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THE PNEUMATIC DISPATCH.

The growth of the business and population of New York City is wonderful. Twenty years ago we numbered less than 400,000 inhabitants, while to-day we have nearly 1,000,000, and if the same ratio of increase continues for twenty years longer, we shall then count 3,000,000. Already our streets, spacious compared with many large cities, are over-crowded; public conveyances impede each other, and can only travel at slow pace. The carrying traffic has become so enormous, the number of men, horses, and vehicles so great, that they frequently blockade the streets, move with difficulty, and of necessity their charges are high. It costs more to carry a barrel of flour one mile within the streets than to transport it hither from the mills, distant two hundred miles.

The city postal service, excellent in some respects, fails to afford a tithe of the assistance it is capable of rendering in the transactions of ordinary business. No person expects promptness in the delivery of city parcels and letters: as for out-of-town mails, letters fail to go unless they reach the General Post Office down town, from one to two hours prior to the departure of the car or boat.

The need of some method of relieving the streets and affording to the public more abundant, quicker, and cheaper means of local communication, was never more pressingly felt than at present.

We are glad to observe that a movement is being made which promises something practical in respect to the faster conveyance of passengers. We understand that the Senate Committee of the Legislature has decided to report in favor of a tunnel passenger railroad to extend from the southern extremity of the island under Broadway, with branches under Third and Eighth Avenues, to Harlem River, a distance of eleven miles.

Of still greater importance to the material prosperity and business convenience of the city, is the introduction of an underground method for the safe, prompt, and economical conveyance of all kinds of freight, goods, parcels, and the mails.

To this service the Pneumatic Dispatch system is admirably adapted, and to some of its practical uses we propose now to direct the attention of our readers. The system of communication now generally known as the Pneumatic Dispatch, consists in the employment of a closed tube through which air is driven or exhausted, by means of steam power and blowers of large dimensions. Cars or trucks closely corresponding in form to the shape of the tube are employed therein to carry freight, and these are sucked or blown along, from station to station, literally with the speed of the wind. The Pneumatic Dispatch is now employed in London, with complete success. By it freight, mail bags, etc., are transported with a velocity of 30 miles an hour, up hill and down, around the sharpest curves, with great economy. A velocity of 50 or 100 miles, or even more, per hour, may be obtained if desired, by simply burning more coal and driving the blowing machinery faster.

The Pneumatic Dispatch system is also well adapted to the propulsion of passenger cars, and for city use it is probably more economical and safer than any other known means. The superior economy of stationary engines for steady work is well known. Between pneumatic trains there can be no collisions; the same current drives them all; if one train stops on the track, no other can approach it; no engineers and firemen are required on the cars; no gas or smoke is evolved; the tunnel and cars are constantly supplied with moving fresh air; the cars run with peculiar steadiness, without any jerking at the start or stop. With an atmospheric pressure of only 2½ ounces to the square inch on the rear end of the car, a velocity of 25 miles an hour is obtained. The use of the pneumatic passenger cars in London established these facts long ago.

We have selected for illustration in connection with this subject, the application of the Pneumatic Dispatch to the city postal service, from designs by Mr. A. E. Beach, of the SCIENTIFIC AMERICAN. Engravings of the driving machinery and valve arrangements are reserved for future issues.

The engraving herewith presented is an interior view of a supposed Pneumatic Dispatch Station. Passing through the apartment is seen the main pneumatic tube, *g*, having side switch tubes, *h*, through which the pneumatic cars enter and leave the station. Each car on emerging from the switch tube is carried by its momentum across the floor into a short tube, *h'*, which serves as an air cushion and gently arrests the car.

The automatic letter-distributing mechanism is seen in front. The packages and letters destined for different city stations are placed by the attendant in the rotary letter and parcel boxes, A B C, which indicate the stations to which the packages are to be conveyed and delivered. The pneumatic car is divided into compartments corresponding respectively to the boxes, A B C, and when the car passes through the tube under these boxes, a pin, *b*, upon the car, strikes a projection, *a*, upon the blade of each rotary box and causes it to turn upon its axis far enough to compel the contents of the box to fall into the car beneath. Each box is similarly operated by a separate pin, *b*, and thus the contents of the several boxes at the various stations on the route are successively transferred into their corresponding car compartments, without any stoppage of the car. When it is desired to send the cars through the tube without operating the boxes at the stations, it is only necessary to remove the pins, *b*.

The delivery of the contents of the car at the appointed stations, is accomplished by opening the car bottom, each compartment bottom, *f* being hinged for that purpose. On reaching station A, for example, the rod, *e*, which rests upon the car bottom, and projects above the top of the car, will come in contact with an inclined lug, fastened in the roof of the tube, *g*, which lug will depress the rod, *e*, and cause it to

APPLICATION OF THE PNEUMATIC DISPATCH TO CITY POSTAL SERVICE

open the bottom of compartment, A, and the contents thereof will drop out, through an opening in the bottom of the tube, upon a table, or other receiver, within the station. A similar transfer takes place at each station from each car compartment corresponding to that station, without stoppage of the car. By this simple means the collection, transportation, and delivery of letters and parcels, may be automatically effected throughout the entire city, with extraordinary rapidity, safety, and economy.

The delivery of the contents of a car upon the table of a station is illustrated in the large engraving on page 8, at the right, where the main pneumatic tube passes through the basement. In the Receiving Office above is a series of slides or tubes which communicate respectively with a series of rotary letter boxes, A B C D E F, mounted upon the main tube below. These letter boxes indicate so many stations to which letters are to be sent, and they are distributed by the attendant into the slides, A B C D E F, down which they fall into the letter boxes where they remain until a car comes along, which takes them out and carries them to their several destinations, in the manner before described.

In the foreground of the picture is a lamp-post letter box, and under its base are two rotary boxes, one for up-town letters, the other for down-town letters. The pneumatic cars are intended to pass under these lamp-post letter boxes, to collect and carry the contents as already described.

By the use of the Pneumatic Dispatch letters and parcels may be collected, conveyed, and delivered, from and between all stations and lamp posts below 42d street and the Post-office, Nassau and Liberty street, in six minutes, distance 3 miles. Letters deposited in any pneumatic post or station, in any part of the city, 15 minutes before the departure of any mail, will be in time for such mail. Messages, letters, and parcels could be sent to any address, up or down town, and the answer returned, all within an hour's time, or even less.

Among the first results of the introduction of the Pneumatic Dispatch, in connection with the postal service, would be an enormous increase in the number of letters sent. It would soon become the great popular means of communication, a sort of Hermes, or winged messenger, employed by the gods, as we read in ancient mythology, but in these modern times transferred to the service of the sovereign people.

Independent of the postal service, which of itself would bring in an immense revenue, and soon repay the cost of construction, the additional existing business which the Pneumatic Dispatch would command at once in the city of New York, by its unapproachable cheapness and facility, is something remarkable. We have been at some pains to investigate the daily movement of packages and parcels through our streets, and the result, we think, will surprise those who are best acquainted with the business.

There are two or three leading Express Companies which collect and distribute three or four thousand packages each per day; each employing from fifty to a hundred horses and as many men. But these mammoth establishments take up but a drop of the flood, comparatively. We have at least a dozen important express lines to the interior, constantly employing in our streets an aggregate of nearly a thousand men and horses, in the collection and distribution of not less than fifteen thousand parcels of all sizes per day. But the City Express system is entirely additional to this, and twice as large. All the out-of-town express matter is collected and distributed here by the companies without charge to their customers, and consequently pays no license fee to the city. But the number of licensed express wagons doing business for hire within the city is over eleven hundred; and their daily parcels must exceed thirty thousand, if each wagon be allowed only thirty calls per day, which would barely support man and horse. Again, this does not include the suburban express wagons, which are licensed in their respective localities, although their business is wholly to and from this city, and of which some two hundred and forty come over every day from the city of Brooklyn alone. Jersey city, Hoboken, Hudson city, Weehawken, Newark, Staten Island, Flushing, Astoria, Jamaica, Flatbush, and many other places, send in their full quota of daily express wagons; so that five hundred suburban expresses, with their fifteen thousand daily parcels, must be considered a very moderate estimate.

But all this is a sort of excrescence, the growth of a few recent years, upon the main body of our system of street transportation. The public cartmen number upward of 7,000, with 275 public porters. Of the private carts and wagons belonging to our wholesale merchants, manufacturers and large retail houses, we can only make inadequate conjectures, so as to be within bounds. Of our 8,000 wholesale merchants, at least 1,000 have their own carts. The manufacturers, who, for the most part, cannot dispense with private wagons, cannot possibly have less than 2,000 of these in motion. Here are ten thousand vehicles in the wholesale way. Then we have 17,000 retailers and 11,000 in mechanical trades. Of these, some 3,000 grocers, and 2,000 butchers and bakers, must have, nearly all of them, wagons, for the collection of their numerous daily supplies of goods or materials, as well as for distribution to their customers. Allow them 4,000 wagons, and let the other 12,000 retailers have 1,000 more. Total of public and private business vehicles, 15,000, besides expresses. Give them a low average of thirty parcels per day—many of them carry hundreds—and we have a total movement of 450,000 parcels. To these add 15,000 out-of-town express parcels, 15,000 suburban, and 30,000 city, and we have a total of 510,000 per day.

Half a million of parcels and packages already passing [illegible] our streets daily by horse-power—to which we might [illegible]d a hundred thousand more by hand—furnish the basis of business strictly legitimate for the Pneu[illegible] transacted by that agency at a decisive saving in cost. The latter fact will be apparent on a simple calculation. The cost of a horse in this city, well cared for, is found by accurate account, to be about sixty-five cents per day. The wages of employees are about three dollars, and the earnings of cartmen five or six dollars at the lowest. Allow the men an average of four dollars, and let the wear of wagon and harness, with the expenses and wear of the horse, make up one dollar a day. Too little, every one will say: but here are over 17,000 horses, as many wagons, and as many men, maintained at a minimum cost of $85,000 per day, which is an average cost of seventeen cents for every one of the half million parcels they are supposed to carry. Of course the *price* paid, directly or indirectly, must be higher. Any one generally acquainted with such prices in the city, will admit that twenty-five cents would be a medium estimate for the average.

Reduce this price to an average of ten cents, which would be a lucrative rate for pneumatic transportation, and you have instantly the proper condition for doubling the business; which the quickness, certainty and facility of the new method would soon double again.

Again, as to capital: here are 17,000 horses worth on an average $300 each, and as many wagons and carts (leaving the more expensive double wagons out of the account) worth an average of $200 more; making a total capital of eight and a half millions of dollars invested in this business, in the form of horses and vehicles alone: enough to extend the pneumatic system through every thoroughfare of the city twice or three times over.

Photographic.

The large and splendid engraving of the Scientific American Office which covers page eight of this paper, is from an admirable photograph by Rockwood & Co., 839 Broadway, whose excellent capabilities we have before had occasion to notice. Every branch of photographic art is carried on by them in superior style. We have before us a specimen of life size portraiture which in its fine execution does them the highest credit. It is a solar camera enlargement from a two inch negative. We called attention not long ago to the photo-medallions produced by Messrs. Rockwood. These are raised or medallion portraits, similar to cameos, produced by the aid of photography, with all its life-like accuracy. The likenesses thus made are said to be marvellously correct.

Some very curious applications of this Photo-Medallion process are described in the *Photographic News*. They consist in what are termed "Micro-Photo-Sculptures," or enlarged images in bas-relief of microscopic objects, the material being plaster of Paris. Nothing can exceed the delicacy, sharpness and perfect rendering of these reliefs, which give, practically, an enlarged model of the original object. The tongue of a cricket is the most perfect of those before us; the tongue of a fly is also exceedingly good; a flea is from a somewhat imperfect negative, and lacks crispness; but this is in nowise due to the process. The perfection of the modelling depends, of course, on the perfection of the definition in the negative; and the amount of relief, other things being equal, on the intensity of the negative; although this may be considerably modified by management in the manipulation. Those before us are on round tablets about three inches in diameter, the amount of relief resembling the thickness of a skeleton leaf.

The result is exceedingly beautiful, and it is probable that the principle upon which they are produced will find other applications. It is only necessary to remark that it is imperative that the subject to be reproduced should be semi-transparent, and admit of being photographed by transmitted light, so as to secure the relations of form in a relief so produced.

How to Intensify Negatives after they are Varnished.

Hughes says:—"When a negative has been once varnished, its character is supposed to be so settled that it is beyond the reach of alteration or improvement. It is certainly the best plan so to consider it; yet sometimes a negative becomes so weakened in the varnishing as to cause great disappointment. It is a consolation to know that a negative need not be given up as hopeless, even under these circumstances. The method of proceeding is to make a "negative intensifying varnish" by adding tincture of iodine—alcohol one ounce, iodine ten grains—to any good negative spirit varnish, until of a very deep sherry color. Label the bottle and keep it for special use. When a negative prints weak and without sufficient contrast, re-varnish with this varnish; pour on in the usual manner, allowing a few seconds for the yellow varnish to penetrate the film, and dry by heat in the usual manner of varnishing the plate. The negative will be found to be changed to a more non-actinic color that will take longer to print, and will produce a more brilliant impression on paper. Many weak, thin, foggy negatives may thus be made to produce passable prints. It is well to keep two varieties of this yellow varnish—one, of an ordinary sherry color, for negatives that only want a little intensifying; and another with a very deep port-wine color, by adding a greater quantity of tincture of iodine, and using this latter for negatives that are very weak and gray. Used with care and judgment, there is no question but that these varnishes will be found extremely useful in every photographic laboratory.

"A varnish of this character may also be used with advantage for varnishing the plate in the first instance, if the negative is found to be not quite intense enough, as the iodine in the varnish unites with the silver deposit, and makes the deposit much more chemically opaque than the ordinary varnish, thus increasing the intensity of the negative.

"It is scarcely necessary to say that judgment must be exercised in employing these expedients, and though useful in cases of extremity, they should never be considered as the regular practice."

Glycerin for Preserving Wet Plates.

In photographing interiors, where very long exposures are necessary, and in taking landscapes at a considerable distance from the dark room, we all know how difficult it is to keep the film from becoming surface dry. The partial drying of the bath solution on the surface is apt not only to give rise to various kinds of stains, but also by concentrating the nitrate of silver, to weaken the sensitive medium considerably by dissolving the iodide of silver which it contains. Next to the nuisance of having to use tents, etc., this is one of the most annoying shortcomings of the wet collodion process. Many schemes have been devised and recommended for at least mitigating the evil, but all of them hitherto described seem to entail a considerable loss of sensitiveness.

The process we would recommend is the following:—

Use the ordinary bromo-iodized collodion and silver bath. When the plate has been sensitized and is still moist, pour on and off several times, until all traces of greasy lines have disappeared from the film, the following solution:—Pure glycerin, one oz.; distilled water, one oz.; thirty grains nitrate solution, one oz.

The plate when thoroughly soaked with the above solution, should be allowed to drain on blotting paper for several minutes before being placed in the dark frame. It will retain nearly its primitive sensitiveness for four hours, probably much longer, but we have not tried to find the limit to its keeping properties. The development is, as usual, either with protosulphate of iron or pyrogallic acid.

Glycerin, it is well known, is oxidized by rather strong nitric acid into oxalic and glyceric acids, with the formation of some other compounds of less importance, but these reactions take place only after a considerable time has elapsed. From this it has been surmised, and therefore recommended, that the nitrate bath for this process should be acidulated with acetic instead of nitric acid. From our experience it appears that the slight trace of nitric acid in the bath has little or no effect on glycerin; in fact, such a bath answers at least quite as well as one acidulated with acetic acid.—*British Journal of Photography*

Leptographic Paper.

This is the name given to a species of new photographic paper which is prepared by a company in Paris, and sold, ready sensitized, at a comparatively low price. We hope it will be introduced here. It has been examined and experimented upon by many of the leading photographers in France and Great Britain, nearly all of whom speak well of its practical uses. It consists of the ordinary paper upon which a sensitizing collodion or film has been poured and dried. Exactly what the film is composed of does not yet appear. It was at first supposed to be nothing more than paper covered with collodio-chloride, as in Simpson's process; but the Leptographic film seems to be different from that, as it is more insoluble, keeps better, is harder, etc.

The Leptographic paper possesses some very peculiar and valuable qualities: "The paper being prepared beforehand and properly protected from the light, is ready for use at any moment; it may be left, indeed, in the printing frame, if the weather is unfavorable, and then exposed again two or three days afterward, in order to finish the impression already commenced, and all this without any inconvenience or detriment to the whites—a convenience which is very agreeable, and which occurs with no other paper. It has been demonstrated by experience that this paper is as sensitive at the expiration of half a year as on the day of its preparation.

Yankee Enthusiasm.

"We have always thought the Scientific American a very useful and instructive paper. We only learned by the last mail from New York that it merits comparison with the sacred Bible. If well-conducted trade papers are to reach such a standard of purity and excellence, what a glorious destiny is in store for *The Grocer!* It and its editor may hope some day to be canonized This is a part of a letter addressed to the Scientific American, and published in the last number:—

I think a great deal of the Bible and its truth. I can read it over and over, always finding something new and instructive. I really think it is the same with the Scientific American. It is suitable for all, rich and poor. By it even ministers of the Gospel will find they can be interested and instructed.

We may add in serious mood that if the Scientific American has the misfortune to possess among its many thousand subscribers even one such blasphemous fool as the man who wrote the above, it says little in favor of his sense of decency to give vent to his mad ravings."

[We copy the above peculiar paragraph from the *Grocer*, a weekly journal published in London. We can assure the Editors that they will never be canonized so long as they encourage the sale of "pork sausages" and "Old Tom Gin."—Eds. Sci. Am.]

Underground Railway.

The Senate Commission on Railroads, in the city of New York, unanimously adopted a resolution in favor of one line of underground road from the Battery to the City Hall Park, under Broadway, with one branch connection under Chatham street, Bowery, and Third avenue, to the Harlem River; another running on the west side, under Park place (or Murray or Warren streets, or by the most feasible route) to Hudson street, thence under Hudson street to Eighth avenue, thence under Eighth avenue to Broadway, thence under Broadway to Ninth avenue, thence under Ninth avenue to Harlem River.

The line under Broadway, between the Battery and City Hall Park, to be constructed only as part of one or more of the through lines.

Miscellaneous Summary.

THE TRICHINÆ excitement has died out—not so the trichinæ. Victims *a la* king Herod continue to be reported. Miss Lida Jordan, of Maine, Iowa, recently died of trichiniasis, having eaten of diseased pork last spring. On post-mortem examination, her flesh was found to be filled with the worms. "Hog Cholera" (as the disease is called in the animal) is raging throughout Illinois and northern Kentucky, and defying all remedies. A western carcase apparently healthy and unusually fat, was examined in Oswego, a few days since, revealing millions of trichinæ in a mouthful (!) of fat, varying from atoms scarcely perceptible to worms two inches long. The *Palladium* describes them as of a greenish yellow color, resembling in shape a needle pointed at both ends. The practice of allowing swine to feed upon the flesh, offal and excrement of animals, is the source of the disease. The trichina egg never developes to a harmful stage while passing naturally through the intestines. It must be eaten, and thus harbored and nourished a second time, in order to reach its boring and destructive stage of growth. It is a penalty of confederate greed and filthiness in swine and their owners.

THE proportion of wood-land required for an agricultural country, to secure a regular and sufficient rain-fall without violent storms, is an interesting subject of scientific inquiry. Inestimable benefit would result to the material interests of our country, if this proportion could be ascertained and in some way secured by legislation, in each of our several descriptions of territory. The quality, pitch and elevation of the land, with the influence of mountains and seas, as well as climate, are among the conditions to be taken into account. Rentzsch calculates 20 to 23 per cent of forest as necessary in Germany; while 5 per cent would suffice for England, and Sir Henry James considers half that proportion sufficient.

MANGANESE.—Mr. Charles T. Girwert of Rienzi, Mo., responds to the enquiry of a former correspondent relative to the black oxide of manganese. One of the richest and perhaps the softest species of this ore ever found, was discovered in Arkansas, just before the war, by an English proprietor of manganese mines in Germany. This gentleman was induced by a statement of the late geological surveyor of Arkansas, to come over and search for a conjectured deposit near Polk's Bayou. It was found, in the mountains to the left of Law's Creek, which empties into Polk's Bayou about two miles from Batesville, and pronounced by the discoverer superior to any that he had ever worked. There is a good deal of the harder species in Independence county, especially on Lafaty Creek.

PROF. FARADAY has demonstrated that the electricity evolved during the combustion of a few grains of charcoal or a common candle, would, if arranged in a continuous circuit, exceed that of the most powerful batteries. The theory is that the heat generated by combustion is owing to the union of the two electricities. If a key to this source of power could be discovered, a new career, almost, would be opened to science and mechanics.

IMMENSE deposits of fluor spar, fine-grained and closely resembling indigo, have been found on the James river, Colorado. It is suggested that these deposits may become valuable for the purpose of dissolving quartz in fluorine.

THE posts used by the French Telegraphic Company are carbonized at their ends, for the sake of preservation, by an enveloping jet of flame, from a new machine invented by M. Hugon. The Paris and Orleans Railway Company carbonize their sleepers or ties with this machine, at a cost of only about one centime each, or less than one-fifth of a cent. The same inventor applies his jet of flame (driven by a blast of compressed air into which drops of water are injected) to the blasting of hard rock. However useful this new application of a primitive agent might be in open excavations, it must be extremely difficult if not impracticable in tunnelling.

THE Federal Government of Switzerland, encouraged by the successful rectification of the course of the Rhone, have resolved upon the rectification of the water-courses of the Jura. The method proposed, is to lower the level of the lakes, and the object is, to produce a sufficient fall for the drainage of the water from some 45,000 acres of marsh-land in their neighborhood. It is expected that the value of these lands will thus be increased more than $3,000,000, at an outlay of about half that amount.

A FRENCH inventor, M Boue, proposes to patent an invention of durable cast-iron molds for castings. To prevent the rupture of the casting by contraction under rigid constraint, he lifts the upper mold box immediately after running in the metal. This is unnecessary, however, in casting simple hollow forms, if a soft core of the usual kind be employed, as the contraction is exerted in a direction from the circumference to the center.

THE Canadian Parliament has recently enacted a law requiring the doors of all buildings used for public assemblages to open outwards, to prevent the danger of their being closed and fastened by the pressure of a crowd within, in case of fire or other alarm.

THE Canadian city of Coburg is brilliantly lighted with gas from pine stumps, bones, and other vegetable and animal refuse, at a reduction of one dollar per 1,000 feet from former prices. The works are also much cheaper than those required for coal gas.

THE electrical fuse for firing blasts, is in very satisfactory use in Europe. The engineer at the Ast tunnel, (Innspruck and Bozen railway) states that 30 holes of great depth have been blasted simultaneously by this apparatus.

THE centrifugal pump, (an American invention) is taking the place of all others for heavy pumping, in England.

REPEATED efforts have been made of late years to adapt wood for use in the soles of shoes, but as yet without flattering success. One manufacturer succeeded, just before the war, in starting a considerable southern trade in wooden-soled shoes for the negroes; but the manufacture has not been resumed. In this instance a sole of maple was fastened to the upper with screws. A patent was obtained, a few years since, for a compressed wooden sole. This has been abandoned. A company in New York have lately been manufacturing a shoe with soles and heels of maple, and the shank of leather; securing the upper to the sole by a thin rim of iron clasping the edge of the latter. A recent Boston invention fastens a shaped maple sole to the upper by means of staples. It is in use among the fishermen.

Dr. Burggraeve of Ghent has recently published a method of dressing wounds with sheet-lead. After carefully washing the wound, the lacerated parts are drawn together and held in position by very thin strips of the metal, attached by sticking plaster. This permits a jet of warm water to be thrown under the armor from time to time, to cleanse the wound and refresh the parts. In cases of injury by machinery and gunshot, such dressing may often save a limb or even a life.

PEAT IRON.—The Montreal *Gazette* notices the first bloom made in that part of the world with pure peat fuel, and pronounces it of the very highest quality, equal to the best Swedish iron. The bar was bent cold by a vice, and doubled up close at right angles with an edge, without a crack or flaw appearing, the outer corners remaining smooth and sharp: a test which it is said no coal-iron made in Canada will stand. The fact is of great importance to Canada, in view of her large supplies of peat and iron.

A NEW process is proposed for making wrought-iron, which, it is claimed, will save seventy-five per cent of fuel, and nearly all waste of metal. The ore, crushed and cleaned, is placed in the furnace, inclosed in sheet-iron canisters, and kept exactly at a reducing heat until de-oxidization is completed, when the heat is raised to the welding point, and the canisters are treated in the same manner as puddle balls. The operation occupies four to six hours.

AN English inventor proposes to diminish the expense, danger and other disadvantages of distilling petroleum at a high heat, by removing the atmospheric pressure and applying the heat of steam. The intermixture of deleterious gases and offensive odors in the product of evaporation, is avoided, as well as the burning and deterioration of the residuum. The invention is an American one, having been patented here some time since.

JOHN HOLLEY, of Blackwell, England, has invented a railway brake, the wheel of which presses against the traveling wheels of the car, giving it great velocity, and winding up the chain that operates the brakes. The *Engineer* says:—"We have examined the model and are disposed to think favorably of the invention."

A JET of vapor of ether is now thrown upon parts subjected to surgical operations, by an instrument made for the purpose, producing insensibility of the part in from two to four seconds. The patient becomes a spectator: "merely this and nothing more."

THE postage stamps consumed annually in the United States amount to 350 millions, in France to 450 millions, and in England to 800 millions. The French contractor makes a million and a half per day for the government at 90 cents per 1,000. To prevent lithographic forgery, the paper is first covered with a sort of transparent ink, the composition of which is a secret, so that both inks, the transparent and the colored, would stick to the stone, if an attempt were made to transfer the design. After printing, certain specks of color are also laid on with a brush, by hand.

THE statistics for 1866, amassed and presented in the Senate by the friends of Colorado as a state, show a tax valuation, exclusive of mines, of over ten and a half millions; Internal Revenue to the amount of $141,368; 251,000 acres of public lands entered for actual settlement, against 140,000 last year; postal receipts more than doubled in a year, and exceeding those of certain of the states; 250 new buildings costing $476,000, in Denver city, alone and an exchange business of nearly $12,000,000, transacted by a single bank which is not far ahead of several others. The population is estimated at 60,000.

THE market value of skilled and educated labor in glass and iron, is enormous. In the window-glass factories of Pittsburgh, for example, blowers and flatteners receive $250 per month, and the more skilful make as much as $20 per day, and that for long periods. Some of the melters in the steel works clear from $20 to $22 per day.

THE sale of horseflesh is increasing in Paris. There are now seven buteheries in that line, disposing of about 40,000 pounds per week, at from five to nine cents per pound. We presume that Americans who visit Paris next year will be largely fed on horse steaks, horse hash and horse sausages.

AN emigration of Chinese farmers of the better class, has begun to arrive in the Sandwich Islands. A Honolulu paper thinks it not unlikely that the Chinese element may in time supplant the native race with a new and superior stock.

CALIFORNIA petroleum is now refined in San Francisco, said to be of as good quality and at as low prices as in the eastern states.

THE Codfisheries of the North Pacific are attracting attention in our Pacific States, and promise to become important.

THE curious fact has been observed by means of the microscope, that perforations made by the electric spark are uniformly pentagonal in form.

Life Boats and Life-saving Tackle.

The natives of the East and West Indies, of portions of South America, and of the Pacific Islands, employ a peculiar style of raft for passing through the heavy surf of the coast, either when fishing or landing the cargoes of outside vessels. The principle of the catamaran has been made use of, by Captain L. F. Frazee, in constructing a life-boat combining so many really excellent features, that the inventor merits the lasting gratitude of the sea-faring community.

The value of this life-saving raft was well tested on the 6th inst., at an official trial made under the direction of a committee appointed by the United States Board of Supervisors of steamboats, at their annual session in Buffalo. The beach at Long Branch was selected as the scene of operation, and thither the commissioners and invited guests were conveyed.

Constructed on the duplicate principle, the boat or raft requires neither davits nor tackle of any kind for launching, but is thrown overboard directly from the deck of the vessel, and righting itself immediately, whichever side turns uppermost, is ready for use. The buoyant power resides in two cylinders of galvanized iron, each twenty feet in length, divided into forty air-tight chambers, capable when combined of supporting a dead weight of twenty thousand pounds exclusive of itself. The central compartment is a trench some two feet in depth, designed to hold the oars, mast and all necessary equipments. Water-tight lockers adjacent, are for the storage of bread and water: at each end there is a movable or flap bow which can be adjusted so as to break somewhat the force of the waves.

This, the third public trial, proved as eminently successful as the preceding had been. With sail set, the craft proceeded from the steamer safely through the heavy surf, and returned entirely uninjured by the hazardous voyage.

The succeeding experiments with boat-detaching apparatus were hardly less important. Boats lowered at sea are always liable to capsize, either on account of getting foul, or the bow or stern may be lowered too fast, or those on board may be thrown to one side by the rolling of the ship. To detach both ends from the tackles simultaneously is the object of the several devices experimented with at that time.

A law passed by Congress in July last, requires that all vessels carrying passengers shall be provided with a disengaging apparatus whereby boats may be launched under speed or otherwise, and to be operated by one man. The same principle was employed in each of the five devices exhibited, differing only in mechanical arrangement. The boats were dropped from the davits, when the steamer lay at anchor, also when under full head of steam, and the trials one and all proved entirely satisfactory.

Trades Union Terrorism.

The contrast between the management of trades combinations among our own mechanics, and the course of proceedure permitted if not authorized by those in England, received a marked exemplification in Sheffield last October. We have refrained until now from referring to the facts, hoping that evidence would be adduced to prove that the unions had no hand in the outrage. They have not, so far, succeeded in clearing their skirts of suspicion, and the matter is to be investigated by a parliamentary commission, at the urgent demand of the accused organizations.

The circumstances were these. On the morning of Oct. 8th, a can filled with combustibles was thrown into the cellar of a house occupied by a man who had rendered himself obnoxious to the union by his refusal to become identified with it. He and his family narrowly escaped from the building with their lives. The *Ironmonger* says:

It has been very clearly shown that a system of almost unheard-of terrorism has existed among the working classes; and not only have non-union or defaulting members been subject to insult and abuse, but they have been put to considerable pecuniary loss. Scores of cases have been cited in which such men have been applied to by the officials of the union for their "natty money," and on their refusing to pay it, their employers have been requested to assist the union by exercising a little gentle pressure on such defaulters. Non-compliance by the employers has almost invariably been followed by the missing of the tools, wheelbands, or some necessary article belonging to the men who would not pay. It has also been proved that on arrears being paid, a note would be received from "Mary Ann," informing where the missing articles were to be obtained. This practice has prevailed to a very large extent, and so secretly have these proceedings been conducted that any criminal prosecution has been most exceptional.

It is to be regretted that even in this country occasional attempts at coercion have been made during the progress of strikes; but it is honorable to the masses of our mechanics and laborers that they have always expressed their detestation of such measures in unmistakable terms. The organs of our workingmen have, without exception, sustained the right of individual opinion and action, while declaring the right of association for procuring better terms and improving the condition of labor; a right which cannot be denied.

But the system of petty tyranny, which, according to the *Ironmonger*, is common in England, will not advance the interests of those in whose behalf it is undertaken. For the credit of labor in general, and for the benefit of workmen the world over, we hope the proposed investigation will exonerate from all blame and suspicion the organizations whose interests are thus jeopardized by the villainies of unworthy hangers-on.

STEEL RAILS FOR AMERICAN RAILROADS.—*Engineering* says that Charles Cammell & Co., of Sheffield, have received orders for 28,000 tuns of Bessemer rails—many of these orders being from America, for the Erie, New York Central, Pennsylvania Central, Boston and Worcester, Boston and Providence, and other lines.

Patent Plow Harrow.

In some respects this harrow is a novelty. Harrows with teeth or blades similar to the mold board of a plow, have been in use for years, some so formed as to keep the blades beneath the surface, loosening the soil to a considerable depth. The one here presented differs from others in having the additional advantage of reversing the soil thus lifted, exposing the earth to the action of sun and air.

The frame of the harrow shown in the engraving is of the usual form, the teeth being secured to the under side of the diverging bars by flanges and screw bolts. The front tooth, A, has two wings precisely alike, and is shaped so that the knife edge penetrates the soil with a drawing stroke, and the

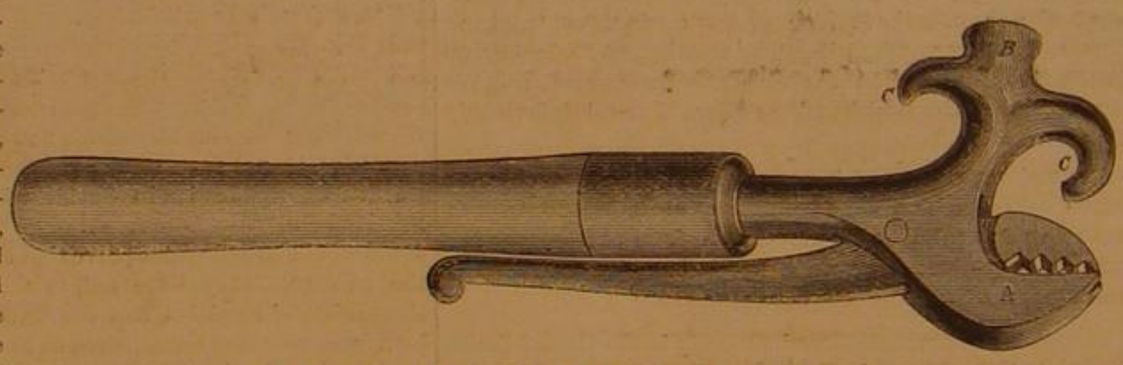
AYRES'S IMPROVED HARROW.

blade is held under the soil by the curve of the wings. Each flank tooth has a similar receding knife edge and is curved two ways. The front curve, B, goes under the soil and the upper rear curve, C, turns and throws the lifted soil downward, completely reversing the soil and thoroughly mixing it. This implement is also effective as a cultivator, as the teeth are so placed that every portion of the soil, the whole width of the harrow, is effectually pulverized. The form of the teeth offers but little resistance, so that the power required to draw it is less than in many other harrows.

Letters patent were granted for this device to Jonathan Ayers, on the 10th of July, 1866. All applications for further details should be made to A. R. Ayres, Canterbury, N. H.

Improved Combination Tool.

The term "Yankee Notions" has been applied to many simple, but very effective devices, designed to lighten labor and conduce to the comfort of the race. These "notions" are often very valuable. The engraving herewith presented shows one of these handy combination implements, simple in construction, cheap in price, and effective in operation. It is a combination of hammer, pincers, nail-drawer, tongs, and hooks, and can be applied to varied uses about the house. The jaws, A, are intended to pull tacks and nails, to grasp covers of stoves, handle cooking utensils, etc. The hammer, B, is for driving tacks, and the hooks, C, for lifting pots, kettles, sad-irons, and other household appliances. The working part is of iron and the handle of wood.



LONGSHORE'S HOUSEHOLD IMPLEMENT.

It was patented through the Scientific American Patent Agency, Oct. 23, 1866. For rights and for the article itself, apply to J. C. Longshore & Brother, manufacturers, Mansfield, Ohio.

Gleanings from the Polytechnic Association.

Reported for the Scientific American.

The regular meeting of this branch of the American Institute, was held on Thursday evening, the 13th ult., Prof. Tillman presiding.

COSMOGONY.

On the creation of the universe, Dr. Vander Weyde made the following remarks, illustrating his views with numerous experiments.

Modern discoveries of the correlation of forces have elevated the hypothesis of Laplace, to a theory. As now accepted, this nebular theory holds, that all atoms in the beginning were diffused through infinite space, but by the action of gravity collected and arranged around different centers of attraction, they now constitute the millions of suns, and the planetary system.

When any substance undergoes a diminution in volume, there is a development of heat: hence it was evident to the Russian astronomer Maedler, thirty years ago, that the enormous gravitation of the sun's mass, and the resulting compression of all its constituent parts, must have developed light and intense heat.

Nearly a century ago, the French naturalist Buffon, and more recently Bischof, made a series of experiments with cast iron balls of varying sizes and heated to a white heat, seeking to establish some law of relation between size and the time requisite to cool through a certain number of degrees. From the results of these experiments the conclusion is deduced that millions of years would be required to cool to any perceptible degree, a body as large as our sun, if once in a white hot state.

Experiments prove that no motion can be obtained without generating heat. By the aid of Melloni's thermo-multiplier it is shown that even a leaden ball cannot be dropped on the floor from a hight of a few feet, without raising its temperature. The effect then, caused by the falling of the myriad masses, through space millions of miles in extent, and with inconceivable velocities, must be a rise in temperature, of which we can have no apprehension. This force is now radiating into space, and giving back slowly, in the form of caloric and luminous undulations, a part of the power created by the falling down or coalescence of the masses. But a small fraction, less than one ten-thousand millionth part, of the waves from the sun ever reach our earth, but this amount, it needs no explanation to show, furnishes the true and only source of all motive powers employed by man, whether steam, wind, water, or muscular power.

As proof of the intense heat of the sun, the spectroscope shows that substances solid on our earth, such as zinc, sodium, potassium, nickel, copper and even iron, exist on the surface of the sun, only in the state of vapor.

OCEAN AND AIR CURRENTS.

In reviewing the theory of Prof. Grimes, the Dr. mentioned several instances, which seemed to prove that it is not supported by mechanical laws, or by geological data. Mr. Morley followed with an interesting paper, showing that ocean currents were produced by the centrifugal motion of the earth, acting on water of different densities, causing a piling up at the equator, or an equatorial protuberance, of thirteen miles, and by gravity this is caused to flow down hill toward the poles.

Currents of air are not influenced by the same laws that govern the ocean currents. Difference in temperature in both cases produces motion, but in the former, the warm air is cooled by rising but a few miles, to effect the same purpose. At the equator, the air rises, and again falls at the latitude of 30° north or south: when warmed at this point, it again rises, to fall at 60°: from this parallel to the pole, is another circuit. Hence each hemisphere is divided into three sections.

Diffusion Process for Extracting Sugar.

A revolution is confidently announced in the manufacture of sugar from the cane or root. The patented diffusion process of M. Robert, a large beet-sugar manufacturer in Austria, dispenses with nearly the whole expense of grinding, crushing and pressing, and claims to yield more and purer sugar. The cane or root is finely sliced by a machine cutter adapted with care to avoid crushing the cellular structure and thus liberating the albumen and other elements which usually mingle as impurities in the product. The material is then repeatedly soaked in water at a certain temperature, until the saccharine juice is approximately exhausted, or washed out: when the solid remainder, if root, is in wholesome condition for feeding to animals (as it is not when crushed) and if cane, needs only drying to make fuel. A "battery" of six or eight vats, is arranged in a circular series, connected by stop-cock pipes, and filled with the sliced material and water in due proportions. After standing a certain time, the liquid in the first vat is drawn off into the second, and replaced with pure water; after another interval, the second is emptied into the third and refilled again from the first; and so on, until from the last vat is withdrawn an infusion eight times enriched, and nearly equal to the juice of the plant. Pure water is put in its place, which goes thence to the first vat (by this time replenished with fresh material) and thus the circuit of operation is made continuous, each vat in turn discharging the concentrated juice and receiving pure water, and each in turn replenished, after eight infusions, with fresh material. At M. Robert's works in Selowitz, 200 tuns of beet-root are treated every twenty-four hours, by fifteen men, who could just as well manage twice or thrice the quantity.

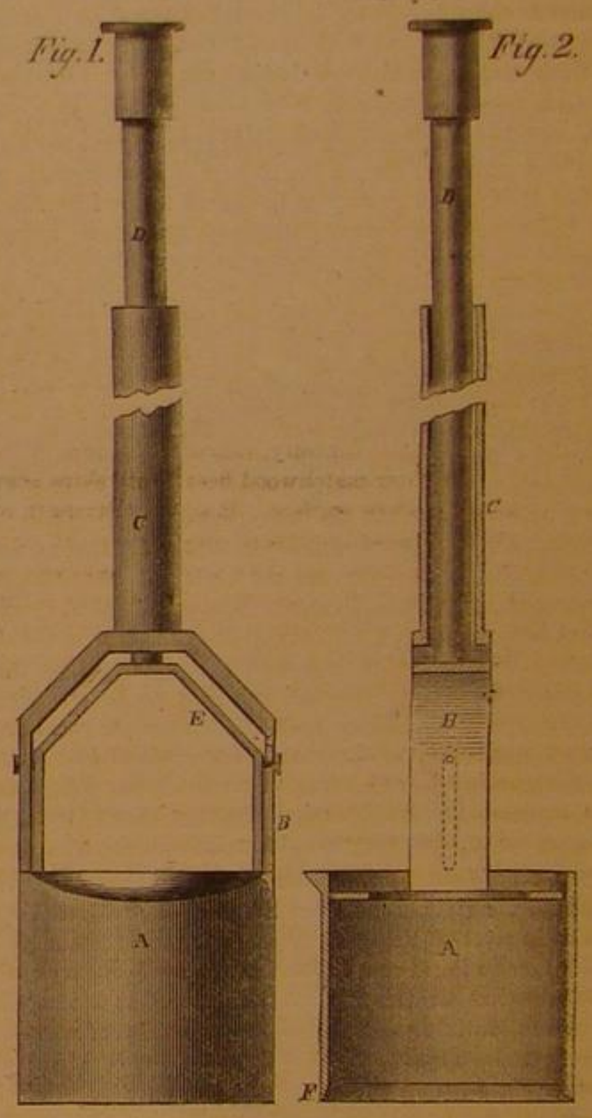
Silk Collodion.

The product of the silkworm has been reduced again by art, to the raw material or gum from which the insect spins its dainty fibres. A Frenchman, M. Persoz, fils, makes the discovery, using chloride of zinc as a solvent for the silk, and then separating the silk from the solvent by Prof. Graham's dialysis. This is a very simple process of filtration. A gutta-percha vessel with a parchment bottom receives the solution, (diluted with water to the consistency of collodion) and is set upon the surface of water. The chloride of zinc percolates through the moistened parchment bottom and mixes with the water; leaving the pure fiberless silk substance behind. For photographic purposes, it is iodized by mixing with an aqueous solution of iodide, and then dried and sensitized. The chloride, before using, is heated with a small quantity of oxide of zinc, to neutralize any excess of acid, and then filtered through fine linen to remove the residuum of the oxide. For a prompt solution, the chloride is kept warm. The separation, to be entire, occupies a few days.

