch as the strap sheaves, becket and hook, are all cast in one piece, thus rendering it much cheaper to manufacture and durable in use. The becket, A, is cast of a proper shape to receive the line or rope to be run through it, and is smooth, so that the same will not be chafed or frayed out from use. They are made from one-fourth of an inch to one inch, both single and double sheaves. The block was patented through the Scientific American Patent Agency Sept. 27, 1864, by Capt. J. W. Norcross. For further information on both of these articles address the manufacturers, Messrs. Wilcox & Hall, Middletown, Conn.

TIN--HOW SAMPLED, ASSAYED AND SMELTED.

The tin mines of England are confined to its southwestern extremity. They are worked by two different classes of laborers, distinguished from each other by the mode in which they are remunerated for their work. One of these classes undertakes to remove a given area of ground for fixed wages, totally irrespective of its mineral contents; the other sinks a shaft, or drives a level, of specified dimensions, being paid for the same by a percentage on the mineral contained in the ground he removes. The former class are called tutworkmen, the latter tributers. From the above two kinds of labor it results that a portion of the stuff dug from the mine is owned wholly and entirely by the adventurers, or shareholders, in the mine, while the remainder is only theirs after the miner has deducted from it the percentage for which he undertook to remove it. Now, since in a large mine there are many gangs, or pares of men, as they are called in Cornwall, between whom and the shareholders contracts are entered into on tribute, and since it would be quite impossible to keep each parcel of ore separate in its passage through the innumerable stages which tin has to undergo in its cleansing, it consequently becomes necessary, as well to protect the adventurer as the tributer, to ascertain by assay the amount of black tin in each parcel before it is mixed in the common heap, to be stamped, washed, and calcined, all processes neccessary to bring the ore to that condition of purity required by the tin smelter.

Having used the word black tin, it may be as well here to explain that the term is applied to the pure black oxide of tin, in which form nearly all the tin in Cornwall occurs in nature. Well, having thus seen the necessity of ascertaining the quantity of tin in each parcel of ore, we will proceed to describe the manner in which it is arrived at, and which is termed, trying tin samples.

Each parcel of stuff which is known to contain mineral is, when brought to the surface weighed or measured, to ascertain its exact bulk or weight. Immediately this has been done a sample is caretully taken of the whole pile, and placed in a small tray, some 10 in. square. The tray is then removed to the sampling-house, and its contents emptied on to an iron plate in the floor. Then, under the superintendence of one of the mine agents, it is roughly crushed by flat hammers, and a fair sample, about one-third of the whole, taken. The rest being rejected, this one-third is replaced on the iron plate, and crushed much finer. Of it is, again, taken a sample, about one-third of the whole, and the remainder again rejected. This is again and again repeated, until the sample is reduced to about half-a-pint, which quantity is placed in a small bag, with a label indicating the parcel from which it is taken, and then carried to the sample trying house. The tools of the sample tryer are a large shovel, slightly concave, with a handle fixed in it nearly parallel with its face; a large tub almost full of water; a wooden upright, placed on one side of the tub, and fitted with little hooks to hold the shovel when roasting on it; an iron mallet, with two heads for bruising the ore on the shovel; a small clay crucible; and, lastly, a low fire. The mode of procedure is as follows:—The assayer measures the dried and pulverised ore in a small cylinder, holding one-forth of a noggin; this full, he upsets it on to his shovel, previously dried, and returns it again to the measure to ensure great accuracy; emptying it again on the shovel, he moistens it with a little water from the tub, and taking the shovel in his hand he gives it a series of movements, difficult to describe; they, however, resolve themselves into two principal actions—first, a cleansing by a rapid agitation, which imparts a rotatory motion to the liquid, and makes the muddy water run off; second, the rocking by little shakes up and down, and forth and back, which cause the heavier substances to rise toward the right edge of the shovel, the poor sand being washed to the back of the deposit, and the worthless being drawn towards the opposite side, whence it is thrown over by a shake. The ore, thus enriched, contains some rough grains; so the assayer places his shovel on the pedestal, and taking one of the heads of the mallet in his left hand, and the handle in his right, he rubs the sand vigorously. He then rewashes the assay, or, as it is termed in Cornwall, re-vans it, and drying his shovel over the fire, carefully brushes off every particle into the clay crucible. This crucible is then placed on a slow fire, and the assayer keeps continnally stirring the charge, until the whole of the pyrites so commonly admixed with tin or in nature, is destroyed, and the charge is roasted quite sweet. The roasted mineral is then replaced on the shovel, washed, bruised, re-washed, dried, and weighed. The black tin obtained is weighed by the lb. troy, and they reckon it by grains and pennyweights. Now, to deduce from the result of the assay the quantity of black tin contained in a parcel of ore, the assayer has a table calculated supposing the assay to be made on half a noggin. On this hypothesis it is generally allowed that for 9 grains found in the assay there exists 1 cwt. of black tin to 100 sacks of ore, each sack containing 12 gallons by measure. It is needless to go into the calculation, and all that need be observed is that the principal of the valuation consists in the admission of the equality of the ratios —½ noggin of dry sand =9 grains; 100 sacks of moist particles=1 cwt. Experience has led to the adoption of these figures, so that account may be taken of the water passing from the ore, and that there may still remain a bonus for working it.

In cases where the ore is weighed, instead of measured, the whole calculation is, of course, totally different, and certainly much more satisfactory to the miner. In this case the assayer operates on 2 ozs. avoirdupoise, and weighs the black tin obtained by troy, and a table is made based on the fact that 1 gr. in the assay corresponds to 2 lbs. 8 ozs. in1 tun of ore.

By the above process all the ores of tin in Cornwall are assayed for black tin; and by it the miner estimates the quantity of tin contained in any given piece of ground. At first sight it would seem to be a method to be practised by anyone, but it is not really so, for the washing of the ore on the shovel, termed vanning, requires the greatest dexterity on the part of the manipulator, or he will wash away a large quantity of tin with the refuse. In it, as in all processes for dressing tin on the large scale, the success depends on the specific gravity of the tin ore being greater than that of the worthless matter mixed with it; but the difficulty of applying this property to the assay on a small scale on the shovel is immensely inhanced as compared with the difficulty of using it to collect the tin when in bulk and spread over large areas. In truth, without continued practice and great experience a vanner will invariably lose some ore, whilst to the initiated it is a method very accurate and trustworthy; also to the traveling miner its value can hardly be overestimated, for with his vanning shovel and crushing hammer he can roughly estimate the value of any gold or tin vein he meets with.

Now, the tin miner probably labors unders greater disadvantages than any other class of miners, because he is obliged to cleanse and purify his ore to a greater extent than they are before he can sell it to the smelter. Pure black oxide of tin contains 77 per cent of metallic tin, and unless a tin ore can be cleansed as as to contain nearly 60 per cent of metallic tin the smelter rejects it. This is certainly a fact which has not received the attention it deserves, for the great cost of tin mining is in the expense and labor of purifying the ore after it is dug out of the mine before it is fit for the smelter. It may be safely

said that no greater boon could be conferred on the tin miner than the discovery of some method of tin smelting by which the necessity of extreme purity in the ore was not an essential. When we come to speak of tin smelting we shall see that there is a method by which impure tin may be smelted, but we shall then also see that there are so many practical objections to the process that it can never be commonly adopted. It is known by some tin miners, although we believe not generally, that acid may be most successfully applied to the purification of tin ore when mixed with certain readily soluble bodies, and it is almost a wonder that its power is not more generally applied. For a long time the use of acids for this particular purpose was thought to be a great secret, and its application was rigidly, when made use of, hidden away in back sheds; now, however it can no longer be called a secret, so that the more generally the fact is diffused the greater the boon to the miner.—*Mining Journal.*

Correspondence

The Power of Belts.

Messrs. Editors:—Facts appear to be wanting concerning the power of belts. Here are some, well observed and conclusive, so far as they go:—

The towers of the Cincinnati bridge are 200 feet high, and contain 16,000 perches, or 400,000 cubic feet, of masonry each. This material has been raised by engines of 10 inches bore and 20 inches stroke, working with a pressure of 60 to 80 pounds, making 80 to 150 revolutions per minute. The power is transmitted by a 9-inch leather belt, from a 4-foot iron pulley, keyed upon the crank shaft to another 4-feet pulley, fixed upon a pinion shaft. This pinion is 14½ inches in diameter, and drives a spur wheel of 6 feet diameter; another 14½-inch pinion on the shaft of the lathe moves a second spur of 6 feet, fixed upon the same shaft, which turns a 3-feet drum, which winds and unwinds a hoisting wire rope, of 1½ inches diameter. By this rope the weights are hoisted direct without any further tackle or appliances. By 25 revolutions of the engine the wire rope drum revolves once, and pays off or receives 10 feet of rope. This makes the speed of the belt 50 times the speed of the wire rope.

A block of sandstone, measuring 60 cubic feet, and weighing 8,400 pounds, is a full-sized stone for the work. The belt will run up each a block, the engine making 125 revolutions per minute, at the rate of 50 feet per minute, which task requires the tightening pulley to be pressed down hard, so that about ⅗ths of the circumference of the 4-feet pulley are closely hugged. The same belts have been performing this duty nearly three seasons with ever falling. On the contrary a limestone of the same cubic contents weighing 170 pounds per foot, or 10,200 pounds, cannot be raised without the slipping of the belt, and without such hard application of the tightening pulley, as to endanger its splicings and safety. A weight of 8,000 pounds may be considered in this case as the fair working limit of the power of the belt. A strain caused by 10,000 pounds is altogether too much for safety and economy.

The speed of engine being 125 revolutions per minute the speed of belt is 4×3 1416×125=1571 feet per minute. The duty performed in this case is equivalent to 50×8,000=400,000 foot-pounds. With a load of 8,000 pounds the tension of the belt is 254⅔ pounds. Its speed being 1571 feet per minute, its performance is 1571×254⅔=400,000 foot-pounds. Assuming the width of belt at 10 inches we have 40,000 foot-pounds for one inch of belt. The old rule allows one inch for every horse-power of 33,000 foot-pounds, and I think this is a very good rule for ordinary mill practice, provided the speed of belt is equal to about 1,500 pounds per minute.

Blocks weighing 8,000 pounds have been frequently raised 150 feet high in 2½ minutes without the slipping of the belts. This speed is equal to 60 feet per minute and the duty performed is equivalent to 60×8,000=480,000 foot-pounds=15,54 horse power; speed of belt=1,885 feet.

The principal element which determines the power of a belt is its speed. A slow moving belt cannot transfer much power, any more than a slow moving piston. The higher the speed the more power will be run off. Now the question of speed can only be qualified by the question of wear and tear, and by adhesion. If the speed is too high the belt will slip, more pressure becomes necessary, and a greater wear and tear will result. Where there is no absolute necessity, the speed should never exceed 1,500 feet. A less speed of 1,000 to 1,200 is preferable and will be found more economical in the end. Where a higher speed, say 2,000 feet and more are essential, as in the driving of fans, economy must be neglected.

The absolute strength of a belt is a fixed and invariable quantity at any one time. Speed, on the other hand, may vary, say from 500 feet, per M. to 3,000 feet per M. The strength being given, the other factor (the velocity) will determine the performance, or foot power which can be raised—provided in all cases that there is no loss by slipping. Now the adhesion of a belt is directly as the pressure. Ordinarily a belt or wire rope, passed over a pulley, will produce adhesion equal to its tension, resulting from a contact of a semicircle. In other words we can elevate 2,000 pounds by a counterweight of 1,000 pounds, if the physical conditions are favorable and the speed is slow. As the circumference of contact is increased so is the adhesion. By taking a sufficient number of turns around a snubbing post, any line or rope may be broken, provided the post stands.

The mathematical consideration of this question is very complicated, while the practical issue is easily determined by experiment. The adhesion of belts is also favored by large pulleys, but not in proportion to the size. The conditions of the belt and also of the atmosphere will likewise influence its performance.

In conclusion I will observe that the engines mentioned above drive other hoisting gear, besides the drums. If the wire rope gear alone was to be operated, the power might be applied direct without any belting. John A. Roebling.

Cincinnati, Ohio, July 8, 1865.

Defence of Patent Sale Agents.

Messrs. Editors:—I have noticed in your last issue an article signed, "J. T.," in relation to the "Trials of Inventors." It would appear by that article that J. T. fell among thieves, or would, had he not proved too smart; that he makes a faithful record of the facts, so far as his experience is concerned, I would not doubt, although his experience always kept him from their clutches. Many persons have visited this city, and instead of buying goods of a regular house wended their way to a mock auction shop, and finally left the city in disgust at the prevailing wickedness of the metropolis. It is legitimate for your house to solicit patents, and for the United States to grant them, I would ask why it is not legitimate to sell patents; at what particular point does knavery necessarily begin; and why, of necessity, is a patent sale agent a knave? I am aware by seeing advertisements, that there are several parties in New York engaged in the sale of patents; as to their mode of doing business I have no knowledge, as I have not the honor of an acquaintance with a single party in the business. I sell patents, and require a model, patent papers and power of attorney, in order to close a sale when the purchaser is ready without delay. I make no charge to the inventor for receiving a patent, and none whatever unless I make a sale. There are dishonest men in all departments of business, but that is no reason why the entire community, or the whole of any class should be subject to wholesale charges, without comment, thus leaving the impression that no one in that particular branch is worthy of confidence. Judged by this rule every kind of business would suffer.

J. H. Beardsley.

New York, July 6, 1865.

Cutting Hard Steel.

Messrs. Editors:—Seeing in your last number an article upon cutting hard steel with a soft iron disk rotating at a high velocity, and having had some experience in using the like, I send the following:—A few years ago I made a considerable quantity of gimblets, and finding the old way of cutting the screw by hand to be slow and hard upon the eyes, I constructed a machine to cut the screw with a sheet iron disk, 3½ inches in diameter, making about 3,000 revolutions per minute. The disk was supported by plates ½ an inch less in diameter than itself. I could with this machine cut from two to four dozen gimblets per hour.

P. S. Will the lubricating coal oil injure leather belting? I find it makes the belts very soft.

[We should suppose that heavy coal oil would injure leather belts, but as our correspondent is trying it, we hope he will communicate the result.—Eds.

Length of Steam Pipes.