Ellerbé's Transplanting Implement.

Gardeners and other cultivators of the soil know the great advantage of starting many different plants in mass and then separating and transplanting to other situations; but however carefully performed, this work is always attended with considerable risk from the disturbance of the tender roots. The engraving shows an implement by which this necessary work can be accomplished without separating the intimate connection between the roots and the soil.

Fig. 1 shows the implement in perspective, and Fig. 2 in section. It is really a spade, circular instead of rectangular in form. The main part is a circular cylinder, A, of cast iron. The lower end should be of steel, sharp to penetrate the soil.



From two opposite sides of this cylinder, at the top, rise the arms, B, which are fastened to the hollow handle, C. Inside this hollow handle is a rod, D, terminating at the top in a knob, and at the bottom secured by the yoke, E, to a ring loosely fitting the interior of the cylinder. The upward and downward movement of this ring is guided and governed by pins sliding in vertical slots in the upright portion of the arms, B.

The operation can be comprehended by a brief statement, aided by reference to the engraving.

The implement is forced into the ground at the point where the transplanted shrub is to remain by means of a lateral projection on its upper rim, and a cylinder of earth is raised, which adheres to the iron cylinder by the compression attained by the inside bevel of the edge, as at F. A downward movement of the plunger clears the inside of the cylinder. The implement which cut the orifice in the soil, or a similar one, is placed over the plant to be removed and pressed into the earth. The plant with its surrounding soil is taken up and carried to its proper place, and, by means of the plunger and its ring piston, deposited, without disturbing it or the the soil in immediate contact with it. In fact, it transplants the soil as well as that which grows in it.

Patent secured through the Scientific American Patent Agency, Oct 16th, 1866, by W C. S. Ellerbe, of Camden, S C., whom address for particulars.

Musical Boxes---Where to Get Them.

Reader, did you ever own a musical box? If not, and you have money to spend in luxuries, we advise you to make an investment in one. A good musical box affords amusement to the adult as well as youth, and, with careful usage, will last a long time. For a holiday or birthday present, but few articles are more acceptable to most persons. The writer has been the owner of one, purchased of Mr. Paillard several years ago, and the entertainment it has afforded has more than repaid the cost, and the instrument is still as good as

new. The degree of pleasure attained augments in mathematical ratio with the number of tunes the box plays.

M. J. Paillard & Co., 21 Maiden Lane, have given special attention to the importation of music boxes for the past seventeen years, and keep a great variety constantly on hand, which play from 2 to 72 tunes, and cost from a few dollars each to as many thousands. Music boxes are mostly made in Switzerland, and are an article of large exportation from the city of Geneva.

CONVERSION OF WOODEN SHIPS.

This subject is largely occupying the attention of our English cousins, the *Engineer* of Nov. 16th presenting an elaborate plan, illustrated by engravings for converting their "wooden walls" into iron-clads. This journal says: "We must not forget that this wooden fleet was, until the advent of iron clads, both in the number and character of its component ships, the most powerful fleet in the world. Its construction cost vast sums of money, and employed the talents of perhaps the most able constructors who ever existed in any country. Even at this moment, it is questionable if it be possible to set better ships afloat as regards strength, seaworthiness, and comfort. Much importance has been attached to recent changes in the construction of vessels of war, but, after all, these changes relate almost solely to what we may term the military equipment of the ships, either not operating at all, or else operating prejudicially as regards every question connected with the sailing, steaming, and turning qualities of the hull."

There is some force in the recommendation of the *Engineer* to utilize the present wooden navy of Great Britain, judging from the list given, of seven three-deckers and fifty-one two-deckers; but the question of the feasibility of the project turns wholly on the availability of these hulls for the purposes of modern warfare. Mr. C. F. Henwood submits a proposal to razee the three deckers to the lower deck, just above the water line, and then to armor the side with a skin of one-and-a-half-inch iron, covered with eighteen inches of teak carrying six eight-inch iron plates. The deck to be plated, and having above a raised spar or hurricane deck of iron, over the tops of the turrets, strengthened and supported by girders on the principle of our American steamboats. This deck to be enclosed by upright bulwarks of iron ordinarily, but when in action to be lowered and lie upon the decks. It is supposed by the *Engineer* that these girders, supported and strengthened by trussing, would restore the vertical stiffness lost by cutting down the ship's sides. Mr. Henwood proposes to convert the smaller vessels into monitors in a similar manner, except that where the large ships would carry six inches of armor the monitors would carry twelve inches. The cost of this conversion is calculated at less than half that of building new.

Engineering, on the contrary, ridicules the idea of converting what it calls "our matchwood fleet" into ships adapted to the purposes of modern warfare. It says: "Strength of structure is certainly a most important consideration in connection with our iron clad fleet, and does any one suppose that the wooden ships, even if they are still as good as new below the water line, will, when cut down and loaded with even so little as eight inches thickness of armor, be really strong ships, fit for any service—for ramming, and for all the rough work of modern warfare? They would have nothing like the lateral strength required; they have no compartments, and would very likely break open and sink on the first blow from an enemy's ram. The old timber ships cannot even bear the vibration of their own screws. What would they be, then, when half their lateral strength in the shape of decks was taken from them?"

John Bourne says: "Our old wooden ships, refurbished and plated, might do if we had no more enterprising enemy to apprehend than the Chinese; but it would be quite inexcusable, with our knowledge of what is being done and contemplated by other nations, to send our sailors into action in ships so weak and imperfect that no amount of courage or seamanship could possibly avert disaster and defeat."

It is undoubtedly the part of wisdom in the case of the English navy to begin *de novo*. It is folly to suppose that those wooden hulls when razeed and loaded with iron of sufficient protective thickness at and near the water line, and carrying immense turrets, could withstand the assaults of thoroughly built monitors. They were not constructed for such kind of warfare as must be waged on the seas hereafter. Of how much service would they be in such an encounter as that between the Austrian and Italian fleets at Lissa? Even the *Re d' Italia*, immensely stronger than any wooden ship could possibly be, could not stand the shock of ramming although almost impenetrable to shot. There is a vast difference between wooden ships built for plating and those built for the old style of naval warfare. These last are not fit even for harbor defence or floating batteries. Under the fire and direct assaults of true iron clads they would become the coffins of those who put their trust in them.

Patent Laws in Mexico.

Among the acts of the bogus Empire of Mexico, we hear of one which, it may be hoped, the legitimate government will soon find leisure to confirm or improve upon. We refer to the introduction of a system of patent laws; conferring rights for five, eight or twelve years, at the option of the inventor, with fees attached, respectively, of from five to twenty, twenty to forty, and forty to sixty, guineas. We might mention the features of the system in detail; but of course Maximilian's regulations are of small practical moment to any body at present, as no validity is very likely to be allowed to his acts by the future rulers of the country.

THE Russian iron clad fleet was begun in 1861 by the building of the *Pereenez*. Now the fleet consists of thirty armored ships of different descriptions.

PITEZELS EXCELSIOR CLAMPS.

The engraving furnished herewith will explain itself to harness makers, shoemakers, and other manufacturers of articles made of leather and other similar material.

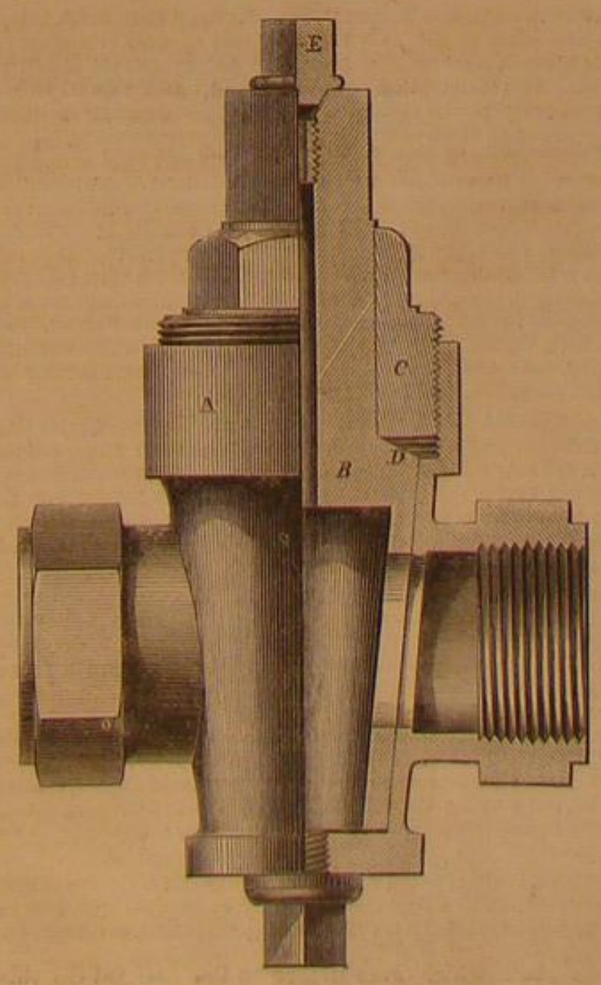
It can be attached to any bench, stool or table, and is strong, cheap, and efficient in operation. The fixed jaw, A, is secured to a bed of cast iron which has a flange extending up the back of the wooden jaw, and a rib which fits a mortise in the jaw, the two being secured in position by a screw bolt passing

through the iron and the wood. The movable jaw, B, is properly secured to the upper part of the lever, C, as seen in the engraving, which passes through the table and is pivoted at D. An extension of the bed plate clasps the table and is secured by a bolt. The lower end of this extension bears a small roller over which the strap, E, passes, one end attached to the lever, C, and the other to the treadle, F. The operation can now be readily understood. Depressing the treadle closes the jaws, and a rubber spring—not shown—between the jaws at the bottom, throws them apart when the pressure on the treadle is removed. The treadle can be held at any point by a simple ratchet rack on one of the table legs to engage with a projecting plate of metal on the side of the treadle. The jaws are open from the table up, so that a dash board, the folded parts of a carriage cover, or long boot-legs, may be held. A diploma was awarded at the late State Fair of Michigan.

Patented Nov. 6th, 1866, by John H. Pitezel, Three Rivers, Mich., whom address for other particulars.

LEHMAN'S IMPROVED STOP COCK.

The improvements contemplated by the inventor of the cock herewith represented are of a nature which have often demanded the attention of engineers and others engaged in steam and gas work. The objects sought were a straight port or way, which is not secured in the ordinary globe valve; perfect joints without the possibility of leaking; freedom from danger under pressure, and security against freezing. These appear to have been attained in the cock shown in the engraving. It is shown half in perspective and half in vertical section.



The shell, A, is not open at the bottom as in ordinary stop cocks. The plug, B, is open at the bottom, and, as seen by the shaded portion in the engraving, is hollow nearly to the stem. The upper portion of the shell is enlarged to form a stuffing-box into which the follower, C, is screwed. The stem of the plug passes through this follower, and that part just above the seat, at D, is beveled toward the circumference. This beveled form, in combination with the flat bottom of the follower, compresses the packing at its outer circumference and thus prevents leaking. The follower also keeps the plug in its seat, and does this more securely and effectually than it is done by the screw and spring washer in the ordinary cock. Before the plug could be blown out by pressure, the threads of the follower and stuffing-box must be stripped.

The little screw, E, at the top of the plug stem, has a central longitudinal channel, communicating, just under the head, with a lateral opening. These openings communicate with the interior of the plug by a small central hole in the stem. Screwed into the bottom of the case, is another valve screw with similar openings. Both these screws have seats or are packed so that when closed they are tight, and when opened in the slightest degree they make a passage through the plug. It will be seen that by this simple device all freezing and bursting the case is obviated.

Letters patent for this invention were secured through the Scientific American Patent Agency, Oct. 16, 1866, by B. F. Lehman, Bethlehem, Pa., who will furnish all additional information to persons interested.

GOVERNMENT GAS LIGHTING.

The unpopularity of gas monopolies, and the difficulty of checkmating their doublings and combinations, are not confined to American cities. The town of Prague, in Bohemia, has suffered in the same manner as New York, until the municipal authorities have decided to abate the burden by taking the business into their own hands. Corporation gas works have been erected and pipes laid in the most perfect manner yet known, and gas of improved quality is furnished to the citizens at about $1 75 per 1,000 feet against $2 25 formerly charged. The private company is, of course, compelled to "follow suit," and can hardly manage to confederate with the opposition establishment, after the American fashion. Shall New York and Brooklyn look to Albany for gas, as well as for police, health, and the other necessaries of city life?

A proposal analogous to this is before the British Parliament, for turning over the business of supplying London with gas to the Metropolitan Board of Works. The city corporation is also in the field with a rival application for power. Both schemes propose the utter extinction of the private gas companies, and the purchase of their works, by agreement or compulsion, by the public authorities; a plan much less politic, fair, and practicable, than that of the Bohemian city, which establishes simply a permanent and unpurchaseable competition in the interest of the public, to keep down abuses and extortion.

Local authorities manage the gas-making in a number of towns in England, but probably not always with the most satisfactory effect for consumers; their prices in some cases being reported at a dollar or more per 1,000 feet, while Liverpool is supplied with an article of splendid illuminating power at 67 cents, and Plymouth with a poorer article, as low as 61 cents.

The competitive plan is evidently the only true economy; although the above comparison of prices, given by the London *Journal of Gas Lighting*, amounts to nothing of itself, the municipal prices quoted being only from small towns, where the cost is necessarily higher. A general return has just been made to Parliament under an act of the last session, from 157 chartered gas companies, and thirteen municipal boards; showing their rates, cost of coal, capital, and dividends. The experiment of public lighting on a large scale, like that of Liverpool or London, remains, it seems, to be tried in England.

Reservoir For Storing Petroleum.

The *Grocer*, (London,) says:

A new method of storing inflammable oils has been invented and patented by M. Ckiandi and MM. Bizard and Labarre, of Marseilles. The reservoir is a bell-like vessel without bottom, fixed within a water vessel rather taller. At the upper part of the bell are two stop cocks—one for filling it, and the other for drawing off the oil. The surrounding cistern being filled with water to the hight of the bell, one of the cocks being turned to allow of the escape of the air, the bell also becomes filled with water. The oil is then pumped in, and being lighter than the water it remains at the top, and drives a quantity of water equal to its own volume out of the cistern by an escape pipe. The condition of the interior of the bell is shown by a tube and a float. To draw off the oil the discharge cock is opened, and more water being poured into the cistern, the oil is forced out of the bell. There is no danger from fire or leakage. At the bottom of the cistern is a small reservoir arranged to receive any impurities which may be deposited by the oil. The inventors assert the great storing economy of this system.

It will be seen that this plan does not materially differ from the apparatus used for storing illuminating gas being a modification of the common gas holder. If we are not mistaken, a method similar to this was in use in this city four or five years ago, and is still employed. It seems to be well adapted for the storing of inflammable oils, but not for protecting them during transportation.

A LINE of steam carriages for common roads is about to be established between Marseilles and Aubagne, a distance of ten miles. There are to be three departures daily, and the price of a return ticket will be 1f., 20c.

BREECH-LOADING ARMS FOR THE GOVERNMENT.

In March last a Board of Examiners met by order of the War Department to examine and report upon the following:—

1. What form and caliber of breech-loading arm should be adopted as a model for future construction of muskets for infantry?
2. What form and caliber should be adopted as a model for future construction of carbines for cavalry?
3. What form of breech-loading arm should be adopted as a model for changes of muskets already constructed to breech-loading muskets?

The officers detailed for this duty were Major-Gen. W. S. Hancock, U. S. V.; Brevet Major-Gen. R. C. Buchanan, Col. 1st U. S. Inf.; Brevet Brig-Gen. P. V. Hagner, Lieut-Col. Ordnance Dept. U. S. A.; Brevet Brig-Gen. Charles Griffin, Capt. 5th U. S. Art.; Brevet Col. J. G. Benton, Maj. Ordnance Dept. U. S. A.; Brevet Col. Horace Porter, Lieut.-Col., Aide-de-Camp; Brevet Lieut.-Col. Wesley Owens, Capt. 5th U. S. Cavalry.

The following is their report:—

First: That the 45 inch caliber ball has given the best result as to accuracy, penetration and range.

Second: That all rifle muskets and single-loading carbines used in the military service should, if practicable, be fitted for the same cartridge.

Third: That the charge for muskets should be from 65 to 70 grains of powder, and from 480 to 500 grains of lead.

Fourth: That the Board recommends the plan of alteration submitted by H. Berdan. This gives the stable breech-pin, secures the piece against premature discharge, and involves only a slight change of our present pattern of arms. The bore of our present barrel (as has been proved by experiments before the board) can be reduced to the desired caliber by reaming out the grooves and inserting a tube.

Fifth: The Board has carefully examined the various patterns of new breech-loading arms presented to it, but finds itself unable to recommend any one of them for adoption for future construction by the Government. While fully impressed with the great mechanical ingenuity displayed in many of the plans, no one offers advantages for service superior to the altered musket recommended; and therefore the Board considers that, in view of the large number of excellent muzzle-loading muskets now in store, and the slight changes of machinery necessary to make new arms on that plan, should more arms be deemed necessary, there can be no justification for an entire change of model, and the great expense consequent thereon, until some further improvement shall be devised producing more decided advantages than any of the arms yet presented.

Sixth: The Board is not decided in the opinion whether it would be best to have only magazine carbines in the cavalry service. From past experience the Board would be unwilling to dispense entirely with magazine arms, and as these arms can be used ordinarily as single-loaders (retaining a number of charges in the magazine for extraordinary occasions, free from danger of ignition in the ordinary use of the gun), the only objections to their exclusive use are the additional expense of this arm over the simple single-loader, and the greater inconvenience of the use of a lever-gun compared with some patterns of the hinge-breech gun which have been presented to the Board.

In consideration of the above, and also of the manifest advantages of having single-loading carbines (if needed) and muskets made upon the same pattern, except in length of barrel, the Board recommends that until a suitable plan for new muskets can be obtained, offering decided advantages over the proposed plan now recommended for altered muskets, no single-loading carbine should be constructed for the army.

The experience of the late war, as well as all experiments by this Board, prove that the Spencer magazine carbine is the best service gun of this kind yet offered. Our experiments detected a defect in the arrangement for the extractor, which has been corrected by the manufacturers, upon the suggestion of the Board, producing, in the opinion of the manufacturers themselves, a decided improvement in the arm, and one that will lessen much the liability to become disabled in the service. It is believed, however, from models and from experiments of the Board, that the magazine arm is capable of further improvement; and the Board would therefore recommend some delay in adopting definitely a pattern "for future construction of carbines for cavalry service." Should new carbines be previously needed, it is recommended that the Spencer carbine, with the modified extractor, be used.

Seventh: The Board is of opinion that for facility of handling, lightness, and accuracy of fire, it will be of advantage to reduce the length of barrel, when practicable, to not less than 33 inches, retaining the present length of bayonet; and also, that with the adoption of the metallic cartridge, the present cartridge box should be modified.

Recommendation 4th may be subject to question. We have very little faith in barrels that are reamed out to admit an interior tube. The object of this recommendation appears to be to adapt the present Springfield musket of 50-100ths caliber to a caliber of 45-100ths. The inner tube must in this case be exceedingly thin, while the barrel proper would be reduced in thickness and strength. Gen. Grant is right in endorsing on the report that "the superiority of the .45 caliber in accuracy, range, and penetration, seems to have been placed beyond a doubt, but a uniformity of caliber being so desirable, and there being such a large number of arms of calibers .50 on hand, it may be advisable to adopt this caliber."

We are not aware of the details of Mr. Berdan's plan of conversion, but have no doubt that our present rifled muskets could be converted into efficient breech-loaders more cheaply and easily than new ones could be manufactured.

Iron for Heavy Forgings.

The Detroit *Post*, in an article referring to some remarks in the Scientific American, relative to the composition and forging of heavy shafts and cranks for steamers, calls attention to the excellent quality of Lake Superior iron for this purpose, and mentions some remarkable tests which tend to show its homogeneousness and tenacity. We were always favorably impressed with the excellent qualities of this iron, from repeated examinations and the result of several experiments, but we were not aware that it posessed the qualities of tenacity, ductility, and uniform density, to so high a degree as is stated by the *Post*. This journal says:—

We believe it to be the most tenacious, uniform, durable and reliable variety of iron, for heavy forgings of the kind under discussion, readily procurable in American markets, if not the best for the purpose to be found in the world. Its tenacity and even quality are wonderful; and it is almost impossible to conceive of a steamer shaft made of Lake Superior iron breaking. It might be bent—if well forged, even at right angles, were a sufficient force applied—but it would stubbornly refuse to break. We have seen with our own eyes an inch square bar of Lake Superior iron bent double and hammered down at the bend, when perfectly cold, without even presenting a fibrous or abraded appearance, but drawing perfectly smooth and as bright as polished tin over the curve. We have also seen an inch-and-a-half round bar, having a solid head forged on each end, drawn out by tractile force like a stick of soft wax, until it was about one inch in diameter in the center, without a sign of parting, or the tearing of any fibers, or the appearance known as "brooming;" but the portion drawn out remained smooth and became as bright as a mirror. Such tenacity and uniform density are exceedingly rare in even the best brands of iron, but are among the universally known qualities of Lake Superior iron when properly forged.

Krupp's Guns.

On page 288 of our last volume we copied an article from *Engineering*, which stated that Krupp's steel guns had "burst on trial." Krupp's American agent denounces the article as "disreputable" and expresses surprise that we should have given place in the Scientific American to such malicious reports. He says in his letter to us "as to their having burst on 'trial' when 'fired to destruction,' as the phrase is, that is a matter of course; but none ever burst in service." *Engineering* does not say that any of the guns burst in service, but simply on trial, which might or might not refer to experimental trials. Our authority is usually correct in its published statements, and we do not see any cause for surprise that we should have copied the paragraph. If there is anything disreputable about it, it attaches to *Engineering* and not to the Scientific American.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

Terrasphere.—Eleazar Root, Indianapolis, Ind.—This invention is designed to exhibit correctly to the eye the true motion of the earth, by means of an artificial globe revolving in a vertical circle, corresponding with the plane of the Ecliptic, around a fixed center representing the Sun. It also exhibits the diurnal revolution of the earth, on its own axis, with its satellite, the moon, connected and revolving around it. By these means are shown plainly the physical causes of all those phenomena of nature consequent upon the successive and constantly recurring changes in the relative position of the Sun, the Earth and the Moon.

Dough Mixer and Kneader.—S. J. Talbott, Milford, N. H.—This invention consists of a tapering can, having a double metallic cover, and which is pivoted in a frame by a hoop provided with trunnions and with a handle by means of which it is operated.

Swedge for Welding and Sharpening Horseshoe Toe Calks.—Peter Badore, Montpelier.—This invention has for its object to furnish swedges by the use of which the steel may be drawn to an edge quickly and uniformly for forming toe calks for horseshoes; and by means of which the calks may be sharpened and by the same operation quickly and securely welded to the shoe.

Sawmill.—E. H. Stearns, Erie, Pa.—This invention relates to several novel devices and arrangements of machinery for the purpose of simplifying and reducing the cost of construction, and operating the mill easily, saving both time and material, and performing the work better.

Weeding Hoe.—Mitchell Penz, Naugatuck, Conn.—This invention has for its object to furnish an improved weeding hoe so constructed that it may be contracted or expanded as desired, so that it may be adjusted for use when the plants are at different distances apart.

Iron Manufacture.—James Henderson, Brooklyn, N Y.—In converting cast iron into Besseme-steel, the triple compound of iron, carbon and manganese, is with great difficulty forced into the mass of metal previously treated by the pneumatic process: for the converted metal has a specific gravity, greater than the compound. Mr. Henderson has obviated this difficulty, by charging the blast furnace with a mixture of iron and manganese ores, or indeed, any of the manganiferous iron ores, such as the red oxide of zinc, and Franklinite, so that there is formed on the hearth of the furnace a molten mass of metal, alloyed with metallic manganese in such quantities that it may be run directly into a Bessemer converter and subjected to the usual process of decarbonization, with this advantage over the ordinary method, that the indispensable manganese is thoroughly incorporated, and exerts its beneficial influence from the very beginning, instead of being introduced near the end of the pneumatic process. By this mode, it is claimed that Bessemer steel can be furnished much cheaper than by the older method, and finished Bars, Rails, Plates, etc. can be produced by the same heat that melts the ores into crude or cast iron. The plan, now in successful operation in Austria, is soon to be largely introduced into this country.

Fruit Gatherer.—H. L. Scott, Plessis, N.Y.—This device consists of a basket attached to a long rod, and provided with a pair of shears which extend in an inclined position over the mouth of the basket. The shears are operated by a cord, and when the stems are severed thereby, the fruit drops into the basket, it being thus gathered from any hight without being bruised by falling to the ground.

Cross-cut Sawing Machine.—Edwin Hard, Canal Dover, Ohio.—This invention has for its object to furnish a cross-cut sawing machine, so improved in construction that its operation may be more effective, convenient, and satisfactory.

Riveting of Trunks.—Walter D. Burnett, Newark, N. J.—This invention relates to a device for facilitating the riveting of bars or plates to the exterior of trunks, boxes, and other articles, and it consists in having a block covered with metal on which the trunk or box may be fitted, the block being applied and arranged in such a manner that it may, with the greatest facility, be rotated, and the bars or plates riveted to the different sides of the trunk or box.

Governor.—A. A. Henderson, Norfolk, Va.—This invention relates to a method of governing or controlling the speed of marine and other steam engines by eccentrics and cams upon revolving shafts driven by the engine, and arranged in such a manner that any variation in the speed causes them to open or close the throttle valve, thus letting on or shutting off the steam.

Tool for Cleaning Boiler Tubes.—S. Van Auken, Binghamton, N. Y.—This invention consists in a tool composed of three or more spring arms made of elastic sheet metal, and twisted so that the same will yield both ways; the outer ends of said spring arms are formed into segmental scrapers, and they are provided with cams on the inside and outside of said scrapers, whereby the operation of introducing the tool in a tube or removing it therefrom is materially facilitated.

Finishing Lasts.—Matthias Speule, Detroit, Mich.—This invention relates to a machine which is intended to finish the toes and heels of lasts, as the same are received from the last-turning machine. It consists of a vibrating head containing two adjustable clamps which are connected together, and one of which is intended to receive the pattern last, while the other receives the last to be finished. This head stands opposite to a double-spindle stock, one part of which carries the guide-wheel, and the other the cutter wheel. As the pattern last is pressed up against the guide wheel, the cutters act on the last to be finished, and the toes and heel of this last are worked down in exact conformity with the pattern last.

Life Raft.—James Murtaugh, New York City.—This invention relates to a life raft composed of two or more hollow expansible rings, one inside the other, and fastened together by cords, ropes, or other suitable means, in such a manner that a raft is obtained, which, when not inflated, can be stored away in a small compass, and which, when inflated, affords room for two or more persons, and is sufficiently buoyant to carry said persons, and enable them to sustain themselves above water even in a rough sea.

Sleigh Bells.—Abner G. Bevin, Chatham, Conn.—The object of this invention is to construct the rivet by which the bell is secured to the leather, so that the same will at once effectively hold the bell to the leather, and also prevent the bell from turning; and to so construct the whole that it will be cheap and simple and easily made.

Rag Engine.—James M. Shew, Baltimore Co., Md.—This invention relates to an improvement on rag engines, for the manufacture of paper, and consists in attaching to each end of the cutting cylinder a rotated flange or spiral scroll, for the purpose of preventing the rags from working in around the spindle, and choking the cylinder, thus materially increasing friction and wasting power, as is the case with the ordinary rag engine.

Clothespin.—T. L. Goble, Bradford, N. Y.—This clothespin consists of two jaws hinged together at one end so as to open from and close upon each other in combination with a loose sleeve or collar, so arranged upon the said jaws that by properly sliding it it will close or open the jaws, as the case may be.

Sawing Machine.—T. H. Cushing, Dover, N. Y.—This invention relates to a machine for sawing timber in curved forms, such as is used for ships, bridges, etc., etc. The invention consists of two or more reciprocating saws, rotary planers, and a bed or carriage which moves in the arc of a circle.

Cotton Cultivator.—A. K. and B. H. Foster, Hallettsville, Texas.—This invention relates to a cultivator, designed more especially for cultivating cotton, scraping the earth away from the young plants and thinning out the same. It consists of a shave or scraper composed of two parts and a reciprocating cutter operated from the driving wheel or the wheel which supports the implement.

Hydraulic Governor.—S. M. Hunter.—This invention relates to a method of regulating the quantity of water discharged upon a water wheel, or of steam for driving a steam engine, by the action of an engine operated by water, which engine shall be controlled by a common centrifugal governor, thereby causing an even and uniform speed in the machinery propelled.

Steam Valve.—James L. Mackey, Seymour, Ind.—This invention relates to a balance conical valve which is applicable to a single or double cylinder engine and which is composed of a hollow movable flag working in a sleeve which is fitted into a suitable shell that is cast solid with or otherwise rigidly attached to the steam cylinder; the play valve, the sleeve and the shell being provided with suitable steam and exhaust ports in such a manner that by giving to the play valve an oscillating motion, the steam is alternately admitted to either end of the cylinder and the desired reciprocating motion is imparted to the piston.

Clothes-washing Machine.—James Ballard, Almont, Mich.—This invention relates to a clothes-washing machine of that class in which a reciprocating corrugated rubber is used. The object is to obtain a simple clothes-washing machine which may be operated with facility and a moderate expenditure of power and which will admit of the rubber conforming or yielding to the clothes in the sudsbox however uneven or irregularly they may lie or be moved in the latter under the movement of the rubber. The invention has further for its object the arranging of the rubber in such a manner that it will perform the double function of a rubber and presser so that the clothes will be acted upon in a very efficient manner.

Gate and Door Catch.—B. D. Shaw, Beverly, Mass.—This invention consists in a catch for application to gates and doors having two pivoted catches which are operated upon by a rocking lever, which catches will automatically secure the gate when closed, and which can be operated alternately, accordingly as to whether the gate is to open toward or from the operator, for releasing the catches from a nose or pin secured to the gate post.

Self-oiling Device.—Thomas S. Brown, Poughkeepsie, N. Y.—The object of this invention is to obtain a self-oiling device for crank pins and other journals of machinery which have either a rotary or reciprocating motion, to keep the oil in the fountain in a sufficient state of agitation to cause the same to be fed to the journal in requisite quantity to ensure perfect lubrication.

Tire-tightening Device.—T. B. Mase, Milwaukie, Wis.—The object of this invention is to obtain a simple means whereby tires may be tightened on wheels, at any time when they become loose, without the aid of a smith or mechanic, and by an extremely simple and efficient arrangement of parts.

Separating Cockle from Wheat.—Samuel Hellebower, Alexandria, Va. and John Milton Reed, Loudon county, Va.—The grain is passed between a pressure roller and one or more rollers surfaced with a substance to which the cockle alone will adhere; the cockle is brushed from the rollers at a succeeding part of their revolution so as to prepare them for duty.

Trellis for Grape Vines, etc.—B. F. Elliott, Cedar Rapids, Iowa.—This invention relates more particularly to improvements in a trellis or rack for grape and other vines, patented on the 24th of July.

Saw Set.—John Clarridge, Pancoastburgh, Ohio.—This invention has for its object to furnish an improved saw set so constructed and arranged as to set a saw quickly and accurately, and which may be adjusted to set the teeth of fine or coarse saws with equal facility and accuracy, and to set them much or little as may be desired.

Knob Eyelet for Fastening Carriage Curtains.—Charles W. Acker, Watertown, N. Y.—This invention has for its object to furnish an improved eyelet for attaching carriage curtains to the knobs conveniently, easily, and quickly.

Combined Roller and Harrow.—Geo. H. Woodruff, Jerseyville, Ill.—This invention consists in combining two or more sections of field rollers with a harrow in such a manner that the roller may be removed and the harrow used, or separately employed from the harrow, so that the ground may be rolled and harrowed at the same time, or only harrowed, as may be desired and as the nature of the work shall require.

Sprinkling Attachment to Brooms.—Peter Louis, New York City.—This invention consists in the arrangement of a crescent-shaped cup provided with a socket to fit a broom stick and furnished with a vent valve in its upper and with a large number of small holes in its lower surface, in such a manner that by slipping said cup over a broom stick on the butt end of a broom and filling it with water, the water will gradually trickle down over or through the broom and a self-sprinkling broom is obtained which obviates the necessity of sprinkling previous to commencing the operation of sweeping.

Potato Digger.—Charles B. Cannon, Keokuk, Iowa.—This invention has for its object to furnish a machine by means of which potatoes may be dug, separated from the dirt, and sorted, the larger and smaller ones being deposited in separate compartments in a wagon or cart body.

Metal Loops for Tags.—Samuel B. Fay, Franklin, Pa.—The nature of this invention consists in the construction of metal loops or locks for attaching tags or labels to articles of merchandize, formed so as to pass through or over available parts of the articles to be marked.

Sawing Machine.—Washington H. Stewart, Logansport, Ind.—The nature of this invention consists in the peculiar and novel arrangement of a saw frame in combination with the saw shaft and by which the saw is made to run level and in line with the driving shaft and pitman so as to adjust and accommodate itself to different-sized logs.

Broom.—Willard P. Brooks, Fairmount, Minn.—This invention consists in the peculiar construction of the socket and in the arrangements for holding the brush and handle.

Sugar-cane Planter.—J. Eusebio Cortes, Sagua la Grande, Isle de Cuba.—This invention relates to an improvement in a sugar-cane planter by which sugar cane can be planted even and accurate and at the same time covered and the ground leveled by the same machine.

Ellipsograph.—Honestus M. Albee, Webster, Mass.—This invention consists in the arrangement of an arm provided with an adjustable point in combination with one leg of an ordinary compass, the other leg of which is constructed to receive a pencil or pen in such a manner that when the adjustable point is removed from the leg of the compass to a distance equal to the difference of the major and minor axis of the ellipse to be described and said point and leg are moved along on the two cathetl of a right-angled triangle or in the grooves of a trammel, the pen or pencil connected to the compass will describe a portion of an ellipse and by shifting the right-angled triangle and repeating the operation a complete ellipse of any desired proportion can be described.

Hide Worker.—Henry Lampert, Nunda, N. Y.—This invention consists in the arrangement of a round or convex movable beam either in the shape of a round cylinder or in parts of a cylinder of any convenient shape or size for the hides in combination with eccentrics or other suitable mechanism applied to the beam in such a manner that by the action of said eccentrics or other mechanism the beam can be raised or lowered without interfering with its rotary motion and those parts of the hide which have to be worked under the knife can be easily exposed to the action of the worker. It consists further in a worker composed of a stone or wooden scraper and a knife which are adjustable in a head in combination with a spring, crosshead, and pitman, connecting said crosshead with the eccentric wrist pin of a crank or disk in such a manner that by imparting to said disk or crank a revolving motion, the worker receives a reciprocating and a rising and falling motion causing it to act on the hide with the proper force and at the proper time. It consists, finally, in making the working block adjustable by means of a screw rod in such a manner that the scraper and the knife can be made to bear on the hide with any desired force.

Water and Fire-proof Paper.—Thomas Irving, John McNeil, Geo. W. Rich, and Cyrus J. Fay, Elwood, N. J.—This invention relates to an improvement in the manufacture of that class of paper which is used for the covering of sides and roofs of buildings or for other purposes of a similar nature.

Steam Boilers.—Robert Bailey, Idaho City, Idaho Ter.—This invention relates to improvements in a steam boiler, and consists in constructing it in sections in such manner that it may be readily opened and taken apart for repairing or cleaning the fire flues and spaces in the different sectional parts, which fire flues and spaces are so divided and arranged as to present an immense amount of fire surface in proportion to the size and weight of the boiler, compared with ordinary boilers.

ADJUSTABLE MITER.—Peter A. Snyder, Jersey City, N. J.—The object of is invention is to construct a miter, which may be readily adjusted to any angle, and one which will correctly divide each angle into two equal parts, so that the moldings may be marked by it ready for cutting.

STEAM TRAP.—Thomas N. Davey, Jeffersonville, Ind.—The object of this invention is to automatically relieve steam cylinders, steam pipes, and all o her apparatus where steam is used from condensed steam or water of condensation; also to give the engineer or operator a full and easy control of the rap valve under all circumstances whether under the pressure of steam r not.

SASH FASTENING.—Benj. S. Hyers, Pekin, Ill.—The nature of this invention consists in the peculiar construction of a friction wheel which is made to ear upon the side of a sash so as to hold it in any desired position.

HAME FASTENING.—W. J. Alexander, Manchester, Iowa.—This device is for fastening the hames upon the collar, and consists of two portions attached to the respective hames, one slipping into the other and fastening therein by the ngagement of a spring catch with recesses in the socket. The catch piece is detached from the socket by a peculiar motion, and the whole is metallic and intended to prevent the fastening from being gnawed and destroyed as is frequently the case with mule harness.

SAW MILL.—E. H. Stearns, Erie, Pa.—This invention consists in several novel devices and arrangements of machinery by which the construction of circular saw mills is much simplified and the operation rendered more effective; and the improvements refer esp cially to the feeding and gigging apparatus which are made to work with great facility and exactness.

SHEEP RACK.—Byron D. Tabor, Wilson, N. Y.—This invention consists in an improved sheep rack, for the purpose of furnishing a simple and efficient feed rack, and one easily set up, and taken down for transportation or storage.

TACKLE BLOCK.—John Briggs, Louisville, Ky.—This invention consists in a novel construction of the shell of the block and in an improvement on the pin of the sheave and hook, whereby a very cheap and durable tackle block is obtained.

SAFETY CLIP.—J. Irving, New York City.—This invention consists in the arrangement of a safety clip in combination with the fifth wheel of a carriage or vehicle in such a manner that by said clip the strength of the connection is increased, and the fifth wheel is prevented from rattling.

MALT EXTRACT.—Leopold Hoff, New York City.—This invention relates to a new beverage which is derived from an extract of barley malt produced by a peculiar process and mixed with certain hygienic ingredients, whereby a compound is obtained which on account of its invigorating and heating qualities, particularly in cases of general debility and consumptive attacks may properly be termed beer of health.

REVERBERATORY FURNACE.—J. M. Whiteside, San Francisco, Cal.—This invention consists in the arrangement of a revolving stirrer to which motion is imparted by mechanical power in combination with the hearth of a reverberatory, in such a manner that the operation of stirring and moving a mass of pulverized ores while roasting or chloridizing in the reverberatory furnace is materially facilitated. The furnace in which the ore is roasted, is covered up and arranged so that all but superheated air is excluded therefrom while the same is in operation, and furthermore jets of superheated steam are injected over the ore on the hearth to facilitate the disintegration and chloridization of the same.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us: besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

R., N. Y. asks if there is any material, whether metal or fluid, which is expanded or contracted by the daily changes of light and darkness.

W. L., of Wis.—For reply to your question on the pressure on slide valves we refer you to "Watson's Modern Practice" published by H. C. Baird, 406 Walnut street, Philadelphia. The reply would occupy too much room in our columns, and we have published it several times.

F. S. B., of N. Y.—To make a lacquer for tin to resemble brass, make a varnish by dissolving shellac in alcohol and color it with turmeric to suit your eye. Make the tin clean and apply with a brush.

S. C. D., of Tenn.—The knives of a wood-planing machine can be ground true and regular on an even grindstone, by resting the backs against a cleat secured across the frame at a proper distance from the stone to form the right bevel. Machines are, however, built at a small cost which do the work automatically better than it can be done by hand.

J. W. M., of N. Y., asks if a man could jump from the platform of one locomotive to that of another, the two engines running on parallel tracks, eight feet apart, at the equal rate of sixty miles per hour. We reply: Relative to each other and the man jumping the engines are at rest. Except for the current of wind, sixty miles per hour, a man could jump across with no more effort than from point to point at rest.

W. H. S., of Ill.—We do not think that either the caloric or the gas engine, as manufactured, is adapted to propel carriages over rails or on common roads. The manufacturers of these machines will give you the facts.

H. R., of N. Y.—The benefits or disadvantages of jacketing engine cylinders with steam is still a disputed question. Hopkinson says that where the steam is admitted from the boiler to the jacket, thence to the cylinder proper, an increased amount of cooling surface is exposed, lowering the force of the active steam and occasioning loss. He prefers lagging the cylinder with felt and wood. Bourne, on the contrary, believes there is a saving of steam and fuel by this style of steam jacketing. Our own opinion is that to really effect a saving by a steam jacket, the jacket should be connected with the boiler by an independent pipe and the steam thus used not admitted to the working cylinder. The steam in the outer case would then be higher than that in the cylinder, as it would not lose, as that in the cylinder, by expansion. In this case, the jacket must be strong enough to sustain the full boiler pressure. Jacketing with the exhaust steam we believe to be the sheerest folly.

C. A. G., of N. Y.—If you are successful in completing an engine without any exhaust, as you propose, it is not probable any patent will interfere with you. But what will you do with your steam when you have used it? Condense it and you have a low pressure engine.

M., of Pa.—Our reply to the question of the relative power of engines with different lengths of stroke, or crank, was correct. The *power* exerted is the same in either case. *Power* in this connection being made up of force or pressure exerted, time occupied and steam expended. Only the first condition, or element, seems to have entered into your calculations. In that reply, you will see that we said, "the reason for using different lengths of stroke for cylinders of a common diameter is adaptability to the kind of work to be performed." It may be that your locomotive engineers believe that less power is exerted in starting a train with an engine having long cranks than with one having short cranks. This is apparently, but not really, true. It requires more steam and more time to push a piston three feet than it does to push one eighteen inches, the diameter of cylinders being equal. You cannot get velocity, i. e. expend time, without expending force. Test it on your grindstone with weights.

D. A., of Pa.—One of the minerals you send is a good sample of umber; it is worth a chemical examination. The other specimens are indicative of a coal region; one of them resembles plumbago but is a species of coal.

H. A. S., of Me.—Petrifying wood for razor hones is a new art to us. Silicious matter may be introduced into the body of wood by soaking it first in a weak solution of soluble glass, and then in an acid.

E. F. M., of Ct.—France is the only country that requires a patented invention to be manufactured within its dominions under forfeiture of the right.

J. F. M., of ——.—You have no right to retain the patterns delivered to you by parties who employed you to make castings for them.

D. F. A., of Pa.—The composition of the Zopissa cement has not been made public, and we are not aware that any samples of the article have been brought to the United States. As soon as we procure further information on the subject we shall hasten to give it to the public.

H. O. P., of Mass., desires us to publish "the best methods of finding and recognizing the standard qualities of whale, lard and coal oils." It is not convenient for us just now to prepare a suitable article on the subject. Perhaps some of our readers will furnish the information.

C. A. B., of ——.—To magnetize a steel bar by means of an electro-magnet:—bring one of the poles of the electro-magnet on the center of the bar, and then pressing the two in contact, slide the electro-magnet to one extremity of the bar; perform the same manipulation with the other pole of the electro-magnet on the other half of the bar. The process is to be repeated until the bar becomes fully saturated. The most powerful magnets are obtained by combining thin bars which have previously been magnetized. Magnets should be made of high steel of the best quality, and highly tempered.

SUNDRY ANSWERS.—B. N.—Study our book for Inventors and Mechanics, 25 cts., to know how to calculate horse-power of an engine.—Young Mechanic is informed that minors can obtain patents. See same book.—J. H.—You need not sig new papers.—F. H. M.—You will find a method for attaching rubber o leather in back numbers SCIENTIFIC AMERICAN.—E. S. C.—As to vinegar manufacture, write to H. C. Baird, Philadelphia, Pa., for book. C. P.—ditto. We do not know the parties.—G. H. U.—Rubber can be made snow white. There is a patent for the process. The Goodyear patent for the idea of vulcanizing rubber has expired.—H. B.—No person can use a patented article without the consent of the patentee. It is not new to cement the ends of slates for the purpose you propose. It is doubtful whether the use of the slats would entitle you to a patent. But you can try.—A. P. P. will probably find that the patented jack is slightly different from the one in use. The patent doubtless rests upon the difference.—F. S. C.—Your strap arrangement for coaches can probably be patented.—J. H.—Consult Bourne's book on the steam engine for rule as to lever for safety valve.—D. H. H.—There are ice machines in operation at New Orleans, we believe.—E. G. B.—The "Northern Lights" are supposed to be due to electrical currents.—G. L.—We are not acquainted with the merits of the tanning extract to which you allude nor the company.—D. H. H.—You and your friend will find the nature of the late showering meteors described in recent numbers of SCIENTIFIC AMERICAN.—A. T. The merits of both engines have been discussed in our paper.—J. H. D.—We do not know of any work on boat building.—G. Nearly all the best barrel machines have the toothed cylinder.—W. A. M.—Steam wagons can be successfully used on good roads.—J. A. E.—For best saws and engines see advertisements.—M. B. wants somebody to tell him how to make rings from gold dollars. He has been making one by punching the dollar and hammering the exterior; but he says this leaves a rough hard crease in the middle, and how to soften it he does not know.—J. K. D.—The joint owners of a patent are not partners, and each has the right to make, use, and sell, without accounting to the other.—J. K.—Rebs are now only required to swear that they are citizens of the United States. The oath is the same that all persons are required to take on applying for a patent. To swear that you are a citizen of the Confederate States wont do. The holder of the assignment enjoys the rights of the patentee.

Business and Personal

The charge for insertion under this head is 50 cents a line.

S. Kalfus, 170 Bleecker, N. Y., has for sale ($60), SCIENTIFIC AMERICAN from 1848 up.

J. B. Wilbur, of Johnstown, Pa., desires to know how to remove the scale from new rolled wrought iron. Acid does not answer.

Geo. Francis, Box. No. 4658, New York City, wishes to know where machinery for plaiting or folding shirt bosoms can be purchased.

Jos. C. Haines Lancaster, Pa., wishes to correspond with an author capable of writing on the following subject. "The necessity of every person to be able to hold his horse."

Makers of Ross' Patent Portable Flouring Mill, please address American Tablet Co., Boston, Mass.

J. T. Middleton, New London, Conn., box 704, wishes to purchase a first class treadmill horse-power machine.

The best hay-packing and baling press, for field use, is asked for, with prices, by R. Tattershall, Beloit, Wis.

Parkestein.—H. W. Ladd, Philadelphia, asks where it is manufactured.

Small printing press suitable for druggists, with type, etc. wanted by H. Kroon & Son, North Bennington, Vt.

A. Krauss, Tarr Farm, Pa., wants to know where he can get one of them whistles that sounds like the squeak of a pig, warbles like a canary bird, etc.

A. Tavarts, Kingston, Jamaica, W. I., desires to obtain a machine for making paper boxes for matches (to hold 50 matches). Also wishes for improved machinery for matches, and a small, economical, easily-managed steam engine.

G. Wolf Holste, Neshannock Falls, Pa., wishes to know whether Dale's Patent Loom will weave fancy goods. Also whether the motion is simple and substantial.

Information is wanted concerning the best kinds of work suited for execution by convicts in a penitentiary, where coal, wood, iron, leather, etc., are abundant. Also wanted one or more foremen fully competent to direct such labor. Communicate with H. J. Phares, Selma, Ala.

Jno. Selick, Lewistown, Pa., wishes the address of parties who will manufacture an improved cast-iron apple parer, corer and quarterer.

Horse Hay-Fork Pullies, D. M. Garrett, Shelly, Ohio.

Henry Johnston, Gloucester, Mass., desires to know how to make a cement that will stand a sudden heat and that will set as hard as stone. Wants it for molds, to be repeatedly used.

J. M. Goff, Ionia, Ill., desires information where he can obtain flat, untempered, steel wire, three-eighths inch wide, one-sixteenth thick, price per 100 lbs.

Any one having on hand or who will make rivet machines of approved patterns can find a cash purchaser, by addressing with description, price, etc. "Rivets" P. O., Buffalo, N. Y.

N. Spencer Thomas, of Painted Post, N. Y. writes—"We now have a club for SCIENTIFIC AMERICAN in this village, already numbering eleven or twelve against two heretofore sent to this P. O." Similarly encouraging letters are pouring in from all directions.

E. C. R. of Va., writes wishing the cost of an engraving of a new invention he has just patented, and adds, "I proposed taking my patent out through your office, but was advised to make my application direct to the Patent Office. How much trouble I have had, you may well know. I assure you I am heartily sick of *direct* applications, and shall in future do my business through your house." Mr. R.'s experience is the same as that of nearly all others who attempt to obtain patents on home-made papers, as our large business in re-preparing papers and prosecuting cases which have been refused by the Patent Office, bears testimony.

☞ Manufacturers of improved machinery of every kind, Steam, Mining, Agricultural, Wood Working, Manufacturing, will find it a great advantage to keep a short permanent advertisement in the SCIENTIFIC AMERICAN. This paper circulates extensively in all of the States, and doubtless is more thoroughly read by mechanical people than any other publication. Advertisements published in the SCIENTIFIC AMERICAN, costing only a small sum, have been known, in many instances, to bring back orders amounting to thousands of dollars.

EXTENSION NOTICES.

William Coleman and Stephen G. Coleman, of Providence, R. I., having petitioned for the extension of a patent granted to them the 15th day of March, 1853, for an improvement in supporting the topping-lift and peak-halyard block of sail vessels, for seven years from the expiration of said patent, which takes place on the 15th day of March, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 25th day of February next.

Robert Waddell, of Liverpool, Kingdom of Great Britain, having petitioned for the extension of a patent granted to him the 6th day of June, 1854, antedated to April 27th, 1853, and dated in England, the 2nd of March, 1853, for an improvement in balancing slide valves of steam engines, for seven years from the expiration of said patent, which takes place on the 27th day of April, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 18th day of February next.

James E. A. Gibbs, of "Steel's Tavern," Virginia, having petitioned for the extension of a patent granted to him the 21st day of February, 1860, for an improvement in design for a sewing machine, for seven years from the expiration of said patent, which takes place on the 21st day of February, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 11th day of February next.

Moses Marshall, of Lowell, Mass., having petitioned for the extension of a patent granted to him the 15th day of March, 1853, for an improvement in knitting machines, for seven years from the expiration of said patent, which take place on the 15th day of March, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 25th day of February next.

IMPORTANT LAW CASE---FIRE-PROOF SAFES.

WM. A. SANBORN vs. SILAS C. HERRING, ET. AL.

N. Y. Supreme Court—Before Judge Barnard and a Jury.

The facts in this case are briefly as follows.

The plaintiff in 1862, was an express and collecting agent and coal dealer in Sterling, Illinois, and in 1865 became a banker.

In March 1862 he bought of defen't's agent in Chicago one of their fire proof safes with a Banker's box inside at an entire cost of $300. The price of the box if sold separate would have been $85. The safe and Box were sent to plaintiff at Sterling, and placed in his office, situated in a warehouse about one hundred feet from an inhabited dwelling, and by the side of a R. R. track. The warehouse was built of wood, and had a common wooden door, with glass windows without shutters.

On the night of August 27, 1865 the ware house was entered by burglars and the safe robbed, as plaintiff claims, of $26,465.

The inside box was about 1¼ inches thick, made of three different kinds of metal, and secured by Hall's lock. The testimony of one of the burglars was taken, who swore that the safe and box were opened by the use of chisels, a hammer, a pick axe, a crow bar and sledge, as cars passed by. The sledge seems to have done the final work by driving in the spindle of the lock, thus giving access to the revolving tumblers.

The plaintiff brings this suit for the value of the contents, on the alleged ground, 1st, that the safe was warranted to him to be perfectly burglar-proof, and 2d, that as he made known his business, and that he wanted a secure safe, it was not as strong a safe as he ought to have had, and therefore that he had an implied as well as actual warranty and should recover his loss.

The defendants claim on their side that they never warrant safes perfectly burglar-proof, or that when exposed in warehouses or remote buildings, where burglars can undisturbed use any tools or force they please, they will be secure, and that there was no direct or implied warranty in this case.

They also claim that the safe in question was one of their cheapest make and had on their cheapest lock—that plaintiff selected it from a stock of about 100 safes and took the lower priced and less secure safe after being shown the higher priced and more secure ones, on the ground that he did not wish to pay more than $300.

Further that he ought to have had one of their best safes and kept it in a more secure place, for the amount of money he had in it, and thereby he was negligent, not using ordinary care. Such in brief are the leading facts and claims of the parties, and each side made out a very good case.

The case has occupied the Court and Jury for a week, and the judge in an able charge, among other things submitted the question of warranty substantially as follows.

If there was a warranty it must have been one of these three kinds.

1st. That the safe was absolutely burglar-proof, so that no amount of force could under any circumstances open it. If you find this, there will be no damage for its breach, for there is no data to fix the damage. No safe can be made but what can be opened, and in this view you will find for defendants.

2nd. That the safe was the best one made by defendants, and if not, then you will find for plaintiff the difference in price between this safe and their then best safe.

3rd. That the safe was as well made, and of as good material, and as capable of resisting burglars as safes of the class and price to which it belongs usually are; and if the safe in question did not come up to this, you will find for the plaintiff the difference in value between the two safes.

4th. You will find for the plaintiff the amount claimed by him in case you find that defendants falsely and fraudulently represented the safe to be their best when it was not; and that it would resist any and all attacks of burglars, knowing it would not, and that plaintiff believed such statements and was thereby induced to purchase the safe.

5th. The authority of the agent to sell the safe, carries with it the authority to warrant.

The jury being unable to agree were discharged.

For plaintiff, Judge Edmonds & Barlow & Hyatt.

For defendants, S. P. Nash & H. M. Needham.

The only case ever tried of a similar kind was brought by Walker, one of the principal jewelers of London, against Milner, the principal safe manufacturer. Walker's safe was robbed of some £3000 in jewels, and he brought the suit before the Queen's bench against Milner for their value, alleging a warranty. The case was tried about a year since, and found for the defendant.

The final result of this trial is looked for with interest, for in the language of the Judge "it involves millions of money, and the labor of thousands of men."

No man will buy safes if they furnish no security, and no man will make them if made liable for the contents.

Rights of Partial Assignee of a Patent to a Reissue.

IN May, 1863, Andrew Whitely, assignee of a sectional interest in a patent granted to Jonathan Haines, on the 4th September, 1855, applied to the Commissioner of Patents for a reissue of said patent, which was denied examination on the ground that the law did not authorize the Commissioner to grant a reissue to an assignee, unless said assignee held the entire right to the patent. Upon the application of Whitely the Supreme Court of the District of Columbia granted a peremptory mandamus, commanding the Commissioner to refer the case to the proper examiner; whereupon the case was appealed by the Commissioner to the United States Supreme Court, which will soon settle an important question, viz.: whether the assignee of a portion of a patent can surrender said patent and obtain a reissue.

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,578.—HOISTING APPARATUS AND CARS FOR MINING PURPOSES.—George Williams Sterling, Colorado. Oct. 6th, 1866.

2,590.—ATMOSPHERIC ENGINES.—David Dick, Mea lville, Pa. Oct. 8th, 1866.

2,594.—BRICK-MAKING MACHINES.—Antoine McNair, New York City. Oct. 8th, 1866.

2,626.—APPARATUS FOR OPENING AND CLEANING WOOL AND OTHER FIBROUS MATERIALS.—Charles G. Sargent, Graniteville, Mass. Oct. 11th, 1866.

2,630.—SEWING MACHINES.—Elias Howe, Jr., New York City. Oct. 11th, 1866.

2,666.—APPARATUS FOR TAPPING BEER CASKS AND OTHER LIKE VESSELS CONTAINING LIQUIDS UNDER PRESSURE.—Thomas Marsh, Central Falls, R. I. Oct. 16th, 1866.

2,674.—MANUFACTURE OF REFLECTORS.—William H. Winder, New York City. Oct. 16th, 1866.

2,701. TYPE SETTING MACHINE.—Augustus Corey and John McM. Harper, both of Philadelphia, Pa. Oct. 19th, 1866.

2,710.—POWER LOOMS.—Erastus B. Bigelon, Boston, Mass. Oct. 19th, 1866.

2,714.—MACHINERY FOR MAKING PINS AND NEEDLES.—Orin L. Hopson and Heman P. Brooks, Waterbury Ct. Oct. 20th, 1866.

2,720.—CONSTRUCTION AND ARRANGEMENT OF STEAM BOILERS, AND MEANS FOR COLLECTING SEDIM ENT OR DEPOSIT THEREIN.—Joseph A. Miller, New York City. Oct. 22nd, 1866.

2,726.—FASTENING FOR BALING BANDS.—Robert Dillon, New York City. Oct. 22nd, 1866.

2,728.—PAPER MACHINE.—Richard Smith of Sherbrooke, C. E., and Oliver Ellsworth of Boston. Oct. 23rd, 1866.

2,751.—MANUFACTURE OF PLOUGHS.—Collins Company of Hartford Ct. Oct. 25th, 1866.

2,805.—CONSTRUCTION OF STEAM BOILERS.—Robert Bailey, Idaho City, Idaho. Oct. 30th, 1866.

2,808.—BRAKE FOR RAILWAY CARRIAGES.—Aaron Higley, Joseph B. Birdsell and Variam O. Birdsell, all of South Bend, Indiana. Nov. 7th 1866.

2,900.—PROCESS FOR PRODUCING PICTURES, ORNAMENTAL DESIGNS, LETTERS, CHARACTERS OR FIGURES ON MARBLE AND OTHER CALCAREOUS STONES.—Asa Hill, Norwalk, Ct. Nov. 7th, 1866.

2,931.—INSTRUMENTS FOR TRANSMITTING TELEGRAMS BETWEEN REMOTE PLACES, ESPECIALLY ADAPTED FOR SUBMARINE AND SUBTERRANEAN LINES OF COMMUNICATION.—George Little, New York City. Nov. 10th, 1866.

2,974.—APPLICATION OF BEDSTEADS TO APARTMENTS.—Julia P. Brown Mass. Nov. 13th, 1866.

ILLUSTRATIONS OF THE PNEUMATIC POSTAL DISPATCH, AND VIEW OF THE SCIENTIFIC AMERICAN OFFICE, NEW YORK. [See Page 1.]

THE
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VOL. XVI., No. 1....[NEW SERIES.] ....*Twenty-first Year.*

NEW YORK, SATURDAY, JANUARY 5, 1867.

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(Illustrated articles are marked with an asterisk.)

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ADVERTISERS.

The value of the SCIENTIFIC AMERICAN as an advertising medium cannot be over-estimated. Its circulation is ten times greater than that of any similar journal now published. It goes into all the States and territories, and is read in all the principal libraries and reading rooms of the world. We invite the attention of those who wish to make their business known to the liberal terms offered in our advertising columns. A business man wants something more than to see his advertisement in a printed newspaper. He wants circulation. If it is worth 25 cts. per line to advertise in a paper of three thousand circulation, it is worth $2.50 per line to advertise in one of thirty thousand. The value of an advertisement depends chiefly upon the circulation that is given to it.

CONDITION OF THE PATENT OFFICE.

The Patent Office building was commenced in 1836, and 270 feet of the south side of the block were finished and occupied within four years of that period. It is one of the most magnificent public buildings in the world, an ornament to any age or nation.

The order of architecture adopted for the exterior is the Grecian Doric of the age of Pericles, when the fine arts in Greece, particularly architecture and sculpture, had reached the highest excellence. The details are modeled after the celebrated Parthenon, erected on the Acropolis at Athens, which is now in part standing, the marbles having indurated to such a degree by an exposure of more than 2200 years to the atmosphere, as to resist the action of a chisel.

It was the intention of the projectors of the Patent Office, that it should be employed exclusively for the legitimate purposes of its creation, and from time to time as the work progressed Congress appropriated from the surplus patent fund the money necessary for its completion. The last grand hall of the north wing was fitted up in 1865, and formally taken possession of as a receptacle for models. In 1851, Mr. Stuart, at that time Secretary of the Interior, fixed his eye upon the Patent Office and coveted its spacious apartments for the use of his department. At that time it so happened, unfortunately, that we had a very weak person as Commissioner of Patents, who coolly and deliberately reported to Congress, "that the two wings of the Patent Office be finished, and that they be appropriated to the accommodation of the Department of the Interior and the different offices attached thereto." The SCIENTIFIC AMERICAN protested most energetically against the proposition. We thought of the old fable of the porcupine who, wanting shelter for himself, was admitted to share the hospitality of a nest of snakes, but they were so annoyed with his sharp, prickly quills, that they soon repented of their easy compliance, and entreated the porcupine to withdraw. "No," says he, "let them quit the place that don't like it: for my part, having got in, I am well enough satisfied as I am." When this scheme was maturing, we stated in the SCIENTIFIC AMERICAN, Vol. 7, 1851, that "the wings of the Patent Office should belong to the Patent Office and no other Department. *for if absorbed by any other Department now, when they are required for patent purposes, it will be no easy matter to get them, and required they must be at no distant day.*" The very number of the SCIENTIFIC AMERICAN which contained these words, published a list of only *ten patents* issued for the week ending January 21, 1851!

The condition of the Patent Office today, furnishes a powerful confirmation of the warning we then uttered against surrendering any portion of the Patent building to the Department of the Interior; and though Æsop has been dead over two thousand years, unless inventors and those who feel an interest in the future of the Patent Office, unite in firm opposition, his old fable of the porcupine and the snakes is likely to be repeated. In the year 1850, just before the plan was laid to plunder a large share of the Patent Office for illegitimate purposes, there were about twenty-two hundred applications for patents. In the year 1866, when the Patent Office is cramped into the stocks like Titus Oates, the President informs Congress in his annual message that over 14,000 applications for patents were filed during the year ending Oct. 1st. A recent visit to the Patent Office and a careful inspection of its condition revealed to us a state of things which demands an energetic remedy.

It is the duty of Congress at its present session to appoint a committee to inquire what further legislation is necessary to provide for the present and prospective wants of the Patent Office.

The committee will find upon investigation that the Commissioner is very conscientious in the discharge of his duties, anxious to satisfy the pressing demands made upon his time and patience, and to do justice to all who have claims before his department: they will also find some of the Examiners happy and contented, others sullen and moody; the state of mind very much depending upon the pressure of cases referred to them for examination. By calling on Mr. McCormick, the committee will find that the balance sheet shows a surplus fund of about $230,000; an increase of $100,000 in the past year, an amount cheerfully paid by inventors, who are entitled to much better facilities than they now receive. The committee should then look into Prof. Page's room, where they will find six clerks and six Examiners breathing a stifling atmosphere and occupying a space just about large enough to accommodate comfortably two Examiners. In Dr. Jayne's room are four tables and four Examiners, where there should be but two; and as for Dr. Hedrick's room, we undertook to visit him and were repulsed by the formidable front of bottles, documents, desks, etc. His bureau resembles Holbein's picture of the old Alchymist. In short, not to speak of Peale's sepulchre of fine arts, the examining force of the Patent Office is wholly inadequate to do the duties imposed, and wretchedly uncomfortable, and unless a remedy is at once applied, the business will decline.

The Commissioner ought to use all the power he possesses under the law authorizing temporary clerkships, to meet and remove one of the difficulties of which we complain. The examinations are much further behind than they ought to be.

The committee will also find that the Patent Office at this very moment actually needs nearly, if not quite, every available room in the building, and no time should be lost in preparing for the removal of the Secretary of the Interior with his pension bureau, land and Indian traps: they have no business to encumber the Patent Office, and if Congress means to legislate wisely and well, for one of the most precious boons ever conferred upon the people, provision will speedily be made to relieve the Patent Office from present embarrassment and its forces strengthened by adequate legislation. The Patent Office is a self-supporting institution—will not Congress pay some little attention to its wants?

CORROSION OF STEAM BOILERS.

The process of corrosion is very similar to that of the combustion of fuel, the only difference being that in corrosion the metal unites with the corrosive agent slowly, while in combustion the fuel unites with the supporter of combustion rapidly.

The external corrosion of a boiler is due to simple oxidation caused by atmospheric exposure principally. In the boilers of sea-going vessels it is also caused by the contact of the bottom of the boiler with bilge water, and by the exposure of the top to leakage from deck. The best means of preventing this is to cover the top with felt and sheet lead soldered at the joints, and to keep the bottom thoroughly painted.

The internal corrosion is due to simple oxidation and to the galvanic action taking place whenever two different metals or a metal under different conditions are either wholly or partially immersed in a fluid in which either of them would be oxidized; that is, united with the oxygen of the corrosive agent; and which has the effect of confining the corrosion principally and sometimes wholly to one of the two metals in contact. The sheets are eaten away around the rivets before the rivet is injured, on account of the iron in the rivet being in a different condition from that in the sheet, owing to its being more dense from being hammered until cold, and consequently producing a galvanic action by which the sheet is corroded. Tube sheets are apt to leak, when the sheet and tubes are composed of different metals, from the effect of the galvanic action produced by them.

The hot brine or sea water contained in marine boilers is a most powerful corrosive agent of wrought iron. Hence the stays are corroded and the pins or bolts which hold the stays are eaten and loosened. A very thin film of scale is the best protection against this kind of corrosion. The corrosion of the steam drum is caused by the high temperature of the uptake, about 600° Fah. for natural draft, thereby super-heating the steam and oxydizing the iron in a similar manner to the making of hydrogen gas by sending steam over red-hot iron. Boilers not in use are liable to corrosion on the fire side of the heating surface as well as on the water and steam side. To prevent this the smoke stack should be covered over to keep out rain and moisture, the man-hole plates taken off so as to allow a free circulation of air inside, and a light fire of shavings should be built occasionally to dispel all moisture.

THE usual weekly issue of Patents for Dec. 25th will be suspended on account of the holidays.

THE SCIENTIFIC AMERICAN OFFICE.

The engraving upon the opposite page presents a fine view of the Scientific American and Patent Agency Office, which extends through from Park Row to Nassau street, with fronts on both streets; also occupying the whole front on Beekman street, as shown by our signs. The north end of the block is covered by the beautiful buildings of the New York *Times* establishment.

Few persons would recognize this block as the former location of the Old Brick Church, yet it is the veritable spot. Little we thought, years ago, when our then diminutive quarters were in Fulton street, and we used to meet the reverend pastor of the Old Brick, Dr. Spring, striding down Broadway on Sunday, dressed in flowing gown of black silk, wending his way to pulpit—little we thought that we should ever address the public from the same stand-point. But the Doctor and his Church, and the peaceful dead that once reposed within its gates, have been removed. Three miles up town, there on Fifth Avenue, crowning Murray Hill, stands the new Brick Church, and there the venerable pastor is still to be found, engaged in pious labors, surrounded by a large, affectionate and active congregation.

The Scientific American Patent Agency Office is by far the largest establishment of its peculiar class in the world. Our New York offices probably exceed in extent, the area of all other patent agencies in the city combined. In Washington we also have larger and better offices than any others in the profession. Our wide-spread reputation as Solicitors, and our unequalled facilities and success in obtaining Patents for inventors, based as they are upon an experience of nearly a *quarter of a century* in the business, naturally excite the envy of rival patent agents, especially of new comers. They consider themselves particularly fortunate if they can locate near our doors, and by a display of flashy signs, delude inventors into the idea that theirs is the true Scientific American Office: they live upon the few crumbs thus picked up. But after all, the old Scientific American Patent Agency never enjoyed a greater share of the public confidence than at the present moment, and we shall continue by honest industry to deserve it.

DRAINAGE AND UTILIZING WASTE OF CITIES.

A novel system of drainage for the houses of cities, patented by Captain Liernur, is about to be introduced at the Hague, the residence of the king of the Netherlands and a town of 80,000 inhabitants. It consists of an arrangement for daily inodorous emptying and scouring of the passages for excretæ, by pneumatic action, and the immediate removal and utilization of the products, without allowing time for the pestilential process of fermentation, which evolves the intolerable gases of our ordinary sewerage. The absence of water in the products removed, is of no little advantage for fertilizing purposes A plow which at once distributes and covers these products beneath the soil, forms another item of the apparatus. The system of house excretion is quite simple. A straight vertical water pipe extends from the basement to the top of the house, and emerges open, like a chimney. Into this the necessary openings are made, on each floor if desired, with air-tight lids, but entirely clear of valves, traps or other machinery. A strong current of air sets through them in the direction of the outlet above, whenever they are opened. All the house pipes connect with a street pipe, which ends in a reservoir of boiler-iron sunk beneath the roadway at the principal street-crossings: the whole being constructed air-tight. Each house-pipe is closed by a valve operated at the edge of the sidewalk. Every night a sufficient number of wagons go their rounds, each provided with a powerful air-pump, steam engine, and detachable tender carrying an air-tight reservoir. First, the air-pump is coupled to the reservoir beneath the street crossing, and a sufficient vacuum created. Then the valves of the house pipes are opened, one at a time, with a sudden movement. The pressure of the air from the open top of the pipe has already forced the contents as far as the valve, and on opening it, the mass is shot into the reservoir, with a rush of air like a concentrated hurricane scouring the interior of the pipethroughout. Experiment, it is said, has shown this necessary work to be very thorough. Each valve is again closed before another is opened, and during this process, the steam engine continues its work, maintaining the vacuum. When all the valves have been opened and closed, the tender reservoir is coupled on, and the contents of the street reservoir are thrown into it by pneumatic pressure. When filled, it is met and relieved by another tender, and goes its way to the poudrette manufactory; or the reservoir is shipped to the nearest rural station and there decanted into the barrel reservoirs of the patent plow and emptied under the surface of the soil.

The economical estimates reported are as follows: One steam-engine of 10 or 12 horse power, with three tenders of 90 cubic feet each, suffices for the nightly service of a population of 10,000; working seven or eight hours. The quantity removed is one pound and three quarters or 48 cubic inches per day, for the average of all persons; the liquid being to the solid as a little more than six to one, and much the more valuable intrinsically. The least agricultural value of the fertilizing products in Europe, is stated at one shilling sterling per cubic foot; making the income from this source, if the work were performed without charge to the inhabitants, over $22,000 per annum for the services of one engine truck and three tenders, requiring half a dozen horses and as many men, with some further charge for fuel and freight to the country.

In the city of New York, probably a full half of all this agricultural wealth is wasted in the sewerage, and at the same time converted into a source of disease instead of profit. After all this waste and mischief, however, we are informed that there remain, at the very lowest calculation, 500,000 cart-loads or 25,000,000 cubic feet of night-soil, carried out of

the city in the most primitive and offensive manner, at the rate of 2,000 loads nightly, for 250 nights of the year. This, or all it can use, the poudrette manufacturing company takes of the city at $4,000 per annum, while the city pays $17,500 per annum for carrying it to that liberal purchaser. At the European valuation, this manure, allowing half of it to be rubbish, would be worth $2,750,000. At a low American valuation, say five dollars per hundred feet, it would amount to $312,500, or, for the whole city, $625,000. Hints from this system might be profitably adopted in villages, and even by the builders of isolated houses.

New Method of Removing Hyposulphites from Photographic Prints.

Messrs Tichborne and Robinson of Dublin, have ascertained that *chloric* and *perchloric acids* completely oxidize weak solutions of hyposulphite of soda. The following are the author's directions for carrying it out in practice:—Prepare a solution of twenty-four grains of chlorate of baryta in each ounce of water, and add to this quantity twenty minims of perchloric acid (of about 12 per cent). This is the eliminating liquid. Take a porcelain or other dish, and place in it a pint of hot water, then add two ounces of the above solution. The bath is now ready. Having washed the prints sufficiently in the ordinary way, plunge them into the warm eliminating bath, and let them remain there for an hour or so. They afterwards need only be washed with plain water in order to cleanse the print, then to be dried and mounted.

The process is undoubtedly a simple and economical one. The question then arises—Is it effective? On this, the chief point, we cannot offer any decided opinion, as our experiments are not yet completed in this direction; but, so far as we have gone, the results have been decidedly encouraging. Messrs. Tichborne and Robinson have produced prints in which nothing could be desired in point of tone, showing no evidence of bleaching action, and which are stated by Mr. Tichborne to be perfectly free from all traces of hyposulphite. One of these lies before us as we write, and it speaks well for the success of the process.

We hope to lay before our readers a full account of our experiments, and such details as may be necessary for the satisfactory working of the new method.—*British Journal of Photography.*

"PHOTOGRAM."

A correspondent proposes to rectify a manifest error introduced of late years into our language, in the progress of invention. "Photograph" has a termination devoted to the verb active, or otherwise to the name of the agent: "*photogram*" is the proper form for the name of the effect or product. The suggestion is unimpeachable. The same argument by which the introduction of the word "telegram" was successfully enforced requires us to accept "photogram." We might as properly speak of sending a telegraph, as of buying a photograph. Both are abhorrent to classical order. The reason is, that *graph* is the root of the present active—to write, or, using the participle substantively, anything writing: while *gram* is the root of the perfect participle passive—written, or, substantively, anything written.

Positions of the Crank and the Piston.

I have no desire to enter into any controversy upon this subject, nor yet to be placed in a false position in the minds of the readers of the Scientific American, as I value their good opinion too highly to lose it by hasty statements.

I have said in a former letter that it was not of any importance to know the relative position of the crank and the piston in setting valves, *but I have not said* that the crank and the valve had no relation to each other. Their true relations will be found by considering the indicator diagram which shows us exactly where the steam enters to the piston, how far it follows, how much it expands, the amount of compression at the end of the stroke, and other matters not necessary to consider in this connection. All this we read as in a printed page. Now what do we do when we find errors in the diagram? Alter the crank? No, sir: we alter the eccentric, and the crank takes care of itself; for the economy of the machine depends on the eccentric and valve, all other things being equal.

No valve can be set exactly right without an indicator card to rectify errors of adjustment. Exceptions occur to this statement as to all others, but they are only accidents and not reliable, for reasons well known to all well informed engineers.

Many persons confound the velocity of the piston at different points of the stroke with the relative position of the crank and the piston. These things are, I hardly need say, entirely different and have no connection with each other.

I shall not intrude upon your attention again, Mr. Editor, as there is no room for argument in this matter, and I thank you for your courtesy in giving me a hearing.

Egbert P. Watson.

A comparison of the expenses of British and American government throws light upon the contrast between the condition of the common people under republican and under aristocratic rule. With a larger population, our civil service costs but about two-fifths that of Great Britain, or twenty-nine millions against seventy-three millions of dollars per annum.

The culture of the pomegranate is attracting attention in California. A gentleman at Martinez has a large plantation of this fruit in bearing. It is said to be nearly as easy to cultivate as the peach.

Nuemeyer's inexplosive gunpowder is about to be tested by the British Government.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING DEC. 18, 1866.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
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In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $300 on application.

☞ 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.

60,457.—Cotton or Hay Press.—James S. Allums, Cusseta, Geo.

I claim the mode herein described of constructing the frame and supporting the same by strong iron rods in the manner and for the purpose set forth.

Also the combination of the frame so constructed with the modes of supporting the frame and the screw in the manner and for the purpose set forth.

60,458.—Blacksmith's Forging Apparatus.—Leonard and Ira Andrews, Biddeford, Me.

We claim the arrangement of the treadle, c, link, d, crank shaft, a, balance wheel, b, truck, f, shaft, l, having the truck, b, and cam, k, hammer, m, and anvil, t, in order to constitute, when the trucks, f and h, are connected by a belt, a machine which can be operated by a single person, in the manner herein set forth, and working as described.

60,459.—Steam Generator.—William C. Baker, New York City.

First, I claim the partition, p, dividing the front from the rear of the boiler when combined with a tubular boiler constructed as herein set forth and directing the heat in its course between the tubes as, and for the purposes, described.

Second, I also claim the supplemental water chamber, g, combined with the circulating tubular boiler as specified.

Third, I also claim the additional steam chamber, C', connecting with steam chamber, s, substantially as and for the purposes set forth above.

Fourth, I also claim the connections or bends which bear against and support each other vertically and laterally by which the tubes are supported as and for the purposes described.

60,460.—Apparatus for Cleaning and Hulling Wheat and other Grain.—E. P. Barrabe, Paris, France.

First, I claim the case, D, and its plates, c, in combination with the shaft, C, and its plates, b, when each of the latter plates is greater in diameter than the plate next above it for the purpose specified.

Second, The dividing shaft, E, and disk, d, in combination with the shaft C, its adjustable roller, f, and the lever, k, or its equivalent, the whole being arranged and operating substantially as set forth.

60,461.—Plow.—Ira W. Bartlett, Otter Creek, Ill.

First, I claim the axle and wheels, E G G', combined with the rod, H, and lever, I, when employed in connection with the beam, A, for governing the depth of the plow as herein set forth.

Second, The combination of the ratchet bar, l, and set screw, n, with the toothed colter bar, L, arranged and operating as herein set forth.

60,462.—Preserving Fruits, Meats, and other Substances.—E. S Bartholomew, Westfield, N. Y. assignor to himself and C. H. Ballow, Cleveland, Ohio.

First, I claim the combination of the air pump, B, and close combustion retort, D, receiver and purifier, G, provided with the perforated coil, h', with the hermetical preserving chamber, A, arranged and operating substantially as set forth.

Second I also claim a preserving chamber formed with inclined or converging sides, a a, in combination with the several eduction pipes, c c, and main eduction pipe, b, when used in combination with an exhausting pump, B, or equivalent, substantially for the purpose described.

Third, I also claim the sulphurous acid gas generator, E, in combination with the retort, D, and induction tube, f, when used in connection with the air pump, or equivalent for the purpose described.

Fourth, I also claim the employment of sulphurous acid gas in preserving meats, by injecting a small per centage thereof into the preserving chamber, in combination with the nitrogen and carbonic acid gases, substantially as set forth.

60,463.—Low Water Detector.—B. H. Bartol, Philadelphia, Pa.

I claim the pipe, A, rod, d, and steam whistle, C, constructed and arranged in respect to each other and to a steam boiler, substantially as described.

60,464.—Invalid Traveling Chair.—C. L. Bauder, Cleveland, Ohio.

First, I claim the foot piece, D, arms, E and E', in combination with adjustable back, B, and seat, B' hinged and hung so as to operate conjointly as and for the purpose substantially as set forth.

Second, The lips, I I', in combination with the arms, E E', and hinged foot piece, as and for the purpose set forth.

Third, The bracket, C', consisting of two arms, n n', in combination with the levers, e, connecting rod, d, link, c, and chair arranged as and for the purposes set forth.

60,465.—Railway Car.—G. and G. T. Benjamin, and H. S. Weston, Millersburg, Ohio.

We claim the double window, B B', the rod, D, and deflector, F, in combination with the car, as arranged in the manner and for the purpose herein set forth.

60,466.—Metal Plated Sole.—Erastus Blakeslee, Plymouth, Conn.

I claim plating soles for boots and shoes with strips of metal, when the said strips are formed and arranged so as to completely cover the face of the sole, substantially as and for the purpose specified.

60,467.—Horse Hay Fork.—C. C. Blodgett, Watertown, Conn.

First, I claim, in combination with the tubular sheath and center rod of a hay fork as described, the slotted claws or barbs, elongated at their end above the pivot d points so that when the claws are projected from the sheath, the said end shall be brought in contact with the sides of the sheath, substantially as and for the purpose set forth.

Second, I claim the combination with the tubular sheath of a hay fork, as described, of a center rod or bar, provided with flanges arranged relatively to each other and to the locking mechanism of the fork in such manner that they shall not only guide and center the rod but also constitute the means whereby its motion in the sheath may be limited or stopped, substantially as herein shown and set forth.

Third, In combination with the center rod or bar, arranged as described, I claim the open-topped tubular sheath and the pin or equivalent device for preventing the withdrawal of the rod from and the rotation of the same within the said sheath, substantially as herein shown and set forth.

Fourth, I claim the herein-described device for locking and unlocking the center rod, the same consisting of a hoop or sleeves, F, loosely encircling the sheath, and combined with the spring, G, and locking pin, h, substantially in the manner and for the purpose herein shown and set forth.

Fifth, I claim the guard formed on the center rod, and constructed and arranged so as to protect the locking and unlocking device, substantially as herein shown and described.

60,468.—Fruit Jar.—Joseph Borden (assignor to T. and J. Bodine), Bridgeton, N. J.

I claim the cover, B, the set screw, D, projecting from the underside of the same in combination with cross bar, E, serving as a nut for the said screw, and adapted to recesses or projections in the neck of the vessel, all as set forth.

60,469.—Carpet Stretcher.—John H. Bosworth, Bath, Me.

I claim the tubular and serrated head as constructed and applied to one of the parts of the staff of the carpet stretcher in manner and for use as set forth.

I also claim the combination of two toothed heads, two bars, and a slide tube arranged and applied together, substantially in manner as hereinbefore set forth.

60,470.—Water and Steam Separator for Steam Generators.—Richard C. Bristol, Saint Clair, Mich.

First, I claim in combination with the steam generating apparatus, A, the vessel, C, disconnected portions, A' B', of the steam pipe and the drain pipe, C', arranged for joint operation in separating the water and steam flowing through the pipe, A', discharging the water through the pipe, C', and the steam alone through the pipe, B', substantially as herein set forth.

Second, I claim the within-described arrangement of the vessel, C, and its connections relatively to the boiler, A, so that the water separated from the steam and descending in the pipe, C', shall flow directly back to the boiler without the necessity for intervening mechanism, substantially as and for the purpose herein specified.

60,471.—Means for Propelling Vessels.—Charles W. Cahoon, Portland, Me.

I claim the application of the undulatory motion of the sea to the propulsion of vessels by means of pumps, and substantially as described.

I also claim controlling the movement of the connecting rods by which the pumps are actuated so that the length of stroke of the pistons may be governed, substantially as described.

60,472.—Tanning.—Joseph W. Calef, Salisbury, N. H. assignor to himself and John R. Folsom, Stoneham, Mass.

I claim in the process of tanning the employment of the ingredients first described, when used as and in the proportion substantially as set forth.

I also claim, in combination with said tanning ingredients, the employment of the material for hardening sole leather, substantially as set forth.

Also, the employment of the preservative solution in connection with the tanning process, substantially as set forth

60,473.—Churn.—Alexander Carbnow, Potsdam, N. Y.

First, I claim the arms, B B, the standard, E E, or their equivalent as arranged and combined with a drive and pinion wheel, and connected with a tub or churn for the purposes herein specified.

Second, I claim the arms, K K K K, with the paddles, I I I I I, the breakers, m m m m and n n n n, as represented in figures, 2 3 and 4, or their equivalents, for the purposes herein specified.

Third, I claim the peculiar arrangement of the arms, B B, the standard, E E, the drive wheel, f f, the pinion wheel, h h, and the shaft, l l, and their peculiar combination to and with each other for the purposes herein specified.

Fourth, I claim the peculiar arrangement and combination of the paddles, I I, etc., and the breakers, m m m m and n n n n, for the purposes herein specified.

Fifth, I also claim the adjusting of the drive wheel, f f, to the pinion wheel, h h, for the purposes herein specified.

60,474.—Air Engine.—Peter Chick, Taunton, Mass.

I claim, First, The inverted semi-sphere in the upper portion of the fire box substantially as shown and described.

Second, The semisphere in combination with the fire box, substantially as shown and described.

Third, The arrangement of the water injection pipe in such a manner that it may be withdrawn at any time, substantially in the manner shown and described.

60,475.—Computing Machine.—John H. Chidester, Cleveland, Ohio.

First, I claim the series of disks, D, and toothed wheels, B, arranged upon the shaft, G, in combination with the case, A, index openings, b b b, and numeral openings, a a, arranged and for the purpose set forth.

Second, I claim the notches, c, and flange, F, of the discs and wheels, B, provided with a series of numerals, in combination with the spring, h, recess, C, and shaft, G, arranged in the manner and for the purpose set forth.

Third, A computing machine when constructed, arranged and operating in all its parts, substantially as herein set forth.

60,476.—Carpet Lining.—George W. Chipman, Melrose, Mass.

I claim as an improvement in the manufacture of carpet linings, the construction herein described, viz.: a lining in which a thin sheet of fibrous material is confined between two sheets of fabrics of close texture, by reason of the edges of said sheets bein; cemented together.