Messrs. Editors:—We are building a factory four hundred and fifty feet from a dyehouse; we wish to put in a boiler large enough to supply both places; will it work well to carry steam through so long a pipe from the factory to the dyehouse, and how should it be laid? John C. Gardner.

Hingham, Mass.

[Steam pipes should always be as short as possible, but in the Gould & Curry mine, Cal., steam is carried 1,100 feet, with a loss of only five pounds pressure. The pipe is cased with ashes.—Eds.

The Jet and Ball Problem.

Messrs. Editors:—"C. H. A." asks an explanation of the philosophy of the suspension of a sphere (leaden ball) in a perpendicular jet. I have studied the matter a little heretofore and convinced myself that it is the effect of compensated friction on the lower or under half of the ball. If the jet strikes centrally the ball is raised centrally; whenever it varies a rapid upward motion is given to the inner portion, or that part directly over the jet, and consequently the opposite hemisphere moving in a reverse direction is exposed to greatly increased friction and pressed back to its original position. This continues until something breaks in upon the regularity or perpendicularity of the steam. If it can be shown that any other than vertical revolutions are made by the ball, of course my theory fails. R. H. A.

Bath, Md., July 13, 1865.

The Sandwich Islands.

Among the foreign countries engaged in commerce with our northwest Pacific States, there is none that is establishing with them more intimate commercial relations than the Sandwich Islands, which are located in the North Pacific, in latitude 20°, about 2,100 miles southwest from San Francisco, and directly in the track of vessels bound from that port to China. The prospect of a speedy establishment of a line of monthly steamers across the Pacific, under contract to perform the American Mail service be between California and China, touching at Honolulu and Japan, both in going and returning, gives increased interest to the agricultural progress of the group. Postmaster General Dennison has officially invited tenders for the performance of this important mail service; and as it is understood that parties are ready to place the steamers on the route at once, it is expected the line will be in operation during the next year at the farthest. The establishment of a steam line will reduce the time required to make the passage from San Francisco to Honolulu from fifteen days to eight, and tend to greatly increase the commerce with this group, which is practically an American colony, as a large majority of the foreign population are Americans. We propose in two or three brief articles, to notice the agricultural progress made there during the past few years, most conspicuous among which has been the

MANUFACTURE OF SUGAR.

The cultivation of sugar cane in the Sandwich Islands dates back more than twenty-five years; but it was not till after the settlement of California, and the consequent opening of a near and permanent market for sugar on the Pacific coast that any impetus was given to the business. Since 1850 foreign capital has been slowly becoming interested in cane culture and in the manufacture of sugar and molasses, till now there is no less than twenty-five plantations, valued at over two million of dollars, and capable of manufacturing twenty millions of pounds of sugar annually, with two hundred thousand gallons of molasses. The sugar mills are generally of the largest size, well made, with all the modern improvements, such as steam clarifiers, centrifugal machines and other late inventions, and are surpassed by no other sugar mills in the world. They have been man

ufactured mostly in Boston or Scotland, but a large iron foundry is now established in Honolulu which has turned out some very superior mills, though smaller than those imported from the above-named places. A first class plantation has machinery capable of manufacturing a thousand tuns of sugar per annum, and several of them, it is thought, will produce that quantity this year. Such a plantation requires about 150 laborers and workmen. The latter are generally mechanics from the United States, England or Germany. The field laborers are wholly natives of the Islands, who, when well managed and treated, are found to be as reliable and efficient as any plantation laborers in other sugar countries. Indeed, some assert that the plantations in the Sandwich Islands are conducted with fewer hands, in proportion to the product, than in other countries. There has been no lack of laborers thus far, and if we may judge from the number of unemployed men living without any regular means of support, it will be some years before any great scarcity is felt. The Island Government has wisely taken measures to provide for any future deficiency that may arise, by making provision for the emigration of Asiatic laborers to the Islands, whenever any are found ready to migrate thither with their families.

The quantity of sugar manufactured in 1864 was about eleven millions of pounds, most of which found a ready market in San Francisco, Oregon and British Columbia. It is estimated that the production for 1865 will be fifteen millions of pounds, and that the annual increase will be about 33 per cent. In quality, the Sandwich Island sugar ranks in the San Francisco market equal to the best New Orleans or Cuba for consumption; and for refining purposes it is far superior to them, on account of its peculiar crystalizing or graining properties; and in this respect it is preferred to the best Manilla or China sugars. The cost of its manufacture in the Sandwich Islands has been estimated at four cents per pound; but on old-established plantations it probably does not exceed three and a half cents—prices which enable the planters to compete successfully with Manilla, India or China.

The climate of the Islands has been found to be peculiarly adapted to the growth of cane, and though the average yield does not exceed two tuns of sugar to the acre, yet as high as five or six tuns of sugar have been frequently produced from a single acre. There is a large extent of cane land still unoccupied. The island of Hawaii alone, it is estimated, is capable of producing one hundred millions of pounds of sugar annually. This being so, there is a prospect that this group may, before many years have elapsed, become to the Pacific coast what Cuba now is to the Atlantic States. For its developement this business must rely in future as in the past on foreign capital and management; but with a stable government and with permanent steam communication between its chief ports and our Pacific States, its progress will be sure and rapid. H. M. W.

[We are indebted for these interesting statements to H. M. Whitney, Esq., editor of the *Pacific Commercial Advertiser*, which is published at Honolulu. —Eds.

RECENT ENGLISH PATENTS.

CONSTRUCTION OF PUMPS.

This invention relates to that description of pump which is usually termed a rotary pump, and consists in the adaptation to the purposes of pumping or forcing of a modification of an improved construction of steam engine. The improved pump consists of a circular annular chamber, constructed with two castings, with semicircular grooves or spaces formed in them, so that, when the two castings are brought together, a circular annular chamber is produced, in which works a disc or piston, made water-tight by means of suitable metallic packing. This piston is attached to a hollow boss mounted on a central shaft, which passes through stuffing-boxes formed on the sides of the cylinder casting, at the central part of which there are water chambers, with which the supply and delivery pipes of the pump communicate. Spaces are cut out of each side of the hollow boss (which carries the piston), and these spaces communicate in succession with the openings of the water chamber as the piston moves round. Two transverse discs, mounted in suitable grooves or ways, in which they can be moved in and out, are adapted to the annular chamber, and are worked by eccentrics as the piston moves round in the cylinder. These transverse discs act as stops, to divide the cylinder into separate chambers or compartments, into one of which the water will rush behind the piston as it moves forward, while the water is expelled from the other compartment or from the front of the piston. In this way a lift or force pump is constructed which will act equally well in either direction, and does not require a separate air vessel.

APPARATUS FOR EMPTYING THE CONTENTS OF CASKS, SHIP'S TANKS OF PETROLEUM, PARAFFINE, &c.

This invention is carried out as follows:—To the end, side, or other part of the vessel, the inventor fixes a flange and tube by screws, rivets, or other means, which tube projects into the interior of the vessel, and its interior is screwed as a nut. Into this scewed part of the tube he screws a tubular plug, open at the front and closed at the back, there being in the body of the plug near the back a number of perforations, and at the front end two or more notches or recesses. The end part of the discharge tap or pipe is screwed to correspond with the interior of the tube fixed to the vessel, and its extreme end has two or more projections corresponding with the aforesaid notches in the plate, and when the contents of the vessel have to be withdrawn, the projections are entered into the notches, and the end of the tap or pipe screwed into the tube, and as the projections and notches move together, the plug is unscrewed from the tube, thereby allowing the perforations to be open to the contents of the vessel, which then escape through the interior of the plug to the tap or pipe. When the tap or pipe is required to be moved it is unscrewed from the tube, and at the same time it turns the plug and draws it into the tube and closes the perforations, so as to make the vessel perfectly tight, and thus prevent leakage. For supplying and shutting off air to the vessels he uses vents formed in a similar manner, the pipe having the projections being connected to a valve or tap. Similar apparatus is also applicable to the mains of water and gas pipes. Not proceeded with.

CONSTRUCTION OF SHIPS AND BOATS.

This invention consists in bending the ribs used in the above constructions into a serpentine form, so that the sides of the adjoining ribs touch each other at certain points where they are joined together by bolts, rivets, or otherwise. Also, in a variation of the same principle, which consists in the intertwining of screw-shaped coils of metal or other material, and used in the same manner as the serpentine ribs. Not proceeded with.

VALVES FOR REGULATING THE FLOW OF STEAM IN STEAM ENGINES.

This invention refers—first, to an improvement upon such piston valves as are described in the specification of a patent granted to the present patentee, in conjunction with W. M'Naught, dated 27th December, 1856 (No 3079). The ring constituting the valve is made in one piece with the boss, which is mounted upon the valve rod. The patentee forms the said boss and ring in separate portions, the one being provided with a part which connects it loosely to the other, but admitting the required motion to be given to the valve. The spring for expanding the ring he mounts independent of the valve rod, and by these two improvements the central position of the said rod is not interfered with. Another part of the invention relates to an improvement upon the arangement for which letters patent were granted to the present patentee dated Feb. 24, 1858, and consists in a method of communicating motion from the governor to the regulating valve. The two valves specified under the above patent, the patentee still mounts upon the same central line, but the governor, by means of levers, imparts a sliding motion to the rod which passes into the valve case.

OBTAINING AND APPLYING MOTIVE POWER FOR THE PROPULSION OF NAVIGABLE VESSELS.

The inventor's object is to obtain power by forcing or compressing into a space or spaces, or a container or containers, in or on the ship, air, or other elastic incondensible fluid, at high pressures, either when a vessel is in port by the employment of a steam engine and pumps, hydraulic or other power; or when the ship is on a voyage, by employing small steam or other power to force air into the spaces or chambers above mentioned, and so as to have it stored ready for use when required. Not proceeded with.

APPARATUS FOR THE PREVENTION OF ACCIDENTS IN CONNECTION WITH STEAM BOILERS.

This invention consists in apparatus for preventing the explosion of steam boilers in which a float inside a steam boiler, or in a vessel in communication therewith, is so arranged in combination with a loaded valve or cock, situated outside the boiler, that closes a passage through which the water space of the boiler, or other receptacle containing water, can communicate with the fire, that, upon the water line of the boiler falling below a certain level, the said float is caused to act upon and open the said valve or cock, so as to allow of the water from the boiler or elsewhere being injected upon the fire in order to extinguish the same. The said valve may also be arranged as to be acted upon and opened by the pressure of the steam in the boiler, so as to inject water into the fire.

NEW ROWLOCK.

This invention has for its object improvements in propelling boats, by means of which the necessity of looking back to see the direction in which the boat goes is obviated, and consists, First, in using two rowlocks, or fulcrums, on each side of the boat. Secondly, in using jointed oars, the joints of which work between the said rowlocks or fulcrums, so that in pulling the handles of the oars towards the stern of the boat, the blades of the oars will be forced through the water in the same direction as the handles, thereby obviating the necessity of the rower or rowers turning round. Thirdly, the oars are each made in two parts, and in connecting them together each flange of the two joints or hinges is fastened securely to each part of the oar, and united together by a centre pin, thereby forming a hinge, as is well understood. The rowlocks are attached to the gun wale of the boat, the outer one projecting about six inches from the inner one, the joint of the oar or skull working at about the centre between the two rowlocks.

Useful Plants.

According to a German author, the number of useful plants has risen to about 12,000; but it must be remembered that these researches have been completed only in certain portions of the earth. There are no less than 2500 known economic plants, among which are reckoned 1,100 edible fruits, berries and and seeds; 50 cereals; 40 uncultivated edible graminaceous seeds; 23 of other families; 260 comestible rhizomes, roots, and tubers; 37 onions; 420, vegetables and salads; 40 palms; 32 varieties of arrowroot; 31 sugars; 40 saleps. Vinous drinks are obtained from 200 plants; aromatics, from 266 There are 50 substitutes for coffee; 129 for tea. Tannin is present in 140 plants; caoutchouc in 96; gutta percha, in 7; rosin and balsamic gums, in 389; wax, in 10; grease and essential oils, in 330; 88 plants contain potash, soda, and iodine; 650 contain dyes; 47, soap; 250, fibres which serve for weaving; 44, for paper making; 48 give materials for roofing; 100 are employed for hudles and copses. In building 740 are used; and there are 615 known poisonous plants. According to Endicher, out of the 278 known natural families, 18 only seem up to the present time, to be perfectly useless.—*Cosmos.*

There are said to be underground creeks in the limestone regions of Georgia with currents of sufficient velocity to carry a mill. There is a government tannery, the bark mill of which is driven by one of these subterranean streams.

The famous vessel Alexandra, intended for a blockade runner, has been turned into a river boat, and now plies between London and Gravesend. She is a novelty on the Thames, as she is the only boat that has cabins upon deck, in the American style.

The Philadelphia *Mining News* says:—"Inventors should give their best efforts to the improvement of machinery for crushing quartz; success would meet a rich reward."

Baron Liebig's extract of meat is attracting attention at the International Exhibition at Cologne. Its price is twenty-four shillings per pound, and a pound would make sufficient soup for a battalion.

Improved Soldering Furnace.

These engravings represent an ingenious method of soldering fruit, paint or other cans that require to be air-tight and rapidly completed. The invention consists in forming the cans with a circular groove in the tops and bottoms, as at A, Fig. 2, and in filling this groove with a coil of solder in wire form, as at B. The can so provided is then placed on a furnace, C, which has covers of a peculiar kind. These covers, D, have grooves, E, in them corresponding in shape to the bottom of the can. The part where

Fig. 1

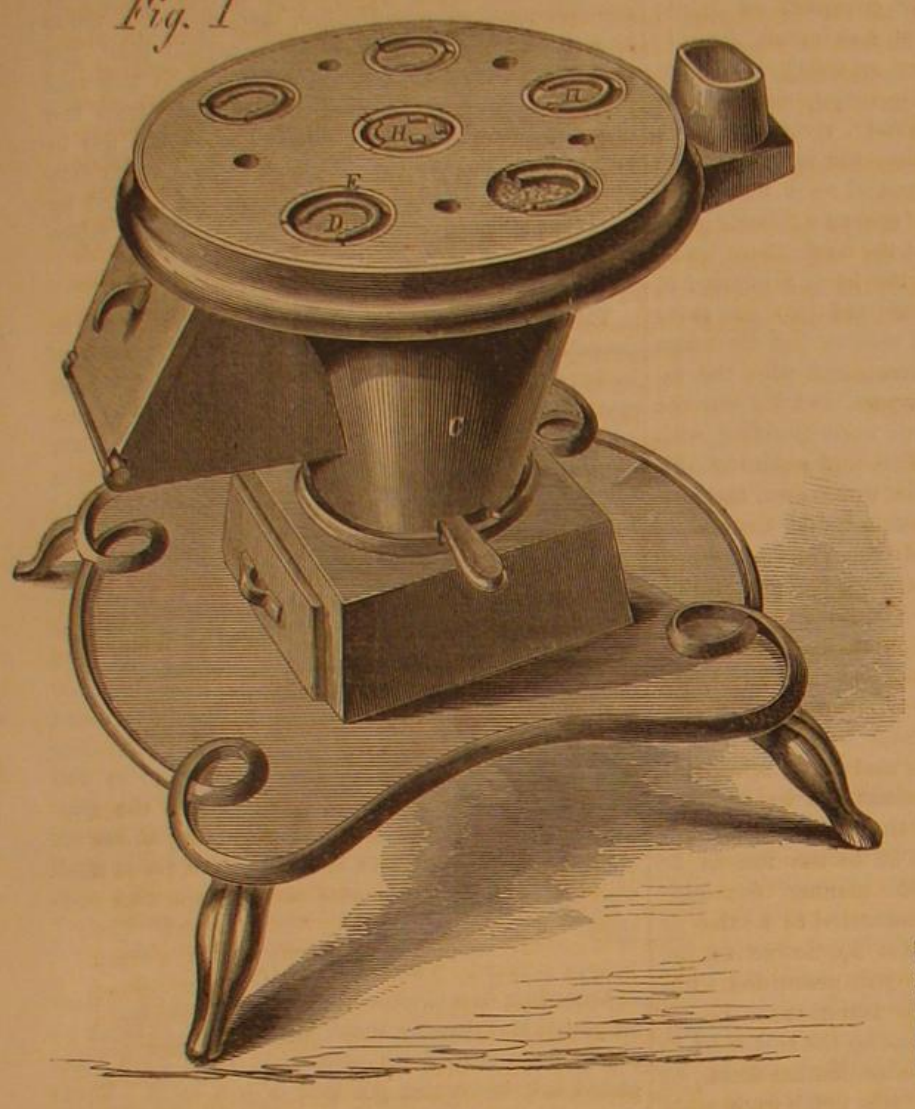
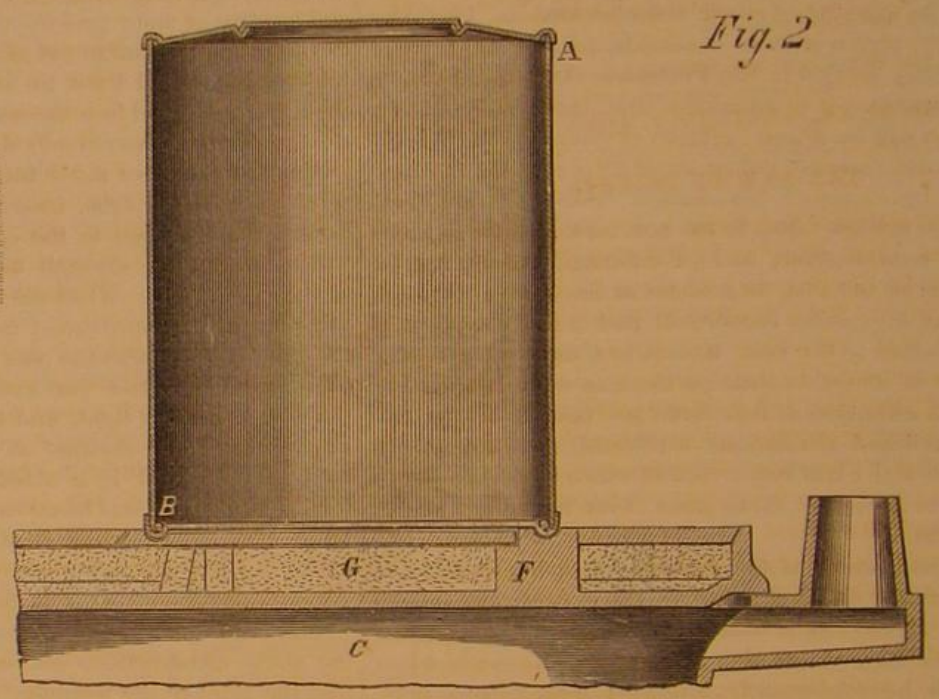


Fig. 2



HOLLINGWORTH'S SOLDERING FURNACE.

the grooves are is solid, as at F, Fig. 2, while the surrounding portions are hollow and filled with non-conducting material, G. The operation is as follows:—When the can is set in the grooves the heat causes the solder to flow around and completely fill the grooved bottom, so that a neat and air-tight joint is formed almost instantly; a slight agitation of the can causes the solder to fill every crevice. The solid part of the furnace cover confines the heat of it to that particular spot, and the non-conductor inside prevents heat from radiating to the sides, and thus destroy the joint which has previously been made. The ashes or non-conductor are filled in through the covers, H, when needed. The top of the can is treated in the same manner as the bottom, to secure the joint, and the rapidity of the operation does not affect the soundness of the side seam in the least. This is an expeditious, convenient and economical process for soldering cans, as the use of irons is avoided, and the amount of solder for each can may be accurately graduated so that none is wasted. The employment of children or unskilled labor is available here, and we recommend an examination into the merits of this system.

A patent is now pending through the Scientific American Patent Agency by R. J. Hollingsworth, of Cincinnati, Ohio. For further information address him as above.

Screw Soled Shoes.—We were shown a few days since a new style for making shoes, a rival to the copper nail shoe—and which we are informed, can be made equally cheap. The improvement consists of a brass screw inserted by machinery and cut off smoothly upon the outer sole. We see no reason why a pair of shoes screwed together would not be more durable than a pair nailed.—*Shoe and Leather Reporter.*

FICTITIOUS AMETHYSTS.

A very singular passion for wearing ponderous jewelry has been noticeable of late. Rings of fine gold, set with amethysts (?) an inch broad are not at all uncommon, and little remark is excited by the spectacle of a show window in some country town filled with gems fit for the cabinet of a king.

It is needless to remark that these are not all real gems, and that true stones of the size described are so rare that few persons could afford to wear them. Amethysts of one carat weight are worth from three to five dollars. They are frequently imitated by fluor spar, oftener by a composition of paste. This is composed of the following substances:—Strass, or colorless crystal glass, 1,000 parts; oxide of manganese, 8; purple of Cassius, 0·2, and oxide of Cobalt, 500. This formula is from "Feutchwanger's Treatise on Gems," and is described as being so accurate a resemblance of the real that good judges can scarcely tell one from the other.

HOW TO SET A SLIDE VALVE.

Some steam chests are made with the bonnets cast on—a very foolish practice—so that the chests are merely hollow boxes, with the bottom out; it is impossible to see the valve or the lead here, and it may be set separately, and the chest put on afterward, by breaking the connections and using circumspection in putting them together again, so that nothing is deranged by false measurement.

LEAD.

A point discovered in some experiments lately made in this city is the absorption of the lead of the slide valve by expansion of the valve and cylinder, and springing of the rods when at work. Valves are set when the engine is cold, and the change which takes place subsequently is sufficiently large to affect the character of the work very much. The valve on the engine in question was set with one-eighth of an inch lead, but it was found that when actually at work it opened an eighth of an inch too late, although the parts were as strong as usually made for engines of the class under trial. No reliance could be placed on the indicator to test the actual time of opening and closing of the valve, and an engineer, Mr. W. T. Selden, contrived a novel indicator, which caused the valve to register the lead accurately, so as to determine the loss between the two conditions of the engine—that is, when hot and cold.

THE LEAD INDICATOR.

This indicator was constructed as follows:—A wooden cylinder, covered with paper, was secured to the cylinder head close to the valve stem, in such a position that it revolved with the main engine shaft. This cylinder was equal in circumference to one stroke of the engine, so that a line traced upon it would represent in length the travel of the piston; a pencil-holder was fixed near the cylinder in such a manner that it could be thrown in or out of contact with the paper—the same, in fact, as an ordinary indicator. The pencil-holder had, further, a wedge-shaped spur on one side, and the valve stem had two such spurs, which were fixed at the lead points of the main valve. The pencil holder was nearly in line with the spurs on the stem, so that the one on it and those on the valve stem, came in contact slightly when moved past each other. It is easy to see, therefore, that when the main cylinder is rotated by a line from the engine shaft the pencil will draw a straight line, except at the lead points, where the valve-stem spur and that on the pencil holder come in contact, when a sharp, triangular break will appear in the line. The original lead line is traced when the engine is cold, and, to be a verification of it, the line should appear the same when actually running, but, as before stated, the difference was very marked.

This is a simple and beautiful instrument, for the purpose, and, as it is cheaply constructed, it should be on every engine, since the time of the opening and closing of the valve are as easily seen as one's face in a mirror. The common indicator exhibits only the apparent time, while this apparatus shows the real time. Since the value of expansion, according to the law of the celebrated and immortal Mariotte, of whom so much has been said lately, depends wholly upon the extent of it, it will be seen that the lead is an important element in computing the actual volume of the steam—versus the apparent volume. It is also important as regards the mechanical action of the steam engine, for shafts have been screwed up too tight in their bearings, pillow blocks shifted, and connections keyed up, with a view to stop thumping, which was caused entirely by the valve opening too little, or at improper periods.

TOGGLE JOINTS AS POWER.

A number of engineers and others have written communications to this office relative to Bickel's Power Multiplying machine, illustrated in the Scientific American, with the inventor's own description, a couple of weeks ago. It is hardly necessary to criticize the correctness of Mr. Bickel's theory but we insert a closing paragraph from our correspondent's letter, which will portray the conclusions of most of the other writers:

"Mr. Bickel says he has gained eight times the power applied; if so how many more toggle joints will enable him to propel a steamboat twenty miles per hour?

Exhaust steam is used in some instances to ventilate mines.

THE

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Contents:

(Illustrations are indicated by an asterisk.)

VOL. XIII. NO. 5...[NEW SERIES.]....*Twentieth Year.*

NEW YORK, SATURDAY, JULY 29, 1865.

THE LAW OF PATENTS.

During the past few years a considerable discussion has been going on in the British journals in reference to the propriety of protecting invention by letters patent. Some wealthy English manufacturers, like Sir Wm. Armstrong and others, have found it quite disagreeable in their business to recognize the rights of patentees, and the London *Times*, true to its illiberal sentiments, has allowed itself to become the mouthpiece of that class, who destitute of genius, and unable to produce a really good invention, would be glad to have the patent laws abolished in order to enable them to appropriate without let or hinderance the fruits of other mens' labors. The numbers who have advocated the abolition of the patent laws are comparatively few, yet they are bold and determined and readily avail themselves of every open channel through which to convey their ideas. The venerable Edinburgh *Review* has taken up the subject, and with calmness and ability, undertakes to show that the system of granting patents has been a positive hinderance to industrial operations.

The *Review* cites a number of well-known inventors, who it alleges were injured by patents, though it utterly fails to show in what sense, or yet how the granters of patents inflicted the injury. Whatever real or imaginary injury may have resulted to the early inventors of Great Britain from the grant of letters patent, we are sure that no such state of facts can be deduced from the history and experince of American inventors. Chief among these are the well-known names of Blanchard, Goodyear, Howe, McCormick, Burden, Morse, Wilson, Hoe, Bigelow and Ericsson. We venture to say that not one of these eminent inventors could or would assert that the patent laws had not conferred upon them signal advantages. If this were not true why in the name of reason have these inventors been so persistant in their efforts to perpetuate an extension of their patents? The answer to this inquiry is readily suggested to every intelligent mind. These patentees would not spend time and money in endeavoring to procure an extension of their patents, if by so doing they were heaping grevious burdens upon their own backs. That there are exceptions to this general rule, we fully admit, but we are not now hunting for exceptions, which are found equally among all classes, trades and professions. Without attempting to follow the *Review* through its entire argument, we will notice a single point in the article in order to show the woof and warp of which it is made. It declares that "Arkwright's invention was most profitable to him after his patent had been annuled and the expenses of litigation had ceased with the monopoly it gave him." This is, indeed, a very strange circumstance. After infringers had ceased to trouble him, and after he had established himself as a manufacturer, of his power loom, "Arkwright," says the *Review*, "realized a princely fortune." Now we would enquire what enabled him thus to establish himself in a lucrative business. Certainly no one will pretend to deny that this success resulted from the fact that, encouraged by the grant of letters patent, which promised to secure him the exclusive right to his invention for a term of years, he sought to enter upon the enjoyment of his rights. These rights were invaded by unscrupulous infringers, who preferred not to pay him for the use of his patent, and while Arkwright was endeavoring to defend his much-abused patent, he was all the time laying the foundation of that princely fortune he afterward realized. The grant of a patent stimulated his energies and encouraged him to believe that his rights under the patent would be respected. In this, however, he was mistaken, but, nevertheless, he ultimately got rich out of his invention.

That the position taken by the *Review* is indefensible we refer our readers to a very able article on "Patents and Monopolies," reprinted on another page, from the *Reader*, a prominent literary journal, published in London.

WORK AND POWER.

In the pages of the *Journal of the Franklin Institute*, a discussion is going on between De Volson Wood, Professor of Civil Engineering in the University of Michigan, and J. W. Nystrom, Acting Chief Engineer, U. S. N., on the subject of work, force and power. The main purpose of Mr. Nystrom seems to be to deny the position that work is independent of time, and he succeeds in involving the question in considerable confusion. The facts of the case are simple and plain enough.

Work is the overcoming of mechanical resistance of any kind, either by raising a weight, dragging a body along, turning off a shaving, or by any other action. The question, whether it is independent of the time depends entirely upon the meaning of the language employed. A foot-pound of work is the raising of one pound of matter one foot in vertical hight, and this foot-pound is precisely the same quantity whether one second or one thousand years be consumed in the operation.

We may say that a machine is doing the work of raising one foot at the rate of one inch per second; then the work done by the machine will depend upon the time that it is in operation; it will take it twelve seconds to do one foot-pound of work, and twenty-four seconds to do two foot-pounds.