60,477.—Distilling Apparatus.—John A. Coffey, London, England.

I claim the improved constructions and arrangements set forth in regard to the distillatory portions of such apparatus, it being understood that I do not claim any of the mechanical details *per se* and apart from the purposes of my said invention.

60,478.—Paint for Coating Wood, Stone, etc.—William Coggeshall, Springfield, Ohio.

I claim, First, The method herein described for coating substances by the application, dry, to properly prepared surfaces of the hereinbefore described crude article or any equivalent compound substantially as set forth.

Second, The use of the aforesaid crude article or any equivalent substance in combination with any coloring matter when applied dry, substantially in the manner set forth.

60,479.—Car Coupling.—V. and E. Cole, Detroit, Mich.

We claim the pin, a, with its rubber spring, b, and pointed link, B, arranged to operate with the headed slide, B', spring, C, and bar, E, in the manner and for the purpose herein specified.

60,480.—Vapor Burning Stove.—O. K. Collins and William B. Grover, Woodbury, N. J.

We claim the burner, B, consisting of the chamber, y, communicating with an elevated reservoir, the flange, b, and disk, c, with the intervening annular space, x, communicating with the said chamber, y, the whole being arranged substantially as and for the purpose described.

Second, The combination of the above with the pipe, f, and valve, g.

Third, The gas generating burner, B, in combination with a pipe, F, water tank, G, and valve, i, and pipes, c' and E.

60,481.—Door Spring.—James M. Connel, Newark, Ohio.

I claim the hollow slotted mandrel, C, or its equivalent, provided with a tongue which projects into the arm, G, substantially as specified.

Second, The mode of journaling the mandrel, C, or its equivalent on the studs, B, projecting into the casing, K, and attached to the base plate, A, substantially as described.

Third, The coils, D, in combination with the hollow slotted mandrel, C, or its equivalent, the tongue, C, and arm, G, substantially as described.

Fourth, The arrangement of the coils as conical frusta upon a core or mandrel of corresponding character as and for the purpose described.

Fifth, The arrangement of the arm, G, and the semi-cylindrical portion, G', rotating between guides, K K, on the casing, K, and occupying in the rear, the enlargement, K', substantially as described.

Sixth, The recesses, e, for securing the tangential prolongation of wire coil, substantially as described.

Seventh, The general combination of parts consisting of the mandrel, C, or its equivalent, tongue, c, coiled springs, D D, arm, G G', casing, K, studs, B B, and base plate, A', substantially as described.

60,482.—Hammer.—David T. Crockett, Newark, N. J.

I claim a hammer, screw driver, and tack extractor combined as shown, formed of one piece of metal as a new article of manufacture.

60,483.—Corn Planter.—Isaac Crum, Port Union, Ohio.

I claim in combination with a hoe or its equivalent, having tube a, and aperture, e, the distributing plate, g, constructed and operating as above described and set forth.

60,484.—Apparatus for Finishing and Boxing Paper Collars.—John J. Currier and Samuel Wells, Jr., assignors to themselves and James H. Plaisted, Boston Mass.

We claim, First, A machine for finishing and boxing shirt collars made of paper or other material, consisting of the rollers, B C and D, cylinder, E, piston, F, and wheel, P, arranged and combined substantially as described.

Second, The combination and arrangement of the cylinder, E, piston, F, and rollers, B C and D, substantially as and for the purpose specified.

Third, The wheel, P, and the devices for moving the same, consisting of cam, 10, rod, M, bell crank, Q, arm, R, ratchet wheels, U and X, arm, V, lever, S, rod, L, and spring, N, substantially as described.

Fourth, The combination and arrangement of the cylinder, E, piston, F, and wheel, P, said wheel having devices attached for giving it an intermittent motion substantially as described.

Fifth, The combination and arrangement of the cylinder, E, piston, F, shaft, G, lever, J, ring, H, rods L and M, spring, N, and cam, 10, substantially as and for the purpose specified.

60,485.—Saw Mill.—James Davis, Buffalo, N. Y.

I claim, First, The placing of the saw arbors, D, in sliding frames, C C, arranged with gearing and racks substantially as shown and described to admit of the saws, G, on the two arbors, D D, being adjusted simultaneously toward and from each other by the turning of a single, I, as and for the purpose specified.

Second, Adjusting the plates, M, upon shaft, L, by means substantially as described, in combination with the adjustable slide, J, as and for the purpose set forth.

Third, The two carriages, O O', provided with the dogs, P P, and operated through the medium of the drum, R, and chains, Q Q, all constructed and operating substantially as shown and described.

60,486.—Saw Mill.—James Davis, Buffalo, N. Y.

I claim adjusting the roller, N N', by means of bars, d, levers, O, weights, S, notched bars, P, guide, Q, and wedges, R, as and for the purpose specified.

60,487.—Railroad Switch.—S. T. Denise, Branch Port, N. J.

I claim the bars or rails, F, provided with swiveled pieces, G and H, respectively, substantially as and for the purpose described.

60,488.—Wearing Apparel made of Paper.—A. T. Druison, Poland, Maine, and E. P. Furlong, Portland, Maine.

We claim, as our invention, the new manufacture, consisting of articles of wearing apparel made, in whole or in part, from paper formed into crinkles or flexures while in a pulpy or semi-pulpy condition, substantially as set forth.

60,489.—Dumping Wagon.—Daniel Dennett, Buxton, Me.

First, I claim the tail board, D, with its oblique sides, so arranged as to enable the body to tip between the fore and rear axles of the wagon, substantially as described.

Second, I claim the combination of the tail board, D, with its oblique sides, beams, A A, and rod, B, all arranged as described for the purpose specified.

60,490.—Heat Radiator for Stove Pipes.—Emanuel Detwiler, Milwaukee, Wis.

First, I claim the T, iron ribs or braces, A, combined in relation with the flues, d g, substantially as herein set forth for the purpose specified.

Second, The horizontal flues, d g, and vertical flues, E, arranged in relation with each other and with the flues, M N, and the pipe, D, substantially as herein set forth for the purpose specified.

60,491.—Igniting Illuminating Signals.—Jacob J. Detwiller, Greenville, N. J.

First, I claim arranging the fuse or quick match, C, in connection with the signal, and the stock, A or B, substantially as shown and described for the purpose specified.

Second, Making the stocks, A and B, with a hole, d, in its axis, in combination with the transverse hole or groove, e, to receive the end of the match and the fire from the percussion cap, substantially as set forth.

Third, Enveloping the signal and capping the lower end of the stock in a metallic case, for the purpose of protecting it from punctures and dampness substantially as shown in Fig. 12, and as described.

60,492.—BONE BLACK KILN.—Edward P. Eastwick, Baltimore, Md.

I claim connecting two or more vertical retorts by means of intervening bed plates and adapters or couplings resting in the floor of the upper chamber of the bone black kiln, supporting the upper retorts independently, and allowing a separate expansion and contraction of the lower retorts, substantially as herein described.

60,493.—CHURN, BEER COOLER, ETC. — Samuel S. Elder, Springfield, Ill.

First, I claim the combination of the hexangular casing, A, and dashers, D" and G', revolving in opposite directions, when respectively constructed and arranged substantially as set forth.

Second, I claim the combination of the dashers, D" and G", when carried in opposite directions upon a system of shafts, F F' and G, and collar, D' and D"', arranged and operated substantially in the manner and for the purpose set forth.

60,494.—COMB.—James Emerson, Lowell, Mass.

I claim, First, The comb, A, when made in the proper form to fit the upper lip, with guards in front to hold the moustache, when made substantially as described.

Second, I claim the nippers, I I, in combination with the comb, for the purpose of holding the comb in the moustache as described.

60,495.—WAGON WHEEL.—Benjamin M. Esterle, San Francisco, Cal.

I claim, as my invention and improvement in carriage wheels, the use of the plate, E, constructed as shown in Fig 3 of the drawings, so that it may be used on the inside of the front wheels of a wagon, and pass or slip over the lock or friction plate fastened to the carriage for the wheel to rub against in turning the wagon.

60,496.—STEAM GENERATOR.—Henry Feyh, Columbia, Ohio, assignor to himself and George T. Emory. Antedated September 13, 1866.

First, I claim pipes or tubes of different diameters, arranged so as to be exposed to the direct action of the fire, and connected at one end for producing a forced circulation of water in steam boilers, substantially as described.

Second, The combination of the feeding pipes, c, leading from the water space and below the water level, with the end couplings, G, and with pipes leading from said couplings above the water level in the boiler, substantially as described.

60,497.—ROCK DRILL.—C. D. Foote, Fond du Lac, Wis.

First, I claim in drilling machines of the character above described, so arranging the cylinder and its attachments that the same shall be fed up to their work, substantially as set forth.

Second, Mounting the cylinder and its attachments upon a horizontal frame, hinged to the side of main frame, so that the drilling mechanism may be swung out of line with the hole being drilled, without removing the main frame, as set forth.

Third, Arranging the cylinder in such a manner as to operate the drill by a blow direct from the end of the piston, substantially as set forth.

Fourth, The rod, F, or its equivalent, arranged to operate substantially as set forth.

Fifth, The drill-holding device, with the opening in its side to permit the insertion or removal of the drill, as and for the purpose set forth.

Sixth, The bar, m, arranged to operate the ratchet wheel, T, for the purpose of feeding the machine forward, substantially as described.

Seventh, The mechanism so arranged as to raise the drill from the rock at its cutting point and return it again at each blow of the hammer, as herein described.

60,498.—STOVE-PIPE DAMPER.—J. Frazer and O. S. Garretson, Buffalo, N. Y.

We claim, First, Connecting the two disks of a pipe damper together by means of lugs, f f', and corresponding slots, or their equivalent, in combination with the axial rod, C, substantially in the manner and for the purposes set forth.

Second, We also claim the two scallop or equivalently-formed disks, B B', combined to form a pipe damper, substantially in the manner and for the purposes set forth.

60,499.—LAMP BURNER.—John A. Frey, Washington, D. C. Antedated Dec. 4, 1866.

First, I claim the square apertures, L, and the perforations, M, of the circular burner, to regulate and keep the burner cool without any metallic tubes passing into or through the oil or fluid.

Second, I also claim the outer air chamber, B, in combination with the apron, N, and spring, T, as herein described.

Third, I also claim the circular guard, F, on the top of the lamp, in combination with the burner, as herein described, to prevent any sudden transmission of air.

Fourth, I also claim the cone-shaped reservoir of water in the center of the lamp, for the purposes set forth.

60,500.—ENGINE FOR THE UTILIZATION OF AMMONIACAL GAS. —Jean Frot, Orleans, France.

I claim the herein-described apparatus, by means of which ammoniacal gas may be substituted for steam in motor engines, the same consisting substantially of a combined condenser and dissolver, arranged as described, in which the ammoniacal vapor is condensed and dissolved continuously as herein described and set forth.

60,501.—POTATO DIGGER.—Allen Gilmore, Fort Atkinson, Wis.

First, The combination of shovel screen, c, screen, D, and revolving tooth, a2, with carriers, f2 f3, applied to a carriage, A, and operating substantially as described.

Second, The arrangement of comb teeth over the shovel, C', in combination with the carriers, f2 f3, substantially as described.

Third, The arrangement of a pressure roller, g', in front of the carriers, f3, and over the shovel, C', substantially as described.

Fourth, Sustaining the shovel screen, C, against backward strain, when said screen is suspended at its rear part from a shaft, b', by means of segments, d' d', and bearings, e e, substantially as described.

Fifth, The clearer, S, in combination with the carriers, f3 f3, substantially as described.

Sixth, Conducting the potatoes from the screen, D, upward and forward, and delivering them at a point which is near the front part of the machine, by means substantially as described.

Seventh, The use of a rake, K, for separating the vines from the potatoes, said rake being arranged on an elevator, and caused to discharge the vines over gate, J, and guard, F, substantially as described.

Eighth, The application of a screen, K, to the inclined bottom of the elevator, for separating the smaller from the larger potatoes, substantially as described.

Ninth, The construction of the screen, D, with a guard, F, upon the near end, substantially as and for the purposes described.

60,502.—SIGNALLING APPARATUS.—John Sacheverell Gisborne, Liverpool, England.

First, I claim the pulley, e, stud, c, pointer, d, and handle, f, arranged substantially in the manner described, as means of giving motion to one or more endless or double-line, flexible, double-motion conductors, K, to give either audible or visible signals or both.

Second, In combination with the above, the spring, g, constructed to fall into the notches, h, in the manner and for the purpose set forth.

Third, The dials, b and i, placed close together, substantially as shown on the drawings, so that they are illuminated by one lamp and can be seen at a glance.

Fourth, The employment of one or more flexible, endless or double-line conductors, K, as means for conveying or communicating motion for operating signalling apparatus, and for conveying or communicating the motion of a rudder stock, substantially as described.

Fifth, The combination of the pulley, o, disk, q, case, n, with opening, x, and motion conductors, K, either with or without the bell or signalling apparatus, substantially as described.

60,503.—CLAMPS FOR GLUEING THE TIPS OF BILLIARD CUES. —Samuel Gissinger, Lawrenceville, Pa., assignor to himself and David E. Hall, Pittsburg, Pa.

I claim the springs, o, or their equivalent, formed in such a manner as to have a bearing on the cue at two different points of its length, in combination with the conical chamber, i, piston, e, and spring, f, the whole being arranged and operating substantially in the manner herein described and for the purpose set forth.

60,504.—PRINTING PRESS.—George P. Gordon, Brooklyn, N. Y.

First, I claim, in combination with the inking rollers, M, held and carried in a rocking roller frame, I, the use or employment of a third or supplemental roller, M3, whether said third or supplemental roller, M3, shall vibrate or not, substantially as and for the purposes shown.

Second, I claim the grippers, T, to relieve the printed sheet or card from the form or types, constructed and operated substantially as shown.

Third, In combination with a revolving ink-distributing table or disk, N, I claim the use or employment of the inking rollers, and a third or supplemental roller, M3, or its equivalent, for the purposes specified.

60,505.—CAPSTAN.—William D. Grimshaw, Newark, N. J.

First, I claim the combination of the shaft, b, spring, f, nut, g, barrel, c, and ring, d, with the base, a, in the manner and for the purposes specified.

Second, I claim the pawl, o, constructed in the manner specified, in combination with the pointed spring socket, r, wheel, n, and handspike socket, m, as and for the purposes set forth.

60,506.—ENGRAVING.—J. C. Guerrant and B. J. Field, Leaksville, N. C.

First, We claim the arrangement, substantially as described, of the adjustable plates, E F G, with their slots and set screws, in combination with the supporting plate, A, for the purpose and substantially in the manner set forth.

Second, The levers, O O' and Q Q', with the adjustable arm, P, and joints, g and h, arranged substantially as set forth, in combination with the adjustable staff, L, and sleeve, M, for the purpose of allowing universal motion and adjustment to said levers, O O' and Q Q', as set forth.

Third, The vibrating arc, S, and pattern frame, T, constructed, arranged, and operating substantially as described, and for the purpose set forth, in combination with the plate, A, and its adjuncts, as set forth.

Fourth, The arrangement, substantially as set forth, of the stylus or tracing point, m, and its adjuncts, whereby it will be always kept against the pattern as described, in combination with the adjustable sleeve, U, as set forth.

Fifth, We claim the ring holder, Y, with its set screws, r r, or equivalent device, arranged and made adjustable by means of the staff, V, and sleeve, W, substantially as set forth.

60,507.—JACK FOR THE MANUFACTURE OF BOOTS AND SHOES. —Charles M. Gustin, Laccarappa, Me.

First, I claim the combination of the bolt, C, and friction washer, o, to prevent a too easy and ready revolution of the yoke, A, upon the bolt, in a horizontal plane.

Second, The combination of the crank stop, d, sliding in the blocks, e e, with the holes in the segment, C, as and for the purpose specified.

Third, The sliding toe rest on the top of the arm, f, when secured at any point in the manner described and for the purpose set forth.

60,508.—ATTACHING COVERS TO KETTLES, BOILERS, STOVES, ETC.—William Hailes, Albany, N. Y., assignor to himself and S. H. Ransom.

First, I claim securing the covers to vessels or other objects by a pivot connection, in such a manner that the covers will be held down in place by an overhanging hook, C, or its equivalent, substantially as described.

Second, The combination of the hook, h, and the perforated portion, i, with the projection, a, and its stud, b, substantially as and for the purposes described.

Third, The construction of the projection, a, with a stop, c, and a notch, e, formed on it, substantially as and for the purposes described.

60,509.—SPIRAL FRICTION CLUTCH FOR MACHINERY.—James Hanley, New York City.

I claim the friction cord as herein described, and applied substantially to control the movement of machines.

60,510.—SAWING MACHINE.—Henry Hassenpflug, Huntington, Pa.

I claim the arrangement of the slotted arms with respect to the saw frame, in such a manner that the saw may be set at any required distance in advance of the frame, substantially as set forth.

60,511.—COMBINED BLACKING BRUSH AND BOX. — Frank Hatch, La Crosse, Wis.

I claim the combination of an adjustable and attachable liquid blacking reservoir, as set forth in specification and drawings accompanying my application.

60,512.—FILTER.—Thomas Hayes, Cambridge, Mass.

I claim the passages, c d e f, and valves, g h i j, operated by cams, F G, all arranged for the purpose of reversing the current of water through the filterer, substantially as set forth.

60,513.—GRAIN SEPARATOR.—S. Heflebower, Alexander, Va., and J. M. Reed, Loudon County, Va.

We claim the combination of a pressure roller with one or more rollers, with an adhesive covering, to which the cockle will become attached and thereby removed from the wheat, substantially as described.

60,514.—TREATING ORES OF COPPER AND OTHER METAL TO OBTAIN METALS AND OTHER PRODUCTS THEREFROM. —William Henderson, Glasgow, Scotland.

First, I claim the two several improved processes hereinbefore described, for extracting copper from any ore in which it may be found as a salt of copper, whether iron or other metal be or be not found in such ore.

Second, The improved process and processes hereinbefore described, for separately obtaining from the sulphuret ores of copper, silver, zinc, or other metal, the copper, silver, zinc, or other metal therein contained, whether the object be to obtain from such sulphurets one only or all of the metals therein contained.

Third, The manufacture of the product hereinbefore denominated iron powder by the process hereinbefore described, to be used in the processes hereinbefore described, as a precipitate.

60,515.—CAR BRAKE.—A. Higley, South Bend, Ind.

First, I claim the stirrup, L, and spring, M, in combination with the pawl, K and ratchet, J, arranged and operating as and for the purpose set forth.

Second, The lever, G, and friction coupling, D, in two sections, as set forth, in combination with the pawl, I, ratchet, b, and pulleys, E E', as and for the purpose described.

Third, The swivel, I', bar, H, spring, I, and chains, c d e, in combination with the pulleys, F E and E', arranged and operating as and for the purpose described.

60,516.—FLUX FOR WELDING, PUDDLING, AND BRAZING IRON AND STEEL.—Anthony J. Hindermeyer, Rohrerstown, Pa.

I claim the use of the herein-described compound as a flux for welding and brazing, and as a physic for cleansing and improving iron in the operation of puddling.

60,517.—PADDLE WHEEL.—William H. Holland, Chelsea, Mass.

I claim my improved paddle wheel or propeller as constructed with its main and auxiliary floats, C D, three series of radial rods or arms, and two series of radial auxiliary radial arms, arranged and combined together, and with rings and hubs, substantially as hereinbefore described.

60,518.—PADDLE WHEEL.—William H. Holland, Chelsea, Mass.

I claim the arrangement of the main and auxiliary floats of the wheel with respect to each other and the side frames, substantially as specified and represented, each main float under such arrangement being extended diagonally or obliquely across the entire wheel, and its auxiliary float being made to extend from the middle of the main float at an acute angle thereto and joined to one of the side frames, as specified.

I also claim the arrangement of each main float and its brace or auxiliary so as to stand obliquely in the wheel in directions opposite to those of the next adjacent main float and its brace or auxiliary float, the whole being as represented in the drawings and as hereinbefore described.

60,519.—PIANOFORTE.—G. H. Hulskamp, New York City.

I claim the combination of the wooden bridge, d, and the rest plank, h, with the agraffe, A, substantially as and for the purpose set forth.

60,520. — REPEATING ACTION FOR PIANOFORTES.—Joseph Hurd, Boston, Mass.

I claim for the purpose of supporting the hammer of a pianoforte action near its string in position to give a repeating blow, the combination of an elastic support of the hammer butt, with a lever, o, when this is connected with the key lever actuating the hammer by means of the link, n.

Also the employment of the right and left-hand screw in the link, n, for the purpose of adjusting the position of lever, o.

60,521.—FOOT BATH.—Isaac A. Isaacs, Cleveland, Ohio.

I claim the tube, D, funnel, C, in combination with the perforated bottom, B, guard, b, and pail, A, arranged in the manner and for the purpose set forth.

60,522.—WATCH-CHAIN FASTENING.—Henry Jahne (assignor to himself, Gerrit Smith, and Anthony J. G. Hodenpyl), New York City.

I claim a watch-chain fastening composed of a case, b, containing a spring bolt, c, operated by the guard, f, and provided with the hinged shackle, a, at one end and a ring at the other end, as a new article of manufacture.

60,523.—BARS OR SLATS FOR REFRIGERATORS.—John C. Jewett, Buffalo, N. Y.

I claim the construction of ice racks for refrigerators of bars of wood sheathed and hermetically inclosed in zinc or other sheet metal, substantially in the manner and for the purposes herein set forth.

60,524.—TANNING.—James J. Johnston, Alleghany City, Pa.

First, I claim placing skins of animals in air-tight vats from which the air has been exhausted and then treated with tanning liquid and agitated in the manner and for the purpose described.

Second, In connection with the above the application of hydrostatic pressure in the manner and for the purpose described.

Third, The combination and arrangement of the vats, A B and C, furnished with trunnions, o and e, frames, x, and pressure device, the whole being constructed, arranged, and operating in the manner substantially herein described and for the purpose set forth.

60,525.—CENTER TABLE.—Edwin Lampman, Catskill, N. Y.

I claim the arrangement of the disk, C, as constructed with the leg, A, pin or plug, a, and top, D, as and for the purpose herein set forth.

60,526.—FEMALE SYRINGE.—Simon M. Landis, Philadelphia, Pa.

I claim the funnel-shaped cavities with or without grooves of the syringe bulb tube.

Also the box applicable to spigots of any size in combination with syringe bulb tube, as herein described.

60,527.—FARM GATE.—A. Larrowe, Cohocton, N. Y.

I claim the gate constructed as shown and used in connection with the hooks, d, and pins, e, all arranged to operate as herein shown and described.

60,528.—COTTON-BALE TIE.—R. G. Latting, New Orleans, La.

I claim a buckle arranged with two loops, d g, constructed as described in combination with an angular ridge, c, formed by the depression of the center of the plate, as and for the purpose described.

Second, I also claim the hook, h, or its equivalent, for strengthening the open loop, g.

60,529. — COLLEGE CABINET. — William W. Levering, San Francisco, Cal.

I claim a cabinet constructed as described and having a door serving for a blackboard and held up by the bars, e e', substantially as described.

60,530.—MANUFACTURE OF YARN.—Edward T. C. Lutton, Philadelphia, Pa.

I claim yarn from the entire surface of which the superfluous projecting fibers have been sheared, for the purpose specified.

60,531.—MACHINE FOR FORMING BRIDLE FRONTS.—Ira Manning, Philadelphia, Pa.

First, I claim the guides, B B', either fixed or graduating, for the purpose herein specified and described.

Second, The guides, B B, in combination with the centers, D D', substantially as specified and described.

Third, The guides, B B', in combination with the centers, D D', and the presser, E, substantially as specified and described.

Fourth, The sliding center board or piece, I, substantially as specified and described.

60,532.—MARKING STAMP.—William B. Mason (assignor to himself and Chas. H. Moore), Boston, Mass.

I claim making the face of the type elastic to yield to the small inequalities of the surface printed in combination with a small elastic base (less in area than the face of the type) to yield to the large inequalities of the surface printed.

And in combination with the elastic face and small elastic base, I claim so arranging or holding the solid body of the type in the case that it can rock when required to adapt the surface of the type to the irregularities of the surface printed.

60,533.—DEVICE FOR DETACHING HORSES FROM VEHICLES. —B. A. McConnaughey, New Market, Ohio.

I claim the tugs, D D, connected to the end of the traces and fitting within the openings therefor provided and held by the bar, m, when used in combination with the springs and lever, a, for detaching the horse, substantially as herein set forth.

60,524.—TYPE CASE.—Leonard H. Miller, Ottawa, Ohio.

First, I claim a type case when formed with detachable boxes, B, set nuts or frame, A, substantially in the manner and for the purpose set forth.

Second, In combination with a case, A, and independent boxes, B, I claim a removable partition, C, constructed and used substantially as set forth.

Third, I claim the boxes, B, when constructed with oval bottoms, substantially as described.

Fourth, I claim the boxes, B, when formed with flanges, B', for interlocking the boxes when placed in the case, substantially in the manner set forth.

60,535.—PUMP.—Oliver Miller, Salem, Ohio, assignor to himself and Thomas D. Ball.

First, I claim the chambered chest, E, with its valves, e e', in combination with the cylinder, B B, pistons, b", valves, g g', and induction pipe, A, all arranged in relation to each other and operating conjointly, for the purpose set forth.

Second, I claim in combination with the foregoing cylinders, C C', with the respective plungers, chambers, D D"', and valves, I I", pipe, H, valve, d, and nozzle, G, arranged and operating in the manner and for the purpose set forth.

Third, I claim the chamber, J J', of the chest, E, valves, e e', and openings, m m', in combination with the cylinder, B, pipes, D' D", and chamber, D D"', as and for the purpose set forth.

60,536.—COMPOSITION FOR MAKING SHARPENING STONES.— Robert R. Miller and A. W. Carver (assignors to B. Hoopes and C. Berie), Philadelphia, Pa. Antedated Dec. 5, 1866.

We claim the composition for making sharpening stones, consisting of the materials herein described, combined substantially as specified.

60,537.—RETORTS FOR THE MANUFACTURE OF ILLUMINATING GAS.—Adolph Millochau, New York City, assignor to the American Improved Gas Retort Company.

I claim the platform or false bottom, c, openings or pipes, k, and cap plate, e, in combination with the retort, a, substantially as and for the purposes set forth.

60,538.—COMPOSITION FOR THE CURE OF AGUE.—John Monfort, Jessamine county, Ky., assignor to himself and J. E. Billingsley.

I claim a composition of matter composed, compounded, and prepared, substantially as and for the purpose set forth.

60,539.—ROTARY SIFTER.—Mark F. Morse, Boston, Mass.

I claim the combination and arrangement of the disk, D, its series of cams, g g g, the stud, I, and the spring, l, with the sifting drum, its shaft, and supporting frame, the whole being to operate as specified.

60,540.—BREECH-LOADING ORDNANCE.—William J. Murphy. Cork, Ireland.

First, I claim the barrel, a a, with its opening, d d, and plunger or breech piece, b, in combination with the within-described devices, or their equivalents, whereby the pressure of the water may be caused to operate the breech piece, all substantially as set forth.

Second, The combination of a barrel, a movable breech piece, and a chamber containing a body of water, and so situated that the water will retain the breech piece in its position during the discharge of the piece.

Third, The barrel, a a, with its openings, d d, cylinder, f f, plug, i i, and openings, k l m, or their equivalents, in combination with the plunger, b, and its piston, c, the whole being constructed and operating substantially as and for the purpose described.

60,541.—WHISTLE FOR STEAM AND OTHER ENGINES.—John Murray, New York City. Antedated Oct. 7, 1866.

I claim the above-described whistle, for steam and other engines, as a new article of manufacture, substantially as and for the purposes set forth.

60,542.—SAWING SHINGLES.—Francis B. Northrup, Newark, N. J.

First, I claim sawing a block of wood into shingles or other analogous things having alternate butts and points, by means of a gang of reciprocating saws, when arranged and operated substantially as described.

Second, The projections, c, on the cross bars of the two gates when used in combination with the two reciprocating gates having a gang of saws operating substantially as described.

60,543.—SHOE BINDING.—M. and R. B. Packard, North Bridgwater, Mass.

We claim, as a new article of manufacture, a shoe binding having a construction substantially as set forth.

60,544.—CAR COUPLING.—E. E. Packer, Jr., and John Daley, (assignors to themselves and Edgar L. Thompson), Philadelphia, Pa.

First, We claim the combination of the coupling rod, B, with the cylinder, C, and screw socket, b, of the cylinder, A, substantially upon the principle, and in the manner hereinbefore described and for the purpose specified.

Second, The combination and arrangement of the lever, E, stud, m, link, n, and pawl, o, substantially in the manner described and for the purpose specified.

60,545. — DEVICE FOR FASTENING BLIND SLATS.—William Palmer, New York City.

I claim the adjustable half-elliptic spring, D, as arranged and constructed and for the purposes as set forth.

60,546.—DYEING AND PRINTING TEXTILE FABRICS AND YARN. Alfred Paraf, Mulhouse, France.

I claim the process of developing chromic acid in dyeing and printing operations by the application to the fabric of an insoluble salt of chromium, and the subsequent action of a moist atmosphere, substantially as set forth.

60,547.—SELF-SEALING FRUIT CAN.—Thomas Parker (assignor to himself and Theodore Rube), Germantown, Pa.

First, I claim the construction of a tin can with a glass lid the full diameter of the can, substantially as and for the purpose set forth.

Second, The laying off the top of the can as a bearing for the rubber ring, r r, as shown in fig. 3, substantially as and for the purpose set forth.

Third, The impression of lugs sunk in the body of the can, or their equivalents, substantially as and for the purpose set forth.

60,548.—TANNING.—Julius A. Pease, New York City.

I claim the tanning of hides or skins, substantially as above described.

60,549.—PROCESS OF TANNING.—Julius A. Pease, New York City.

I claim the use of the above-mentioned material for tanning, either alone or in combination with other materials, substantially as described.

60,550.—STRAW CUTTER.—John G. Perry, South Kingston, R. I.

First, I claim the combination of the two-flanged cylinder, G and H, so arranged and geared together that the periphery of the flanges of the cylinder, H, shall move faster than those on the cylinder, G, and be so situated in relation to each other that a shear cut shall be made in the direction of the center of the shaft, G, or radial, instead of tangential, thereto, as shown and specified.

Second, The feed roll, N, having flanges that work in concert with those on the cylinder, G, in combination with one or more cutting cylinders of a hay or feed cutter, substantially as herein described and for the purposes set forth.

Third, Making the flanges against which the knives cut with projections, t t t t, substantially as herein set forth and for the purposes specified.

Fourth, The hub, x, screws, s s, and stud, c, in combination with the wheel, C, and cylinder, G, substantially as herein described and for the purpose set forth.

60,551.—GATE.—E. Petteys and T. C. Leggett, Chestertown, N. Y.

I claim, First, The arrangement with the gate, F, and link hinge, E, of the rock shaft, B, and arms, D D', substantially as described.

Second, The arrangement of the palette, I, plate, L, and arm, D', as and for the purpose described.

60,552.—APPARATUS FOR COOLING AND PRESERVING MEAT, FISH, VEGETABLES, AND OTHER SUBSTANCES.—Charles F. Pike, Providence, R. I.

First, I claim the application of the ventilator, B, or its equivalent, to the Refrigerator, constructed and refrigerated, substantially as herein described and for the purposes herein stated.

Second, The making of the pipes or tubes, D, larger at the lower end than at the upper end, substantially as and for the purpose herein stated.

Third, The combination of the pipes or tubes, D, larger at the lower ends than at the upper ends, in combination with the ice box or receptacle, C, and the water tank, E, or their equivalents, substantially as herein described.

Fourth, The structure of the ice box or receptacle, C, pipes or tubes, D, water tank, E, and its appendages, provision chamber, A, and its fixtures, ventilator, B, or other equivalents, substantially as herein described and for the purposes herein stated.

Fifth, The application of a freezing mixture of salt and ice, or its equivalent, to a refrigerator or structure, substantially as herein described and for the purposes herein stated.

60,553.—FILTER COOLER.—S. Montgomery Pike, Cincinnati, Ohio.

First, I claim the outer metallic case, B, and inner case, C, with their series

of perforations, b and C', respectively constructed and arranged as and for the purpose above described and set forth.

Second, The cooler, D, having the flutes, d, in combination with the inner case, C, as above described and for the purpose specified.

Third, The outer perforated case, B, the inner perforated case, C, and cooler, D, in combination with the casing, A, of the filter cooler, all arranged as above shown and for the purpose set forth.

60,554.—Fan, Brush, and Rack.—Britton Poulson, Fort Wayne, Ind.

I claim the hereinbefore described arrangement of parts consisting of the bell-formed base, A, rod, B, set screw, B', head, C, and radial arms, D, when said base also encloses the actuating clock work constructed as described, communicating by means of the crank wheel, K, rod, L, and arm, M, a rotary reciprocating motion to the rod, B, and arm, D, in the manner and for the purpose set forth.

60,555.— Manufacture of Leather Hose. — James and James A. Punderford, New Haven, Conn.

First, We claim forming the joint in leather hose by the application to the surface of the laps of a vulcanizable gum, and curing the same after such application, substantially as herein set forth.

Second, Coating the inner, or outer, or both surfaces of leather hose with vulcanizable gum, and curing the same after such coating, substantially as herein set forth.

Third, Coating the outer and inner surface and the joint or laps by a single sheet of fabricated rubber, substantially as herein set forth.

60,556.—Combined Poker, Tongs, Wrench, etc.—John Richards, Washington, D. C.

I claim the construction of the fire tongs when arranged and combined with the wrenches, C and J, hook, H, poker, G, and regulating screw, K, as herein described and for the purposes set forth.

60,557.—Compound Oil for Paint, etc.—Darius S. Robinson, Oswego, N. Y.

I claim the art of mixing, combining, and compounding the aforesaid articles o ingredients, and making a liquid compound or composition called and designated by me "elastic oil," possessing the qualities and answering the purposes of pure linseed oil, or other pure oils, to be used in painting, and all other general purposes for which linseed oil and other pure oils are used.

60,558.—Dryer for Petroleum and Heavy Oils.—Samuel F. Rogers Malden, Mass. Antedated Dec. 12, 1866.

I claim the within-described petroleum dryer, constructed substantially as set forth.

60,559.—Burning Fluid.—William B. Rogers, Chicago, Ill.

I claim a burning and carbonizing fluid which is composed of the several ingredients herein mentioned, mixed together in about the proportions specified.

60,560.—Steam-generator Flue Brush.—Charles, Jr., and John Ross, New York City. Antedated Nov. 6, 1866.

We claim the construction of a brush for cleansing tubular boilers by combining fused metal among wires, as in figs. 1 and 3, whereby to hold the wires of the brush firm, substantially as set forth.

Second, The arrangement of metal containing wires and cutters, so as to form cutters, and a section of brush as shown at E, figs. 5 and 6, adapted to be put on and off and of the size to fit the tubes to be cleansed, substantially in the manner and for the purpose as herein set forth.

60,561.—Fruit Picker.—J. F. Saiger and A. Davis, Shelby, Ohio.

We claim the skeleton spring head, B, tension rod, C, and adjustable screw nut, E, in combination with the hood, D, bag, F, and handle, A, when arranged in the manner and for the purpose described.

60,562.—Steam Generator.—Herrman S. Saroni, Baltimore, Md.

First, I claim a shallow water drum, or drums, or tubular heater, or heaters, interposed between the burner or burners, and the boiler, substantially as and for the purpose described.

Second, The combination o the boiler with the tubular heater, substantially as described, and so arranged that a space shall be left between them, for the purpose set forth.

Third, The combination of the boiler, tubular drum and burners, substantially as described, so that the drum shall act as a heater cap to the burners, and permit the flame to pass to the bottom of the boiler, as set forth.

60,563.—Sole Edge Finishing Tool.—Franz M. Schmitt, Jamaica Plains, Mass.

I claim the block, A, provided with opposite flat faces, and polishing surfaces, and separate projections, c d, or the same and one or more notches, e, all substantially as explained.

60,564.—Pan for Evaporating Sugar.—Herman F. Schroder, Cincinnati, Ohio.

I claim the provision of one or more hollow disks adapted to receive water, and be hermetically closed. The said disks being adapted for attachment to a common evaporating pan, or kettle, and having a crank or other means of rotation, as and for the purposes set forth.

60,565.—Fruit Gatherer.—Henry L. Scott, Plessis, N. Y.

I claim the combination with the basket, A, of the shears, E E', when the stationary blade, E, is formed and applied in conjunction with the float strip, e', to form one of the ribs of the basket, and when the several parts of the instrument are combined and arranged in the manner and for the purpose herein specified.

60,566.—Ventilating Fan for Gas Burners.—Henry Seher, St. Louis, Mo.

I claim a ventilating wheel, constructed, operated and applied in the manner shown and described, and for the purpose set forth.

60,567.—Charging Shells, etc.—Tal. P. Shaffner, Louisville, Ky.

First, I claim the application of nitro-cotton (known as gun cotton), for the purpose of serving as a cushion and an explosive substance in shells, torpedoes, etc., wherein nitroleum (in chemistry known as nitro-glycerin), or other explosive liquid compounds is used as a charge, substantially as hereinbefore described.

Second, I claim the application of india-rubber as a cushion lining, for the purpose of lessening the concussion upon the nitroleum or other explosive liquid, substantially as hereinbefore described.

Third, I claim the honeycombing of india-rubber, with openings between the cells for the purpose of perfecting the cushion, and for the object of hastening the spread of fire throughout the said honeycomb cushion lining, substantially as hereinbefore described.

60,568.—Method of Graduating Vessels.—Tal. P. Shaffner, Louisville, Ky.

I claim, irrespective of size, form, or material, the bottle graduated substantially as described and represented.

60,569.—Electric Fuse.—Tal. P. Shaffner, Louisville, Ky.

I claim, First, The fuze head, a, or d, with its chambers, be, one or both, as and for the purpose or purposes described.

Second, The indented or flanged cylinder, j j', with its cap, k, and head, d, for the direction of the flame of the fuze as described.

Third, I claim the mode of attaching the wires to the fuze head, by means of a non-conducting cement, inserted into a chamber in said head, or in the cylinder in immediate connection therewith as described.

Fourth, I claim the protecting water-proof membrane, or cover, n, for closing the mouth of the composition chamber, b.

Fifth, I claim the water-proof lining to the composition chamber, b, to prevent access of moisture to the said composition.

60,570.—Hydraulic Press to Prevent Corrosion.—Tal. P. Shaffner, Louisville, Ky.

I claim a non-corrosive lining to the chamber of a hydraulic or other press, and to the piston or that end of it presented to the said chamber; and this I claim whether the said parts consist wholly of material capable of withstanding the action of acids, or whether only such parts are thus protected as are exposed to the said action.

60,571.—Manufacture of Gun Cotton.—Tal. P. Shaffner, Louisville, Ky.

I claim the process of making nitro-cotton, commonly called gun cotton, or other nitro-fiber, under pressure.

60,572.—Artillery and Mining Blasting.—Tal. P. Shaffner, Louisville, Ky.

I claim the combination of blasts to be discharged simultaneously by electricity, in such manner as will effect a conjunctive force of the respective charges, thereby increasing in disruption of matter beyond what can be obtained by separately discharging the said blasts.

60,573.—Method of Blasting with Nitroleum.—Tal. P. Shaffner, Louisville, Ky.

First, I claim the combination of nitroleum with sand, for the purpose of blasting and distributing the explosive force throughout the drill hole or space where the same are employed, in the manner and for the purposes described.

Second, I claim for blasting purposes the use and interposition of a column of water between the "tamping" and "blasting" charges, when the same are arranged in the manner and for the purposes described.

Third, I claim as a method of blasting in rock the adjustment and arrangement of the "tamping" and "blasting" charges in such manner that the former shall be placed at or near the surface or upper part of the drill hole, while the latter is located at the bottom thereof or in such a manner as that the gases of the two charges may be united disrupting the rock, in the manner and for the purposes hereinbefore described.

60,574.—Hame Fastening.—M. R. Shalters and T. Catern, Alliance, Ohio, assignors to themselves, Samuel Ray and S. Thomas.

I claim, First, The bar, A, provided with hooks as seen at each end and with the hook, B, secured to and operating with it, as and for the purpose set forth.

Second, The bar, C, with links formed in it and used in connection with the bar, A, constructed as and for the purpose set forth.

60,575.—Process for Rendering and Bleaching Tallow, Lard, etc.—John S. Shapter, New York City.

I claim the bleaching of tallow and other fatty matters by subjecting them to the action of alkaline lye while heated in vacuo, substantially as herein specified.

90,576.—Fence.—W. B. Shelton, Congruity, Pa.

I claim, First, The combination of the posts, A, strip, A', boards, B, and clamps, C, constructed and arranged substantially in the manner and for the purpose set forth.

Second, The mode of forming the corners by means of the post, A, strip, A', boards, B, and clamps, D, respectively constructed substantially as set forth.

60,577.—Lamp Shade.—Allen Shepard, Ashland, Mass.

I claim the combination of the support, B, and cap, C, with the corrugated shade, A, when said parts are arranged to operate as set forth.

Second, As a new article of manufacture, I claim the corrugated shade, A, provided with the support, B, and cap, C, as shown and described.

60,578.—Well Tubing.—N. H. Sherburne, Elgin, Ill., and J. T. Whipple, Chicago, Ill.

We claim the combination, of cylinder, B, pipe, A, screen, m, and disk, L, the whole constructed, arranged, and operated substantially in the manner and for the purpose described.

60,579.—Belt Fastening.—S. J. Sherman, Brooklyn, N. Y.

I claim the arrangement of the hooks, A, on the adjustable fastening, C E D, and adapted for use on belts and waist bands, substantially in the manner and for the purpose herein set forth.

60,580.—Atomizing Tube.—Asahel M. Shurtleff, Boston, Mass., assignor to himself, Benj. S. Codman, and F. O. Whitney.

I claim combining with the atomizing tubes, operating as described, an adjustable plug, or its equivalent, placed in or connected with the tube, b, substantially as set forth.