In this case, however we have attached to the word, "work," a meaning for which the word, "power," is employed by the standard writers on mechanical philosophy. To keep our ideas clear it is better to regard the machine as exerting a power of one inch-pound per second, and to confine the word, "work" to the aggregate resistance overcome.

One writer argues that 2 and 2 do not always make 4, sometimes making 22. By analagous tricks of language we may confuse our minds in regard to any problem whetever; but a more useful aim of discussion is to free our minds from confusion, and to accomplish this, one of the most important steps is to use words always in their exact signification.

Regarding work as the overcoming of physical resistance, it is plain that the aggregate amount of any given quantity is independent of the time required for its performance.

There is probably no higher authority on the philosophy of mechanics than Arthur Morin, and from his "Lecons de Mecanique Practique," translated by Bennett, we take the following extract:—

"*The Idea of Work is Independent of Time.*—We see, from what precedes, that in the measure of work we have only regarded the effort exerted, and the space described in the direction peculiar to this effort. It is therefore independent of time.

"Thus, in raising goods, the effect is not measured by the duration of labor, but by the product of the load into the hight of its elevation."

WHAT CAME OF IT.

Some time ago an intelligent machinist while looking about a factory in this city noticed that a large and small boiler were connected by a pipe upon which was a globe valve, intended to be opened or shut by hand whenever one boiler was to be used and the other shut off.

As such an arrangement as this has frequently caused disaster the machinist spoke to the proprietors, warned them of the danger they were in, and insisted that it should be altered. They replied that the boiler was in careful hands and they considered it quite safe, but upon further consideration, asked the cost of changing the pipe and valve so that it would be wholly safe. Our friend answered, "fifty cents; just turn the thread off the stem," said he, "put the valve back again, and it will regulate itself. If you will bring the valve down to the shop," he continued, "I will turn it off for nothing." "Fifty cents," and "for nothing," was altogether too insignificant to be thought of, so no further attention was paid to the subject. This is what came of the neglect:—The boiler blew up on the 15th inst., killing the fireman, scalding the engineer very severely, and destroying a large amount of property. All this was caused in the first place by putting a valve where there was no occasion for it, and, secondly, by culpable neglect on the part of the proprietors in not removing this valve or arrangement when called upon to do so by an expert.

The explosion of this boiler under such circumstances should be a warning to all others having them in the same condition and such changes ought to be made as will insure safety and not allow it to be dependent upon the opening and shutting of a globe valve between one boiler and another. It is also another evidence of the only true theory on which to base boiler explosions, that is the "careless theory," for to this source most of them may be traced.

STEAM JETS IN FIRES LENGTHENING THE FLAME.

The practice of introducing small jets of steam into furnace fires is very rapidly extending; at one machine shop in Providence two kinds of apparatus for supplying the jet are manufactured on a wholesale scale, so large is the current demand. The steam is usually employed to create a blast, a small quantity of steam at a high velocity carrying along several times its volume of air, by the well known dragging action, by which one current produces another in any fluid with which it comes in contact. The creating of a blast is not, however, the principal object in employing a steam jet, as it is generally understood to be a wasteful mode of using steam for this purpose; one high authority has stated the quantity of steam necessary to produce a given blast when applied in this way, to be fifty fold greater than when the steam is worked through an engine to drive a blower.

Under certain conditions, and for certain purposes, there can be no boubt that a small jet of steam increases very considerably the action of the fire. At one wrought iron forge, it is said the number of heats per day of a certain sized bar have been increased by this simple expedient from six to ten, equal to nearly seventy per cent. If with a blast of dry air the combustion be perfect, it is impossible to increase the quantity of heat generated, by throwing either water or steam into the fire, as we have repeatedly shown; the cause of inproved results must therefore be looked for in some other action of the jet.

In fires of anthracite coal and of some other kinds of fuel, one effect of a steam jet is to lengthen the flame. In coal fires of any considerable depth, a portion of the carbon escapes from the surface of the bed of coals combined with one equivalent of oxygen in the form of carbonic oxide. If this inflamable gas meets with atmospheric air at a red heat it immediately combines with a second equivalent of oxygen, becoming carbonic acid, the carbon giving out in this second burning more than twice as much heat as it did when it was burned into carbonic oxide. Now if the carbonic oxide be mingled with a swift current of steam, it may be carried along much farther from the bed of coals before its several atoms encounter each an atom of oxygen, in the air blast, thus transporting the burning to a distance, in other words, lengthening the flame. This action may be of very great utility in coal-burning locomotives, and in other places where a lengthened flame is desired Though the aggregate quantity of heat would not be augmented, its intensity in the interior of the tube

might be greater, and, as the rapidity with which heat is transferred from one body to another is in proportion to the difference in their temperatures, it is possible that the quantity of water evaporated by a given quantity of fuel might be very materially increased.

LAUNCH OF THE "DUNDERBERG."

It has frequently been asserted by those who opposed the monitor iron-clads that the Government never gave other plans a trial, and was unwilling to admit any other inventors or designers to compete with them. This is incorrect. The first iron-clad built in this country was a broadside, casemated ship, and there have been in all four sea-going casemated vessels constructed. These are, the *Galena*, the *Keokuk*, the *Ironsides* and the *Dunderberg*. This last vessel was successfully launched on the morning of the 22d inst. A large concourse assembled to witness the event, which was an entire success.

The *Dunderberg* is a wooden vessel; she is solid throughout, and the work is of the most massive character.

THE HULL.

The hull of the *Dunderberg* is massive, being solid from stem to stern; it is 378 feet long and 68 feet wide, and 32 feet deep. The frames are twelve inches thick, and and are built of oak, firmly bolted and fastened together. The model of the ship is very peculiar. The floor is dead flat for the whole length, and the sides rise from it at an angle everywhere save forward, where they are very nearly vertical. The bow is as sharp and has as fine lines as it is possible to give it, and the stern and run aft are very clean and handsomely modeled. The hull is divided by several water-tight compartments, both longitudinally and transversely—a precaution, common to nearly all modern sea-going ships, which has been found indispensable. The frames are strapped diagonally with heavy irons, 5 inches wide by $\frac{7}{8}$ of an inch thick, blunt bolted to them. There is a slight sheer on deck, but it is almost invisible to the casual observer at a short distance. There is but one rudder; provision is made, however, for steering by an auxiliary apparatus of a peculiar nature, should the main steering gear be shot away. The frame timbers, 12 inches thick, are ceiled inside 5 inches thick, planked outside 5 inches thick, and over the planking two courses of heavy oak beams, 12 inches thick, are again laid, making in all an aggregate amount of nearly five feet of solid timber on the ram's sides. The planking is all caulked, and the seams payed before the last protection is applied, and the entire mass is as firmly bolted together as it is possible to do it.

THE RAM.

The ram on the *Dunderberg* is about as formidable a looking object as one can conceive; the entire forefoot of the vessel is prolonged thirty feet from the hull proper, and, rising easily upward from the keel about half the distance from the water line, is there rounded, presenting a blunt end in shape like the profile of an ax edge; it then runs back toward the stem again. The mass of wood which forms this ram projects inside of the hull almost as far as it does outboard, and is there substantially secured to the main timbers. The sides and edge of the ram will be iron-plated, and even should the whole of it be knocked off in an affray, the builders say that the hull will be water-tight.

THE CASEMATE.

The *Dunderbery* has, on top of the main deck, casemated quarters for the guns and crew. This casemate slopes at an acute angle from the sides to the top; it takes up a large portion of the vessel amidships, and is an elongated octagon in shape; it is made of heavy timber plated with iron 4½ inches thick; it is pierced on each side for three broadside guns, and has one port forward and another aft in the casemate, for bow and stern firing. The hull of the ship is built out from a distance below the waterline to meet the edge of the casemate above, so that the broadside of the *Dunderbery* will present an acute angle to the line of the enemies fire. The mass of wood and iron presenting a resistance to the enemy's rams or projectiles at this point amounts in all to seven feet. The deck of the casemate, and so the main deck, will be plated bombproof, and the quarters for the officers and crew, being in the fortress on deck, will be thoroughly ventilated and open to the light and air. The *Dunderberg* will draw about twenty feet of water. Her speed is not stated. Her engines are estimated at 6,000 horse-power, and were designed by Erastus W. Smith.

THE SKY NOW.

The heavens present at this time an unusually brilliant appearance. The bright planet which makes its appearance in the southeast in the early evening, and slowly climbs the sky as the night advances, is Jupiter. As his orbit is exterior to that of the earth, and as the earth is now nearly between him and the sun, we are about the nearest to him that we ever approach, and as in this position his illuminated hemisphere is turned most nearly towards us, he now presents his largest and most brilliant appearance. By the aid of an ordinary spy glass three feet long his four moons can be seen forming nearly a straight line with the center of the planet. If the spyglass be a good one the belts can also be made out.

Still farther to the west, and somewhat nearer the zenith, in the constellation Virgo, is Saturn with his ring. The ring is very clearly brought out by a three foot telescope.

In looking at the planets with a glass, the instrument should be firmly secured so that it will remain in position without shaking or trembling. At the optical instrument establishments clasps for supporting telescopes may be bought, arranged to screw into window frames, or other supports of wood, and provided with a universal joint for turning the instrument in any direction.

SPECIAL NOTICES.

Wm. Kenyon, of Steubenville, Ohio, has petitioned for the extension of a patent granted to him on the 14th of October, 1851, for an improvement in machines for making nuts, washers, etc.

Parties wishing to oppose the above extension must appear and show cause on the 25th of September next, at 12 o'clock, M., when the petition will be heard.

Thos. J Sloan, of New York City, has petitioned for the extension of a patent granted to him on the 21st of October, 1851, for an improvement in machinery for shaving, nicking, and re-shaving wood screws.

Parties wishing to oppose the above extension must appear and show cause on the 2d day of October next, at 12 o'clock, M., when the petition will be heard.

Identification of the Dead.

The *Alta California* of March 16th, reports that Dr. L. J. Henry, by the consent of the coroner of Alta, brought into use the process of Dr. Richardson of London for restoring the features of a dead man who had undergone such change from decomposition that he could not be identified. The man had been murdered and buried in a very shallow grave; the body was discovered from some animals having partly removed the earth. On the body being brought to the dead house it was quite unrecognisable. Dr. Henry placed it in a water tight shell, and then covered it (the body) with water containing twenty pounds of common salt and one pound of hydrochloric acid. After immersion for three hours, the body was removed; the face was washed first with simple water, then with chlorine water, and finally a free current of chlorine gas was passed over the face. After the operation, by which the face was bleached, the friends of the dead man were able positively to recognize him as one Charles T. Hill, and on his identification a man was arrested in whose possession various articles belonging to Hill were found, and who is believed to be the murderer. The restoring process seems in this case to have been entirely satisfactory, and to have served a purpose which a few years ago it would have been considered impossible to carry out.

Among the colossal engineering projects of the present day is a scheme for constructing a railway tunnel under the bed of the Severn, for the purpose of connecting the South Wales Union line with the Principality. The tunnel will be about three miles long, and is estimated to cost $3,750,000.

ISSUED FROM THE UNITED STATES PATENT-OFFICE
FOR THE WEEK ENDING JULY 18, 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.

48,781.—Water Wheel.—Jason A. Allen and Alanson Allen, Oakham, Mass.:

We claim, First, Providing the lower side of the wheel case with a flanged rim, K, for the purpose of causing the water to press on the lower side of the wheel, substantially as and for the purposes stated.

Second, In combination with the detachable flanged rim, K, applied to the lower side of the wheel case, the grooved flange, g, on the lower side of the wheel, substantially in the manner and for the purposes described.

Third, The application of turbine shafts and to the lower face of the turbine wheel, of the adjustable supporting collar, I, substantially as and for the purpose described.

48,782.—Method of Treating Hemp, Flax, Jute, Grass, Etc.—Stephen M. Allen, Woburn, Mass.:

I claim, First, A fiber composed of flax, hemp, jute, china grass and other long line substances dew or water rotted, steeped or fermented and submitted to a stranding and flossing process by drawing rollers, scutchers, scrapers, bar heaters, pickers, cards or any suitable machinery for the purposes of reduction in the manner and for the purpose set forth.

Second, I claim a yarn, cloth, felt or paper stock made from long fiber such as flax, hemp and other like substances which has been line submitted to dew or water rot, steeping or fermentation, in combination with stranding and flossing by mechanical means, substanaially as herein set forth.

Third, I claim a yarn, cloth, felt or paper from long line fiber treated as above and when mixed with any other fiber, substantially as set forth.

48,783.—Cultivator.—Parker H. Allstott, Jeffersonville, Ind.:

I claim the relative arrangement of the shares and beam and the construction and arrangement of the connecting rods, bars, bolts and screws and taps so far as they assist in effecting the purpose and object of changing at will the angle between the shares and beams and thereby altering the draught of the tiller.

48,784.—Belt Clasp.—A. D. Ansell, Hartford, Conn.:

I claim the employment of the inclined planes, b, in combination with the plate, a, and jaws, c, substantially as and for the purpose described.

48,785.—Drill for Boring Rocks, Etc.—William Bickel, Pottsville, Pa.:

I claim the combination of pick and chisel described, the points constituting the former extending longitudinally beyond the latter, for the purpose set forth.

48,786.—Churn.—Caleb C. Bishop, Poughkeepsie, N. Y.:

I claim the adjustable screw blades, E, bearings, e, arranged relatively to the hub, D, and handle, C, of a reciprocating churn dash, substantially in the manner and for the purposes herein set forth.

48,787.—Car Coupling.—John W. Boughton, Appleton, Wis.:

I claim, First, The latch pivoted and held in place as shown, and for the purposes set forth.

Second, The movable tumbler, working in combination with the latch and pin in the rear, in the several combinations as shown and described, and for the purposes set forth.

Third, The spring box or rod, I, located above the tumbler for the purpose set forth.

48,788.—Carpet Slipper.—Daniel Bowker, Boston, Mass.:

I claim as a new article of manufacture a carpet slipper provided with a waterproof inner sole and having the quarter united to the upper by means of a rivet or rivets in connection with the ordinary stitching, as herein described.

48,789.—Inhaling Tube.—Charles Bullock, Cambridge, Mass.:

I claim combining with an inhaling tube, an auxiliary mouth tube, in the manner and for the purpose substantially as set forth.