60,581.—Hanger for Stove Hooks, etc.—Joseph Sigourney, Azel T. Robinson, and James Shepard (assignors to J. Sigourney, Azel T. Robinson, and B. B. Lewis), Bristol, Conn.

We claim, First, The band, F, with the swayed groove, B, when applied to a stovepipe, in the manner and for the purposes described.

Second, In combination with the foregoing, we claim the cast-metal hook or hanger, the whole constructed and used as set forth.

60,582.—Shoulder Brace.—Alonzo N. Smith, Hallowell, Me.

I claim the combination of the back pieces, B B, made with the spaces, the elastic cross pieces, b, attached as specified, tags, A A, and lacings, a, arranged and operating as and for the purposes set forth.

30,583.—Artificial Teeth.—Francis W. Smith, Philadelphia, Pa.

I claim the use of flanged-headed plates, constructed substantially as described out of strips drawn from platinum wire, for confining artificial teeth to vulcanized gum or other plates, as above specified and shown.

60,584.—Blind Fastener.—G. Truman Smith and William E. Sparks, New Haven, Conn.

We claim the combination of the latch, A, provided with the lever, B, with the latch, C, when constructed and arranged so as to operate in the manner and for the purpose specified.

60,585.—Refining Hydrocarbon.—Hamilton L. Smith, Gambier, Ohio.

I claim the charcoal filterer, G, in combination with the receiver, D, fan, A, heater, C, coiled pipe, B, arranged and operating as and for the purpose set forth.

60,586.—Pump for Deep Wells.—William B. Snow, Titusville, Pa.

I claim the grooved metallic packing section or sections, B, secured in the tubing of an artesian well, in combination with an elongated piston, C, working through the same, the range of which is above and below said packing section or sections, they being of less interior diameter than the tubing, arranged substantially in the manner and for the purposes herein set forth.

60,587.—Boots and Shoes.—Horace P. Stewart, Oak's Corner, N. Y.

I claim forming the heels of boots and shoes by the alternate, or nearly so, arrangement of welts and taps so as to build up the right shape without paring away the material to any considerable extent, substantially as herein specified.

60,588.—Manufacture of Boots and Shoes.—Horace P. Stewart, Oak's Corner, N. Y.

I claim the instrument as described for shaping the heel welts, having its supporting arm, B, of the upper die swing on the base, A, which bears the other die substantially as and for the purpose herein specified.

60,589.—Combined Gang Plow and Cultivator.—Wm. W. St. John, St. Louis, Mo. Antedated Dec. 2, 1866.

I claim, First, The combination of the frame, A C C D D', with the beams, M' and F, the draft plows and either the cultivator plows, F', and their attachments or the gang plows, M4, and their attachments, substantially as described.

Second, The combination of the wheel stands, B', with the frame, A C C D D', in such manner as to admit of lateral regulatory movements, substantially as and for the purpose set forth.

Third, The combination and arrangement of the levers, M3, with the beams, M', and chord or chain, M4, substantially as set forth.

Fourth, The employment of the guiding bars, M2, when constructed and used as and for the purpose set forth.

Fifth, The attachment of the draught rod, M, for the plow beams, M', to the pole, P, substantially as described.

60,590.—Stuffing and Varnishing Wood.—H. R. Stone and E. N. Schultz, Greenwich, N. Y.

We claim the compound which we have above described to be applied either to oil finish or varnish finish, and to be used for the purpose of filling or stuffing the pores or interstices of all kinds of porous woods, thus making a perfect enamelled surface impenetrable to air or water, and which cannot be injured by either.

60,591.—Compound for the Cure of Diseases in Hogs.—D. W. Stow, Thornton, Ind.

I claim the compound herein described in combination with the operation described as a remedy for the cholera, etc., in hogs, substantially as set forth.

60,592.—Breech-loading Fire-arm.—Thomas L. Sturtevant, Boston, Mass.

First, I claim, in combination with the hammer, trigger, guard lever and the barrel applied to the stock and so as to operate with a stationary breech, c, as described, mechanism substantially as hereinbefore specified, whereby by one movement of the trigger guard lever the barrel may be caused to be raised to receive a cartridge, the hammer be set at half or full cock, and the spent cartridge shall be expelled from the barrel.

Second, I also claim the combination and arrangement of the main and auxiliary hammers and a screw, whereby the main hammer may be either caused to actuate the auxiliary hammers or be thrown out of action therewith as occasion may require and for the purpose hereinbefore explained.

Third, I also claim the construction of each of the grooves, d, with its rear end open, when such groove is combined with the barrel and the trigger guard, lever, and is to operate therewith as and for the purpose described.

60,593.—Filter for Petroleum.—George W. Sylvester, Newark, N. J.

I claim, First, A petroleum filter so arranged as to keep the crude oil in prolonged contact with the filtering material, and to admit of the clarified oil being off by a stop cock or its equivalent, substantially as herein set forth.

Second, Parallel diagrams or their equivalent serving to lengthen the pathway of the descending oil, substantially as herein arranged and for the purposes set forth.

Third, The introduction of a current of heated air into the bottom, so as to permeate and agitate the whole mass, and assist chemical action.

Fourth, The perforated screen, e f b g, with its radiating supports, used as in the manner described, and for the purposes set forth.

60,594.—Railroad Signal Lights.—Elisha H. Tobey, Watertown, N. Y.

First, I claim the combination with a revolving reflector box or other receptacle for a signal light of a signal or dial plate capable of being rotated in a plane at right angles to the plane in which the said box is revolved, as herein shown and described.

Second, In the apparatus herein described I claim the combination of the dial or signal plate with the gearing by which it is revolved under such an arrangement that the raising or lowering of the said plate in the signal frame shall cause it to be thrown in or out of gear, substantially as shown and set forth.

Third, In combination with the main signal frame I claim a reflector box or other receptacle for the signal light, under such an arrangement that the said box while sliding vertically in said frame shall also be capable of being rotated in a horizontal plane, substantially as shown and described.

Fourth, In the herein described apparatus I claim the combination with the reflector box and revolving dial plate, whose axes of rotation are at right angles with each other of the gear, mechanism by which the said box and plate are respectively revolved, arranged for operation, substantially as shown and set forth.

60,595.—Drill for Rocks, Wells, etc.—R. S. Torrey, Bangor, Me.

First, I claim the self-operating reversible ratchet, J, so constructed that it will reverse its motion with the same stroke, and will give the desired motion to the drill at every vibration of walking beam, B, for drilling purposes in combination with friction roller and spring, L.

Second, I claim the dog or hand, K, connecting, P, Fig.'s 1 2 and 7, adjustable slide, N, Fig.'s 1 and 2, nut, 3, sleeve, 2, Fig. 6, which is attached to center post, A, Fig. 1, in combination with the circular slanted plate for regulating the stroke of dog or hand, K, Fig. 1, to each stroke of walking beam, B, in the manner and for the purpose substantially as described.

Third, I claim the reversible shaft, H and H, Fig. 3, in combination with gear, H, and pinion, I, Fig.'s 1, 2, and 3, the whole operating in the manner and for the purpose set forth.

60,596.—Shoe Peg Float.—G. G. Townsend, Rochester, N. Y.

I claim, First, The employment or use of the auxiliary or detachable float plate, F, substantially as and for the purposes shown and described.

Second, Connecting the said plate, F, to the head, H, by means of the lugs, f, and one or more keys, e, substantially in the manner shown and described.

Third, The arrangement of the spring locking latch or lever, C, in combination with the pivoted head, H, substantially as shown and described and for the purposes set forth.

60,597.—India-rubber Covered Umbrella.—James H. Walker, Bergen, N. J.

I claim the India-rubber umbrella-covering formed in the manner specified as a new article of manufacture.

60,598.—Gas-heating Parlor Stoves.—William S. Walker, Alexandria, Pa.

I claim the detachable top, A B, for a stove, the said top consisting of the oven, B', the valve, b2, the two hot air chambers or flue spaces, a2 a3, and the recesses, a' a', in the outside plates for receiving within them the faces of the smoothing irons as described, the said parts being constructed, arranged and combined together as and for the purposes described.

60,599.—Trace Fastening.—John R. Watkins, Baltimore, Md.

I claim the use of a barrel with slot and spiral spring and pin with catch thereon, making a secure and ornamental fastening for a trace to the end of the singletree.

60,600.—Hooks and Eyes.—Israel Weinberg, Philadelphia, Pa.

I claim the construction of the eye having curved forked ends, E, for the purpose of regulating, tightening, or loosening the waistbands of pantaloons, so as to correspond with the shape of the body and suit the wearer, as herein described.

60,601.—Open Fire Places.—Marshall D. Wellman, Pittsburg, Pa.

I claim the use of a damper or dampers, so constructed and arranged relatively to the grate bars of a fire place or other furnace as that the area of the opening between the bars for the admission of air into the fire shall be increased or diminished by the operation of the damper or dampers, substantially as hereinbefore described.

Second, The use of a reflector or reflectors placed in front of and within the fire chamber of an open fire place, substantially as and for the purpose hereinbefore set forth.

60,602.—Cooking Stove.—Marshall D. Wellman, Pittsburg, Pa.

I claim the use, in cooking stoves, ranges, and other furnace grates, of dampers, slides, or shutters, in combination with a close fire chamber, so constructed and arranged, substantially as hereinbefore described, as that the air may be admitted below the surface of the fuel to a particular part or portion entering of the fire chamber, while it is excluded from entering the fire chamber at other points.

60,603.—Milk Can.—Rollin C. Wickham, Pawlet, Vt.

I claim the construction and arrangement of milk cans with reference to the supporting bottom and ears, as herein described, to be operated in the manner and for the purpose set forth.

60,604.—Corn Planter.—Albert Windeck and Andrew Runsteller, Peoria, Ill.

We claim, First, In a seeding machine the oscillating semi-cylindrical bottom, C, in combination with the casing, B, when arranged substantially in the manner and for the purpose set forth.

Second, The combination of the dropper, c, lever, J, and valves, K and L, in the runner shank, constructed substantially as and for the purpose set forth.

Third, In combination with the valve crank and lever, J, we claim the box, I, when said several parts are constructed and arranged as set forth.

Fourth, The combination of the oscillating dropper, C, arm, N, and handle, M, when arranged substantially as set forth.

Fifth, The combination of the treadle, G, hinged roller, F, and runner, P hinged to the frame at e, substantially as and for the purpose set forth.

Sixth, The runner, P, and its shank, D, when constructed as set forth.

Seventh, In combination with the droppers, C, the adjustable slide, c, when constructed and arranged substantially as set forth.

Eighth, In combination with the dropper casing, B, we claim the cotton dropper constructed and operated substantially as described.

60,605.—Pump.—E. B. Winship, Racine, Wis.

I claim the combination and arrangement of depressions, 1 2 3 4 5 6 7 8, flange, W, loose packing, B, ribs, D, and openings, F, substantially as set forth and described.

60,606.—Whip.—Edmund F. Woodbury (assignor to himself and H. A. Strong), Rochester, N. Y.

First, I claim a whip, having the handle or any other portion covered with a knit fabric, substantially as herein described.

Second, I claim covering the handle or any other portion of a whip by drawing on the same a piece of tubular knit fabric, and fastening it thereon in any suitable manner, substantially as and for the purpose herein described.

60,607.—Breech-loading Fire-arm.—Theodore Yates, Milwaukee, Wis.

First, I claim the construction of the breech, C, having the rectangular opening with the overhanging shoulder at the top, and having the wall or shoulder, m, for the breech block to rest against, substantially as described.

Second, In combination with the breech, C, I claim the block, D, having its upper arm pivoted on a line with the upper surface of the bore, and its lower arm abutting against the shoulder, m, in line with the lower surface of the bore, with its upper front corner beveled as shown, said block being arranged to operate as herein set forth.

60,608.—Carriage-curtain Eyelet.—C. W. Acker, Watertown, N. Y.

I claim the toothed struck-up plate, C, and notched struck-up plate, D, in combination with the slitted elastic plate, E, constructed and applied substantially as described for the purpose specified.

60,609.—Ellipsographs.—H. M. Albee, Webster, Mass.

I claim the arm, D, with its adjustable point, c, in combination with the compass, A, constructed and operating substantially as and for the purpose described.

60,610.—Anvil for Swedging Calks for Horse Shoes.—Peter Badore, Montpelier, Vt.

I claim the swedge, A, for drawing the steel from which the toe calks are to be formed, to an edge, when said swedge is constructed substantially in the form herein shown and described.

60,611.—Steam Generator.—Robert Bailey, Idaho City.

First, I claim a sectional steam boiler divided into four principal parts, two central sections, B' B', and two external jackets, B B, constructed, combined, and arranged as herein described.

Second, I claim the combination of the hollow grate bars with the central sections, B' B', and the jackets, B B, arranged and connected as herein described.

Third, I claim the damper, k, for giving direct or indirect draught through the boiler, in combination with the fire spaces, D and e e', and the exit flue, F arranged and operating as and for the purpose herein described.

60,612.—Washing Machine.—James Ballard, Almont, Mich.

I claim the reciprocating rubber, B, having the hand lever, C, connected to it through the medium of the hinged bar, E, with elastic cord, D, or equivalent attached, substantially in the manner as and for the purpose herein set forth.

60,613.—Sleigh Bell.—Abner G. Bevin, Chatham, Conn.

I claim the sharp-edged lugs, a, extending from the sides of the shank, A, and resting on the head of the rivet, to the other end of which the bell is secured and adapted to cut into the leather and prevent the turning of the rivet, as and for the purpose specified.

60,614.—Tackle Block.—John Briggs, Louisville, Ky., assignor to himself and E. A. Holmes, Passaic, N. J.

I claim the combination and arrangement of the sheave pin, C, sheave, B, collar, D, pin, G, bushing, F, hook, E, pins, e e, and cheeks, A A, when all are constructed as herein shown and described.

60,615.—Broom Head.—Willard P. Brooks (assignor to himself and F. B. Crippen), Fairmount, Minn.

I claim the combination of the metallic point or piece, B, the rod, C, bolts, D, or equivalent, and the wires, I, with each other, and with the handle, A, and socket, E F, when said point, rod, bolts, and wires are constructed and arranged substantially as herein described and for the purposes set forth.

60,616.—Self-oiling and Adjusting Bearing for Machinery.—Thomas S. Brown (assignor to himself and John P. Adriance), Poughkeepse, N. Y.

I claim the combination of the bed, A, part, B, with its bearing surfaces, as described, and lip, b, slotted shell, c, cast with part, B, forming the oil chamber, a, the grooved part, E, slotted caps, F, and semi-spherical washers, H, arranged with the journal, C, provided with the ring, D, substantially as and for the purpose specified.

60,617.—Anvil on which to Rivet Trunks.—Walter D. Burnett, Newark, N. J.

I claim the adjustable rotating block, C, secured to a frame, A, and arranged with pins, c, or other equivalent stops, substantially as and for the purpose set forth.

I further claim the connecting of the pins with springs and a treadle, to operate in the manner substantially as and for the purpose specified.

60,618.—Potato Digger.—Chas. B. Cannon, Keokuk, Iowa.

I claim the improved potato digger, consisting of the fluted wheels, n3 n4, the prongs, U, the carrier, W, and screens, V, the various parts of which are constructed, arranged, and operated substantially as herein described and for the purpose set forth.

60,619.—Saw Set.—John Clarridge, Pancoastburg, Ohio.

I claim an improved saw set formed by the combination of the cylinder, B, cones, g and L, scales, J and O, index pins, K and P, set screws, E F I N and R, with each other, and with the frame, A, substantially as herein described and for the purposes set forth.

60,620.—Sugar-cane Planter.—Eusebio Cortes, Sagua la Grande, Cuba, assignor to Jose A. Mora, New York City.

First, I claim the cane planter, consisting of the wire box, C, plow, D, plows, I, hopper, J, inclined chute, K, handle, H, and adjustable wheels, A E, substantially as and for the purpose specified.

Second, I also claim the lever, F, and wheel, E, in combination with the frame, A, and plow, D, when constructed and applied as herein shown and described.

60,621.—SAWING MACHINE.—T. H. Cushing, Dover, N. H.

First, I claim the combination of recip ocating saws, J, with rotary planers, W W, arranged with a carriage or bed, K, placed on curved ways or guides, b, for the purpose of sawing and planing sticks in curved form simultaneously or at one operation, substantially as shown and described.

Second, The friction roller, R, attached to the pendent swinging frame, S, which is connected to the lever, T, as shown in connection with the two shafts, O P, provided with the gears, c d, the belt, h, and the adjustable bearing, a', of the shaft, P, arranged with lever, T, to operate substantially as and for the purpose specified.

Third, The taper blocks, U U, when used in connection with a carriage or bed, K, working on curved ways or guides, b, and reciprocating saws, J, substantially as and for the purpose set forth.

60,622.—STEAM TRAP.—T. N. Davey, Jeffersonville, Ind.

First, I claim the stem or upper portion, A, and the case, B, when combined with the faucet barrel, cam, or key, H, and the arm or handle, J, constructed substantially as described.

Second, I claim the cam, H, when used in connection with the adjustable spring seat, G, and spring, E, substantially as herein shown and described.

60,623.—TRELLIS FOR GRAPE-VINES.—B. F. Elliott, Cedar Rapids, Iowa.

I claim the combination with the hinged uprights, A, of the wedge pieces, E, and staples, F, substantially as and for the purpose described.

I also claim the rails, G, hung to the uprights, A, so as to turn or swing thereon, substantially as and for the purpose specified.

60,624.—METAL LOOP FOR TAGS.—Samuel B. Fay, Franklin, Pa.

I claim the hook for tags consisting of the loop wire, A, with both ends turned or bent into circles, adapted to lay side by side and applied to the tag in the manner described for the purpose specified.

60,625.—COTTON CULTIVATOR.—A. K. and B. H. Foster, Hallettsville, Texas.

First, We claim the share, D, composed of two parts, d d, arranged in V-form with a space, e, between their front ends and attached to a standard, F, and to the front ends of the handles, B B, in the manner shown and described, or in an equivalent way, to admit of being adjusted at a greater or less distance apart at their front ends, substantially as shown and described.

Second, The reciprocating cutter, L, operated from the wheel, D, through the medium of the screws, i, and the rock bar, I, provided with the arms, p p', in combination with the share, E, substantially as and for the purpose specified.

Third, The fitting or securing of the screws, i, to the wheel, D, by means of the concentric annular grooves, c c', in the side of the said rim, b, of said wheel to receive the nuts, a, of the screws, i, whereby the screws may be readily applied to and detached from the wheel and secured at an equal distance apart, substantially as described.

60,626.—PREPARATION OF PAPER ETC., FOR PHOTOGRAPHIC USE.—William Gibson, New York City.

I claim the production of an insoluble enamel or surface or size in or upon paper, silk, cloth, fibrous and textile articles of all kinds, wood, leather, glass, porcelain, earthenware, metals, india-rubber, gutta-percha, *papier maché*, passe-partout and compositions by the successive application thereto of an adhesive mixture or body and astringent mixture or solution, substantially as described.

60,627.—CLOTHES PIN.—T. L. Goble, Orange, N. Y.

I claim a clothes pin consisting of two jaws, A, pivoted or hinged together, in combination with the shackle, B, arranged to slide upon the said jaws, substantially as and for the purpose described.

60,628.—SAWING MACHINE.—Edwin Hard, Canal Dover, Ohio.

I claim operating the saw carriage by means of the bevel pulleys, Y Z, clutch, A', lever, B', curved lever, G', adjusting bar, D', and gage rod, E', arranged and operating substantially as described for the purpose specified.

60,629.—STEAM-ENGINE GOVERNOR.—A. A. Henderson, Naval Hospital, near Norfolk, Va.

I claim the shaft, B, the sleeve, C, the eccentric plates, D and E, and cam, E', and shaft, G, with its lug wheel, H, and ratchet, I, the arm, J, and the spring, S, and the eccentric rod, C', with its guide pins, c and c', when constructed, arranged, and combined substantially as herein described for the purpose specified.

60,630.—SOLAR TIME INDICATOR.—James Higgins, East Cambridge, Mass.

I claim the combination of the ring, A, having slots, a and c, in it with the ring, B, provided with the scales, D D', and set screw, C, the same constructing a solar time indicator, substantially as herein shown and described.

60,631.—MALT EXTRACTOR.—Leopold Hoff, New York City.

First, I claim the within-described process of malting by soaking the barley with a decoction of fennel, instead of plain water, as set forth.

Second, The beer of health, obtained by mixing the wort obtained by the above-named process with the hygienic ingredients, as herein set forth.

60,632.—HYDRAULIC GOVERNOR.—S. M. Hunter, Terryville, Conn.

First, I claim regulating the speed of a water wheel or a steam engine by the action of an engine driven by water or other non-elastic fluid, in the manner herein set forth.

Second, I also claim the oscillating valve, T, constructed substantially as described, in combination with the non-elastic fluid engine.

90,633.—SASH FASTENER.—Benjamin S. Hyers, Pekin, Ill.

I claim the catch, E, operating within the toothed roller, A, in combination with the plate, F, inclined tooth back, C, and toothed roller, A, substantially as herein shown and described and for the purpose specified.

60,634.—FIFTH WHEEL.—Joseph Irving, New York City.

I claim the safety clip, E, consisting of the part, c, with the semi-circular recess and the recessed part, d, between which the fifth wheel plays in the recesses, having a yielding pressure, and secured and operating in the manner and for the purpose specified.

60,635.—MANUFACTURE OF WATER AND FIRE-PROOF PAPER.—Thomas Irving, John McNeil, George W. Rich, and Cyrus J. Tay, Elwood, N. J.

First, I claim water-proof paper, prepared as herein described, as a new article of manufacture.

Second, The within-described process of manufacturing water-proof paper by treating manilla, or hemp, or other fibrous material, with the ingredients and in the manner set forth.

60,636.—APPARATUS FOR SCRAPING HIDES.—Henry Lampert, Nunda, N. Y.

First, I claim the revolving beam, A, mounted on the vertically adjustable shaft, B, in combination with the block, g, carrying the scraper, e, and knife, f, and with suitable mechanism to impart to said worker a reciprocating motion, substantially as and for the purpose described.

Second, The eccentric, b, lever, a, and serrated arc, d, in combination with the cleats, c, shafts, B, and beam, A, constructed and operating substantially as and for the purpose set forth.

Third, The worker, composed of a block, g, with scraper, e, and knife, f, in combination with the spring, h, pitman, G, cross head, F, and eccentric wrist pin, n, on the disk, H, constructed and operating substantially as and for the purpose described.

Fourth, The screw rod, j, and nut, k, in combination with the worker, g e f, spring, h, and pitman, G, constructed and operating substantially as and for the purpose set forth.

60,637.—SPRINKLING ATTACHMENT FOR BROOMS.—Peter Louis, New York City.

I claim the within-described sprinkling attachment for brooms, composed of reservoir, A, provided with a socket, a, a number of holes, b, in its bottom, and with a vent hole, c, in its top, for the purpose herein set forth and described.

60,638.—ROTARY STEAM VALVE.—James L. Mackey, Seymour, Ind.

First, I claim the valve, A, with a V-shaped partition, B, and apertures, c d a a' b, in combination with the sleeve, C, and shell, D, constructed and operating substantially as and for the purpose described.

Second, The transverse channel, m, in combination with the hollow plug valve, A, V-shaped partition, B, and with aperture, j j' k k' l l' c d, substantially as and for the purpose set forth.

60,639.—TIGHTENING THE TIRES OF WHEELS.—F. B. Morse, Milwaukee, Wis.

First, I claim the lips, e e, at the ends of the tire, C, in combination with the keys, D D E, operated through the medium of screws and one or more removable or adjustable keys, F, all arranged substantially as and for the purpose set forth.

Second, The arms, f f, on the lips, e, in combination with the keys, E D D, substantially as and for the purpose specified.

Third, The socket, B, provided with the partitions, a a, to form two end partitions to receive the ends of the felloes, and a central compartment to receive the tire-tightening mechanism, substantially as and for the purpose specified.

60,640.—LIFE RAFT.—James Murtaugh, New York City.

I claim the expansible rings, a a, separate and arranged one within the other, with a net-work covering, forming a seating surface and a rest or hold for the feet, in the manner described for the purposes specified.

60,641.—EXTENSION WEEDING HOE.—Mitchell Pentz, Naugatuck, Conn.

First, I claim forming the head of the hoe in two parts, substantially as herein shown and described, so that they may overlap and slide upon each other, as and for the purpose set forth.

Second, Forming ways upon the parts, A and B, of the hoe head, to keep them in proper relative position upon each other while sliding back and forth, substantially as herein shown and described.

Third Forming slots in the parts, A and B, of the hoe head, for the reception of the handle, substantially as herein shown and described.

60,642.—TERRASPHERE.—Eleazar Root, Indianapolis, Ind.

First, I claim the stand, A, and the pillar, B, combined with the vertical dial plate, C, the horizontal spindle, D, carrying the sun, G, and the frame, H H, carrying the earth, E, revolving on its own axis, f f, in the suspended vernier, g, and while revolving vertically around the sun, G, with the frame, H H, keeping its true angle of inclination to the ecliptic throughout her orbit arranged and operating substantially in the manner and for the purpose, herein described and specified.

Second, I claim the zodiacal belt, I, in combination with the pillar, B, the dial plate, C, the frame, H H, the sun, G, and the earth, K, arranged and applied, substantially as and for the purposes herein described.

Third, I claim the adjustable moon, N, in combination with the earth, K, and its axis, f f, and applied substantially as and for the purposes herein set forth.

Fourth, I claim the radiating points, c c, representing the ways of the sun in combination with the spindle, D, the sun, G, and the earth, K, and applied substantially as and for the purposes herein described.

Fifth, I claim the hemispherical night cap, M, in combination with the earth, K, axis, f f, and the sun, G, and applied substantially as and for the purposes herein described and represented.

60,643.—CORN STALK CUTTER AND CORN HUSKER.—Jacob Russell, Brooklyn, N. Y.

First, I claim the construction of rollers, C C', of circular cutters, f f, and longitudinal cutters, h h, these latter intersecting the cutters, f, so as to cut the stalks of corn crosswise at the same time that they are split longitudinally and at the same time crowd the ears of corn back, substantially as described.

Second, The husking bed consisting of non-elastic rollers arranged in an inclined plane and rotated substantially as described in combination with knives on rotary cylinders, which allow the stalks to pass between them, but crowd the ears of corn back upon the bed, substantially as set forth.

Third, The inclined bridge, G, interposed between the roller, C', and the husking bed, substantially as and for the purpose described.

Fourth, The yielding gate, J, arranged over the inclined husking bed so as to operate substantially as described.

Fifth, A machine which is adapted for cutting up corn stalks, stripping the ears of corn from the stalks, and then separating the husks from the ears, substantially as described.

60,644.—GATE AND DOOR LATCH.—B. D. Shaw, Beverly, Ohio.

I claim the combination of the catches, D D, and pivoted lever, E, constructed so as to operate substantially as herein shown and described.

60,645.—RAG ENGINES FOR PAPER MAKING.—James M. Shew, Piper Mills, Md.

I claim placing a spiral scroll or voluted flange on the ends of the cutting cylinder of a rag engine of a paper mill, substantially as and for the purposes herein described.

60,646.—ADJUSTABLE MITER.—Peter A. Snyder, Jersey City, N. J.

I claim the arrangement with the pivoted blades, a b, leaves, c d, and flat stock, A, of the screw, e, nut, h, and groove, f, when the plates are constructed as to admit of the ready adjustment of the pivoted blades, a b, and leaves, c d, when said stock is resting on a flat surface as herein set forth.

60,647.—WOOD TURNING LATHES.—Mathias Speule, Detroit, Mich.

First, I claim the arrangement of two clamps which are coupled together, one to contain the pattern last and the other the last to be finished in combination with the guide wheel, F, and cutter wheel, G, constructed and operating substantially as and for the purpose described.

The swinging head, B, and adjustable platform, C, carrying the clamps, D D', in combination with the guide wheel and the cutter wheel, substantially as and for the purpose set forth.

60,648.—SAW MILL.—E. H. Stearns, Erie, Pa.

First, I claim relieving the saw from friction of the log while resting on the carriage, B, by means of the flat wheels, a, grooved wheels, a', axles, c, and boxes, a'', flat track, b, and angular track, b', constructed and operating substantially as described for the purpose specified.

Second, I claim constructing a cant support joined to and forming an inseparable part of the saw guide in such a manner that when the guide is moved nearer or farther from the saw arbor when changing saws, the cant support will necessarily move with it, arranged and operating substantially as and for the purpose herein specified

Third, I claim giving motion to the log carriage and reversing the same by means of friction pulleys, l and l', when caused to bear upon the pulley, m, and when rigidly fixed to shafts, f f, each having a continuous and positive revolving motion from bolts applied to pulleys, l l', all constructed and operating substantially as described.

60,649.—SAWING MACHINE.—Washington H. Stewart, Logansport, Ind.

I claim the brace, E', provided with a ratchet in combination with the pawl, G, saw bar, H, pitman, J, and crank wheel, L, for the purposes and substantially as described.

60,650.—FORK AND CAKE LIFTER.—P. D. Sunnie, Shirleysburg, Pa.

I claim an improved culinary instrument formed by combining the fork, B, and the flat blade, C, in one piece pivoted at one end of the handle, A, and held in place when reversed for the use of either the fork or the blade by the yoke, c, under pressure of the spiral spring, g, arranged and operating as described.

60,651.—SHEEP RACK.—Byron D. Talor, Wilson, N. Y.

I claim an improved sheep rack formed by the combination of the end pieces or frames, A B, the binders, c, the sides, D, of the hay rack, the revolving troughs, F, levers, E, and revolving covers, G H, with each other, the parts being constructed and arranged substantially as herein shown and described and for the purposes set forth.

60,652.—DOUGH MIXER.—S. J. Talbott, Milford, N. H.

I claim an oscillating dough mixer consisting of the can, A, double metallic cover, B, hoop, D, trunnions, E, handle, F, hooks, G H, and frame, C, constructed and operating in the manner as and for the purpose specified.

60,653.—TOOL FOR CLEANING BOILER TUBES.—Sidney Van Auken, Binghamton, N. Y.

I claim the doubly yielding spring arms, B, in combination with the segmental scrapers, C, and cams, a b, constructed and operating substantially as and for the purpose set forth.

60,654.—REVERBERATORY FURNACE.—J. M. Whiteside, San Francisco, Cal.

First, I claim the arrangement of a revolving stirrer, in combination with the oven, A, constructed and operating substantially as and for the purpose described.

Second, The protecting cap, b, in combination with shaft, c, which gives motion to the stirrers substantially as and for the purposes set forth.

Third, The arrangement of the supply tank, E, and stop-cock, i, which is operated automatically from the driving shaft, C', in combination with the generator, h, tube or tubes, g, and oven, A, constructed and operating substantially as and for the purpose described.

60,655.—COMBINED ROLLER AND HARROW.—George H. Woodruff, Jerseyville, Ill.

First, I claim the employment of the pivoted lever, O, for the purpose of elevating the harrow, so that only the rollers may be used substantially as shown and described, and for the purpose set forth.

Second, The wheels, B B, in combination with the rollers, C C, and frame, A, constructed and arranged in such a manner that the rollers may be removed, and only the wheels used, or the wheels removed, and the rollers moved out to the frame, substantially as herein shown and described, and for the purpose set forth.

Third, I also claim the beams, G G', standing obliquely to the frame, A, when the said frame, A, is provided with wheels, B B, and rollers, C C, constructed and operated substantially as and for the purposes set forth.

Fourth, The adjustable seat in combination with the frame, A, wheels, A A, and rollers, c c, and harrow, for the purpose of regulating the depth of the harrow teeth, e, substantially as described, and for the purpose set forth.

Fifth, Attaching the pole or tongue, E, by means of bifurcated bar, or straps, P, to near the center cross-piece, K, of the frame A, in combination with the guide, a 2, substantially as shown and described, and for the purpose set forth.

60,656.—MANUFACTURE OF BUTTER FROM WHEY.—James Suggett, Cortlandville, N. Y.

I claim the manufacturing of butter from whey, substantially in the manner herein described.

60,657.—CUSHION FOR BILLIARD TABLE.—Levi Decker, New York, N. Y.

I claim the cord, E, employed in combination with the elastic strip, D, and cushion, c, in the manner and for the purposes specified.

RE-ISSUES.

2,419.—KNITTING MACHINES.—Jonas B. Aiken, Franklin, N. H., assignee by mesne assignments of J. B. and W. Aiken. Patented July 8, 1856.

First, I claim the hollow circular needle plate, having grooves cut on its inner surface, substantially as described, for the objects specified.

Second, I claim the horizontal groove, c, near the bottom of the cone, so arranged in relation to the inclined operating groove that the needles may be retreated thereto, substantially as described, and retained therein when they are not wanted to operate on the fabric knit in the manner set forth.

Third, I claim the switch, g, arranged substantially as described, to change the needles from the inclined operating groove to the retreating groove.

Fourth, I claim the use of the two sets of sliding needles in rotary knitting-frames, called the plain series, and the rubbing series, arranged and operated substantially as set forth.

2,420.—LOCKS.—Richard B. Burchell, Brooklyn, N. Y. Patented September 11, 1866.

First, I claim the fixed tumbler stud, g, and key stud, l, arranged on the line of a plane passing through the center of the bolt-head in combination with tumblers of unequal shape and dimension, but so constructed that they can be applied on either side of the key stud, and be equally operative with a key of different shape or dimension, substantially as set forth.

Second, I claim constructing the head of the bolt as described, and arranged by a series of swinging tumblers to operate in conjunction therewith substantially as set forth.

Third, I claim the tumblers, h i k, constructed and applied substantially as specified, in combination with the key stud, l, and bolt head, c, constructed and arranged in the manner and for the purposes set forth.

2,421.—PORTABLE LAMP COOKING APPARATUS.—C. A. Harper, Rahway, N. J. Patented May 1, 1866.

First, I claim the heater, E, when attached to the bottom of the boiler, or its supporting plate, by cleats, on which it may be moved without disturbing the other parts of the apparatus, as and for the purpose set forth.

Second, The boiler, A, of a cooking stove, when constructed with a central vertical pipe, B, opening through it, and also with transverse pipes, E, across the same, as and for the purpose set forth.

Third, A cooking apparatus, when so constructed that there shall be a direct communication from the heater through the boiler into the chamber without the interposition of bottom plates to the latter.

Fourth, So arranging the boiler and oven that access may be had to the interior of the boiler through the doors of the oven, substantially as set forth.

Fifth, The oven, C, when so construc ed that the heated air is introduced directly into the body of the oven, and its exit is controlled by the flue sheet, L, and damper, O, arranged substantially as set forth.

2,422.—COMPOSITION OF MATTER FOR LUBRICATING MACHINERY AND FOR OTHER PURPOSES.—The Lester Oil Manufacturing Company, New York City, assignees of John H. Lester. Patented Jan. 30, 1866.

I claim the combination of oil with the synovial fluid or other substance obtained from animal matter, substantially as described.

2,423.—MACHINE FOR CUTTING SCREWS.—John A. Merriman, Chicago, Ill. Patented Aug. 1, 1865.

First, I claim, in combination with a revolving die holder, two or more screw-cutting dies, provided with inclines and projections, arranged and operated substantially in the manner and for the purposes herein specified.

Second, In combination with a revolving die holder and two or more screw-cutting dies, constructed substantially as described, I claim the arrangement of longitudinally sliding bearings operating upon said dies, substantially in the manner and for the purposes set forth.

Third, In combination with longitudinally-sliding bearings, operating directly upon screw-cutting dies substantially as described, I claim the arrangement of a latch or stop for the purpose of retaining said dies in, or releasing them from the die holder at the will of the operator, substantially as herein specified.

Fourth, Closing the dies by the use of the bearings, K, upon the longitudinally-sliding cylinder acting directly upon the dies, substantially as and for the purpose herein specified.

Fifth, The sliding bearings, K, the levers, I, and the dies, g, arranged and operating substantially as and for the purposes herein specified.

2,424.—MACHINE FOR PICKING COTTON.—William E. Brall, Washington, D. C. Patented February 27, 1866.

First, I claim a machine for harvesting cotton, constructed and operating substantially as described.

Second, In a machine for harvesting cotton, I claim the revolving picking cylinder as a device for gathering the cotton among the branches of the plant, constructed and operating substantially as described.

Third, I claim in a cotton harvesting machine, the employment of one or more continuous series of said picking cylinders, so arranged as to be made to pass in close succession through the plant to gather the cotton as described, and also to move progressively along the row of plants so as to operate on all parts thereof, substantially as described.

Fourth, I claim the combination and arrangement of a continuous series of picking cylinders projecting from the face of a wheel set at an angle to the line of progression of the machine or its equivalent, so that in their downward movement the picking cylinders shall pass outside of the plant then beneath its branches, and up through and among the same, substantially as described.

Fifth, I claim the combination with a series of revolving picking cylinders arranged upon a wheel or its equivalent as described, of a stationary band or other equivalent mechanism that will rotate said cylinders, substantially as described.

Sixth, I claim the combination of the wheel, E, and its series of picking cylinders or the series arranged in a manner equivalent thereto, with the carrying wheels, C, of the machine, so that the picking cylinders shall automatically and simultaneously receive therefrom a rotating movement as described, and an upward movement through the cotton plant, and a progressive movement along the row of plants, substantially as described.

Seventh, I claim in combination with the series of picking cylinders, arranged as described, the series of toothed arcs and the clearing wheel or their equivalents for removing the cotton from the cylinders, substantially as described.

Eighth, I claim the employment in combination of two systems of mechanism for gathering and discharging the cotton, constructed, arranged and operating substantially as described, and set diagonally face to face so as to operate simultaneously upon opposite sides of the plant, substantially in the manner described.

Ninth, I claim the trough or receptacle for the cotton placed above the cross connection of the machine and within the series of picking cylinders so as to receive the cotton as it is removed from the cylinders, substantially as described.

Tenth, I claim the manner of combining and arranging the wheels, E, with their adjuncts, the framing of the machine, the carrying wheels, and the tongue or perch, so as to leave an open space lengthwise through the machine below the cross connections; which enables the machine to pass over plants without bending them down so as to interfere materially with the cotton substantially as described.

Eleventh, I claim combining with the framing and operative parts of the machine, constructed and arranged as described a tongue or perch, to which animals may be harnessed in the manner before described, to draw the machine along, and maintain it in an erect position.

2,425.—HEATING STOVE.—Silas T. Savage, Albany, N. Y. Patented March 30, 1858.

I claim, in stoves or furnaces, a fire-box, with a grated back for the admission of the air which circulates through the ash pit, and the flue back of the grate, substantially as described.

2,426.—PUNCHING MACHINE.—J. Steadman, Pecatonica, Ill. Patented December 19, 1865.

First, I claim the socket, F, sliding through the opening, V, operating in combination with the link, G, pivoted to the right-angled lever at its inner end, whose outer end is pivoted to the connecting rod, J, operated by the adjustable right-angular lever, P, substantially as described.

Second, The combination and arrangement of the link, G, which drives the socket and punch, F E, with the right-angled lever, I H, working on the rock-shaft, R, when the connecting rod, J, arms, R N, working on the rock-shaft, L, and the link, O, and hand-lever, P, substantially as described.

2,427.—MACHINE FOR CUTTING STAVES.—W. Steele, Wheeling, Va. Patented October 19, 1858.

First, I claim the swinging-frame, composed of the pieces, c c, bed-plate, K, and knife, R, in combination with cross-tie, I, constructed and operated in the manner substantially as shown and described, and for the purpose set forth.

Second, The apron, M, hinged to the bed-plate, K, as described, or otherwise attached to the machine, in such a manner that it can be held under or back of the knife, to support the piece during the process of cutting, and then swing down or fall back to allow the piece to drop from the knife.

Third, The combination of the levers, L L, and stops, B and D, or their equivalents, as described.

2,428.—PAINT FOR THE BOTTOM OF SHIPS.—James Gamage Tarr, and Augustus H. Wonson, Gloucester, Mass. Patented June 20, 1865.

First, We claim the composition of paint consisting of oxide of copper, oxides of zinc, and oxide of arsenic, used with a basis of ochre, and a suitable medium substantially as described.

Second, The composition of paint consisting of the oxide of copper, and oxide of zinc, used with a basis of ochre, and a suitable medium, substantially as described.

Third, The composition of paint consisting of oxide of copper, and oxide of arsenic, and with a basis of ochre, and a suitable medium, substantially as described.

2,429.—HAY ELEVATORS.—Edward L. Walker, Benford's Store, Penn.

First, I claim the combination in a fork for elevating hay, or similar material, of the following devices: First, a shaft for penetrating such material; second, a barb or barbs, for sustaining the material while being elevated; and third, a device for relieving the barb or barbs for discharging the material, substantially as set forth.

Second, I claim a penetrator in combination with one or more sustaining prongs or barbs, and a discharging device substantially as specified, for raising or discharging hay, or similar material, substantially as set forth.

Third, I claim the barbs, E E, arranged substantially as specified, in combination with the rod, F, for sustaining said barbs as set forth.

DESIGNS.

2,530.—KNIFE HANDLE.—Henry H. Hayden, New York, N. Y., assignor to Holmes, Booth & Hayden, Waterbury, Conn.

2,531.—SPOON HANDLE.—Henry Hebbard, New York, N. Y.

2,532.—BALANCE.—Charles E. Hoffman, Philadelphia, Penn.

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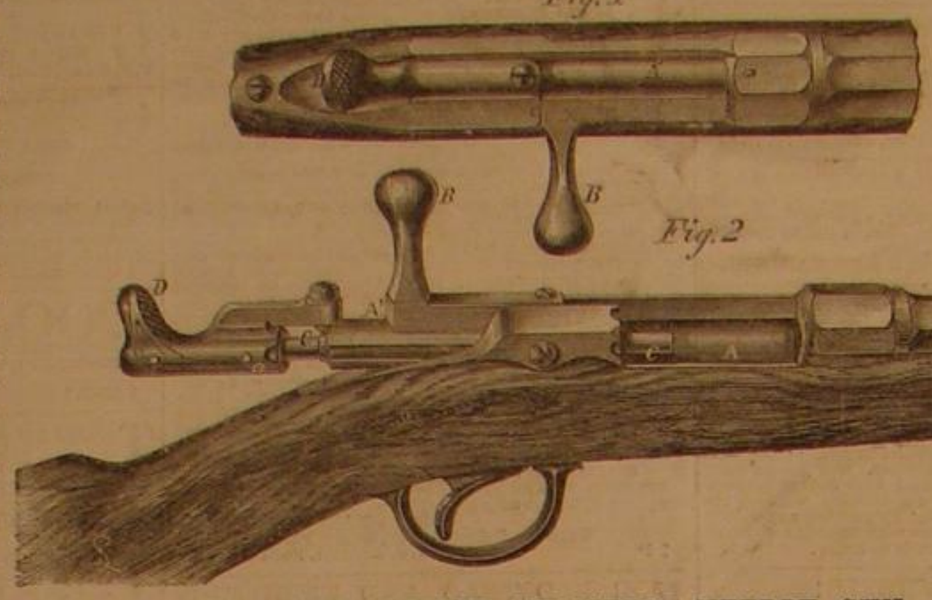
Improvement in Needle Guns.

The Emperor of France, not wishing to remain behind other nations in the possession of an effective fire-arm, has adopted the invention of M. Chassepot, of which Fig. 1 in our engraving shows the construction. This gun resembles the original Prussian needle gun, over which it possesses certain improvements.

An opening on the right hand side of the chamber, A, permits the insertion of the cartridge. This chamber is filled by the movable cylinder, A', which may be moved back or forward by means of the handle and knob, B. The cylinder, A', surrounds the shaft, C, and can be revolved around the same. It contains the spring by which the needle is propelled. The rear end of the shaft, C, is made in the shape of a handle, D. The spring is compressed, when the handle, D, is drawn back as shown. The shoulder, *a*, on the shaft, C, comes in contact with the cylinder, A', when the arm is at rest. When loaded and ready for firing, the two parts are drawn asunder. In the engraving the arm is shown in position to receive the cartridge. The shaft, C, also serves to protect the needle which is surrounded by the same and is forced out of the front end of the shaft as soon as the trigger is pulled.

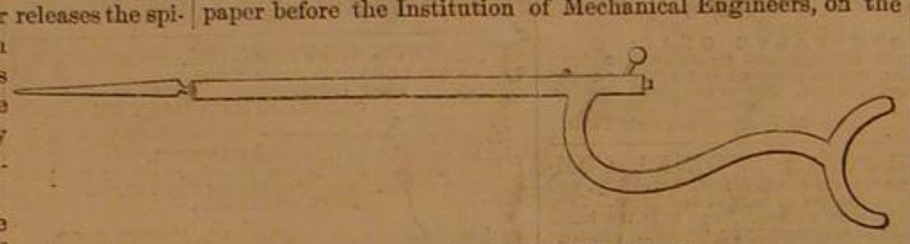
Fig. 1



THE FRENCH CHASSEPOT NEEDLE GUN.

After the cartridge has been inserted, the knob, B, is pressed forward, and is then laid over to the right hand side, as shown in Fig. 2. The aperture, A, is now closed. By the first of these two movements the cylinder, A', is moved forward, thereby forcing the cartridge into the breech; the second movement secures the cylinder, so that it cannot be thrown back by the force of the explosion. The pulling the trigger releases the spiral spring, which then forces the needle through the percussion wafer. It is claimed that this gun cannot be clogged up as easily as the Prussian needle gun, and is more substantially built. But it is constructed on the same principle in almost every respect.

The Prussians, seeing that all nations are making rapid progress in the perfection of their arms, do not want to be behind them, and Mr. Dreyse, the inventor of their needle gun, is at work day and night, inventing and testing more powerful and destructive implements of war. The annexed sketch shows his latest improvements in the needle gun. The heavy wooden butt end is here superseded by one which is made altogether of metal, in the most practical form. The arm is thereby made about three lbs. lighter than it was formerly, and from two to three dollars cheaper. In this gun provision is made that the needle cannot be burnt, as it is instantaneously drawn back as soon as it has pierced the percussion wafer, thus not coming in contact with the fire, which it has to set free. Mr. Dreyse is also experimenting on a new breech-loading needle cannon, in which two barrels are arranged alongside of each other, which can be managed so rapidly that eight shots are fired in a minute.—*Leipsic Illustrated.*



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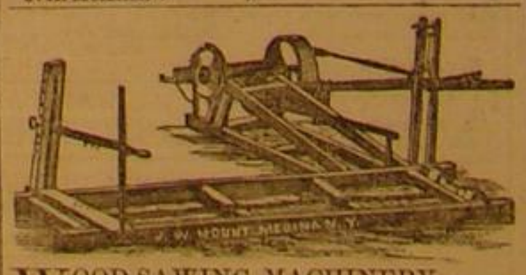

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Novel Methods of Extinguishing Fires.

The engravings represent an apparatus for extinguishing fires, which was proposed in 1865 by David F. Masnata, a resident of the island of Cuba. They show a vertical section of the device and also one method of its application.

The cylinder, A, is of sheet-metal, in this case provided with trunnions, B, and mounted on a movable frame having wheels or trucks by which it can be moved from place to place. Or it may be slung by straps to a man's shoulders and operated while in this position, as shown in the larger engraving.

The cylinder is furnished with a cover which fits air-tight and may be secured in this position, while danger from over-pressure is obviated by means of a safety valve on its top. Suspended in the center of the cylinder is a tube, C, of lead while D is a lead pipe and stop-cock projecting from near the bottom and having a hose and nozzle attached.

In preparing the apparatus for use the cover is opened and a quantity of marble dust or other cheap carbonate is introduced, when the vessel is nearly filled with water. The cover is then secured and the center plug opened through which a quantity of sulphuric or other acid is poured into the tube. In case of a fire the cylinder is tilted so that a portion of the acid is mingled with the water, and by its action on the carbonate, carbonic acid is evolved and exerts a pressure on the water sufficient to project a small stream to a considerable distance.

Mr. Masnata's address is to the care of the Spanish Consul, No. 29 Broadway, New York City.

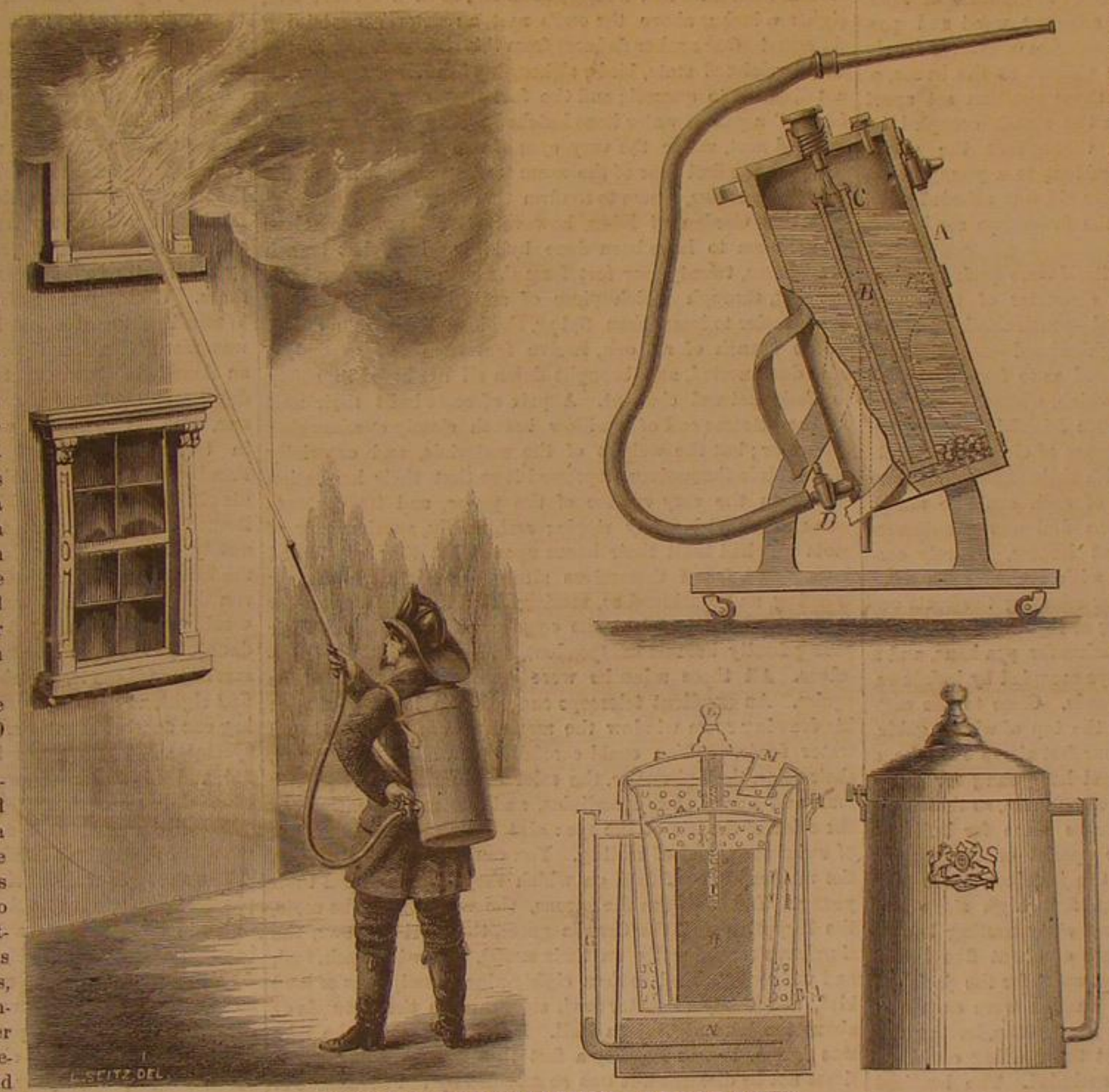
An apparatus of a somewhat similar character was severely tested on Monday, the 14th inst., before a committee of the Metropolitan Fire Department at Jones's Wood, this city. The experiments seemed to demonstrate the value of this portable extinguisher as a ready means to subdue a fire in its first stages, and even after it had assumed considerable proportions. The water in the cylinder of this device becomes charged with carbonic acid gas, and in this condition, it is claimed, may be kept for any length of time without deterioration, and yet is ready for use whenever required. Its effects on a fire, whatever the nature of the combustibles, are almost instantly apparent. Burning coal tar, animal, and even kerosene oils were extinguished with the greatest ease. A small building of wood, ten feet square, was erected and set on fire. After the flames had completely enveloped the structure, the operator, with an extinguisher on his back, advanced and begun to play upon the fire. In less than five minutes the flames were subdued.

The apparatus occupies scarcely more space than a water bucket and is said to be always ready for service although standing unused for years. The Levey Brothers, licensees of Baraguanath & Van Wisker, the patentees, conducted the experiments. Their office is 58 Nassau street, this city, and we presume they are ready to give all information desired by persons interested.

These experiments remind us of the Phillips Fire Annihilator, exhibited in various parts of the country in 1851, and illustrated in the SCIENTIFIC AMERICAN, Vol. VII., No. 1. We reproduce as a curiosity two of the engravings then used which represent the small hand machine. It consisted of two outer cases, A and B, of metal with a chamber, N, containing water. G is the discharge pipe. H is a chemical composed of wood, charcoal, coke, common saltpeter, plaster of Paris, and size, ground fine, mixed, and molded into blocks. I is a glass tube inserted into the charge and containing sulphuric acid. The charge was ignited by the rod, K, which shivered the glass and freed the acid. Vapor or gas was instantly evolved and projected with considerable force on the flames. The apparatus was not, however, very successful.

In No. 6 of the same volume (Oct, 25, 1851), we published an engraving of a steam fire engine a part of the description of which was as follows:—"When the engine is standing in the house, the boiler always contains a sufficient quantity of water to get up steam, and at the same time is charged with carbonic acid gas by suitable apparatus, until it contains sufficient to work the engine for ten minutes in which time steam can be raised to take its place, when exhausted." Our firemen now would think such a machine rather old-fogyish, as they consider less than half that time sufficient to get up steam on their engines.

Whether either of these devices or any other by which fires are attempted to be extinguished by chemical mixtures will ever supersede the use of water alone, may be doubtful, but that the attention of inventors is directed to this object is gratifying. In a city so crowded as is the metropolis a handy and efficient means of quenching fires in their incipiency should be attached to every building, and especially to our tenement houses swarming with human life. The Legislature should compel the adoption of some proper apparatus.



FIRE-EXTINGUISHING APPARATUS.

IMPROVED JOINT FOR BOILER FLUES.

The internal flues of boilers are sustained only by the ends, with, in some instances, stays to brace them. Their weight exerts an enormous strain upon the boiler heads to which they are attached, and it is well understood by engineers that the flues of horizontal boilers constitute the weakest element in their construction.

We copy from *Engineering* a new joint for boiler flues introduced by the Bowling Iron Company. In the engraving, A is the barrel of the flue, and B, the ring joint. From the section

Fig. 1

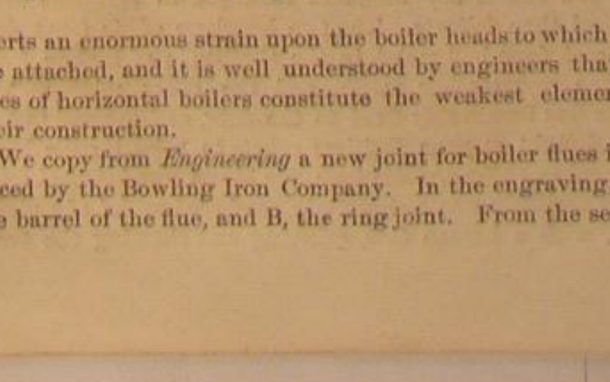


Fig. 2

Fig. 1, it will be seen that this form of joint gives extraordinary stiffness, while at the same time it imparts to the flue a certain amount of longitudinal elasticity to allow for expansion, and thus reduces the strain upon the end plates. These hoops are rolled of any required diameter without weld.

MODEL MAKING.

The demands of inventors, in order to conform to the requirements of the Patent Office, have developed, within a few years, a department of mechanics not before separated from the ordinary business of the common machinist. But the business of the model-maker has now become as distinct from that of the machinist and cabinet-worker as theirs are from that of the forger and the carpenter. None but first-class mechanics can hope to become successful model-makers. The work required is generally exact, fine, and perfect. Working models, where practicable, are preferred, and the model-maker must use as much judgment in the construction of the model as the engineer or machinist in building the working machine, while he must almost equal the watchmaker in closeness of work and skill in manipulation.

A fine working model is a thing of beauty, and next to the full-sized working apparatus is a delight to the mechanical eye, while a botched-up job is an eye-sore. We feel a pride in the inspection of a well-made model, and many of them come under our notice in our professional labors. We feel a pride in the art with which we know ourself to be allied by taste and profession. It is pleasant to see the efforts of boys of a mechanical turn, who usually attempt the construction of a miniature machine, sometimes with the poorest tools and of the most unsuitable materials, but not seldom with splendid success.

Model making affords a pleasant branch of occupation to those mechanics who, possessing naturally fine tastes and an acquired dexterity of manipulation, recoil from the heavy, rough work of the engine builder. They not unfrequently make improvements in tools and processes and serve well their day and generation. Their work is at the same time a pleasure, not laborious or necessarily dirty, and affording an agreeable variety. Some specimens of their handiwork are as much monuments to their ingenuity and patience as is the marine engine to the comprehensive genius of the engineer.

A TRULY AMERICAN IDEA.

If any American yet lives in ignorance of the triumph of scientific American skill in the manufacture of watches, he should be advised to provide himself with the information, in the form of a Waltham watch, at his earliest convenience. Meanwhile, a glance at the testimonials presented on one of our advertising pages, will be instructive. Every one knows, of course, that we have no labor in this country, skilled or otherwise, which will consent to compete in cheapness with that of Europe. How then is a watch, almost the whole cost of which is in labor, to be produced here in its perfection at once better and cheaper than it can be imported? The problem was solved, as many another of the same kind has been, by the application of exact science and inventive genius. To make machinery for the production of every piece required, in perfect proportion and finish, was the initial labor, which once done was done always, instead of being to do anew on every watch, as in the hand-made work of European manufacturers. Hence the Waltham watches are precisely alike, after each kind; and since their parts could be interchanged without difficulty, it follows that they must run together as accurately as they are adapted to each other, and may be, as they are, warranted with entire certainty. Nothing was ever more successful, as a scientific or a business effort. The works now cover three acres, and employ a thousand operatives. It is estimated that the American Watch Company, which commenced business ten years ago, make nearly half the watches sold in the United States.

A NATURALIST'S HOME.

There is no place like England for a rich man to live in exactly as he pleases. It is the appropriate exercising ground for the hobbies of all mankind. You may join an Agapemone, or you may live alone in dirt and squalor, and call yourself a Hermit. The whim of the late Charles Waterton, naturalist, was a very innocent one, namely, to make his home a city of refuge for all persecuted birds, a sanctuary inviolate from net and snare and gun; and he effected his humane purpose. An intimate associate and fervent admirer of his, one Dr. Richard Hobson, has given to the world an account of this ornithological asylum; and it is certainly very curious. The name of the place was Walton Hall, near Wakefield; and it seems to have been peculiarly well adapted for the purpose to which it was put. It was situated on an island, approachable only by an iron footbridge, and having no other dwellings in its immediate neighborhood. The lake in which it stood gave the means of harboring waterfowl of all kinds, while the "packing" of carrion crows in the park exhibits a proof of the protection afforded by even the mainland portion of the estate; it was sufficiently extensive to allow of portions being devoted to absolute seclusion, for those birds which are naturally disposed to avoid the haunts of man. "Two-thirds of the lake, with its adjacent wood and pasture land, were kept free from all intrusion whatever for six successive months every year; even visitors at the house, of whatever rank, being 'warned off' those portions set apart for natural history purposes. Even the marsh occupied by the herons was forbidden ground throughout the whole breeding season, unless in case of accident to a young heron by falling from its nest; in which case aid was afforded with all the promptitude exhibited by the fire-escape conductors for the safety of human life."

The surroundings of the mansion itself were quaint and exceptional, exhibiting the eccentric character of their proprietor. Item, a magnificent sun dial—constructed, however, by a common mason in the neighborhood—composed of twenty equilateral triangles, so disposed as to form a similar number of individual dials, ten of which, whenever the sun shone, and whatever its altitude, were faithful timekeepers. On these dials were engraved the names of cities in all parts of the globe, placed in accordance with their different degrees of longitude, so that the solar time of each could be simultaneously ascertained. Near this sun dial was a subterraneous passage leading to two boat houses, entirely concealed under the island, furnished with arched roofs lined with zinc plate, and arrangements for slinging the boats out of water when they required painting or repair.

Four sycamores with roosting branches for pea hens, and a fifth, whose decayed trunk was always occupied by jackdaws, screened the house from the north winds. Close to the cast-iron bridge entrance was a ruin, on the top of whose gable, at the foot of a stone cross twenty-four feet above the lake, a wild duck built her nest, and hatched her young for years. A great yew fence enclosed this ruin on one side, so that within its barrier birds might find a secure place for building their nests and incubation. For the special encouragement and protection of the starling and the jackdaw, there was erected within this fence a thirteen feet high stone and mortar built tower, pierced with about sixty nesting berths. To each berth there was an aperture of about five inches square. A few, near the top, were set apart for the jackdaw and the white owl. The remaining number were each supplied at the entrance with a square loose stone, having one of its inferior angles cut away, so that the starling could enter, but the jackdaw and owl were excluded. The landlord of these convenient tenements only reserved to himself the privilege of inspection, which he could always effect by removing the loose stone.

The lake had an artificial underground sluice, which issuing out at a little distance into sight, furnished the means of cultivating a knowledge of the mysterious habits of the water rat; this stream then passed through one of the loveliest grottos in England. Near this place were two pheasantries, the central portion of each consisting of a clump of yew trees, while the whole mass was surrounded by an impenetrable holly fence; the stable yard was not far off; and hence the squire had infinite opportunities of establishing the important fact, as he considered it, that the game cock always claps his wings and crows, whereas the cock pheasant always crows and claps his wings. Mr. Waterton's interest in natural history was, however, by no means confined to the animal creation. He concerned himself greatly with the culture of trees (though by no means of land), and hailed any *lusus naturæ* that occurred in his grounds as other men welcome the birth of a son and heir. Walton Hall had at one time its own corn mill, and when that inconvenient necessity no longer existed, the millstone was laid by in an orchard, and forgotten. The diameter of this circular stone measured five feet and a-half, while its depth averaged seven inches throughout, and its central hole had a diameter of eleven inches. By mere accident, some bird or squirrel had dropped the fruit of the filbert tree through this hole to the earth, and in 1812 the seedling was seen rising up through that unwonted channel. As its trunk gradually grew through this aperture and increased, its power to raise the pondrous mass of stone was speculated upon by many. Would the filbert tree die in the attempt? Would it burst the millstone? Or would it lift it? In the end, the little filbert tree lifted the millstone, and 1863 wore it like a crinoline about its trunk, and Mr. Waterton used to sit upon it under the branching shade. This extraordinary combination it was the great naturalist's humor to liken to John Bull and the national debt.

In no tree fancier's grounds were there ever one tenth of the hollow trunks which were to be found at Walton Hall; the fact being, that the owner encouraged and fostered decay for the purposes of his birds' paradise. These trees were protected by artificial roofs in order to keep their hollows dry, and fitted thus for the reception of any feathered couple inclined to marry and settle. Holes were also pierced in the stems, to afford ingress and egress; and one really would scarcely be surprised if they had been furnished with bells for "servants" and "visitors." In an ash tree trunk thus artificially prepared, and set apart for owls (the squire's favorite bird), an ox-eyed titmouse took the liberty of nesting, hatching and maturing her young. Mr. Waterton attached a door, hung on hinges, to exactly fit the opening in the trunk, having a hole in its inferior portion for the passage of the titmouse. The squire would daily visit his little tenant, and opening the door, delicately drew his hand over the back of the sitting bird, as though to assure it of his protection. But unfortunately, after the bird had flown, one year, a squirrel took possession of this eligible tenement, and although every vestige of the lining of its nest was carefully removed, no titmouse or any other bird ever occupied it again.

In May, 1862, the squire pointed out to the author no less than three bird's nests in one cavity—a jackdaw's with five eggs; a barn owl's with three young ones, close to which lay several dead mice and a half grown rat, as in a larder; and, eighteen inches above the owl's nest, a redstart's containing six eggs! Our author deduces from this circumstance, that in an unreclaimed state, birds, although of different species, are not disposed to quarrel; and the fact that near this "happy family" a pair of water hens hatched their eggs in a perfectly exposed nest, under the very eyes of two carrion crows who occupied the first floor of the same tree, an alder, without the least molestation, seems to confirm this view.

In this Garden of Eden, however, all sorts of anomalous things seem to have been done by birds. In a cleft branch of a fir tree, twenty-four feet from the ground, a peahen built her nest, through which piece of ambition, since falling is much easier to learn than flying, she lost all her young ones. In the branch of an oak, twelve feet from the ground, a wild duck nested, and brought down all her brood in safety to their natural element. A pair of coots built their nest on the extreme end of a willow branch closely overhanging the water; but the weight of the materials, and especially of the birds themselves, depressed it so that their habitation rested on the very surface of the water, and its contents rose and fell with every ripple; and, finally, another pair of coots who had built their house upon what they considered *terra firma*, found themselves altogether adrift one stormy morning, and continued so, veering with the fickle breeze for many days, until at last the eggs were hatched, and their young family became independent, and could shift for themselves. All these minutiæ were carefully watched by the squire. An excellent telescope enabled him to perceive from his drawing room window the manœuvers of both land and water fowls. "You could carefully scrutinize their form, their color, their plumage, the color of their legs, the precise form and hue of their mandibles, and not unfrequently even the color of the iris of the eye: also their mode of walking, of swimming, and of resting. You could distinctly ascertain the various kinds of food on which they lived and fed their young. You could see the herons, the water hens, the coots, the Egyptian and the Canada geese, the carrion crows, the ringdoves (occasionally on their nests), the wild duck, teal, and widgeon." No less than eighty-nine descriptions of land bird, and thirty of water fowl, sojourned in the grounds or about the lake of Walton Hall. In winter, when the lake was frozen, it was literally a fact that the ice could sometimes not be discerned, it was so crowded by the thousands of water fowl that huddled together upon it without sound or motion.

Mr. Waterton, it may be easily imagined, was himself no sportsman; but it was his custom to supply his own table on a fast day (he was a Roman Catholic) with fish shot by himself with a bow and arrow. Otherwise, he made war on no living creature, except the rat: the "Hanoverian" rat, as he designated him with bitterness: and even him he preferred to exile rather than destroy. On his return home from his famous wanderings in South America, he found the hall so infested with rats that nothing was safe from them. But having caught a fine specimen of the "Hanoverian" in a "harmless trap," he carefully smeared him over with tar, and let him depart. This astonished and highly-scented animal immediately scoured all the rat passages, and thus impregnated them with the odor of all others most offensive to his brethren, who fled by hundreds in the night across the narrow portion of the lake, and were no more seen. Though very bigoted in religious matters, the squire was indeed a most tolerant and tender-hearted man. He built a shelter upon a certain part of the lake expressly for poor folks, who were permitted to fish whether for purposes of sale or for their own dinners; and notwithstanding that it was his custom to dress like a miser and a scarecrow, and to live like an ascetic, sleeping upon bare boards with a hollowed piece of wood for a pillow, and fasting much longer than was good for him, he was very charitable and open handed to others.

It must be confessed, however, we gather from this volume that the great naturalist was, out of his profession, by no means a wise man, and certainly not a witty one. He loved jokes of a school boy sort, and indulged in sarcasms more practical than delicate. The two knockers of his front door were cast, from bell metal, in the similitude of human faces, the one representing mirth, and the other misery. The former was immovably fixed to the door, and seemed to grin with delight at your fruitless efforts to raise it; the latter appeared to suffer agonies from the blows you inflicted on it. In the vestibule was a singularly conceived model of a nightmare, with a human face, grinning and showing the tusks of a wild boar, the hands of a man, Satanic horns, elephant's ears, bat's wings, one cloven foot, one eagle's talon, and with the tail of a serpent; beneath it was the following motto:—

Assidens præcordiis
Pavore somnos auferam.

It was his humor, more than once, when between seventy and eighty years of age, to welcome the author, when he came to dinner, by hiding on all fours under the hall table, and pretending to be a dog. He made use of his wonderful taxidermic talents to represent many individuals who took a leading part in the Reformation by loathsome objects from the animal and vegetable creation, and completed the artistic group with a sprinkling of "composite" demons. He was seriously vexed, and behaved very rudely to a stranger under his own roof, who had profanely designated his favorite (stuffed) Bahia toad as "an ugly brute."

These and similar instances of bad taste we think Dr. Hobson might have left unrecorded with advantage. Still, there was much to like as well as to admire about the great Naturalist. No museum of natural history elsewhere could compare with the beauty and finish of the specimens, prepared by the squire's own hand with wonderful skill and patience, which adorned the inside of Walton Hall. "Not even living nature," says our author, "could surpass the representations there displayed." In attitude, you had life itself; in plumage, the lustrous beauty that death could not dim; "in anatomy, every local prominence, every depression, every curve, nay, the slightest elevation or depression of each feather." The great staircase glowed with tropic splendor. At the top of it was the vertical cayman mentioned in the Wanderings, on which the squire mounted in Essequibo, and the huge snake with which he contended in single combat. Doubts have been thrown on both these feats, but Dr. Hobson relates instances of presence of mind and courage shown by the squire in his own presence, quite as marvelous as these. Wishing to make experiment as to whether his Woorali poison, obtained in 1812 from the Macoushi Indians, was more efficacious than the bite of the rattlesnake, he got an American showman to bring him twenty-four of these dangerous reptiles, and took them out of their cases, one by one, with his own hand, while the Yankee fled from the room in terror, accompanied by very many members of the Faculty, who had assembled to witness the operation. In his old age, he alone could be found to enter the cage of the Borneo orang-outang at the Zoological Gardens, in order minutely to inspect the palm of his hand during life, and also the teeth. It was with difficulty he obtained permission to run this hazard, the keepers insisting upon it, that the beast would "make very short work of him." However, nothing daunted, the squire entered the palisaded enclosure. "The meeting of these two celebrities was clearly a case of love at first sight, as the strangers embraced most affectionately, kissing one another many times, to the great amusement of the spectators. The squire's investigations were freely permitted, and his fingers allowed to enter his jaws; his apeship then claimed a similar privilege, which was courteously granted after which the orang-outang began an elaborate search of the squire's head."

The strength and activity of Waterton were equal to his physical courage, notwithstanding that he was wont to indulge in venesection to a dangerous extent, always performing that operation himself, even to the subsequent bandaging. At eighty-one, the suppleness of his limbs was marvelous; and at seventy-seven years of age our author was witness to his scratching the back part of his head with the toe of his foot! Death, however, claimed his rights at last in the squire's eighty-third year.

Charles Waterton lies buried in a secluded part of his own beautiful domain, at the foot of a little cross with this inscription written by himself,—

Orate
Pro anima Caroli Waterton,
Viatoris:
Cujus jam fessa,
Juxta hanc crucem
Hic sepeliuntur ossa.

Even those iron limbs of his grew weary and he died.—*Chambers Journal.*

Hard Rubber Type is said to be manufactured at Dalston, England, at one-third the cost of metallic type and of equal durability.

Pure Sand, such as is used on floors, should be employed by benevolent people instead of ashes, on slippery sidewalks. Ashes make a sticky, uncleanly paste while wet, and return in fine corrosive dust to lungs, garments and goods, when dry.

Small Savings.—The parings of a bushel of juicy apples are said to yield a quart of cider by the aid of a hand press. The honey that wastes its sweetness on the air around an acre of buckwheat in blossom, can be saved to the amount of fourteen pounds per day, according to the estimate of a German investigator. Rags can be saved to the value of $60,000,000, as shown by the paper statistics of this country alone.

Wet Seasons.—The usual impression that wet seasons are unhealthy, is contradicted on the authority of compared meteorological and medical records, showing that the more rain the fewer deaths, and *vice versa*. Intermittent fevers in malarious localities have been observed to prevail worse in dry than in wet seasons. Diarrhea and cholera are asserted to follow the same law. What say the doctors? If their proverbial diversity cannot yield us at least three contradictory opinions on this question, we shall have made a remarkable approximation to definite assurance.

Editorial Summary.

SLAUGHTER PITS.—The Collieries of England sacrifice nearly one thousand lives outright every year, not to speak of the shortening of life by an unhealthy subterranean occupation. The late explosions at Barnsley, destroying some 425 lives, were by far the most destructive on record. Experience, science and legislative authority seem to have exhausted their resources in the ineffectual endeavor to cope with the subtle and invisible foe which prevades all the cavities of a coal so abundant in hydrogen as that of England. Sir Humphrey Davy's safety lamp, (covered with a wire gauze through which air and light, but not flame, can be communicated) has been in use over half a century; yet only the ratio, hardly the aggregate, of violent deaths in coal mines, has been diminished. As long as mankind are fallible—and the most prudent are liable to be off their guard at some fatal moment—the safety lamp must remain but a partial protection. Still the problem has not been given up, and undoubtedly the parliament at its next session will make a fresh effort to bring invention to the rescue. Some mechanical means of removing, or some chemical means of indicating or neutralizing the explosive gas—explosive when mingled with air—is now earnestly sought. It would seem, however, that ventilation, even if perfected so as to obviate the accumulation of the gas, must be powerless against its sudden irruption from concealed reservoirs.

NUTRITION OF THE TEETH.—Dr. Henry S. Chase, in the *Medical Investigator*, estimates that a mother and child under eighteen months, together require for the nutrition of the dental and osseous systems, 55 grains per day of phosphate of lime for the former, and 27 grains for the latter. These 87 grains, he says, are contained in 10 ounces of cheese, in 31 ounces of peas, in 35 ounces of fresh mutton, beef or unbolted wheat flour, or in *one hundred and seventy-five* ounces (nearly 11 pounds) of fine flour, such as we commonly use—enough to make a dozen loaves of baker's bread of the largest size. Think of a woman eating a dozen of those loaves daily to sustain the osseous system! It is consoling that bread is a minor item in the diet of most persons. Want of backbone or any bone at all would result from a diet of fine wheaten bread, if these calculations are not at fault somewhere. Living on "bread and butter" of this sort is too common, however, among the women and children of America. There is a "fatal facility" about it. We must have a new "staff of life" with more bone in it, and equally handy.

WINTER GARDENS may be made with beautiful effect in front of dwellings, by a tasteful arrangement of evergreens in parterres, having regard to the varieties and contrasts in their shades of color, forms and sizes. The *Prairie Farmer* suggests the following arrangement:—A group of three or more of the upright junipers, from three to four feet high, in the center, and one of these decidedly taller than the rest. Around these a single row of low Canada balsams, taking the form of the bed, but not crowded too closely. Outside of the balsam a row of arboritæs, or a ring of snug little red cedars, very compact and low. Next a circle of bear grass, with its long pointed leaves, so as to make a continuous band of their pale green. Here, Lastly a prostrate broad-leaved evergreen, the vinca minor, often called the ground myrtle will come in as a fine contrast.

CHEAP SOURCE OF OXYGEN.—Highly oxygenated compounds such as the chromates and manganates, can be partially deprived of oxygen by steam, for which they immediately compensate themselves from the air. A method has been patented in France for making this process continuous, and thus drawing a steady supply of oxygen from the atmosphere. A current of steam is passed through a retort containing one of these compounds, and carries off with it a current of oxygen, which is collected in a gas holder where the steam is condensed to water. Following this, a current of hot dry air is passed through the retort and re-oxygenates the compound, which is then ready to yield again. An improvement of the apparatus so as to de-oxygenate and re-oxygenate simultaneously, would seem to be desirable.

IRRIGATION.—Over a million acres of land, in the counties of Fresno, Merced, Stanislaus and San Joaquin, Cal., are to be reclaimed by artificial irrigation. A Stockton paper states that a San Francisco Company have surveyed the work, and will commence early in the spring a canal that is to bring a perpetual and abundant supply of water from Tulare Lake, through a level country requiring no locks or aqueducts, at once irrigating the land and forming a highway that will convey the products of the whole region to the San Francisco market. It is supposed that it will be the cheapest canal ever built.

It is said that Wm. H. James, who is reported to have been the inventor in 1820 of tubular boilers, is living in England at the age of seventy years in abject poverty. It was ascertained that he had been living without food for several days and had supported existence for a year by pawning his clothes, tools, and furniture. A subscription was started for his relief which promises to place him beyond future want.

THE largest anchor in the world, according to Chas. Ryland's *Iron Trade Report* has lately been finished at H. P. Parkes' Works, Tipton, Staffordshire. It is intended for the *Great Eastern* and weighs eight tuns exclusive of the stock. Its dimensions are; length of shank, twenty feet six inches; of woodstock nineteen feet six inches; trend of arms seven feet four inches. It is somewhat different in form from ordinary anchors, the palms or blades being divided or split so that it may more readily pierce the sea bottom.

CAPTAIN NORTON'S INVENTIONS.—In response to the demand for evidence of his priority in the invention of improved shot, Capt. Norton favors us with an extract from the *United Service Gazette* of Dec. 8, 1866, being a statement under the name of "Richard Airey, Quartermaster General," dated Horse Guards, 22d June, 1860, to the effect that when quartered with him at Woolwich, in 1823, Capt. Norton invented and exhibited an elongated expanding shot and shell, identical in principle with the present Minie bullet, of which he (Airey) frequently witnessed the operation at that time.——For armor-penetrating shot, Capt. Norton asserts that a flat-headed bolt is preferable to the ogival form, and this was known and acted on by the old British archers. In 1827, he pierced with a flat-headed bolt a guardsman's cuirass which had resisted an ogival-headed bolt, both being of steel. Allowing these facts, Government trials, however, have resulted in the rejection of this form for cannon shot, as it breaks on heavy armor instead of penetrating, and is subject also to deviation.

GOVERNMENT ITEMS.—The conversion of Springfield muskets into breech-loaders has been commenced at the armory, at the rate of 50 per day. Martin's new "central-fire cartridge" is to be the ammunition; the advantage being that the anvil on which the fulminate rests is not blown out by the explosion, but remains in the shell.—The House Post-office Committee are reported to be in favor of the telegraphic post-route scheme. The question is now upon buying or leasing old lines, or constructing new. The Postmaster General is in favor of the latter.—A further appropriation is asked, and will probably be granted by Congress, to carry out the plans of the New York Commissioners relative to the representation of our country in the Paris Exposition.—The New York Post-office bill has passed both houses of Congress.

THE CRANMER MACHINE GUN.—This appears, as described in the local papers, to be a California product. It is said to be capable of throwing 6¾ tons of half-ounce bullets in twenty-four hours, with the force of the ordinary rifle. This would be rather a useless operation, but we are permitted to infer that the machine could discharge 300 such shots per minute, which would be something to the purpose. It is operated by a crank, like the successful Gatling gun, and claims the usual advantages of simplicity and exemption from derangement—usual in claims, but rarest of all things in fact. We have no doubt that hand shooting will eventually be superseded by machine shooting, precisely as steam printing has taken the place of hand presswork: i. e., for all except fine work and small jobs.

COTTON AND CORN.—The official estimate for 1866, is 1,750,000 bales of cotton, of 400 lbs. each, or a million and a half of the actual size. This makes 750,000,000 lbs. The largest product is that of Texas, 300,000 bales. Mississippi follows with 270,000 bales; Alabama, 220,000; Georgia, 205,000; Arkansas, 182,000; Tennessee, 148,000; Louisiana, 109,000; South Carolina, 102,000; North Carolina, 91,000; Florida, 36,000; other States, 67,000. The corn crop of 1866, is estimated at 880,000,000 bushels. A diminution appears in the product of 22 Northern States, (679,000,000) of 25,000,000 in quantity and the equivalent of 75,000,000 in quality. The 11 lately insurgent states return 185,000,000 bushels against 274,000,000 in 1859, the year last reported.

BREECH LOADERS FOR THE NEW YORK MILITIA.—The State Board of Officers for the examination of improvements in breech-loading small arms, and particularly methods of converting muzzle-loaders, reconvened at the State Arsenal on the 22d January. The following officers, comprise the board: Brig.-Gen. Geo. W. Palmer, Commissary General of Ordnance; Brig.-Gen. Wm. G. Ward, commanding First Brigade National Guard; Col. Geo. M. Baker, commanding Seventy-fourth Regiment National Guard; Col. Silas W. Burr, Assistant Inspector General.

THE population of London is gradually decreasing. This may be a startling assertion, but nevertheless it is true. The last census shows that the city proper numbers only 100,000 actual residents, and this number is diminishing, dwellings being displaced by warehouses. The solid men who give the city its importance are nearly all non-residents. The actual population is largely composed mainly of the working classes and those in the humbler walks of life, and constitute but forty per cent of the number of persons who transact business there. The city of London proper is not much of London after all. Its surroundings countmillions.

THE PARISIAN COSTAR.—The rat exterminators of France have a unique mode of advertising the merits of their preparations. We learn that a singular equipage consisting of a van covered all over with dead rats, to the number of more than 500, has been creating a sensation in the streets of Paris. These animals were victims to a new process invented by M. Bergeot, of Orleans, a noted destroyer of rats, who has acquired a great reputation from the immense number he has killed at Marseilles and Havre.

THE TROY MAMMOTH.—The remains of the mastodon excavated a month or two since near Cohoes, have been presented by Mr. Alfred Wild, to the New York Cabinet of Natural History, and have been deposited in the State Geological Museum. As the fossils show a tendency to crumble, they must be treated with oil for some months before being placed on public exhibition.

FRENCH MEASURES.—The decimeter (one tenth of a meter) is five times the diameter of our new five-cent piece or 3.83 inches. The weight of the piece is exactly five French grammes.

EFFECT OF VIBRATION ON IRON.—The theory that wrought iron loses its tenacity by crystallization, in consequence of long-continued vibratory shocks, was suggested by the appearance of many rails and axles, which had given way, and confirmed by the analogy of the supposed cause and effect to percussion and its results. At length, this theory has been impugned by a machinist in Berlin, who has observed the same crystallized condition in bars that had failed without having been subjected to vibration, and has produced in his experiments fractures by protracted vibration (if we understand him) without the exhibition of crystallization. Hence he infers that the crystallization so generally if not universally observed in broken railroad axles, probably existed as an original defect in the iron. A more improbable supposition than this can hardly be entertained, and it will require far more conclusive evidence than we have seen to commend it to belief. The subject, however, is worthy of more exact investigation than it has received.

ICE FOR EUROPEAN CITIES.—The glaciers of the Alps are now mines of wealth and tributaries to luxury—inexhaustible in both respects. They are worked (says Dr. Prime) precisely like stone quarries and their product is transported by rail to Paris and other continental cities. Not only so, but they are excavated into galleries, chambers, and magnificent saloons. The depths of snow on the surface exclude the sunbeams, but calcium lights shed a brilliant lustre reflected as from a thousand mirrors of glass, and, in small apartments fitted up for the purpose, the furniture of a well-appointed parlor invites to cool but not inhospitable repose."

GOLD IN OHIO.—The Irish proverb "there's parties every where," will probably come to be applied to gold. In the vicinity of Belleville, Ohio, gold has lately been discovered in minute grains and flakes in the sand. The "placer" has been purchased, and a company has been organized to work it!

ECONOMY OF CHEESE FACTORIES.—A Canada cotemporary supplies data from the books of the West Oxford Cheese Factory as follows:—R. A. G. supplied 101,331 lbs. of milk from 32 cows, from May 7th to Oct 12th, for which he realized $1,064; a return of $33 25 or 21½ cents per day from each cow. J. G. supplied 80,959 lbs. of milk from 26 cows, realizing $849 or $32 69 per cow, for the same period. The price realized for the milk was about 1 1/10 cents per lb. A quart of rich milk weighs about 2½ lbs., hence the price obtained per quart was a little less taan 2½ cents.

CAR FERRY.—A powerful iron railroad steamer, to carry trains of cars in the manner proposed between Dover and Calais, has been running between the respective termini of the Michigan Central and Great Western Railroads, at Detroit and Windsor (C. W.), since January 1st. She takes eight cars and their contents, without "breaking bulk," and is built to break her way through the ice whenever necessary.