48,790.—Harness.—Jerome Calkins, Hudson, Mich.:

I claim arranging and connecting the straps, D D, with the rings, E E, strips, C C, ring, a, and with the ring, F, substantially as and for the purpose specified.

48,791.—Cooler for Beer and other Liquids.—Justus Chollar and Charles W. Cunningham, Washington, D. C.:

We claim the above described cooler, B, provided with the ice space, C, and discharge tube, F, in combination with the outer vessel, A, when arranged and operated substantially as set forth.

48,792.—Artificial Leg.—John Condell, Morristown, N. Y.:

I claim, First, The supporting appendage consisting of the straps, K K, and elastic straps, N L, substantially as and for the purpose described.

Second, I claim the central bar, a a b, in combination with a socketed axial bolt or bolts, c, substantially as described.

48,793.—Shaft for Boring Tools.—Daniel G. Coppin, Cincinnati, Ohio:

I claim the improved coupling for the sections of a well boring rod, consisting of the collars, C and F, the tongue, D, jaws, E and E', dowel, G, socket, H, and the counter sunk screw key, I, or their equivalents combined and operating as set forth.

48,794.—Cover for the Exhibition of Samples.—C. O. Crosby, New Haven, Conn.:

I claim making a depression in the cover of boxes for the purpose described, when the said depression is formed from the same material as the cover, substantially as and in the manner described.

48,795.—Construction of Vessels.—John P. Curry, New York City:

I claim a combined tubular iron and wood frame for vessels so united as to conjointly receive, resist or transmit the strain throughout the whole, whilst the tubular iron frame is free to expand or contract by atmospheric changes without injury to itself, or to the fastenings of the wooden frame, as herein described and represented.

48,796.—Machine for Preparing Woof for the Manufacture of Hair and Grass Cloth.—James Downie, Paterson, N. J.:

I claim the combination of the hollow shaft or spindle, s, with the flyers, x, and the feeding apron, W, the whole operating substantially as described and for the purpose stated.

48,797.—Pipe Coupling.—William Dutemple, Malden, Mass.:

I claim the recess, i, and lip or ring, k, for reception of the male

end of the coupling, and the cement by which the parts are packed.
I also claim giving to the lip or flange, h, an inclination, in manner and for the purpose substantially as set forth.

48,798.—Horse-shoe Nail.—Lucius H. Dwelley, Dorchester, Mass.:
I claim the former, F, having a gaining or progressive motion, substantially as set forth.
I also claim the vibrating cutters, a' b', operating substantially as described.
I also claim causing one of the cutters, by the act of carrying the rod forward to the other cutter, or by any other moving part of the machine brought up against the bent portion of the rod, to feed in a sufficient length of rod for the next succeeding nail.
I also claim feeding in the rod previous to the nail, already formed on its end, being cut off.
I also claim gaging or determining the length of rod fed into the machine, by means of the cutter, b', substantially as described.
I also claim making the cutter, b', adjustable, so as to allow more or less of the rod to be drawn forward previous to cutting off, substantially as described.
I also claim equalizing the throw of the hammers, G, by means of the belts, q, arm, s, and spring, u, so as to cause them to strike at the same instant upon the nail, substantially as set forth.
I also claim the revolving arm or segment, E, carrying a succession of rolls placed at unequal distances from the center around which they are carried, in combination with a movable former, substantially as described.
I also claim the revolving arm or segment, E, carrying a succession of rolls placed at unequal distances from the center around which they are carried, in combination with the hammers, G, and a movable former, substantially as described.
I also claim attaching the springs, o, which operate the hammers, G, to movable carriages, as set forth, for the purpose specified.

48,799.—Stake-holder for Platform Car.—E. A. Eddy, Racine, Wis.:
I claim, in combination with the stake, B, and holder, C, the employment of the latch, A, arranged and operating substantially as herein shown and described.

48,800.—Stake-holder for Platform Car.—E. A. Eddy, Racine, Wis.:
First, I claim the casting, A A', constructed substantially as shown and described, and provided with one or two recesses, a, for the purposes specified.
Second, I claim the combination and arrangement of said stake-holder, A A', with the slotted stake, D, center bolt, C, and projection, b, operating substantially as and for the purposes set forth and shown.
Third, I claim the combination of the stake, D, provided with the projection, b, with the stake-holder, A A', provided with the recesses, a, arranged and operating as and for the purposes specified.
Fourth, I claim the combination of the stake, D, provided with the slot, d, and the pin or bolt, c, arranged and operating substantially as described.

48,801.—Boot and Shoe Holder.—James Ellison, Boston, Mass.:
I claim a boot and shoe holder, consisting of the fixed arm, A, pivoted lever, B, handle, K, ratchet, C, and pawl, D, or their equivalents, constructed, combined and operating substantially as set forth and for the purpose described.

48,802.—Shirt Collar.—A. A. Evans, Boston, Mass.:
I claim rounding and narrowing the lower corners of turn-over or stand-up shirt collars, when constructed with concave bottoms, substantially as set forth and for the purposes described.

48,803.—Pruning Shears.—Joseph Evans, Newark, N. J.:
I claim the arrangement and combination of the parts of the shears, in the manner and for the purpose specified, when used in combination with my already-patented pole or holder, said patent bearing date July 16, 1861.

48,804.—Saw-mill.—Joseph Fecker, Cavetown, Md.:
I claim, in combination with a saw pitman, the changeable crank pin block and follower, with the keys or wedges, for the purpose of shifting the working part of the saw, and thus causing it to wear away uniformly throughout its length, and avoid the necessity and loss of so much filing, as herein described and represented.

48,805.—Steam Boiler.—Henry Gerner, New York City:
I claim the combination and arrangement of the cylindrical steam reservoir, B, located within the boiler, A, the tube, b, and the eduction steam pipe, d, substantially in the manner and for the objects specified.

48,806.—Hydro-carbon Blower for Furnace of Steam Boiler, Etc.—Henry Gerner, New York City:
I claim, First, Superinducing the combustion of fuel by introducing directly thereto a hydro-carbonaceous vapor, when the same is produced by forcing steam into and through a body of petroleum or other hydro-carbon liquid, and when said vapor, together with the atmospheric air, is made to constitute the draught medium, in the manner herein described.
Second, The hydro-carbon chamber, E, provided with a steam supply pipe, C, and vapor discharge pipe, D, in combination with the chamber, F, jets, H H, and air-induction pipe, L M, constructed and operating substantially as and for the purpose described.
Third, Making the air-induction pipe, L, adjustable, substantially as and for the purpose specified.

48,807.—Stereoscope.—S. D. Goodale, Cincinnati, Ohio:
I claim, First, A continuous scene-carrier, having the series of two-faced wedge formed holders, N, strung upon elastic ribbands, M M', substantially as set forth.
I claim, Second, A continuous scene-carrier, having the series of two-faced wedge-formed blades, N, when combined with the pair of depressed lens holders or eye tubes, O O', substantially as set forth.
Third, The scene-holder, N P, formed and operating as described.
Fourth, The combination of the bent elastic pintle, d, with the reflector, B, as and for the purposes set forth.

48,808.—Portable Derrick.—John Grieves, Brooklyn, N. Y.:
I claim the sliding frame, D D, lifting wheel, R, arbor, H, large wheel, H2, in combination with the arbor, M, pinion, M2, spool, O, lever, S, ratchet, Q, and pall, Q2, in the manner and for the purpose set forth.

48,809.—Well-borer.—John Grieves, Brooklyn, N. Y.:
I claim, First, The cone-shaped cap, P, with the collar, R, for the purpose set forth.
Second, The safety-cup, U, as specified.

48,810.—Car Brake.—Charles H. Gustin, Worcester, Mass.:
I claim, First, The employment of laterally adjustable friction clamps, E E', which are suspended from the truck frame, in combination with intermediate friction plates, D, which are secured to the axles of the car-wheels, substantially as described.
Second, The construction of the friction clamps, with wings on them, substantially as described.
Third, Suspending the friction clamps by means of hangers, d d' staple guides, f f, and pins, g g, substantially as described.
Fourth, The removable friction plates, S S, applied to the laterally adjustable clamps, substantially as described.
Fifth, The connecting rods, G G', applied to the hubs of the friction clamps, in combination with the loose pulley, j, chain, k, and lever, H, arranged substantially as described.
Sixth, So applying the laterally adjustable friction clamps that the strain which is received by them will be sustained by the truck frame instead of by the connecting rods, G G, which are used to adjust said clamps, substantially as described.

48,811.—Washboard.—L. B. Hartt, Detroit, Mich.:
I claim the washboard, constructed with longitudinal grooves on its corrugated surface, forming channels with flattened bottoms, in which the clothes are manipulated

48,812.—Pocket Sun-dial.—Henry H. Hempler, Washington, D. C.:
I claim a portable sun-dial, with hinged or folding plates, and central index, in combination substantially in the manner herein described.

48,813.—Rock Crusher.—Samuel F. Hodge, Detroit, Mich.:
I claim, First, The lever and adjustable bed, in combination with the crusher, substantially as and for the purposes set forth.
Second, A stone or rock-breaking machine, with a yielding jaw, B, in combination with a loaded lever, substantially as described.

48,814.—Dish-washer.—John A. Hotchkiss and Richard Eaves, Derby, Conn.:
We claim, First, The arrangement of the alternating bristles and sponges, d d', with the discs, D, of a dish washing machine, in the manner and for the purposes substantially as herein set forth.
Second, We claim the spring, C, arranged relatively to the wheels, B D, and suitable means for depressing, D, substantially as and for the purpose described.

48,815.—Churn.—Henry Hutchison, Three Rivers, Mich.:
I claim, First, The combination in a churn of the four-armed crank, A, with four sectional dashers arranged quadrilaterally, substantially as and for the purpose specified.
Second, The combination with the four-armed crank, the pitmen rods and dashers of the stationary guide, E, arranged within the churn substantially as described for the purpose set forth.

48,816.—Lamp.—James Ives, Mount Carmel, Conn.:
I claim, First, A combined hinged shade and chimney base for lamps, substantially as herein described.
Second, The construction of the hinge with a guide and stop, substantially in the manner and for the purpose described.
Third, The combination of a combined shade and chimney base, a lamp or burner cap, and a huge joint, all constructed and operating substantially as described.
Fourth, The combination of the set screw seat ring of a lamp fountain, and the bowl or lamp fountain, substantially as and for the purposes set forth.

48,817.—Cultivator.—C. M. Jenne, Young America, Ill.:
First, I claim the axle, A, arranged or applied to the draught pole, C, substantially as shown, to admit of a forward and backward play thereon, for the purpose set forth.
Second, In combination with the above, I claim the rods, D D attached to the draught pole, C, and passing through the axle, A, with springs, a, on their rear ends, to operate substantially as and for the purpose herein set forth
Third, The stirrup, H, applied to the draught pole, C, in combination with the bars, I I, rods, f, links, g, and axle, A, all arranged substantially as and for the purpose specified.
Fourth, The rods, M M, attached to the plow beams, J J, and connected by links, N N, with the adjustable plates, O O, on the draught pole, C, substantially as and for the purpose set forth.
Fifth, The bar, E, connected by a hinge or joint, b, with the rear of the draft pole, C, in combination with the rod, F, and adjustable plate, G, for the purpose specified.

48,818.—Roofing Bracket.—Charles A. Kirkpatrick, Massachusetts:
I claim a bracket or machine constructed substantially as above described, and for the purpose set forth.

48,819.—Drill.—Loomis G. Marshall, Mokena, Ill.:
I claim the construction and combination of the pivoted drills, having front and back cutting edges, and flat incline bottoms, for chambering and cutting outward and upward, as herein described.

48,820.—Priming Metallic Cartridges.—Edwin Martin, Springfield, Mass.:
I claim inclosing the fulminate of mercury, or other substance to ignite the powder in a cartridge box by its explosion, in glass or other vitreous substance, substantially in the manner and for the substance described.

48,821.—Children's Carriage.—Orville Mather, Newport, Ky.:
First, I claim the mode of supporting the body of children's carriages from points of suspension above the centers of gravity of the same when loaded, substantially as set forth.
Second, In combination with the above mode of hanging the body of children's carriages, I claim the check brace, D D, or its equivalent, substantially as and for the object stated.

48,822.—Method of Closing Bottles.—John Matthews, Jr., New York City:
First, I claim constructing a bottle stopper with a core of metal, either magnetic or capable of being attracted by a magnet, as and for the purpose specified.
Second, I claim the employment of a magnetic plunger, M M, or its equivalent, substantially as and for the purpose specified.
Third, I claim the bottle, B, stopper, F, and plunger, M, when operating by magnetic attraction, as described, for the purpose specified.

48,823.—Rock Drill.—John M. May, Janesville, Wis.:
First, I claim apertures or mortises, c and d, in thimble, A, or their equivalents, to receive tenons, a and v, or their equivalent, extending from members, C and D, when used to connect thimble, A, and members, C and drill, substantially as and for the purposes described.
Second, Aperture or mortise, e, in member, B, to receive tenons, g and f, or their equivalent, extending from members, C and D, of a drill, when used to connect members, B C and D, of a drill, substantially as and for the purposes described.
Third, An angle and bearing at m and at n in members, C and D, either with or without pieces, o and p, to give suitable outward pressure against the inside of thimble, A, to make, when the several parts are put together, a firm, compact-built tool, substantially as described.
Fourth, Combining members, B C and D, with thimble, A, substantially as and for the purposes described.
Fifth, A general arrangement of members, B C and D, thimble, A, and band, E, when the whole are constructed and operated substantially as and for the purposes described.

48,824.—Lamp Burner.—Rufus S. Merrill, Boston, Mass.:
I claim, First, The employment of annular concentric collecting chambers at or near the tip of the burner, when the same are made adjustable in relation to the burner, substantially as hereinbefore set forth.
Second, The attachment of the annular collecting chamber or chambers concentrically with the wick tube to an adjustable sliding tube or friction sleeve, whereby the flame of the burner may be regulated without interference with the wick itself.
Third, In combination with the above, I claim the concentric outer jacket, open at the underside so as to allow air entering the same in the manner and for the purpose substantially as set forth.
Fourth, In combination with the above, I claim the perforated disk or flange for the purpose specified.
Fifth, The method described of attaching the outer jacket to the adjustable slide by indentation, substantially as set forth.