The Unit of Heat.

Two distinct units of heat have been proposed and are in use. First, the quantity of heat which is required to raise the temperature of one gramme of water 1° cent. Second, the quantity of heat required to raise the temperature of one pound of water 1° Fah. These are very far from having an equal value. By the combustion of 1 gramme of carbon 8,000 grammes of water may be heated 1° cent.; and also it is evident that 1 lb. of carbon will heat 8,000 lbs. of water 1° cent. In other words any given weight of combustible will raise the temperature of the same weight of water an invariable number of degrees. Thus tables of heating values of substances will be composed of the same numbers, whether representing grammes, pounds or any other weights, provided that the same thermometric scale be followed. A change of the thermometric scale requires however a change of all the numbers of the tables to correspond with the difference of value of the degrees.—5° cent.=9° Fah. or 1° cent. =9/5° Fah. and 1° Fah.=5/9° cent. To reduce a cent. table therefore to the Fah. multiply all the numbers by 9/5. Thus the heating value of carbon is 8,000 units by the Cent. scale and 14,400 by the Fah. scale.

This difference of scales has been the source of a considerable confusion in discussions on heat. English writers are obliged to use both scales and thus are in great danger of mixing them up. Inconsistencies on this account may be found in some of our best books. I make these statements in order that I may claim a little sympathy on account of a mistake, I made last week in my calculation on the "Clash of Atoms." I stated the heat value of carbon to be 8,000 units, which was correct enough by the centrigrade scale, but what I needed was the number 14,400, which represents the units by the Fah. scale. Thus it will be seen that my great figures were far too small. I regret it, for I fear that their very greatness will bring doubt on the beautiful theory of the "Clash of Atoms." CHARLES A. SEELY.

Ice Boat Race.

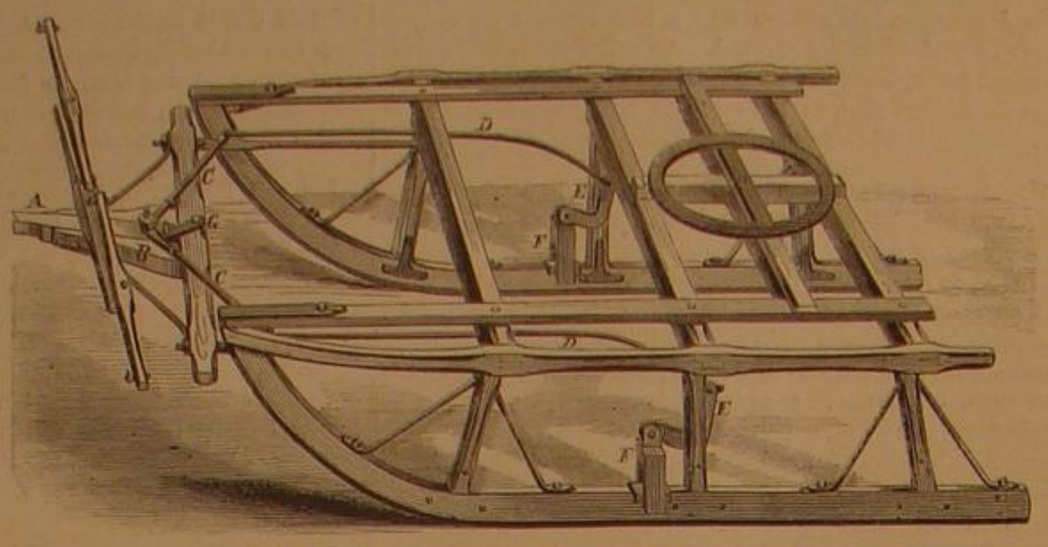
Two of the Poughkeepsie ice boats (*Haze* and *Snow Flake*) ran on the 15th of Jan. from Poughkeepsie to Newburgh, as a reconnoissance for the proposed regatta. The time made was fifty miles per hour, on very rough ice. The *Snow Flake* plunged through the drifts and crashed over the "hummocks" with full mainsail, at a fearful rate, beating her companion four miles. Afterwards in crossing the river at the rate of a mile a minute, the *Snow Flake* had her whole standing rigging raked off in an instant by a shake of wind, the party on board being all luckily to windward and so escaping injury.—A sleighing race for a purse of $1,000, was run the same day from Providence to Boston, 42 miles, winning time three hours forty-two minutes, or 11½ miles per hour.

Improved Sled Brake.

Brakes for receiving the gravitation of the load on inclines are in frequent use on wheeled vehicles, and similar appendages have been applied to runners traveling on snow. None, however, seem to be more effective and simpler than that illustrated in the engraving. Its construction and operation may be easily comprehended.

The pole, A, is allowed to move backward and forward in the "hounds," B, being kept in place by a bolt passing through the "hounds," and a slot in the pole, or by any other suitable mechanical device. To the end of the pole, on the top is secured by a bolt, two levers, C, which are connected with bars, D, to a bell crank, E, on each runner. This bell crank engages with a forked slide, F, extending on each side the runner and working vertically in a simple guide.

When the horses are backed they throw the slides into the snow or ice by means of the retrogression of the pole through the medium of the levers. If while no pulling force is exerted by the draft animals the driver desires that the brakes shall not act, he has only to move with his foot a simple lever stop, G, which holds the pole extended.



NARAMORE'S SLED BRAKE.

It is evidently a simple contrivance, efficient, and not liable to become deranged in using. One advantage is, that the edges of the brake are narrow and do not cut up and ruin the road. It was patented by H. L. Naramore, of Cummington, Mass., through the Scientific American Patent Agency, Sept. 11th, 1866. For more details and for purchase of rights and territory, address Mr. Naramore as above.

RAILROAD ITEMS.

The United States have 36,896·26 miles of railroad completed and now in working order. This is an increase of road brought into use during the year of 1,535 miles, exclusive of some 200 miles of city railroads added to the length reported a year ago. The State of Pennsylvania owns 4,650 miles of track. Ohio ranks second, with 3,401 miles, followed by Illinois with 3,250 miles, and New York with 3,025 miles of road now in working order. Distributed into geographical regions, the New England and six Southern interior States own each one ninth; the five Middle Atlantic States one quarter; the twelve Northern interior States two fifths; the two Pacific States one seventh; and the five Southern Atlantic States one seventh, of the total length given above. In cost per mile the highest priced roads are the through lines of New Jersey, the Hudson River, the Baltimore and Ohio, and the Reading Railroads, in their order. The total cost of all the roads in the country amounts to $1,502,464,085, at an average cost per mile of $40,723. From a length of only three miles in 1828, the railroads of the country have steadily increased, until now the United States are traversed by a longer track than is found in all other parts of the world together, and sufficient to girdle the whole earth at the equator with a double track line.

The organization of a new Pacific Railroad Company composed of Southern capitalists and prominent men is announced. The route proposed is from some convenient point on the Gulf of Mexico, by an air-line route 1,268 miles long to the Pacific Ocean. The aid of Congress in constructing theroad is relied on, as the company claim that if the annual expenses to the government for military purposes along the line of their proposed route were to be capitalized, and the bonds thus created loaned to the company as the road progresses, the road would be completed without incurring expense to the country above what otherwise must be expendedfor years to come in furnishing military protection to the region through which the road is to pass.

A memorial has been presented to Congress praying for a charter to build a railroad from Galveston to Kansas. The project is to build a double track, to be owned either by the state or by a corporation, and has this peculiarity, that like the canals the track is to left open for free competition to all individuals and transportation companies. The rolling stock will be owned and run by these parties, they paying a certain to toll the owners of the track. By this arrangement the capacity of the road, it is claimed, may be increased tenfold and the cost of transportation reduced one half.

The estimates of the cost of the Northern Pacific Railroad prepared by Brevet Brig.-Gen. Simpson are as follows:—For construction of 204 miles of road, $150,000,000; for rolling stock and fixtures at $11,200 per mile, $23,000,000; for steamers on the Missouri and Columbia Rivers, $3,000,000; for engineering and contingencies, $10,000,000; for tunneling, beyond the estimated average per mile, $11,078,000. These and other items make a total of $206,600,340, or an average per mile of $101,040.

The Central Pacific Railroad Company have received from the United States 42,000 acres of land. This area was granted by a patent prepared at the General Land Office, which is prefaced by a beautiful map of the United States, handsomely colored, exhibiting all the states and territories with great distinctness, as also the line of the Pacific Railroad from the Mississippi to the Pacific Ocean.

The rolling stock owned by the railways of Great Britain and Ireland at the close of the year 1866 comprised 7,414 locomotives, nearly 18,000 passenger carriages, nearly 7,000 other cars attached to passenger trains, more than 220,000 freight cars, making in all more than a quarter of a million carriages, locomotives and cars, the increase for the year being 15,061.

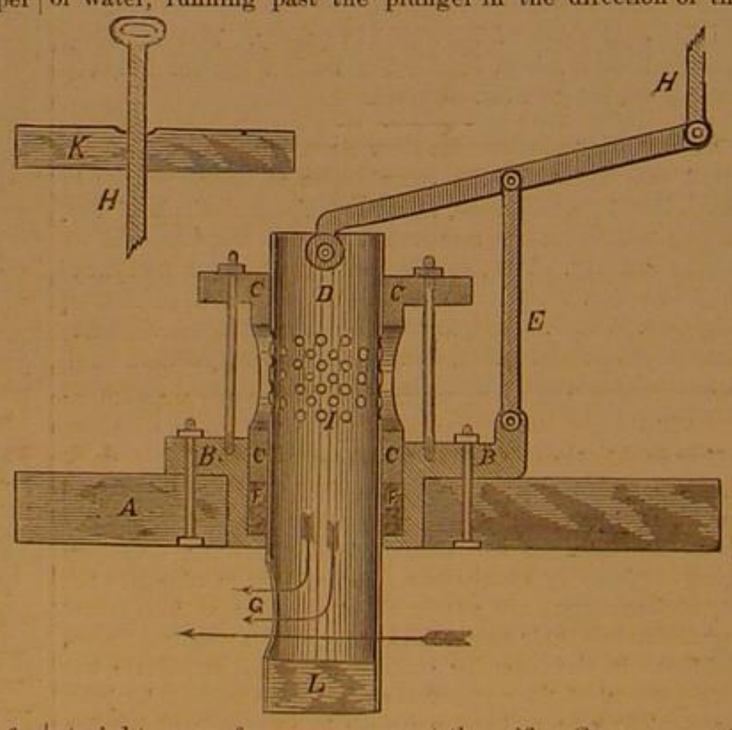
Some of the New York railroads at the last session of the State Legislature succeeded in obtaining an official condemnation of the practice of granting free passes over the roads. These roads are now as anxiously petitioning the same body to repeal the prohibitory enactment. The cause of complaint is not that the principle is not right, but that rival railroads of other states have secured a large increase of business by a liberal distribution of passes among the freight shippers and drovers of the West.

The New York Pneumatic Company, recently organized, are taking the preliminary steps toward uniting this city with Brooklyn and Jersey City. A party of engineers are now engaged in taking soundings in the East and North Rivers, with a view of locating a line for the proposed pneumatic railway. The data obtained so far are said to be highly favorable.

BAGLEY'S PATENT BILGE WATER DISCHARGE.

The annexed engraving represents a sectional view of this new device for discharging water from the holds of vessels of any kind. A represents the bottom planking of a vessel; B is a cast-iron bed plate secured firmly down with bolts; C is a cast-iron gland, with three orifices, firmly secured down on the packing, F. D is a plunger made of gas pipe; E is a fulcrum, and F the packing of rubber; G is an orifice in the lower end of the plunger; H is an iron rod that connects to the lever; I are the orifices in the upper end of the plunger; L is a wooden plug in the lower end of the plunger; K is a sectional portion of the deck.

The operation of this new machine is as follows: A current of water, running past the plunger in the direction of the straight arrow, forms a vacuum at the orifice, G; consequently a suction is thereby formed through the plunger. The bilge water in the vessel will flow through the orifices in the gland, C, thence through the orifices in the plunger, down in the direction of the bent arrows, and out at the orifice, G. By this means all the bilge water may escape from the vessel. By raising the lever the plunger is forced down; then the machine is in motion. As soon as the bilge water is all discharged, to close it uppush the lever down to the deck, K, which will bring the orifice, G, above the packing, F, making it perfectly water-tight and safe.



The working of this invention is all the same whether the vessel is moving through the water, or is stationary and the current is flowing past her.

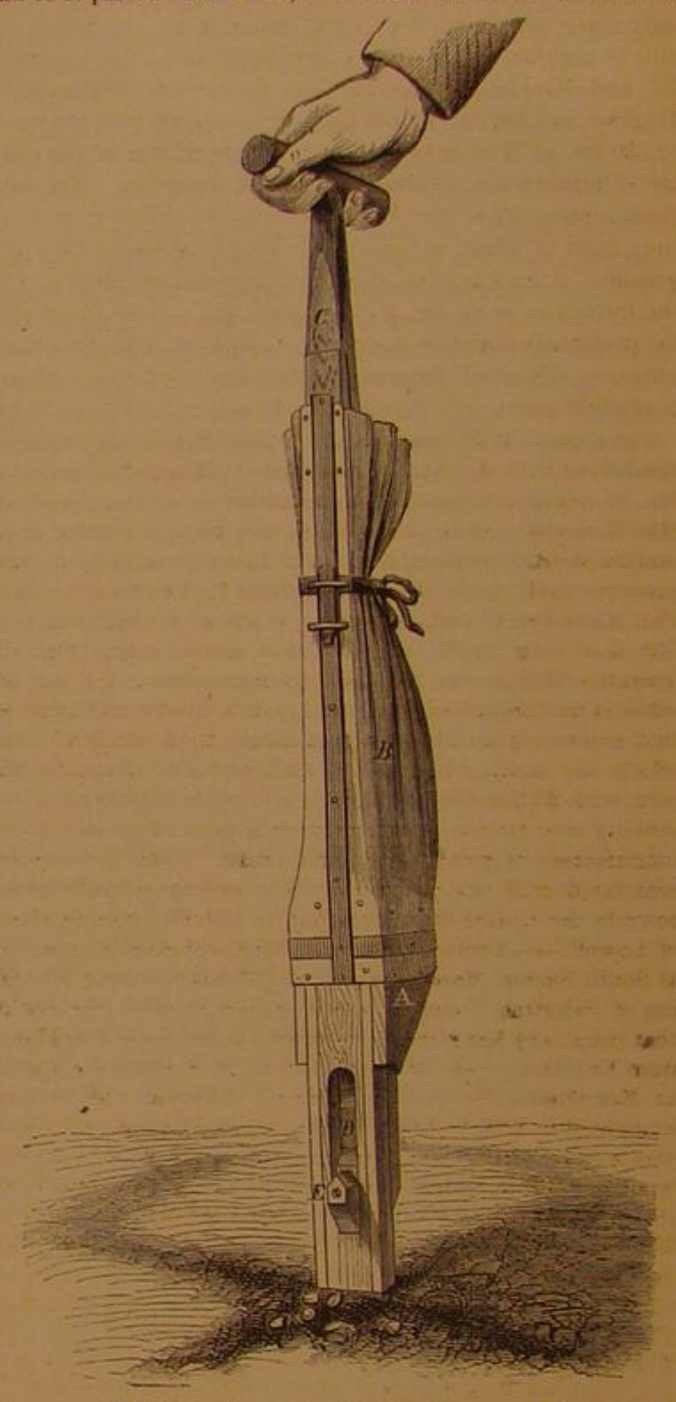
Port rights for sale on reasonable terms by applying to J. M. Bagley, 422½ North Third street, St. Louis, Mo., or M. F. Bagley, Alton, Ill.

A Deep Mine.—A coal mine at Dunkenfield, Cheshire, England, is 2060 feet deep to the bottom of the shaft, whence an inclined plane is excavated, having a dip of sixty degrees for 1000 yards, at which point the depth below the earth's surface is estimated at more than two thirds of a mile.

MC CONAUGHEY'S PATENT SEED PLANTER.

Placing corn in the hill by dropping it from the hand is a slow, laborious, and often a vexatious process, owing to high winds, which sometimes prevail at corn planting seasons. At such times the corn is blown about and the kernels lodge in improper places, as the seed of the sower in one of the parables, and possibly the mistake is not discovered until the crop appears above the soil, too late to remedy the error.

The simple device herewith illustrated prevents the seed from being dissipated by the wind, and insures its regular dropping in such qnantities as the operator may choose. It is a tube of wood made by securing sides to a center piece and having attached a seed reservoir, A, the capacity o. which is enlarged by the bag, B. The plunger, C, has recesses cut in it, which take from the reservoir, A, the proper number of kernels as the plunger is raised, and discharge them at D, where they are divided by the beveled center piece, E, and distributed. The operation is understood by the engraving. The apparatus is carried by the handle and the lower end of it placed in the hill, or at the intersection of the cross



furrows. A light pull on the handle discharges the seed as shown. The number of kernels, or the amount of seed, can be regulated by a simple device (not shown), which changes the action of the plunger, so that it can be adapted to different seeds.

The device was patented through the Scientific American Patent Agency, Dec. 4th, 1866, by Thomas B. Mc Conaughey, of Newark, Del., to whom application should be made for territory in this country, excluding the States of Pennsylvania, Delaware, and Maryland.

Milk and Water.—It makes a great difference whether water is given to the cow or to the can. Dr. Dancel, in a communication to the French Academy of Sciences (quoted in the *Nation*), adduces proof that the yield of milk can be considerably increased by giving salt to incite cows to drink large quantities of water, and by moistening their food, with very little if any of the peculiar effect produced by the experiments of milkmen at a later stage of the operation. According to Dancel's observations, when a cow begins to give milk she drinks from eleven to as much as forty-five quarts of water per day, more than before. All cows that drink fifty quarts per day were found to be excellent milkers, yielding nineteen to twenty-three quarts per day. Less than twenty-seven quarts invariab'y marked a very poor milker. Of course the experiment of artificial stimulation by means of salt was intended only for scientific purposes. The importance of an abundant and convenient supply of pure water at all times, as much as the animal will take, is the practical deduction.

A New Delicacy.—The Paris epicures have found that snails possess a flavor superior to frogs. Consequently the trade in the latter has been for some time noticeably decreasing. The new favorites are sent in great numbers from the surrounding country to Paris, Burgundy and Champagne alone supplying 100,000 snails daily. Frenchmen eat horse meat, snails, fried Hottentot and other outlandish dishes with a relish. The French Zouave eats rats, cats and puppies. A French cook can make good soup out of dried sole leather.

MANUFACTURING AND BUSINESS ITEMS.

METALS, ETC.—Sweet, Barnes & Co., the great steel manufacturers of Syracuse, are about commencing the manufacture of files by new machinery invented and patented by W. A. Sweet, the senior of the firm. Three hundred and fifty different kinds of files will be made, and distinguished by numbers instead of the English technical names.——A new hardware manufactory has been commenced at Greenwich, Conn., under the firm of Russell, Burdsall & Ward, with a capital of $300,000.——New rolling mills are to be started at Corry and at Hummelstown, Pa.——A cutlery concern of $100,000 capital will commence manufacturing at North Adams, Mass., next spring.——The old Wenham Iron Foundery, at North Carver, Mass., is to be rebuilt.——The New Bedford Glass Company will start in February.——The first type foundery in the Pacific states was started in San Francisco last month. Over $100,000 worth of printing types are used up in California annually.——It is stated that there are only three places in the United States where sheet and bar zinc is manfactured. These are Bethlehem, Pa., La Salle, Ill., and Mineral Point, Wis. The furnaces of Mathieson & Heghler, at Lasalle, yield 500 lbs. of this metal per day, from 12,000 lbs. of Wisconsin lead ore. Their rolling mill is capable of turning out 12,000 lbs. sheet zinc per day. The total consumption of bar zinc in this country is estimated at 10,000 tuns, most of which is imported. That of sheet zinc is much greater. American zinc manufacturers cannot compete with the foreign in price, but the purity of the article commands the preference notwithstanding, to a limited extent, for certain purposes. Most of the ore manufactured in this country is made into paint.

TEXTILES.—The Spragues of Rhode Island are reported combining with the capitalists and city authorities of Augusta, Me., to organize a vast cotton manufacture at that point on the Kennebec. It is proposed to set 500,000 spindles in operation shortly, on condition that the value added to their property shall not be taxed by the city for two years.——The Fall River Print Works are about erecting an additional mill 408 feet long by 72 wide and five stories high. The Co-operative Mill, a very large corporation, is also going up; another is just organized, and will break ground soon; another, just erected, is awaiting its machinery from England; and efforts are making to organize still another mammoth concern, with $2,500,000 capital, for a mill with 100,000 spindles; making over twenty large cotton mills devoted mainly to the manufacture of print cloths and prints. These enterprises completed will make that city the leading manufacturing town in the United States, placing it 130,000 spindles ahead of Lowell.——A cotton mill with 2,000 spindles is going up at South Easton, Mass., at a cost of $75,000.——John Murchison of Palestine, Texas, is about to erect a cotton factory in that place, and has already imported the requisite machinery from England.——A hat manufactory is about to be started at Kennebunk, Me.——The wool of California and Oregon amounted in 1866 to 7,000,000 lbs., the major part of which was worked up in the mills of those states. The four principal woolen mills in Oregon are the Willamette, capacity 400,000 lbs. of wool and 300,000 yards of cloth annually; Oregon City, 300,000 lbs. and 300,000 yards; Eagle, of Brownsville, "3,500 yards weekly, and 1,500 lbs. of wool annually" (so the state official report is printed in an Oregon paper); and Ellendale, 75,000 lbs. wool, 90,000 yards cloth, and 30,000 lbs. yarn.——The Oregon Iron Works, at Portland, consume about six tuns raw material, and turn out work to the value of $1,000 per day. There are a number of iron works in Portland and other places nearly equal to this.——The pioneer silk manufactory at San José, Cal., is now nearly or quite ready for operation.

PAPER.—A new paper mill is to be erected at Bennistown, Pa., by a Buffalo company.——The Stewart distillery at Buffalo has been purchased for a paper mill by another Buffalo company, of which Ira Hersey is president, with a capital of $1,500,000. It is expected to turn out forty-six tuns daily, and to manufacture manilla and printing paper from grasses, by a new invention called the "Meech process."——It is estimated that there are now 1,000 paper mills in the United States, with an aggregate capital of $40,000,000, and a daily product of 1,200 tuns. Rags are consumed to the value of $60,000,000 per annum.

OILS.—Oil boring, strange to say, has been run into the ground. The quantity thrown upon the market, together with the diminished exportation, has reduced the price so low that the smaller wells will not pay for working, and are in many cases abandoned. Others are shutting off to await better times and help work up the price. Still others are storing away on the ground for an advance. An Oil Producers' Association is talked of.——The whale fisheries of 1866 have been more than ordinarily successful: 311 American vessels (against 279 in 1865) having secured 85,323 barrels of oil, an increase of nearly 24,000 barrels. Besides this, 109,000 barrels of oil were imported and but 9,370 barrels exported.

VARIOUS.—The shipbuilding of Maine has increased 25 per cent this year: estimated tunnage built, 100,000, to 80,000 in 1865.——The propagation of fish is increasing considerably in New England. Many farmers in Massachusetts make a paying business of their ponds.——Over seven million tuns and $256,000,000 worth of property passed through Buffalo in 1866.——It is remarked that the growth of the wheat product of Minnesota is unexampled. The export of the last year amounted to 9,267,153 bushels. The taxable property of the state increased $12,000,000, or 25 per cent, in the same period. The population is 340,000, of which one in every seven go to school.——The salt mines of Nevada are among the wonders of our mineral territory. A single bed covers 50,000 acres with solid rock salt, 95 per cent fine, and deeper than any shaft has yet been sunk. The accumulation continues without intermission, from the salt water which wells up, overspreads the surface and evaporates, leaving a snowy spread of fine salt, of which 2,000,000 bushels are gathered annually.——The wine product of Los Angeles alone is calculated at over 1,000,000 gallons in 1866.

EUROPEAN VS. AMERICAN COTTON AND WOOLEN MACHINERY.

A correspondent from St. Charles, N. C., sends us a letter directing our attention to an article on the above subject which, he says, is going the rounds of the Southern press. The article is a letter published in the Raleigh (N. C.) *Sentinel*, and introduced by the editor as one received by Wm. H. Willard, Esq., from "one of the most practiced and successful operators in the Southern States." We copy the letter in full:—

DEAR SIR:—I notice by the newspapers the great improvements going on in manufacturing in North Carolina.

Last fall I went to Europe to get posted with regard to machinery of all kinds for the manufacture of cotton and wool, and to purchase woolen machinery for the mill I am now in. I returned in January to prepare my buildings, water wheel and shafting for the machinery on its arrival. We have but a small mill yet—only two sets 48 inch cards, but with my European improvements we can do a great amount of work on them. Last week we carded 5,073 pounds of clean-scoured wool, enough for six thousand yards heavy, all wool, goods. If I had supplied myself in this country I could not have done more than half that amount of work. We run our carding and spinning night and day. Our goods are all sold as fast as made—our agents in Baltimore wrote last week that every yard was sold.

I found the best cotton machinery in England, and the best woolen machinery in France, Belgium, and Prussia, except spinning, which these countries now get from England. I have machinery running from four different countries. I went in company with Mr. Johnston, of New York, was with him while there and came back with him. He purchased from one company eighty-six mules running from seven hundred to eight hundred spindles each. Garnn & Co., of which Mr. Johnston is manufacturing partner, run 4,200 looms on printing cloths. Mr. Johnston goes to England every year—he is there now.

He is throwing out all his American machinery up to the spinning, and that he replaces with English as fast as it wears out. When I was last at his largest mill, he was throwing out six of Whiton's best lappers, almost new and as good as any he makes, and putting in English. I think Mr. Johnston the best cotton manufacturer in this country. Garnn & Co. were hard run, and their paper was as low as any in New York fifteen years ago, now they are rated at seventeen millions. They have been gradually changing their machinery for English since 1857. I state these facts to show you what the best cotton manufacturers are doing. It is important to the people of the South that their mills should have the best machinery and start right, instead of being behind Yankee mills. When Mr. Johnston returns I will give you a letter to him if you wish to see his machinery. The James River Manufacturing Company, of Richmond, have changed all their preparation up to the spinning. I ordered the machinery for them from some of my English friends. I have prices and specifications which I can give you if you wish to order. In England they use no top-flat cards, nothing but the style of one I inclose, one is equal to six old-fashioned top-flat cards. With the fly comb they now put on, you can run the doffer thirty in a minute, if you wish to, and the comb will clear it, to spin 36. Mr. Johnston runs 22-inch doffers thirteen to fifteen. If you should wish any cotton or woolen machinery, or know of any person South who does, you may direct to me here, and I will send you blank specifications with prices. Duty is 35.70 on machinery.

Our correspondent very naturally asks, "Can it be possible that the English are so far ahead of our mechanics in the manufacture of machinery?" It is difficult to reply satisfactorily to this interrogatory if we allow entire credibility to the statements of the writer referred to. Certainly some of the most important improvements in cotton machinery have been made by American mechanics. We do not refer to such inventions as that of the gin by Whitney, but to such as those made by William Mason, of Taunton, Mass., the inventor of the Taunton speeder, the self-acting mule, and the ring spinning frame. His machinery is largely manufactured and used in England, and it is difficult to believe that English workmanship is so superior to American as to make all the difference stated by the writer of the letter. We venture to assert as our belief that the eighty-six mules purchased by Mr. Johnston were of Mr. Mason's plan, and that the American machinery he is throwing out and replacing with English is not of the best kind manufactured here. If our surmises are WRONG it is high time that our inventors and mechanics bestir themselves and gain, at least, an equality with Europeans in the manufacture of cotton and woolen machinery. But really the letter appears to be an advertising dodge to benefit the writer as agent for some foreign manufacturers, especially as there is no such firm in New York as "Garnn & Co."

The New Word "Photogram."

"CARL BENSON" asks through the New York *Times* "What does the SCIENTIFIC AMERICAN propose to do with *autograph*, *monograph*, *paragraph* and *lithograph*, all of which represent the *thing* and not the *agent*?" We have no means of knowing whether this gentleman means to call for information or to convey a challenge. To meet each supposition in turn: First, what does Mr. Carl Benson think should be done with *epigram*, *anagram*, *telegram*, and *monogram*; all of which words are classically constructed to indicate the thing and not the agent? There is something anomalous in the past manufactures of our word-wrights, on one side or the other, and we have shown clearly where it is. If we are to be too conservative to "reform it altogether," is that an argument for going on under the wrong precedents when we have an equal number of right ones to follow? For our own part, we think enough of a correct and consistent analogy in the structure of words, to be willing to sacrifice the four wrong words to the four right words above cited. "Paragram" would have a nine-days oddity about it, we confess, but the three less popular words would give but rare offence to prejudice in the corrected form. Put them all into good *grammar* at once.

THE GREAT PEAT DELUSION.

BY PROFESSOR CHARLES A. SEELY.

A simple inspection of the composition of peat furnishes data for a very close estimate of the quantity of heat it can produce in burning; and thus we may easily arrive at a good opinion of its money value. For the heat producing power is what we want in fuel, and other things being equal the price of fuel must be ruled by it. Prof. S. W. Johnson gives the following as the per centage composition of the best quality of compressed peat:—Carbon 47·2, hydrogen 4·9, oxygen 22·9, ash 5, water 20. Water, ash and oxygen being incombustible cannot contribute to the heat, and the kindest view of them in peat is that they are simply worthless. This worthless matter is then 47·9 per cent. The oxygen is not in a free state but is combined with and thus neutralizes its equivalent of the hydrogen and carbon. The worthless part thus increases to over 50 per cent. of the weight of the peat. And we are too generous when we consider the incombustible part only worthless, for it is positively harmful. Fifty per cent. of such matter intimately mixed with a combustible implies a reduction of the intensity of the heat to one-half, and a notable decrease in the quantity by reason of what is required to change its state. Twenty per cent. of water is to be evaporated out of our model sample, and the heat required for that slips beyond our control. Is it unfair to conclude that this peat has no more than 45 per cent of heat-producing element, and that per tun it is worth only half as much as good anthracite?

It must be noted that the above estimate is made for the best quality of peat, and that it is very far from representing the truth about peat in general. The average value of the peat proposed to be brought into market by peat companies probably does not exceed one-third that of the best anthracite.

It is claimed, however, that by the use of machines (yet untried) peat is to be so improved that it will rival anthracite. But no one has yet told us how and why manufactured peat will produce more heat. No machinery surely can increase the combustible part, or decrease the incombustible and heat consuming part. The fact is, that the effect and object of mechanism is only to improve the physical properties of peat. I suspect that mineral coal is taken as a model, and the machines are to make imitations of its admirable hardness and density. So far, no machine has been able to give peat the density of anthracite.

If any one concerned in the matter is not satisfied with conclusions reached by the above plan of reasoning, let him make the simple and practical test of evaporating water, or learn the experience of others, which may be found widely published in books and periodicals. Concerning peat, there are no questions which need receive a doubtful answer. It has been used as a fuel for centuries, and its relation to other fuel has been the constant study of ingenious men: we have the experience and the best judgment of the accurate and economy-loving German.

But all this is not to say that peat has no value in the United States. I have only labored to point out a fair criterion of its intrinsic value. Peat is simply not so good as something else. Where we cannot have the best, we very properly use and praise the poorer quality. In the desert the lukewarm dirty water is as refreshing as nectar to the gods. The pioneers of the plains use the dung of buffaloes for fuel and they seek it as if it were a treasure. Peat has been a salvation for Ireland and some parts of Germany. Our own country is very broad and we have peat everywhere. If there are localities circumstanced concerning fuel like Ireland, there peat will be a fuel. But Pennsylvania and New York city are probably a great way from such localities. What is needed now is to determine the places where peat can be used profitably. Outside of these the peat bogs should be left undisturbed till our descendants need them. Peat is only an immature coal, and we have only to let it alone, and in a few thousand years we have a coal mine. Perhaps by the time we shall have exhausted our present mines we may open new ones where now are the great Dismal Swamp of the South and the Montezuma marsh of New York.

To conclude,—peat is valuable when on account of cost of transport, coal is too dear. But the actual value has been greatly exaggerated. There is an excitement on the subject which with many has taken the character of an infatuation. Notwithstanding timely warnings of danger some of my best friends have burnt their fingers with peat. This state of things will not last long. In a few years most of the peat bogs will be left to unmolested repose, while some districts in Maine and at the West, will find their peat a bountiful gift of Providence. And history will add the story of the great peat delusion to the facts concerning Morus Multicaulis and the Hen Fever. And I trust that all the proprietors of ingenious machines may be as lucky as was Lord Dexter, who sent a cargo of warming pans to the West Indies, and realized a good profit when it was found that the warming pans could be converted into sugar scoops.

AN HONORED NAME.—The last living heir of CHRISTOPHER COLUMBUS, and Duke of Veragua, died lately in Spain.

CONDITION OF THE PATENT OFFICE.

The calorific class, under the charge of Examiner Deane, is, we learn, close up with its work, as are some other classes.

There was a time when applications for stoves, furnaces, etc., remained unacted upon for several months, but thanks to Mr. Deane's industry the large batch of cases in his department have been worked off.

We hope soon to be able to report as satisfactory a condition of some other classes which are now sadly in arrears. If the fault rests with the Commissioner in not supplying adequate force, we hope he will see to increasing it. If it rests with Congress, in not legislating to pay ample salaries to the Examiners to stimulate them to perform their duties properly, we trust that body will authorize an increase of their pay which is unquestionably inadequate for the talent needed, and labors required. The inventors are taxed sufficiently already, but they are willing to pay more if necessary to insure the prompt action of the office upon their cases. Many applicants for patents in some Classes quietly demur at the delay in the examination of their cases, others impatient or less amiable, are more imperative and demand a reason for the seemingly partial action of the Patent Office in examining some cases about as soon as the application is filed, while others remain unacted upon for several months.

Such disparity in the time taken for a decision under the different classes, causes much dissatisfaction which would be obviated by keeping every Class on the same level.

The examination of cases in the following Classes are those most in arrears, some of which are sadly so: Metallurgy, which includes Locks; the portion of Hydraulics which embraces Water Wheels; Farm Gates, Wearing Apparel, Fibrous and Textile fabrics, and Fine Arts, which includes games, toys, printing, copying presses, etc.

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, January 10th, Prof. Tillman presiding.

VEGETABLE WAX.

Among the novelties presented, was a specimen of vegetable wax from the island of Margaret, off the Texas coast. As it is found in connection with petroleum, the possibility of its being paraffine was advanced, but the composition of this substance is different, and more nearly resembles the tallow tree of Japan.

PLASTIC ANATOMY.

Some excellent imitations of natural fruit were shown, most perfect in shape and color and made from a composition invented by M. Julian Ledion. The same gentleman also exhibited a number of pathological specimens of plastic anatomy modeled in the same substance from cases in the hospitals of France, and which in minuteness of detail and fidelity to life were pronounced perfect by the medical critics present. A great advantage of the compound wax, which is generally employed in forming these models, is its firmness in retaining its shape in any climate.

PROFESSOR GRIMES.

The greater part of the evening was occupied by this gentleman in a labored attempt to overthrow the nebular theory of Laplace and to substitute therefor an original hypothesis. Statements were brought forward which could only support his position by an utter disregard for all the established and universally received laws.

PROFESSOR TILLMAN.

In closing the meeting, the chairman, in reply to an irreverent expression which had been used during the evening, spoke of the revelations of science as confirming more strongly our belief in an all-wise and all-powerful Creator. Modern investigations prove that the myriads of stars, or suns, are but parts of one grand system guided and governed by the same will.

Research shows that the known universe is pervaded by a subtile ethereal medium, in which all celestial bodies are immersed and through which an ubiquitous power is incessantly exerted: further we have reason to believe in the existence of a still more attenuated agency reaching to the very confines of the spiritual, and through which the Creator may communicate with his rational offspring. But this is a field of mere speculation, and we are compelled to confess, "His ways are past finding out." Science can only definitely testify to the presence throughout the universe of a unity of power and of design, that power being the Divine Energy, and that design a direct emanation from the Deity.

The Diamond Drill.

The apparatus for boring rocks with diamonds was originally patented in France by Leschot, in 1864, and was rendered practical by Pihet, in 1866. It consists of an iron tube, the end armed with a series of black diamonds of Siberia, which are set in such a way that by turning the tube they excavate an annular groove in the rock, and leave in the center a solid cylinder which enters the tube, and is easily broken off and extracted when the boring is finished. Fifteen such machines have already been manufactured. The progress is about three quarters of an inch per minute. The diamonds wear very little; it is known that this also is the case with the glazier's diamonds, and that the black diamond is a variety much harder than any other. The expense of boring with a machine of this kind is not materially greater than boring in the old way, although more work is turned out; but the great advantage is, that in the same space where three borers were attached, eight of these machines may work, requiring not more power to drive them. The expense of excavating tunnels with a single machine of this kind, in hard rock, was found in France to be forty or fifty francs per cubic meter, which corresponds to $6 or $8 per cubic yard.

HINTS FOR INVENTORS ON STEAM CONDENSERS.

[For the Scientific American.]

The connection of condensers with steam engines, seeks, in general terms, to subserve one of two purposes, viz: (1) either the reduction of the vapor to fluid that it may as such be returned to the boiler, or (2) the restoration of it to the water state that it may be devoted to some other use.

The problem submitted to invention for solution under the first head, is to effect the condensation at the highest possible temperature and to return the product to the boiler as near the ebullition point as attainable. The conditions under which these two ends can be accomplished, are to be met in the apparatus, and to realize them is the task which mechanical and chemical talent has proposed to itself. He who comes nearest a full satisfaction of these *desiderata* will give the world a most valuable invention. In all attempts to reach these results, there are some well-settled facts to be borne in mind. Among them are the following:

That water contains a large quantity of air in a state of solution, and that by boiling it, this air may be liberated, so that the liquid contains less than any assignable measure: that water freed from air will not boil at all, but at 260° Fah., or thereabouts, explodes into steam with destructive energy: that water in this state and at the temperature noted, will burst into steam if so much as a drop of the fluid in its natural condition be thrown upon it.

These are facts familiar to the manipulations of the laboratory. Others belonging to the same family are as follows: that water in being crystallized is deprived of every atom of air—hence ice possesses not a particle of it: that ice, melted under oil to exclude the atmosphere, does not, upon taking the liquid form, boil at any temperature, but explodes with violence at about 260° Fah. These are facts not so familiar, but nevertheless well established and incontrovertible.

Related to the subject before us, and therefore embraced in the investigations of the inventor, are also the ensuing: that all fresh water used in boilers is impure: *i. e.*, invariably consists of something more than hydrogen and oxygen combined: that in heating it, the acid and alkaline matters existing or evolved form salts, which present themselves in solution or in incrustation: that in boiling it, the air contained is slowly set free and mingled with the gases generated in the formation or by the resolution of the salts: that upon depriving water of its air, the adhesure of its particles seems to be greatly intensified, and its elasticity destroyed, insomuch that a stream of it poured into a glass tube gives a peculiar metallic sound

In the presence of these three series of facts, it becomes us to inquire whether a steam condenser, which collects and returns to the boiler the vapor that the engine discharges into its exhaust, will not gradually separate the air incorporated with the water and thus (*a*) steadily advance the point at which steam can be raised from 212° to —° Fah: and (*b*) finally, at 260° Fah., cause an explosion of the boiler.

Another question, not yet answered by invention, though intimately blended with this, is whether by any means within practicable reach, the air set at liberty by ebullition can be re-combined with the water and thus preserve the liquid in its normal status.

In most condensers of the kind under review, provision is made for the escape of the gases generated by the impurities of the water, and with them, of the air upon which the vitality and safety of the fluid depend. Could not these gases be discharged without carrying the air with them? Or could they not be absorbed without taking up the latter also? These are practical and important inquiries to meet and satisfy.

If a steam engine could work without loss a condenser without leakage, and thus return to the boiler all the water originating from it, the probabilities are that it would prove a source of serious apprehension and not be a desirable thing under any circumstances. Hence another question arises, and that is, how much water in its natural state should be supplied to the "fountain of power" under assigned conditions, to prevent the boiling point from approaching too near 260° Fah: or rather, at what figure on the sliding scale from 212° to 260° Fah. should ebullition be secured in view of the greatest economy of fuel and of the highest safety of operation.

From these considerations it would appear that the more complete the condensation, where the water is restored to the boiler, the higher the ebullition point rises above 212° Fah: that as this point ascends the scale of 48°, the temperature at which the water can be returned to the boiler should be increased; and lastly, that the thermal line, if we may be allowed the expression, on which the steam will condense, passes upward correspondingly toward 212° Fah.

SUGGESTOR.

Goods for the Paris Exhibition.

The ship Mercury, bearing the second installment of contributions to the Paris exhibition, sailed for Havre, on Saturday, Jan. 19th, with about 1,500 packages, or nearly 1,000 tuns in measurement. A large proportion of the cargo comes from New York city and state, and comprises a large variety of the products of mechanical skill, such as machinery, agricultural implements, etc. The Western states are also well represented. California sends rich specimens of ores and various agricultural products. Illinois sends a school-house complete, the materials being sufficient in bulk to load three rail-cars. From Philadelphia there was received a huge machine weighing forty tuns, designed for working iron. Connecticut is represented by a contribution of fire-arms, and Massachusetts by fabrics from mills and workshops. A handsome street railway carriage, from the manufactory of John Stephenson, in this city, goes to the Exposition, on its way to Bombay, India.

A CLARK TELESCOPE is advertised for sale, in this number. We understand that a rare opportunity is presented of obtaining a fine instrument.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

The Water Spouts of Tusquitta.

MESSRS. EDITORS:—In a recent issue of the SCIENTIFIC AMERICAN, "D. C." gives a very interesting account of the effects of water spouts at Tusquitta; but to an unscientific reader like myself he fails to give any easily understood theory as to how such perpendicular-sided cuttings could have been made by the mere falling of water. He says: "These canals could only have been cut by the force of a descending sheet of water." I also can easily imagine the water must have been descending; but I can hardly believe it was only in a descending state.