48,825.—Stair Rod.—Wm T. Mesereau, Newark, N. J.:
First, I claim continuing the metal in the manufacture of the button so that an ornamental device may be formed upon the same, for the purpose specified.
Second, I claim continuing the metal in the manufacture of the sliding catch so that an ornamental device may be formed upon the same for the purpose specified.
Third, I claim combining with the button and sliding catch, whether the same be ornamented substantially as shown or not ornamented, the stair rod, H, for the purposes specified.

48,826.—Pump.—George E. Mills, New York City:
I claim the mode of attaching guide rods, m m, to the head of the pump cylinder and stuffing box, k, so that they will turn to allow the cross head, I, to be worked by a crank in any position, as set forth.

48,827.—Horse Shoe.—S. A. Moore, Bloomfield, Iowa:
I claim the auxiliary calked plates, A A, constructed with inclined locking tenons, g g, and offsets, e e, substantially as described.
Second, The construction of calk plates, A A, with toe and heel calks and locking tenons, g g, in combination with the calked head screw fastenings, d d, substantially as described.
Third, Securing plates having calks formed on them to horse shoes by means of inclined tenons, g g', and intermediate screw fastenings, d d, substantially as described.

48,828.—Hat.—Evan Morris, Philadelphia, Mass.:
I claim a hat having a body or foundation of felt and cover of woven fabric, with gutta percha interposed between the two, the whole being united by the application of heat and pressure, substantially as set forth.

48,829.—Carpet Stretcher.—George G. Mudge, Pittsburgh, Ind.:
I claim the frame consisting of extensible hinged sections, and provided at one end with an armed rocking lever, by which the edge of the carpet is drawn to the position required.

48,830.—Freight Car.—Laurence Myers, Philadelphia, Pa.:
I claim the casing, d, in combination with the tires, D, and the intervening slats or cylindrical casing, or their equivalents, for the purpose specified.

48,831.—Mill Stone Dress.—Gabriel Natcher, Sidney, Ohio:
First, I claim a double inclined plane on that side of the furrow on which the grain rises.
Second, Marking with lines, substantially as described, the first inclined plane, extending from the base line of the furrow to the first step.
Marking with lines of the angle described, or thereabouts, the outer portion of the face of the stone, as described.

48,832.—Marble Polishing Machine.—Edmund S. Nichols (assignor to himself and Francis M. Nichols) Joliet, Ill.:
First, I claim the employment of a reciprocating inclined polishing bed, K, arranged and operating substantially as and for the purposes specified and shown.
Second, I claim the combination with said reciprocating polishing bed, the employment of the antifriction rollers, R, and adjustable bearings, S, arranged as and for the purposes described.
Third, I claim in combination with the sand box, C, the hinged bottom, D, spring, b, and slides, a, all arranged and operating substantially as shown and set forth.
Fourth, I claim the combination and arrangement of the hinged bottom, D, spring, b, chain, c, and arm, E, as and for the purposes described.
Fifth, I claim providing the inclined table, I, with the pivoted adjustable leaf, M, arranged substantially as and for the purposes specified.
Sixth, I claim the employment of a revolving bucket, Q, arranged and operating substantially as and for the purposes shown and described.
Seventh, I claim the combination and arrangement of the reservoir, T, the revolving bucket, Q, inclined table, L, polishing bed, K, receiver, U, and tube or trough, V, operating substantially as and for the purposes described.

48,833.—Houses for Preserving Fruit.—E. F. Olds, New Hudson, Mich.:
First, I claim the safe, B, arranged and constructed in the manner set forth, in combination with the ice house, A, as specified.
Second, I claim the side ice chambers, c g, and doors, c' b g, separate, and in combination with gage or perforated slides, p, as and for the purpose set forth.
Third, I claim one or more central chambers, C D, with or without the gage or perforated sides in connection with the doors, b b, substantially as and for the purpose set forth.

48,834.—Rake Attachment to Harvesters.—Wm. B. Parsons, Granger, N. Y.:
I claim the block, S, in combination with the rock shaft, L, operated and operating substantially as described.
Second, The latch, N, in combination with the block, S, substantially as and for the purpose set forth.

48,835.—Well Drill.—Loren G. Peck, Rouseville, Penn.:
First, I claim the hollow stock or socket holder, composed of the parts, A A, so constructed as to be united or held firmly together at the top, but expanding sufficiently below to receive the boxes, d d, in combination with the reaming bits, B B, bands, f f, and adjustable wedge, G, the whole arranged and operating substantially in the manner and for the purposes set forth.
Second, I also claim the arrangement of the wedge, G, in relation to the points of the bits or reamers, B B, and stock, A, whereby said reamers are enabled to work around and beyond tools or other impediments which accidentally obstruct the well, substantially as shown and described.
Third, I further claim constructing the bits or reamers, B B, with equally inclined faces on their adjacent sides within the stock, A, in combination with said stock, and the wedge, G, so arranged that when said faces by approaching become in contact the motion of the wedge, and the expansion of their cutting parts are limited, and the parts are firmly held together, and act as one reamer, substantially as shown.

48,836.—Deck and Side Light for Vessels.—Charles Perley, New York City:
First, I claim the fixed conical ring, a b, in combination with the conical deck or side light fitted and acting substantially as specified, and in combination therewith I claim the packing groove, 3, for the purposes specified.
Second, In combination with the deck or side light and ring, a, I claim the screws, 3, and groove, 4, as set forth.
Third, I claim retaining the glass in the metallic frame by pins passing into notches in the edges of the glass in combination with a cement surrounding said glass whereby any movement of the glass previous to the hardening of such cement is effectually prevented, as set forth.

48,887.—Washing Machine.—Orrin Reeves, Greenport, N. Y.:
I claim the standard and friction rollers, g g, in the rubbing board, D, in combination with a tub having ribs on its inner perimeter and radial flutes or ribs on its bottom the rubbing board having a scalloped perimeter and radial ribs on its under side as and for the purposes herein described and represented.

48,838.—Tree Protector.—Asa T. Ring, Newtonville, Mass.:
I claim the openings, f f, and slides, g g, in combination with the cases, b b, the caps, c c, the semi tubes, d d, and the two troughs, a a, the whole being arranged substantially as described.

48,839.—Portable Water Apparatus.—J. F. Rochow, New York City:
I claim the injector, A, applied in combination with the steam pipe, t, and condensor, C, in the manner and for the purpose substantially as herein described.
Second, The arrangement of a double packing at the ends of the condensing tubes with open spaces intervening between said two packings, substantially as and for the purpose set forth.
Third, Constructing the condenser, C, with diminishing compartments substantially as and for the purpose specified.
Fourth, The horizontal partitions between the ends of the condensing tubes in combination with the sheets, n, in the interior of the condenser, constructed and operating substantially as and for the purpose described.

48,840.—Clutch-pulley for Driving Sewing Machines.—Peter Rodier, Springfield, Mass.:
I claim the combination of the pulley, C, of a sewing machine loose on the shaft, D, with the collars, A and B, on the same shaft, and the spring pins, b b, and corresponding notches, a a a a, substantially in the manner and for the purpose described.

48,841.—Apparatus for Obtaining Oil from Running Streams.—Thaddeus S. Scovill, Williamsport, Pa.:
I claim the combination of the swinging or movable oil gathering boom, B, oil collecting race, G, with its under gate or gates, o, and chute, c, and the oil reservoir, H, arranged substantially as and for the purpose herein specified.
I also claim in combination with the oil gathering bar, the sunken channel bar, E, arranged and operating substantially as and for the purpose herein set forth.

48,842.—Hinging Coffin Lids.—Jacob C. Seeley, Cambridge, Mass.:
I claim hanging a coffin lid by hinges, the pivots of which are placed in rear of the whole joint between the lid and main cover, substantially as and for the purpose set forth.

48,843.—Machine for Driving Hoops on Casks.—Hiram C. Sherman, Buffalo, N. Y.:
I claim attaching the driving bars, H H, to the direct acting non-revolving screw shaft, E, by means of the head, K, or its equivalent so that said bars are suspended above and in a position to engage with the hoops on the barrel, L, the whole arranged and operating substantially as and for the purpose set forth.
Second, I also claim pivoting or loosely hanging the bars, H, to the head, K, by means of the joint, b, or its equivalent, so that said bars may gravitate freely, substantially as set forth.
Third, I also claim, in combination with the suspended driving bars, H, the disc, M, with its series of cams, f f, and springs, d d, or their equivalent, arranged and operating substantially as and for the purposes set forth.

48,844.—Plow Clevis.—Andrew Shogren, Sandwich, Ill.:
I claim providing a clevis with a cast iron lining or jacket, substantially as set forth and specified.

48,845.—Horse Shoe.—Thomas Skelton, Rockford, Ill.:
I claim a jointed flanged shoe combined with a bottom plate and bar when arranged substantially in the manner described for the purpose set forth.
Second, A jointed flanged shoe combined with a bottom plate, rigid bar and spring arranged substantially in the manner described for the purpose set forth.

48,846.—Gang Plow.—James B. Skinner, Rockford, Ill.:
First, I claim the combination in a gang plow of one or more plows before and one or more plows behind the supporting axle

where the plows are firmly attached to a rigid frame which is itself adjustable upon and in relation to the axle, substantially as set forth.

Second the combination of the tongue with the main frame by a hinge and lock, substantially as described to render it rigid or flexible at the will of the driver.

Third, The combination of a clevis with the main frame of a gang plow and the tongue whether rigid or flexible, substantially as described to work three or more horses abreast and equalize the draft between them.

Fourth, The attachment of the left supporting wheel of a gang plow to a crank axle to preserve the desired parallelism of the axle to the ground, substantially in the manner set forth.

Fifth, The combination of an adjustible gage wheel with the rigid main frame of a gang plow, when arranged forward of the plows, substantially as and for the purpose set forth.

Sixth, The combination in a gang plow of a rigid main frame and an adjustable axle with a mechanism for raising and lowering the frame, substantially in the manner described for the purpose set forth.

Seventh, The combination of the main frame, the axle and standards by the draft rod and reach or guides, substantially in the manner described for the purpose set forth.

48,847.—Vessel for Reception and Transportation of Night Soil.—R. A. Smith, Philadelphia, Pa. Antedated July 6, 1865:

I claim the box, G, rollers, f, tight-fitting detachable cover, H, having the tubular projection, h, and its cap, i, the whole being constructed and adapted for the reception and transportation of night soil and garbage, as set forth.

48,848.—Paper-collar Packing Envelope.—G. K. Snow, Watertown, Mass.:

I claim as a new manufacture, and as of my invention, the said envelope, substantially as described and for the purpose specified.

48,849.—Stubble Coulter.—M. A. Spink, DeKalb, N. Y.:

I claim the herein-described coulter, consisting of the shank, A, and blade, B, the same being constructed as and for the purpose set forth.

48,850.—Steam Blower.—J. W. Stevens, South Danvers, Mass.:

I claim combining with the steam blower pipe, b c, and its jet holes a cock, d, in the manner and for the purpose substantially as set forth.

48,851.—Piston for Steam Engine.—Nathan P. Stevens, Boston, Mass.:

I claim arranging the joint of the expansion ring at the lower part of the piston head and on the bottom of the bore of the cylinder, and providing such ring and piston with a means of preventing the ring from revolving in its groove, the whole being substantially as and for the purpose set forth.

48,852.—Carriage and Caster for Sewing Machine.—Nesbitt D. Stoops, Newark, N. J.:

First, I claim the apparatus described for mounting a skeleton-frame sewing machine upon a carriage, substantially in the manner and for the purposes explained.

Second, Constructing a caster so as to lock and unlock, substantially in the manner and for the purpose described.

Third, Socket, J, when used for the mounting of a skeleton-frame sewing machine on a carriage, to prevent undue elevation of the machine.

Fourth, Caster frame, H, so constructed as to support the caster above the top of the platform, and also to prevent undue elevation of the machine, by letting the caster up into the platform.

Fifth, The combination of platform, A, caster, B, pawl, F, socket, J, and caster frame, H, or their equivalents, constructed and operating together substantially as described.

48,853.—Steam Pump.—A. W. Todd, Chicago, Ill.:

I claim the combination and arrangement of the cylinder, K, levers, 4 4, piston, T, valve rod, F, inlet, J, pipe, L, crosshead, C, rod, H, pipe, P, fulcrum, M, and ropes, I I, substantially upon the principles and in the manner herein set forth.

48,854.—Table for Invalid.—Stephen Ustick, Philadelphia, Pa.:

I claim, First, The combination of the foot pieces, b, with the legs, a, of the table, C, when constructed, arranged and operating substantially as described.

Second, Combining and arranging the cord, m', and clamps, o o, with the table, C, by means of the uprights, m m, substantially as and for the purpose set forth.

Third, Combining the longitudinal guides or ways, F F, with the table, C, substantially in the manner and for the purposes above described.

Fourth, The combination and arrangement of the box, G, rest, H, pen rack, I, pincushion, J, clamps, K, and screen, L, with the table, C, by means of the longitudinal guides or ways, F F, substantially in the manner described and for the purposes specified.

Fifth, Combining and arranging the endless apron, P, with the table, C, by means of the frame, O, and guides, F F, substantially as and for the purpose specified.

48,855.—Water Wheel.—Henry Wenger, Farmersville, Pa.:

I claim the arrangement and combination of the water wheel, K, with its buckets m, on its vertical periphery, M, within the vertical casing, A, chutes, a, on top, disk, B, with its valve, b, and cogged valve, b', operated in the manner and for the purpose set forth.

48,856.—Sash Fastener.—Amos Westcott, Syracuse, N. Y.:

I claim, First, The manner of connecting the bolt, D, to the slotted piece, I, Fig. 5, as and for the purpose substantially as above described, in combination with the triangular piece, J, and the shank, M, Fig. 2, of the knob, C, Fig. 1, essentially as above described.

Second, The arrangement, consisting of the straight moving slide, K, oscillating device, J, and bolt, D, the said parts operating together substantially in the manner and for the purpose described.

Third, The manner of sustaining and guiding the slotted piece, I, Fig. 2, substantially as above described, in combination with the bolt, D, triangular piece, J, Fig. 2, and knob, C, and plate, B, Fig. 1, substantially as above described.

48,857.—Sawing Machine.—G. Westinghouse, Schenectady, N. Y.:

I claim, First, The combination of the lever, L, and adjustable weight, Z, with the beam, G, for rasing, lowering and counterbalancing the saw, as set forth.

Second, The pivoted bar, V, when provided with the projection, W, and connected by means of the bar, X, and lever, Y, to the lever, T, substantially as and for the purpose specified.

Third, The log carrier or log feeder, composed of two heads, U U, made separate, or detached from each other, and placed on the shaft, O, permanently, or so that either or both may be adjusted thereon, for the purpose specified.

48,858.—Lantern.—Wm. Westlake, Chicago, Ill.:

I claim, First, The construction of a lamp pot, e, in connection with the flanges, d and g, substantially as recited, allowing the guard to be attached to the bottom, and the lamp and the bottom to be readily separated from the glass or globe and guard and dome, as herein set forth.

Second, The hole, h, with the sliding door, i, in combination with the recess, j, of the globe, for lighting of the lamp, as herein recited.

48,859.—Railway Frog.—Wm. Wharton, Jr., Philadelphia, Pa.:

I claim a frog, H, having a recess for the reception, and lateral and vertical retention of a continuous rail of the main track, and so constructed and so arranged in respect to a rail of the intersecting track as to afford a medium for permitting the wheels of cars transversing the latter track to pass across the rail of the said main track, all substantially as described.

48,860.—Kerosene Burner.—S. G. Wilmot, Brooklyn, N. Y.:

First, I claim the arms, D3, or their equivalents, on the seamless dome, D, made from the same piece of metal, and serving to unite it with the bottom, A, along short lines, A4, substantially in the manner and with the advantages herein set forth.

Second, I claim bending outward the ears, D2, formed from the metal cut out of the dome itself, substantially as and for the purposes herein set forth.

Third, I claim the wick tube, B B', soldered along the edge, substantially as and for the purposes herein specified.

Fourth, I claim the seamless and legged dome, D D3, as a new article of manufacture, adapted to be cheaply made, by the means set forth, and to be afterwards connected to the parts, A B.

Fifth, The method herein described of manufacturing the seamless skeleton dome, D, by forming the same from a blank cut in shape before forming, and afterwards striking or swedging in dies, so as to produce the legs, D3, having between them the openings required for the admission of the air, without further cutting, all substantially in the manner and with the economy of material and of labor herein set forth.

48,861.—Fluid Ejector.—Joseph Wood, Red Bank, N. J.:

I claim the employment of a curved pipe, provided with an aperture, C, or several similar apertures, placed at a point in the pipe where it or they shall be below the surface of the fluid to be elevated, and in advance of the point in the pipe where the steam or air, which is the propelling power, is admitted, in the manner and for the purpose substantially as described.

48,862.—Submarine Steam Gun.—Wm. W. W. Wood, Philadelphia, Pa., and J. L. Lay, Buffalo, N. Y.,

We claim, First, Projecting submarine shells from vessels by means of a steam cylinder, and piston and piston rod acting against the rear of the shell, substantially as described.

Second, The cylinder, in combination with the tube, F, through which the shells are forced by the piston rod of said cylinder, substantially as specified.

Third, The combination of the tube, F, with the pipe, E, and the ball joint, substantially as set forth.

Fourth, The movable trunk, H, constructed and arranged in respect to the steam cylinder and discharge tube, F, substantially as set forth.

Fifth, The combination of the said movable trunk with the box, G, and its doors, j, substantially as specified.

Sixth, The combination of the pipe, E, and its spherical end, a, the pipe, F, the box, G, its trunk, H, and steam cylinder, K, with the truck, L, and elevating screws, M M.

Seventh, The spool or roller, a, arranged at the end of the external piston rod for receiving the discharging cord.

48,864.—Mortising Machine.—Carl L. Zeidler, Cincinnati, Ohio:

I claim First, The sheave or wrist, F, pivoted eccentrally upon its driving shaft and employed to give motion to a mortising chisel or analagous tool at the will of the operator.

Second, I further claim the toggle arm, J, and sliding box, I, in combination with a treadle lever or its equivalent and with an eccentric sheave or wrist for throwing the tool into and out of action, substantially as set forth.

48,864.—Machine for Cleaning Boots and Shoes.—T. Cecil Andrews (assignor to himself and Peter Gordon), Jersey City, N. Y.:

I claim the arrangement of the hand lever, G, and treadle, H, upon the same fulcrum, e, in combination with the crank, f, fly wheel shaft, D, and pin wheel, d, pinion, c, and rotary brush shaft, C, substantially as and for the purpose herein specified.

48,865.—Washing Machine.—V. R. David (assignor to himself, H. R. Fowler and N. G. Davidson) Newark, Ill.:

I claim, First, The combination and arrangement of the drive wheel, D, the support or standards, C, the frame, B, and the pinion, H, provided with the hollow journal, when all constructed, and operating substantially as described.

Second, The combination and arrangement of the pinion, H, with the hollow journal the iron head, and the arms, K, when constructed and operating substantially as and for the purposes herein set forth.

48,866.—Water Wheel.—L. S. Fairchild (assignor to himself and G. F. French), Cleveland, Ohio:

I claim the herein described water wheels, consisting of the bed, A, chutes, C C, wheel, H I J, gates, E, connected as described, when the several parts are constructed and arranged as and for the purpose herein set forth.

48,867.—Lady's Hood.—Emma Hill (assignor to Thomas Dolan), Philadelphia, Pa.:

I claim a lady's hood composed of the four pieces, A B B' and C, formed, arranged and stitched together, substantially in the manner described.

48,868.—Machinery for Rolling Tapering Bars or Plates.—Josiah Holmes, Pittsburgh, Pa., assignor to Hussey, Wells & Company:

I claim the use of the plunger, water chamber and valves, constructed and arranged substantially as hereinbefore described, situate in and forming part of the pressure screw of rolling mill housing, for the purpose of rolling tapering metallic bars or plates.

48,869.—Machines for Forming Baskets.—Edwin A. Jeffery (assignor to the American Basket Company), New Haven, Conn.:

I claim, First, The combination of a former, B, with a head, H, and folders, a a, constructed to operate substantially in the manner and for the purpose specified.

Second, Closing or folding the sides of the basket by means of the folders, a a, substantially as specified.

48,870.—Steam Boiler.—Thomas J. Jones (assignor to himself, George Wettengell and John D. Richards), West Pittsburgh, Pa.:

I claim the combination with a steam boiler of a scraper attached to a rod, inserted through a stuffing box in one end of the boiler, for the purpose of removing the sedimentary or residual deposit from the bottom of the boiler, substantially as and for the purpose hereinbefore described.

Also the shoes in the edge of the scraper, to enable it to pass the overlapping ends of the boiler plates, substantially as hereinbefore set forth.

48,871.—Combined Seeder and Cultivator.—Sebastian Keller, Elizabethtown, Pa., assignor to himself and Jacob L. Good, Lancaster County, Pa.:

First, I claim the construction of the semi-circular crank, U, and crank, e', forming the top of the pulleys shaft, e, in combination with the friction pulle, d, saddle step and spring brace connection, f, arranged and operating substantially in its adjustability in the manner and for the purpose specified.

I claim the five-pointed star crank, V, for operating the valve, I, in combination with the pin or pins, h, on the face of the driving or roller pulley, D, constructed and operating in the manner set forth.

I claim the flat-sided roller pulley, D, supported in the brackets, a a, for the vibrating hopper frame, B B, in combination with the pivot rod attachment to the cultivator, in the manner and for the purpose specified.

I claim the construction and operations of the valves, 12 and 3, in combination with the connecting rods, R S T, and the double crank, U e', and star crank, V, operated in the manner describeb.

48,872.—Drill.—Loomis G. Marshall, Mokena, Ill., assignor to himself and F. W. Hughes, Pottsville, Pa.:

First, I claim the arrangement and combination of the devices, D E G J and K, of the machine, as herein described and for the purposes set forth.

Second, I also claim the arrangement and combination of the devices, 2 R T V and W, of the drill, J, when constructed and combined as herein described, and for the purposes set forth.

48,873.—Railway Car.—Benjamin T. Millburn, Wilmington, Del., assignor to himself and Jos. Rigby, Brandywine, Del.:

I claim the combination of the chair pieces, A and B, the stirrup, C, and the rails, D D, constructed and operating substantially as described, for the purpose set forth.

48,874.—Extension Door Knob.—W. T. Munger, Branford, Conn., assignor to himself and James Graham, New Haven, Conn.:

I claim the combination of the grooved shank, f, with a lip, e, or its equivalent, in the socket of the rose, in the manner and for the purpose described.

48,875.—Sawing Machine.—Martin Newman (assignor to himself and Clark J. Hayes), Unadilla, N. Y.:

I claim, First, Combining with the yielding rolls of a pair or pairs of feed rolls a lifting piece and a lever, so that the operator from his stand may rise up, hold up, or let down said yielding rolls at will, substantially as described.

I also claim, in combination with yielding rolls, hung at both ends, the connecting of said end supports by a rigid roller cap, to prevent one end of said roll from rising or falling independent of its other end, and to make the pressure on the board uniform at both edges, and thus cause it to move in a direct line, substantially as described.

I also claim shifting the movable saw upon its shaft by means of the levers and link connection herein described and represented, whereby I get a quicker motion, and thus economize time, substantially as described.

48,876.—Mode for Embossing Leather.—Geo. W. Pratt (assignor to himself and William P. Martin, Salem, Mass.:

I claim pebbling or embossing leather or other treated skins by placing the face or grain side in contact with a flat, or nearly flat surface, having the design formed in it, and applying the rolling or rubbing tool under pressure to the flesh side of the skin, substantially as described.

48,877.—Diaphragm Pressure Gage.—Richard C. Robbins (assignor to J. M. and G. W. Keen), New York City:

I claim a diaphragm holder, having a female screw on one part and a male screw on the other part, by which the diaphragm is firmly secured and held in its place, thus dispensing with bolts or scres, and obtaining a more perfect diaphragm, as herein fully described and set forth.

48,878.—Machine for Knitting Shoe Lacings, Etc.—Nathaniel W. Westcott, Providence, R. I., and Henry L. Walcott, Charles River Village, Mass., assignors to James G. Payson, Foxborough, Mass.:

First, We claim the combination of the needle bar, E, carrying one or more needles, with the rest bar, E, constructed, arranged and operating substantially as described.

Second, The looping pin, d, or its equivalent, in combination with the needle, A, and operating substantially as and for the purpose described.

Third, The shear or guard, n, or its equivalent, operating substantially as and for the purpose described.

Fourth, The depresser, h, or its equivalent, in combination with the needle, A, and operating substantially as described, for the purpose specified.

Fifth, The mode of operation described, by which the point of the needle tongue is first positively raised and carried over the loose yarns which are to form the succeeding loop by the interposition of a suitable instrument, and afterward immediately depressed to the requisite extent to permit the loop already formed to be cast off, substantially as described.

48,879.—Sawing Machine.—Chas. P. Wiggins (assignor to Case, Marsh & Wiggins), Indianapolis, Ind.:

I claim the arrangement of the saw guide, J, set screw, L, guide frame, K K, with slotted foot or pivot bar, S S and M, when constructed and operated substantially as set forth.

48,880.—Protection for Pump and Other Oscillating Rods.—Levi Wilson (assignor to J. Nelson Buell), Middletown, Conn. Antedated July 14, 1865:

First, I claim the coaming, E, and top piece, G, so arranged relatively to the reciprocating and vibrating rod, D, as to allow the top piece to cover and inclose the coaming, and to move thereon to accommodate the lateral portion of the rod, substantially as and for the purpose herein set forth.

Second, I claim the central pivots or axis, I, arranged relatively to the coaming, E and G, and rod, D, substantially in the manner and for the purpose herein set forth.

48,881.—Harmonium.—James Gilmour, Glasgow, North Britain:

I claim the arrangement and construction of musical instruments, substantially as hereinbefore described, or any modification thereof.

48,882.—Apparatus for Carbonizing Wood.—Pierre Hugon, Paris, France, assignor to Emil Justh:

I claim First, The method herein described of charring or carbonizing wood, disintegrating rocks, roasting or fusing ores and metals, by direct application in the form of jet of inflammatory gases, generated in and directed by a movable apparatus, substantially in the manner herein shown and set forth.

Second, I claim an apparatus for carbonizing wood, disintegrating rocks, etc., composed of a furnace or fire chamber, movable, upon a stationary frame, both vertically and horizontally, and provided with a nozzle, in combination with a suitable blowing apparatus, substantially as set forth.

Third, In combination with a movable furnace and blowing apparatus, under an arrangement for operation substantially as described, I claim an apparatus for injecting water or steam in the manner described, so as to mix with the air previous to its passage through the furnace, for the purpose set forth.

REISSUES.

2,028.—Amalgamating and Collecting Gold and Silver.—Henry W. Adams, New York City, and W. S. Worthington, Newtown, N. Y. Patented Feb. 16, 1864. Antedated Feb. 12, 1864:

We claim the process of amalgamating the precious metals by bringing their mineral matter in the state of a dust into contact with the vapor of quicksilver during their passage through the heating vessel, substantially in the manner and for the purpose herein set forth.

2,029.—Piston for Steam Engines.—Henry D. Dunbar, Springfield, Mass.: Patented Aug. 14, 1860:

First, I claim the solid T shaped ring applied to a piston head, in the manner substantially and for the purpose described.

I also claim, in combination with a solid or uncut ring, the segmental break-joint rings, e i, the latter fitting into the angle of the former, and both breaking joint with each other, and held out against the cylinder by the action of the steam therein, substantially as described.

2,030.—Machine for Cutting Corks.—Peter Holmes, Charlestown, Mass., assignee of J. Power and A. J. Bailey. Patented May 20, 1862:

First, I claim producing a cylindrical or conical cork by two cuts with one and the same knife, by means substantially such as herein described, or by any equivalent means.

Second, The combination of the reciprocating cutter, L, and rotating mandrel, C, when arranged substantially as shown, so that the latter will have a continuous rotary motion imparted to it in one and the same direction by the reciprocating movement of the cutter, for the purpose herein set forth.

Third, The cap, K, of slide, I, knife, L, and shafts, J J, attached in combination with the sliding rack, O, pinion, N N, and pins, h h', arranged substantially as shown, for elevating and depressing the knife, L, for the purpose specified.

2,031.—Constructing Railroad Cars for Transporting Oil and Other Liquids.—Joel F. Keeler, Pittsburgh, Pa. Patented Jan. 10, 1865:

First, I claim constructing railway freight cars (technically called so) with a covered tank or tanks for the transportation of liquids in bulk, when any part of such tank or tanks is placed below the level of the top of the wheels of the car.

Second, Constructing railway truck tanks for transporting liquids in bulk in such a manner, substantially as hereinbefore described as that the metallic parts of the tank itself shall serve the purposes of a truck frame.

Third, Providing railway truck tanks for transporting liquids in bulk with one or more contracted space or spaces in the upper part of the tank, of less horizontal area than the body of the tank, for the purpose of affording room for the expansion of the liquid, and checking its surging motion, substantially as hereinbefore described.

Fourth, Constructing freight cars with a tank or tanks for transporting liquids in bulk, combined with a box or receptacle for the carriage of dry freight, substantially as hereinbefore described.

Fifth, The mode of ventilating combined railway truck tanks and freight cars by means of air passages, substantially as and for the purposes hereinbefore set forth.

2,032.—Horse Rake.—Ariel B. Sprout, Hughesville, Pa. Patented Jan. 17, 1865:

First, I claim, independently of the shape of the sides, which are, however, in the main of a trilateral character (viewed in cross section), unless by the removal of the angles the sides are merged into a curve, a tooth so constructed that on being divided by a longitudinal section which follows the curvation of the tooth at a point midway between the inner and outer lines of said curvation, the greater amount of metal and the widest portion of the tooth shall be on the inner side of said curved section, substantially as above set forth and described.

Second, In combination with a tooth having the above characteristics, I claim a coiled spring by which it is attached to the head, and by means of which its elasticity is increased.

Third, I claim the plates, C C, adapted to be secured in position by the screw, c, substantially as and for the purpose specified.

Fourth, I claim the spool, C c2 c3, constructed and arranged substantially as described, and adapted for the attachment of the spring A', in the manner set forth.

2,033.—Soda Fountain.—Samuel R. Sylvester, Washington, D. C. Patented July 21, 1863:

I claim, First, Producing soda water on draught by means of an apparatus which is so constructed as to give a direct discharge of the alkaline solution from an open vessel, through a pump, into a vessel containing acidulated sirup, substantially as described.

Second, Producing a continuous or uninterrupted stream of an alkaline solution from an open vessel into a vessel of acidulated sirup by means of a pump, substantially as described.

DESIGNS.

2,134.—Bust of Lincoln.—Henry Berger, New York City.

2,135.—Paper Collar, Cuff, Etc.—Wm. Boggs, New York City.

2,136.—Carpet.—Elemir J. Neig (assignor to the Lowell Manufacturing Company), Lowell, Mass.

2,137.—Envelope.—Geo. H. Reay, New York City.

2,138.—Sewing Machine.—C. A. Shaw and J. R. Clark, Biddeford, Maine.

2,139.—Medallion of Abraham Lincoln.—Franklin Simmons, Washington, D. C., assignor to Wm. Miller, Providence, R. I.

2,140.—Medallion of Gen. Grant.—Franklin Simmons, Washington, D. C., assignor to Wm. Miller, of Providence, R. I.

2,141.—Medallion of Vice-Admiral Farragut.—Franklin Simmons, Washington, D. C., assignor to Wm. Miller, Providence, R. I.

2,142.—Medallion of Maj.-General Hancock.—Franklin Simmons, Washington, D. C., assignor to Wm. Miller, Providence, R. I.

2,143.—Medallion of Maj.-General Wright.—Franklin Simmons, Washington, D. C., assignor to Wm. Miller, Providence, R. I.

2,144.—Medallion of Maj.-General Parke.—Franklin Simmons, Washington, D. C., assignor to Wm. Miller, Providence. R. I.

2,145.—Medallion of Maj.-General Hooker.—Franklin Simmons, Washington, D. C., assignor to Wm. Miller, Providence, R. I.

2,146.—Medallion of William H. Seward.—Franklin Simmons, Washington, D. C., assignor to Wm. Miller, Providence, R. I.

2,147.—Medallion of Chief Justice Chase.—Franklin Simmons, Washington, D. C., assignor to Wm. Miller, Providence, R. I.

2,148.—Picture Frame.—H. Vanderbeck and E. W. Hadden, New York City.

Notes and Queries

M. B., Jr., of Mass.—The best mode of dividing water among several owners of power in their due proportions has been very fully considered in your city by the ablest and most intelligent engineers in the country, and you can learn the plan finally decided on by inquiring at the office of the Locks and Canals Co., or probably of the Superintendents of any of the corporations. Will you please give us the information when you get it. The method in use at Woonsocket, we believe, is to measure the flow at the surface over a horizontal dam.

J. L., of N. J.—We are not aware that any biography of George Law has ever been published. D. Appleton & Co. can tell you.

D. S., of Phila., asks:—"Suppose a patented article be constructed of part wood, part iron, brass work and glass, and the wood work made by one person, the iron by another, the brass work by a third, etc., and all these different parts are ordered and put together by another party, and without the consent of the owner of the patent. Now, in law, would all the different workmen be considered as infringers, or would the principal only be considered such?" As you give us no idea of the patentee's invention or claim it is, of course, impossible to answer your inquiry intelligently. The general rule is that all who make, use or vend a patented article are infringers. But the making of any part of a machine on which part there is no patent, is not an infringement.

W. D. H., of La.—We know of no better means of obtaining gold from a solution of gold and cyanide of potassium than the introduction of a plate of zinc in contact with a plate of platinum or other negative metal. If the action has ceased in your solution the gold is probably all deposited. The color of brass may be varied by varying the proportions of copper and zinc in the alloy. We think you will find that all brass jewelry is gilded.

A. H. C., of Pa., and B. G. E., of N. J.—If it is true that the upper portion of a vertical jet of water is in tunnel form, your explanation, that a ball is sustained by resting in this tunnel, is certainly the most simple and satisfactory of any yet offered.

G. A. C., of Me.—Bitumen of Judea is soluble in camphene. It is to be had of druggists; expressmen will get it for you.

J. J. S., of N. Y.—Your rule for finding the area of a circle—to multiply the circumference by the diameter and divide by four, is the same as the common rule, to multiply the circumference by half the radius. The problem of squaring the circle is to find the exact circumference from the given diameter.

E. J., of Mass.—To render fabrics inflammable immerse them in a solution of tungstate of soda of a strength of 20 per cent of the salt. See page 154, Vol. IX., for fuller directions.

D. S., of N. Y.—We thank you for your good opinion of our paper. Engineers are licensed now in this city, or are obliged to pay five dollars to some one for a certificate, which is probably what the law means.

M. D. A., of N. J.—Your device for running cars on the track after they have been thrown off, strikes us as novel and useful. Such apparatus would save much time if properly used.

A. B. C.—There are lamp shades in use similar to that described by you, and we see nothing patentable in your plan. Try again.

J. P., of Pa.—We thank you for your kind attention in sending us the sketch of the water dam.

W. R., of N. Y.—We are often in receipt of letters inclosing three cents and desiring information by return mail where to purchase certain books. A little reflection will convince you and others that it is unreasonable to expect such attention, and that we cannot attend to such requests.

A. S. B., of C. W.—Ure's Dictionary of Arts and Sciences and Muspratt's Chemistry both contain elaborate descriptions of the mode of making illuminating gas, fully illustrated by engravings. These are large costly works, but we know of no cheap book on the subject.

A Reader, of S. A.—If your practical railroad men think that the outer rail of a curve is worn in consequence of being laid too high, we would suggest that you ask *them* for the grounds of their opinion.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

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It was patented through the Scientific American Patent Agency, on June 6, 1865, by J. G. Ives, of Springfield, Ill. For further information address him at that place.

Fig. 2

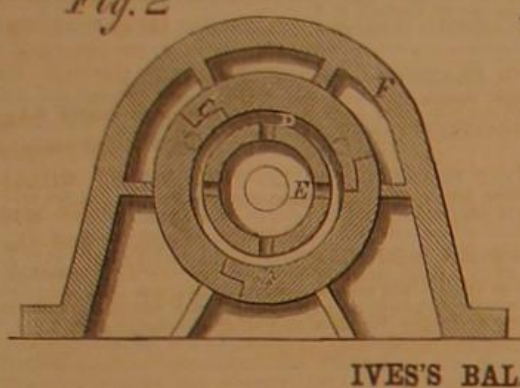
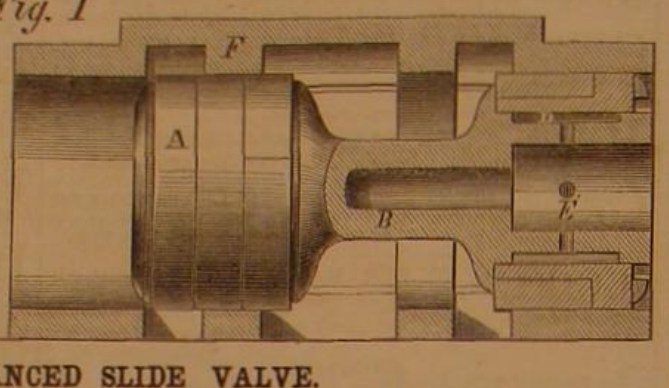


Fig. 1



IVES'S BALANCED SLIDE VALVE.

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:—

Steam Boiler.—This invention consists in arranging the steam dome or reservoir of a steamboat in the interior of its shell and of the water space, in such a manner that the shell of the boiler can be filled up with water nearly to the top and the fire made to strike the same around its entire circumference; and, furthermore, the steam reservoir of the boiler is surrounded by the heated water and the radiation of heat from the same, and the condensation and loss of steam, consequent upon such radiation, are avoided. Henry Gerner, of 20 Bleecker street, New York, is the inventor.

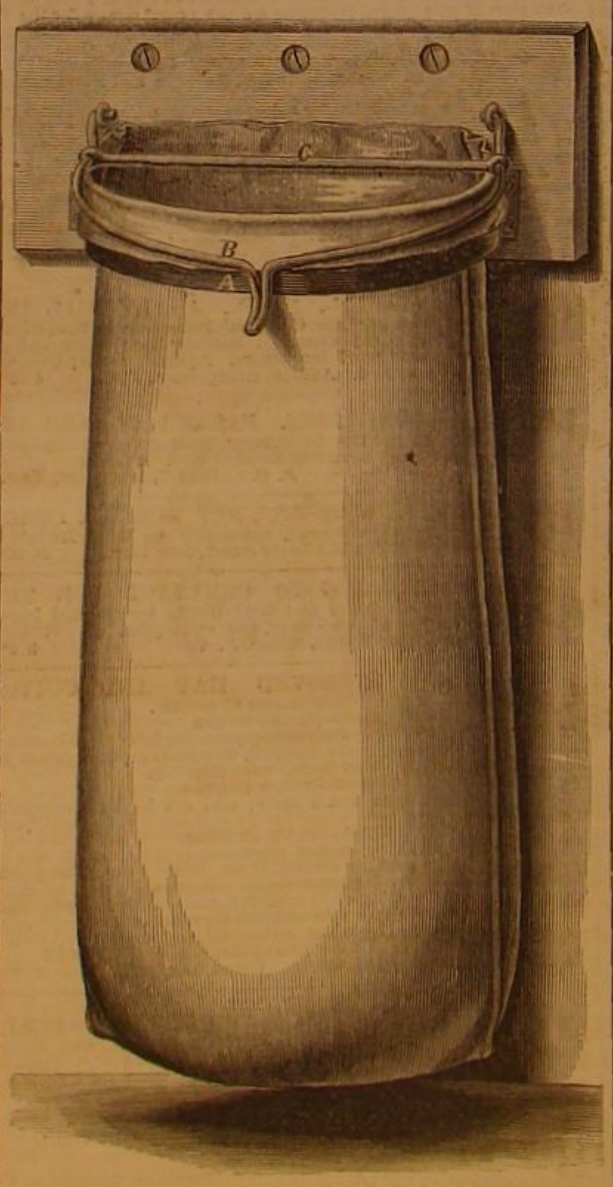
Hydro-carbon Blower.—This invention consists in the use of a current of hydro-carbon vapors formed by the action of steam, and mixed therewith and with a suitable percentage of atmospheric air in combination with a furnace, in such a manner that an artificial draught is obtained without incurring any loss of heat; and, furthermore, a quantity of inflammable gases are introduced into the furnace, and thereby the heat is increased and the consumption of fuel in furnaces is reduced. Henry Gerner, as above, is also the inventor of this.

Drag or Cross-cut Sawing Machine.—This invention relates to a new and improved sawing machine of that class designed for sawing logs transversely with the grain, and intended chiefly for sawing fire or cord wood. The object is to obtain a device for the purpose specified, which may be attended or manipulated with the greatest facility and admit of having the log fed to the saw at equal distances after each cut to insure the log being sawed into pieces of equal lengths. The invention has, further, for its object, the obtaining of a simple and efficient log-feeding mechanism and a means for regulating the downward pressure of the saw on the log. G. Westinghouse, of Schenectady, N. Y., is the inventor.

CORBIN'S BAG HOLDER.

Nothing can be more annoying, in the list of small trials, than filling a bag with one hand and holding it open with the other. Some individuals, with a view to hasten the work, contrive an ingenious and elaborate arrangement of sticks and strings to hold the bag open, but these are so unsuccessful that when the shovel, or measure-full, of grain is partly in, the bag collapses as if on purpose, and the grain flies all over the floor. A simple and cheap device, like the one here illustrated, is of great utility to farmers, or in mills, and will more than pay for itself in a short time.

The invention consists of a guard, A, attached to the wall or timbers of a beam, and a bail, B. The sack is held open by putting it inside the guard and turning the top over it, as shown in the engraving, the bail is then brought down and binds the sack firmly so that it can be fitted in a short time. The brace, C, keeps the back part of the sack out of the way while it is filled. Bags can be adjusted speedily in this holder, and it will prove useful to persons engaged in such business. It can be hung anywhere, is not confined to one locality and will sustain the whole weight of a bag of grain with perfect safety. It is also useful for filling bags with fruit or any purpose where sacks are used. We are informed that over 9,000 of them have been sold since the patent was applied for through this office a few weeks ago. The patent is ordered to issue. State and county rights for sale. Address the patentee, J. S. Corbin, Clinton, Iowa.



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