From his description of the awful state of the elements at that time, and of the impetuous closing together of two such vast and overcharged clouds, it is easy enough to conceive that the immense body of water which they each contained must have had its natural tendency to descend, thwarted or neutralized by a swift rotary motion of the whole mass, given to it perhaps by a still swifter motion of a vast enveloping ring of electricity, flying round and round it vertically—that is, over and under it—and thus confining the water within its folds, and imparting somewhat of its own velocity to it. The result of two clouds under such circumstances coming together and both rotating in the same manner and in the same direction, would be a sudden flattening and spreading out of the parts in contact, giving, probably, a still more increased swiftness of motion to that part of the clouds thus flattened and extended.

D. C. says that when they met they shot instantly upward. Yes, and no doubt they shot as instantly downward, and not only so, but circularly too, though such fact might not and would not be perceived.

At this stage of the imbral combat, the under part of the periphery of this gyrating cloud wheel coming in contact with the earth, acted on it like the edge of a swiftly revolving circular saw, cutting for itself a clean sided channel, where it first struck, and widening the cutting, and leaving it less clearly marked as it continued its descent and lost its electrical power; until, by degrees, the volume of water thus discharged on the sides of the mountain would follow its natural laws, and the electric phenomena obeying also the great fiat of nature's God, would quietly subside.

This view of the matter would easily account for the peculiar appearance of the chasm at the spot so evidently first struck. One can scarcely conceive that water alone could be capable of cutting the roots of trees as clean off as though done with a knife, while it is easy to imagine the electric fluid to have been the author of it in some way or other, if not exactly in the way I have ventured to surmise.

J. H. HODSON.

Perspective Drawings.

MESSRS. EDITORS: A sentence in the article on Perspective Drawings, in the SCIENTIFIC AMERICAN (No. 2, this volume) is likely to give trouble to some artists, judging from what I had myself, and for the same reason: that of supposing that, because a photogram of a street scene exhibits a convergence of vertical lines, therefore a *true* perspective drawing should have the same convergence. I therefore proceeded to various nice experiments, even to place myself in the same position whence the photogram was taken; but it was of no avail: the vertical lines would persist in remaining parallel and perpendicular to the horizon. But as something must be wrong, whenever two operations conducted on the same principle do not agree, I determined to find where the error was, and therefore proceeded to examine more closely the photogram, notwithstanding its reputed infallibility. The cause soon became plain: When a photographer takes a street scene from a certain altitude, he has to incline his instrument a few degrees, thus giving the sensitive plate a slight inclination forward. The plan is no longer a vertical one, and hence the *necessary* convergence of vertical lines. If the plan had an inclination of 45°, both vertical and longitudinal lines would converge alike. Continuing the inclination downward, the longitudinal lines will converge less, and the vertical ones more, until we reach the horizontal position, in which the plan exhibits no convergence either in longitudinal or transverse lines, but all vertical lines converge more or less according to distance. Yours, respectfully, E. ROSE.

Ottawa, Ill., Jan. 14, 1867.

The Amazon.

The Emperor of Brazil has decreed that the vast inland system of the Amazon and its great tributaries, the Tocantins and San Francisco rivers, shall be freely opened to the commerce of all nations. Prof. Agassiz tells us that the climate of the immense valley of the Amazon is delightful. A cool breeze goes up the river at all times, the thermometer varying between the extremes of 72 and 92 degrees, and averaging 84. He says that although warned beforehand that he was going into a region of death, he found that there were no dangers and hardly any discomforts to be met with. Perhaps the Professor was unduly propitiated by his unprecedented haul of fish. The whole region is a vast plain—an unbroken expanse of wood and water—having a descent of only 210 feet in 3,000 miles. The annual swellings of the river rise from 30 to 50 feet, and convert the whole into an ocean for some months of the year, centering in June, and communication is then carried on by boat paths among the tree tops. The primitive and universal forest is almost impenetrable, and filled with the choicest timber, of which 117 costly varieties cut from a tract half a mile square, were lately displayed at a provincial exhibition in Para. The length of the valley

is 2,000 miles, and the width 1,000. The waters are coffee colored, except those of the rivers that rise in the woody plain, which are more like molasses. In some places it is equally impossible to see across them or to see through them. We should think the country must be delightful and healthy —for alligators—and possibly for naturalists.

LADIES habitually carry pins in their mouths—we mean in the dressing-room—and always insist that no harm ever came of it. On the contrary, there are frequent warnings in the shape of fatal accidents resulting from this practice. A tailor at Croydon, England, met his death the other day, in consequence of bending a needle between his teeth and accidentally projecting a part of it into his throat.

THE wheat exports from Minnesota last year amounted to 9,267,153 bushels. The wheat crop of the United States (exclusive of the Pacific States) for this period is given as 153,045,857 bushels, an increase of 5,000,000 bushels over the crop of last year. The exportation of grain from California during the year will exceed $6,500,000 in gold.

CRACKED BELLS.—A cracked bell, producing a disagreeable, jarring sound, is repaired by sawing or filing the walls of the rent so that the slightly-disparted edges may not be brought together by the vibration of the blow.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

GATE.—S. A. Kroner, Doylestown, Pennsylvania.—This invention has for its object to furnish an improvement for gate so constructed and arranged that the gate can be easily opened and closed; that it can be opened in any depth of snow; that it will not blow open or shut; that it will exert no side pressure upon the posts; and that is applicable to gates of any form or size.

WINDLASS ELEVATOR FOR RAISING WATER AND OTHER PURPOSES.—W. E. Babcock, East Pembroke, N. Y.—This invention consists in arranging a drum upon a shaft in such a manner that, while it is entirely secure from accident while the weight is suspended from it, a slight reverse movement of the crank sets it free, and allows the bucket or weight to descend without turning the crank.

PETROLEUM STILL.—William C. Welles, Parkersburg, W. Virginia.—This invention consists principally in securing the fire sheets, or plates, to the bottom of the still, through the medium of a frame, whereby many important advantages are secured.

TIE CHAIN FOR CATTLE AND OTHER ANIMALS.—Cyrus M. Baker, Bingham, Maine.—This invention relates to a new and improved tie chain for hitching cattle in their stalls, the object being to produce a tie chain of such a nature that the cattle, when hitched by it to their stalls, can not shift or move their heads to the other side of the posts or stanchions to which they are hitched, thus obviating all danger of the chain becoming twisted, which oftentimes causes the choking of the cattle.

STEAM PUMP.—George Doyle, Worcester, Mass.—The object of this invention is to improve and simplify the means of operating the steam valve in pumps of this description.

SUBSTITUTE FOR CURLED HAIR.—H. R. Hildreth, and W. H. Smith, Dutch Flat, Cal.—This invention relates to a new and improved substitute for the ordinary and common curled hair, so-called, used for the stuffing of the backs and seats of chairs, sofas, lounges, mattresses, etc., and it consists in so treating the fiber of the soap plant so known, as to convert or manufacture it into the proper form for being used as a substitute for the common curled hair, or as a stuffing for mattresses, the seats and backs of lounges sofas, chairs, etc.

MARINE MOTORS.—W. P. Kirkland, San Francisco, Cal.—The nature of this invention consists in applying as a motive or driving power, the speed or force generated by the propulsion of a vessel through the water, which result is obtained by so arranging a suitably shaped water wheel within the keel or bottom portion of the vessel, immersed in the water, that as the vessel moves through the water, it will be acted upon thereby, and thus made, through any suitable arrangement of connecting parts, to operate the ship's pump, or pumps, or any other desired mechanism of the vessel.

CLEANING KNIVES, ETC.—R. R. Pattison, Chicago, Ill.—This invention relates to a machine intended more particularly for the cleaning or scouring of table knives and forks, although it can be used for other knives, etc.

AMALGAMATOR.—Syranus Standish, Pachea, Cal.—This invention consists principally in providing the rotating muller shaft with a series of spiral flanges or wings, which, as the muller revolves, cause the pulp to be forced under the shoes, and thus brought into contact with the quicksilver or mercury used.

COAL HOD OR SCUTTLE.—David Wright, New London, Conn.—This invention consists in providing a coal hod or scuttle, with a mouth or spout at or near its lower end, for the purpose of removing the coal therefrom without necessitating the lifting of the scuttle.

AUGER.—A. C. Kasson, Milwaukee, Wis.—This invention consists in forming the twist of an auger or auger bit, so that while half circles shall be formed by the twist for the discharge of the shavings by turning the edge of the twist inward, the cutting lip of the auger shall receive its shape from the form of the twist, and the outer edge of the twist shall be a cutting edge the whole length.

PUMP VALVE.—A. S. Cameron, New York City.—This invention relates to a pump valve, which is made of india-rubber or other soft and elastic material, confined in a metallic case, in such a manner that when the valve comes down on its seat, its elastic face will freely accommodate itself to the same, and close tight, and at the same time the india-rubber or other soft and elastic material is confined in the metallic case, so that it cannot be compressed sufficiently to allow metallic contact between the valve and its seat, and, furthermore, by the metallic case the india-rubber or other material is protected, and a valve is obtained which is not liable to leak, and which will not wear out or require refitting for a long time.

SAD IRON.—B. B. Hood, Milford, N. H.—This invention consists in constructing a sad iron with a metallic face and handle, and with the body of the article composed of soapstone or other mineral substance.

PLOW.—William S. Huntington, Byron County, Mich.—This invention relates to a device to be attached to a plow for the purpose of preventing it from choking by the accumulation of weeds, grass, stubble, etc., in front of the mold board.

SMOKING PIPE.—James W. Truman, Macon, Ga.—This invention relates to an improvement in the packing of a pipe stem tip, which is so constructed that it will be durable, easily applied, and not liable to drop off.

SEEDP PEN.—Burton Gifford, Pedee, Iowa.—This invention has for its object to economize feed and time in feeding sheep, and to promote their healthy condition.

HOG PEN.—Burton Gifford, Pedee, Iowa.—This invention has for its object to furnish an improved hog pen, so construct d as to prevent the animals from wasting their food, and so as to promote their healthiness and cleanliness.

DISH WASHING MACHINE.—Gilbert Richards, Cummington, Mass.—This invention has for its object to furnish an improved machine, by means of which dishes may be washed quickly and thoroughly.

SMOKING STAND.—John Holmes, New York City.—This invention consists in a smoking stand, which is provided with a reservoir for smoking tobacco, for cigars, for snuff, for chewing tobacco, for matches, and for pipe lighters, and also with a suitable bracket to support a pipe, in such a manner that all the utensils required by smokers or by persons using tobacco are contained in a narrow space, and persons in quest of one of the above-named articles can easily find them, and, furthermore, a stand is obtained which can be manufactured at a reasonable cost, and which forms an ornament for a counter in a public house or for the mantelpiece in private or dwelling houses.

TURNING MACHINE.—Franz Anton Armbruster, New York City.—This invention relates to a turning lathe, which is intended particularly for the manufacture of pipes, but which may also be used for articles of any other description. The tool or tools used in turning are secured to a chuck, which is fastened on the spindle of the lathe, and said spindle is so arranged that an oscillating motion can be imparted to it for the purpose of turning such parts as, for instance, that portion of the bowl of a smoking pipe where the same joins the stem, and where the tool cannot pass clear round. The oscillations of the tool holder can be increased or decreased according to the article to be turned.

STOVE.—Samuel S. Utter, New York City.—This invention consists in the arrangement of a secondary air chamber, and a separate plate over the bottom part of the back plate of the fire place of a stove, in such a manner that an additional space is obtained for heating the air before the same is allowed to pass to the main air chamber, and through it to the fire, and, furthermore, by said secondary air chamber, the lower part of the back plate is prevented from burning. It consists further in the arrangement of air channels leading from the back plate of the stove down to the lower part of the back oven plate, in combination with the air chamber in the back plate of the fire place, in such a manner that the vapors rising from the articles to be baked are free to escape, and a supply of hot air is carried to the oven and to the fire, and thereby the process of baking is facilitated, and the gases emanating from the fire are consumed more perfectly than in ordinary gas-consuming stoves.

MACHINERY FOR DRESSING AND SEPARATING FIBER OF PLANTS.—Edwardo Juanes y Patrullo, Merida, Mexico.—This invention relates to an improvement in machinery for dressing and separating the fiber of the leaves and stalks of tropical and other plants, such as the banana, cocoa, and the agave Americana.

CONVERTING MOTION.—Augustus Eckert, Trenton, Ohio.—This invention relates to a novel kind of an escapement, which is so constructed that by the action of a weight or spring on suitable gear wheels an oscillating motion can be imparted to a pendulum, and a device is obtained which can be used to advantage for operating a fan, or for imparting motion to a device of a similar nature.

CONDENSER.—J. P. F. Datichy, West Hoboken, N. J.—This invention relates to an improvement in that class of condensers which are based on the application of water or air, separate or together, so as to condense the exhaust steam of an engine, and return the same to the boiler.

PILE FOR MAKING STEEL-HEADED RAILS FOR RAILROADS.—Herbert Davis, Troy, N. Y.—This invention relates to a new and useful improvement in the manufacture of steel-headed rails, or those which are composed of an iron neck or base and a steel head or upper surface. The invention consists in a novel manner of forming the pile from which the rail is rolled, whereby the steel head or upper surface is firmly connected to the lower iron portion, and effectually prevented from separating under the wear and tear to which the rail is subjected by the action of the car wheels upon it.

BEEHIVE.—Orson Colvin, Belvidere, Ill.—This invention relates to a new and improved beehive, and it consists in a peculiar construction of the same, whereby the bees will be protected from dampness and from severe cold in winter, and better provision made than usual for the removal of surplus honey from the hive.

NECK YOKE.—Alonzo Benedict, Janesville, N. Y.—This invention relates to a new and useful improvement in the connection employed between the neck yoke and draft pole. Hitherto leather alone has been employed, and this soon becomes worn and cracked, and is very liable to break or give way. The object of this invention is to obtain, at a small expense, a durable connection and one which may always be kept in proper order without the aid of a mechanic.

APPLYING OR LAYING PLASTIC ROOFING.—Lorenzo D. Ford, Canaan, N. Y.—This invention relates to a new and improved mode of laying that kind of roofing which is composed of a plastic material spread upon a foundation of paper, cloth, or other flexible material. The invention is more especially designed for the laying of what is termed the plastic slate roofing, and it consists in bending the edges or selvedges of the prepared paper or cloth in such a manner that the edges of the same, when applied to the roof, may be connected together by a lock joint, which will effectually prevent leakage.

THILL COUPLING.—John F. Bridgett, Washington, D. C.—The thill at the point of its articulation with the clip iron is supported by a set plate whose screw is threaded into the forward extended end of the plate under the axle through which the bolts of the axle clip pass. A packing intervenes between the set plate and the thill, which latter is prevented from jarring by being passed upward against the bearings.

WINDOW BLIND.—Robert Hutton, Williamsburgh, N. Y.—Patented January 1st, 1866.—This invention relates to window blinds having tenon slats, and it consists principally in a novel manner of connecting the several slats to the operating rod employed for moving the slats.

SPRING BED BOTTOM.—H. H. Palmer, Rockford, Ill.—This invention relates to a new and improved spring bed bottom of that class in which wooden slats are used in connection with wire springs. The object of the invention is to obtain a bed bottom of the class specified which will possess a requisite degree of elasticity and still not be liable to sink or become depressed or lose its elasticity and which will be stronger and more durable than those hitherto constructed on the same plan.

SULKY PLOW.—George Basket and Samuel M. Gaskill, Bluffton, Ohio.—This invention relates to a new and improved plow of that class which are connected to a frame mounted on wheels, so that the plowman may ride and drive while manipulating the plow, and which are commonly termed sulky plows. The invention consists in a peculiar construction and arrangement of the parts, whereby the plow may be manipulated with the greatest facility, and a very simple and efficient improvement or device of the class specified obtained.

CORN PLOW.—John Hindmarsh, Ill.—This invention relates to a new and improved plow for cultivating corn and other crops grown in hills or drills, and it consists in a novel manner of applying the plows to the machine whereby the former may be raised and lowered and also moved laterally by the manipulation of a single lever, and the plows thereby placed under the complete control of the driver and made to conform to the sinuosities of the rows of plants. The invention also admitting of the plows being set or adjusted to plow at a greater or less depth as may be desired.

DOUBLE-SHOVEL CULTIVATOR.—Silas M. Whitney, Galesburg, Ill.—This invention relates to a new and improved manner of attaching the shovel standards to the team whereby the standards, and consequently the shovels, may be adjusted higher or lower, or set to work at any required depth and also adjusted in a more or less oblique position as occasion may require. The invention also relates to a gage wheel applied to the rear part of the beam for governing the depth of the penetration of the shovels and admitting of the same being readily guided to the right or left to conform to the sinuosities of the rows of plants.

NEW PUBLICATIONS.

THE SLIDE VALVE PRACTICALLY CONSIDERED. By N. P. Burgh, Engineer. Henry Carey Baird, 406 Walnut street, Philadelphia, Pa.

Mr. Burgh is well known by former volumes on steam and other machinery. He is an English Engineer of note, and although sometimes holding opinions at variance with commonly accepted theories, he generally fortifies his position with the demonstrations of experiments. In this volume all his conclusions are drawn from actual trials, no assumptions, as such, having been admitted. The treatment of the common, exhaust, relief and equilibrium valves is lucid and plain, easily understood, and illustrated by a number of engravings, sectional and plain. It will be found a useful guide to the engineer and the mechanic.

A NEW GUIDE FOR THE SHEET IRON AND BOILER PLATE ROLLER, containing Tables estimated and collected by C. K Perkins and J. G. Stowe. Baird, Publisher, 406 Walnut street, Philadelphia, Pa.

This volume is a collection of twenty-five tables, giving the weight and proportions of slabs and piles for producing plates, with the thickness by wire gage of the product required, in feet, inches and fractions. The tables are printed on only one side of a sheet, and are well arranged for reference.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us: besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

N. M., of N. J.—"Cold short" iron is that sort of wrought iron which although tough when heated, is very brittle when cold. It will resist oxidation better than other kinds of forged iron and is distinguished by a texture consisting of shiny plates when fractured without signs of fibers. "Red short" iron is brittle when cold. It may be distinguished by the cracks and fissures on the outside of the bars. The brittleness in both these kinds of iron is supplied to be caused by the presence of sulphur and phosphorus.

L. P. S., of Pa.—We believe the first paper mill in this country was established at Roxborough near Germantown, Pa., on Paper-mill Run by William Rittenhousen, an ancester of David Rittenhouse, the eminent American Philosopher. Paper was made here in 1690.

D. A. R, of N. Y.—Sponge may be bleached almost snow white by repetitions of the following process: Soak it in diluted muriatic acid ten or twelve hours, then wash it with water and immerse in a solution of hypo-sulphite of soda to which a small quantity of diluted muriatic acid has been added. Wash and dry it.

E. W. P. of Ind.—13° Cartier are equivalent to 13° Baume. Cartier's hydrometer is used to some extent in France. The formula for converting one scale to the other is: 16C—15 B= 22.

R. L. S., of Pa.—There are inexhaustible sources of salt in the United States; there is no other country so favored in the quantity. Unfortunately, however, for the present, our best salt mines on account of the expense of transportation, are unavoidable. When Texas and the States on the Pacific coast are netted over with railroads and canals we will carry to market more salt and the substances which depend upon it, than all the rest of the world.

V. R., of O.—Your speculations on a tough and elastic glass we fear are only a dream. Mica and gelatine are fair substitutes for what you are striving for, and there is still a good opportunity for ingenuity in divising new applications of their combined elasticity and transparency.

S. C. B., of Conn.—The combustion of gas in a gas stove is seldom as perfect as from the ordinary gas light burner. As to the amount of heat, therefore, the latter has a slight advantage. The same remark is also applicable to the combustion of petroleum oil.

W. R. S., of Pa.—Carbolic acid is a substance quite like creosote in odor and disinfectant properties, and they have a similar origin. Creosote is obtained from wood tar, and carbolic acid from coal tar. Carbolate of lime is a mixture of carbolic acid and lime.

A. and M., of N. Y.—You will probably find that you can make a suitable covering for your large wooden roller out of the rubber cloth which contains no fiber: the cloth is commonly called hospital sheeting. You would find it a very troublesome business if you attempt to dissolve rubber and spread it on a large surface of wood.

C. H. I., of Pa., enquires how to tan or otherwise prepare bladder so that it will not taint the water of an aquarium if used as a reservoir.

S. P., of Ill.—You will probably succeed in bleaching your ancient engravings by exposing them to air slightly charged with chlorin, or immersing them in chlorine water, or a solution of chloride of soda. Ozone is said to be an admirable bleaching agent, and without doubt may be used successfully for bleaching ancient specimens of printing.

R. B., of N. Y.—Crude or unvulcanized rubber becomes hard and brittle at very low temperatures. Vulcanized rubber is comparatively little affected by changes of temperature, and it preserves its elasticity sufficiently for all ordinary uses. Whether the latter will answer your purpose we can give no opinion until we have more information about the use to which you propose to put it. . . . Goodyear's patents for soft rubber have expired. The patents, for hard rubber are still in force and if you use it, you must have the permission of the proprietors of the patents.

R. H. J., of Del.—The best way to preserve green corn is to dry it thoroughly. When kept moist its substance is in a more fermentable condition than that of most other vegetables, and the use of an antiferment is impracticable for the reason that it would injure the taste. The acid of fruits and tomatoes is a natural anti-ferment, and consequently they are very easily preserved.

J. A. G., of——.—A very good way for removing the flesh from the skeletons of small animals is to place them near ant hills. The ants very soon eat up the flesh and leave the bones clean. The flesh is also sometimes removed by boiling or by placing the bodies in a stream of running water.

W. F. C., of Ill.—The pressure of water is always proportioned to its depth, and is a tride less than half a pound for each foot. The form of the containing vessel has no effect whatever on the pressure. In the case you suppose of two vertical pipes of an inch in area of section united at the bottom by a horizontal pipe and each of the vertical pipes containing 50 lbs. of water, the pressure on each square inch of the horizontal pipe would be fifty pounds. Did you imagine it would be one hundred pounds?

Business and Personal.

The charge for insertion under this head is 50 cents a line.

A 90 horse-power Turbine wheel wanted; best construction. Address J. H. Watson, Esq., 227 Palace street, Toronto, C. W.

A dynamometer is wanted by Ford & Kimball, Concord, N. H., for measuring the power of shafting.

John S. Tucker, Omaha, Nebraska, Box 354, calls for the best laundry machinery.

B. and C., of Canada, can learn something in regard to pin machines by addressing Hoxie, Bowdoin & Co., Hartford, Conn.

Albert D. Rust, of St. Louis, Mich., wishes to engage parties to make his patent wire clothes line and fastening, patented January 4, 1867. Rights for sale. See advertisement.

O. M. Fletcher, Elmira, N. Y., wishes to communicate with manufacturers or dealers of small wood planers and dovetailing machines.

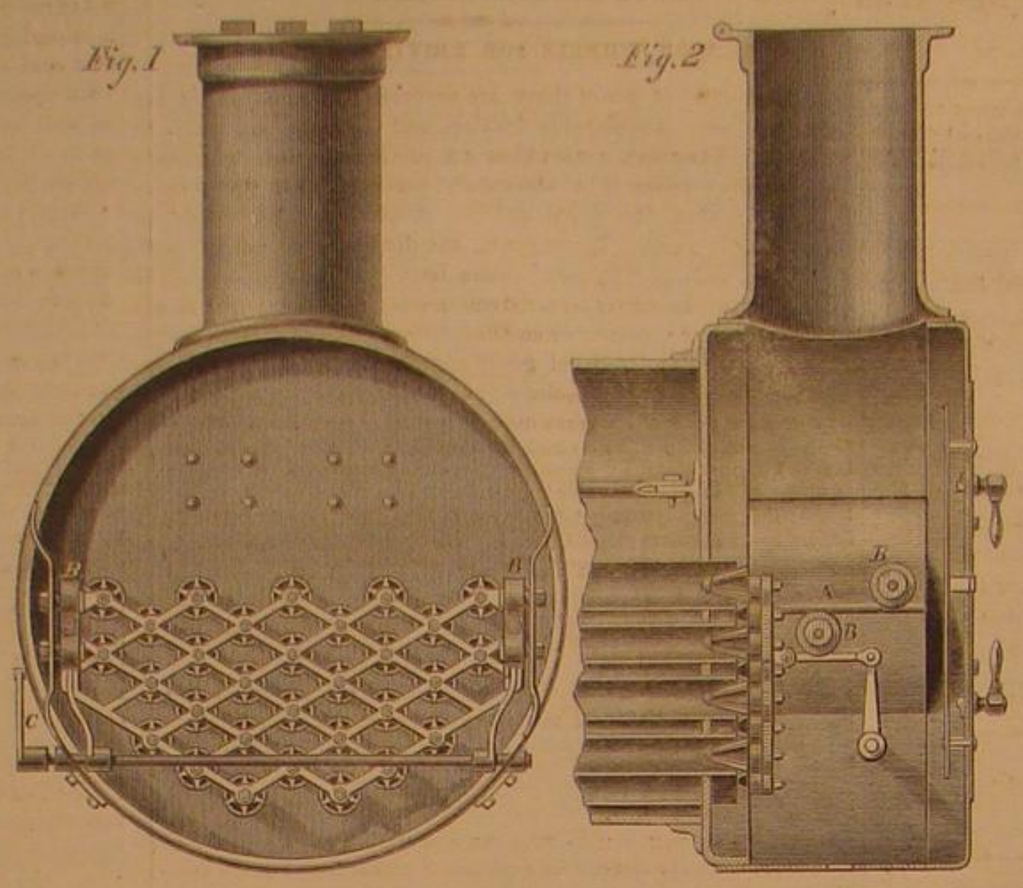
Dr. Landis, 13th street and Girard avenue, Philadelphia, Pa., wishes the address of parties who will manufacture his Patent "Magnitude Syringe and Organic Bath," on royalty, or become partners. A fortune is certain. Send for "Medical Guide" for its explanation and uses.

A New Device for Cleaning Boiler Tubes.

The apparatus which we represent in the accompanying engravings seems to contradict some of the accepted theories of the physicist and the experiments of the mechanic; yet, if *The Engineer*, London, is correct, its use has been attended with remarkable results. It was exhibited at the Smithfield Club Fair, a few weeks ago, by the Messrs. Robey, engineers at Lincoln, England. It is called "Lake's Smoke Consumer," and at first sight seems to produce its results on the principle of *lucus a non lucendo*.

The apparatus may be easily explained by the aid of the engravings. It consists of a series of conical fluted plugs, one for each tube of a multi-tubular or locomotive boiler, secured to a lattice frame at the intersection of the bars by bolts and nuts. The frame is suspended on two guide rods, A, which run between friction rolls, B, with concave peripheries, and is worked by the lever, C, at the side of the smoke box. *The Engineer* says: "At first sight it would appear that the only effect which such an apparatus could produce would be to reduce the calorimeter of the boiler, and with it the draft. It would be too much to assume, *a priori*, that the results would follow which we are informed on indisputable authority do really follow, and therefore we are disposed to regard the scheme more in the light of a discovery than an invention, as we cannot think that any man, resting his experience on generally known facts, only, could conclude that these results would ensue; although an acquaintance with certain experiments, the details of which are little known in this country, might possibly lead him indirectly in this direction. The first result of the application of Lake's apparatus is, that the accumulation of soot in flues is entirely prevented; they are found to be as clean at the end of a month as at the beginning. The second result is of much greater value. Messrs. Robey informs us that they have carried out a series of elaborate experiments with an engine to which this apparatus was applied. The power expended was measured by a friction brake, and the coal consumed was carefully weighed. A direct saving of 23 per cent in the fuel consumed was obtained." *The Engineer* does not attempt to account for the results it has recorded, but hints at a hypothesis which will receive early attention.

Undoubtedly this device—assuming the statements in regard to its practical results to be reliable—will arrest the attention of mechanics. We desire, however, to point to one or two facts which may have a bearing upon the problem presented by this apparatus. It will be seen that the cones are attached to the smoke end of the tubes, and it is well known that the passage of smoke and the gases of combustion through tubes is delayed or retarded by the friction on the interior surface. The gases therefore take the readiest way for an exit. In this case the action of the cone plugs is similar to that of a damper, except that they cannot entirely prevent the escape of the gases, as their surfaces are fluted instead of plain. The result would be: 1st, To compel the gaseous products of combustion to impinge upon the inner surfaces of the tube, thereby removing the soot or other depositions as fast as generated. 2d, By partially closing the tubes and delaying the escape of the gases they would become heated and thus be rendered combustible. There may be other conclusions to be drawn from this experiment, as the contracting of the chimney throat or its equivalent to insure the compression of the gases, etc.; but our object is mainly to draw attention to this remarkable device, which is more suggestive than demonstrative in its operation.



DEVICE FOR CLEANING BOILER TUBES.

Surplus Patent Fund.

If Congress will confer upon the Commissioner of Patents the necessary power, we are assured that the examining force of the Patent Office will be permanently increased without delay, so that all applications will be examined within twenty days after they are filed. This is a very important matter, and ought to receive legislative action at once. The surplus fund ought to be used, so far as necessary, to duplicate by the photographic process copies of all the drawings, and each Examiner should have a set of such of these copies as relate to his class, and for the exclusive use of his bureau. This would greatly facilitate examinations by saving the Examiner much time now taken up in hunting for drawings in the draftsman's room. The fear expressed by a cotemporary whose chief editor seems to be a pair of shears and wastes some of its time in snapping at the Scientific American, that the surplus fund is liable to be taken to apply toward the extinguishment of the national debt, is too absurd to merit notice.

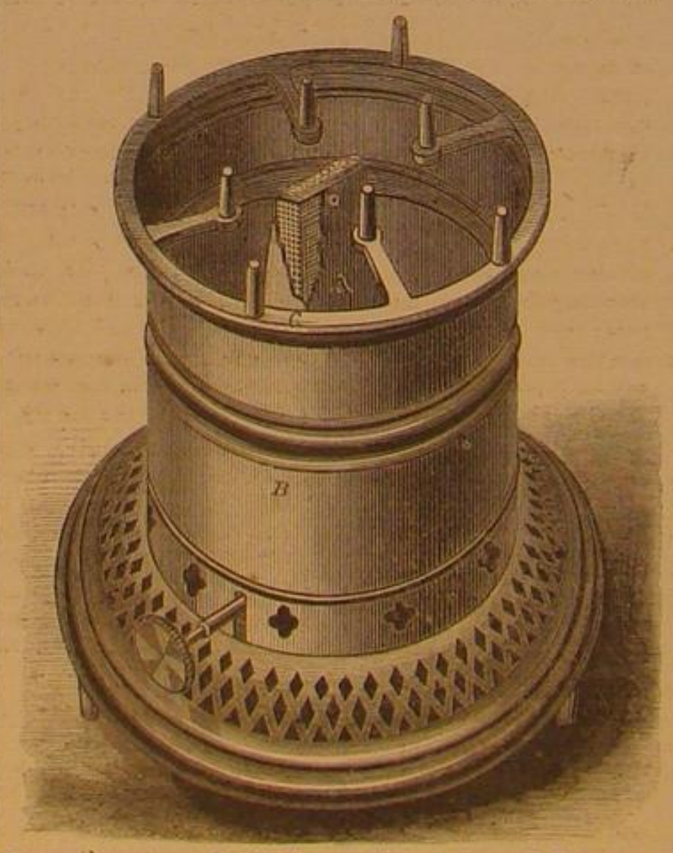
American Emery.

About a year ago we noticed the important discovery of an apparently inexhaustible mine of emery, of a superior quality, in the town of Chester, Massachusetts. It may not be generally known that previous to this time the entire amount made use of in the arts and manufactures was obtained from a few localities in Asia Minor and the Grecian Archipelago, and that two firms, one in Smyrna, the other in London, enjoyed the entire monopoly of supplying the world. That the trade was of no insignificant proportions is shown. The annual consumption in the United States by machinists and glass cutters it is estimated amounts to over 1,500 tuns. The Chester mine has been developed with such success, that it has averaged for the year a monthly supply of from twenty to thirty tuns, and the total supply up to Oct. 1st was 223 tuns, brought to market in both the massive and crystallized form. In chemical composition the mineral from this mine is pronounced nearly identical with the Naxos or Turkish emery. No less than thirteen distinct minerals have been found associated with the emery, but none in proportions or value enough to pay for mining.

The American supply has lately been further augmented by the discovery of the precious mineral on Arrowsic Island in the Kennebec river opposite the city of Bath, Maine. The value of the emery has been fully tested by numerous machinists, who have declared it equal if not superior to the best imported. The hardness of this substance is shown by the difficulties experienced in working it; fifty drills on one occasion being required to drill a hole eight inches deep, and the jaw plates of the crusher, though made of the hardest Franklinite iron, must be renewed every alternate day.

PATENT PETROLEUM STOVE.

The burning of petroleum oil and its constituents is a subject that has occupied the attention of experimentalists for several years, and inventors have largely directed their efforts to the construction of proper furnaces for its combustion, so that it could be used economically, both in the family and in



generating steam for driving engines. Several differing devices have been brought to our notice for using petroleum for cooking purposes, but none we have examined appear to combine safety, simplicity, and really scientific principles in so great a degree as the one which is the subject of this engraving.

The base of the stove is an open work, cast iron pediment, standing on three feet and holding a tin can, from the center of which rises a wide wick passing through a drum, which serves as a base for a funnel-like chimney, A. The case of this chimney is of tin lined throughout with fine brass gauze. At the bottom the chimney case has openings on the sides for the admission of atmospheric air. The cylinder, B, is of Russia sheet-iron and is surmounted by a cast-iron ring, C, having upward projecting points to sustain the cooking utensil. These points elevate the vessel sufficiently to allow the heat from the flame to circulate above the top of the stove around the sides of the kettle. There is an oven adapted to this stove which is said to bake admirably.

The can is filled with naphtha, benzine, kerosene, or petroleum, the chimney removed, and the wick lighted. The chimney is then replaced and the stove is ready for operation. If the wick is kept down below the point where the flame would produce illumination, there will be no deposite of carbon on the vessel used for cooking, and the gauze, with the plentiful supply of oxygen through the chimney apertures will yield an intense heat.

This stove is the subject of three patents issued Oct. 4th, 1864; May 22d, and June 5th, 1866. It is manufactured by the Morrill Petroleum Stove Co., No. 46 Congress street, Boston, Mass., to whom all orders should be addressed.

Poison for Whales.

The Indians of Guiana prepare a poison from certain plants, which they call woorali. Owing to its peculiar effects in causing a relaxation of the muscular system medical experimentors have often attempted to make use of this decoction as a specific remedy for tetanus or lock-jaw. A poison having just the opposite effect, that is, producing excessive muscular contraction, is strychnine. These two contrary poisons have been combined by M. Thierselm, and the result is a preparation which, if administered even in minute doses, causes instant death.

In whale fishing the compound, mixed in the proportion of twenty parts of strychnine to one of woorali, is made up into cartridges of one ounce in weight, containing enough of the poisonous compound to kill the largest whale. Each cartridge is embedded in gunpowder contained in an explosive shell, and is fired at the animal in the usual manner. If it touch the vital part the whale is gone, otherwise we doubt its efficacy.

The Nuisance of Noise.

There is one kind of noise which must be endured, sometimes even by old bachelors, because it can't be cured. We refer to the squalling of babies. All mankind in turn are offenders and sufferers in this way, and no remedy but the questionable one of paregoric, has ever been devised. But generally all other intolerable noises are susceptible of remedy. Responsible beings can be quieted if necessary by the strong arm of the law, and brutes, failing all other persuasives, can be knocked on the head, or removed to a respectful distance from the bedchamber, sick room or study—if the law so pleases. Even the terrific din of pavements can be abolished by the Nicholson plan, and the organ grinder insensible to old boots and dirty water, may be made to move on by the aid of a policeman, if one can be found. Locomotive whistles can also be made amenable to law, if the suffering people will unitedly bestir themselves. The impunity of railroad corporations in every conceivable invasion of private rights, can be abolished either by prosecution or by additional police laws. A number of manufacturing towns in England, impelled by the depreciation of city property near the railways, have united to carry through Parliament a measure conferring police authority to summarily stop all unnecessary screeching and ringing of locomotives within city limits. We commend the suggestion to the legislators of American cities and states, with the addition of obstreporous dogs, roosters and hucksters to the objects of their attention. A society for the prevention of cruelty to human beings ought to be formed, as soon as Mr. Bergh gets the brute creation in a comfortable way.

Mechanics in New York.

Wages of some kinds of skilled labor in this city are among the exceptions allowed by Mr. Wells, (page 34, last number) to his general statement that wages have not advanced in proportion to the price of other commodities. All classes of masons, such as plasterers, brick-layers, and stone-masons, are in so urgent demand as to receive as a minimum four dollars a day, and for good hands $4 50, $5 00 and even $6 on choice work. The crudest of labor, that of hodmen, commands $2 50 per day. Carpenters, coopers, plumbers, painters and horse-shoers are not quite so well off as masons; earning $3 50 to $4 00 per day. Ship carpenters do a little better, when they get work, averaging about $4 00. Printers, iron-moulders and custom tailors average about $3 00. Shoe-makers are depressed: they are represented as generally making but $2 00 a day, which if true of good and industrious mechanics is a shame to civilization. They attribute it to the amount of work thrown into the market from the state prisons: but more probably it is the result of aggregating the boot and shoe manufacture mainly in great establishments of cheap work at Lynn and elsewhere. No branch of business has been more affected by the introduction of machinery of late years, than this. Almost every process pertaining to the manufacture of boots and shoes is now performed by steam. Bakers, who have nothing to contend with nearer to state prison fare than their own bosses turn out, get but the miserable pittance of $10 a week. No wonder the bread is poor: we hope they get enough of it free, such as it is.

Another Solvent of Textile Fibers.—A solution of copper in ammonia is said to be a solvent not only for lignine, and thus for vegetables fibers generally, but also for animal fibers, as wool and silk; forming elastic water-proof substances, and capable of so penetrating one kind of fiber with a solution of another, as to unite certain of their qualities: for example, enabling cotton to receive and retain the same dyes with woolen, and with a similar tenacity.

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The SCIENTIFIC AMERICAN has always given prominent consideration to letters from its correspondents, and its columns are open to contributions from practical men upon all matters relating to the arts and sciences. Mechanics not accustomed to write for the papers are inclined to shrink from a task which they deem themselves unfit to perform. This ought not to be. All communications intended for our paper are carefully revised before publication, therefore mechanics need not fear to write to us on any subject that may interest them. We will see to it that their contributions are well prepared for the paper before publication. Send in the documents.

IMPROVEMENTS IN THE MANUFACTURE OF BOILERS.

The English and continental mechanics have directed considerable attention latterly to the improvement of boilers, in their material and method of manufacture. Cast steel has been tried as a material for boilers, particularly those of locomotives, with considerable success. Sixteen locomotives with boilers of cast steel were manufactured during the half year ending 1865 at the works of the Austrian Staatsbahn Railway Company: of these seven were for their own lines, and the rest were delivered for the use of the Ferdinand Northern Railway. All the tests applied to these boilers have given thoroughly satisfactory results, and no fault has yet been found with them. The Ferdinand Northern Railway also ordered last year nine goods-train locomotives with cast-steel boilers, from the engine works of Sigl, in Vienna. It was specified in the order that the engines were to be lightly but very strongly built, and were to be made suitable for burning small coal, the use of which necessitates the employment of boilers having a large heating surface and furnace. Besides these new locomotives, six old ones were reconstructed on the same principles and with cast-steel plates, in the works of the Northern Railway. Eighteen more locomotives for passenger and goods trains are also to be similarly reconstructed during this year at the same works.

Welded boilers are now made quite extensively in England. The Midland Railway Company build all their boilers on this plan. The plates are rolled with thickened edges, the ordinary thickness of seven sixteenths of an inch being preserved in the body of the plate and the edges being thickened to five eighths of an inch, the taper being gradual and extending from the edge back to about four inches. The longitudinal seams of each cylinder of the boiler iron is a lap weld, and the edges of the cylinders are squared up in a lathe, making flush joints, which are covered with welded hoops double riveted. Machinery not essentially different from that in ordinary use is employed to bend the plate, and the welding is accomplished by means of a crane and a curved anvil face, the convexity of which corresponds to the diameter of the barrel. A welding heat is taken on a portion of the seam, the edges of the plate being scarfed down, and the weld is perfected by repeated heatings of successive portions of the joint.

Corrosion of locomotive boilers is a prolific source of deterioration and also of explosions, and this corrosion is generally confined to particular localities, being found around the smoke-box end of the boiler and along the edge of the inside lap of the riveted longitudinal joints. This is to be attributed undoubtedly to expansion and contraction at the longitudinal seams, by which the joints are alternately opened and closed, continually cracking and removing the scale and exposing the iron to further corrosion. It is apparent that if these longitudinal joints could be dispensed with and the substance of the boiler barrel be of a uniform thickness and homogeneousness, the unequal expansion and contraction would be prevented. Such, in fact, has been the result on the Midland Railway, so far as the trials have extended. Experiments as to the strength, also, of the welded joints show that the plate is as strong at the weld as at any other part.

FRICTION WHEELS FOR DRIVING MACHINERY.

To the use of gears there are several objections. They are noisy, have considerable friction, and the cogs are liable to break. Therefore connections are preferably made by pulleys and belts, unless it is absolutely necessary that the connection between the parts and the ratios of motion should be arbitrarily exact. In changing the direction of motion "half-twist" belts or "turned" belts have been largely used; the first when the driver and driven occupy relatively vertical positions, and the latter when they occupy positions on the same horizontal plane. Bevel gears and crown wheels and pinions —the latter nearly obsolete—have also been used; but a recent device which works admirably is the friction wheel. These wheels may be called bevel gear blanks. They are cast in the form of bevel gears, lacking the cogs, and the face of one is turned and polished while that of the other is recessed to receive a smoothly fitted disk of oak-tanned sole leather, which is soaked and pressed to form. The surfaces of these two wheels are brought in contact, when mutual action is the result. One wheel runs in bearings which are suspended on pivots, so that it can, by a lever or any other suitable device, be brought in contact with or receded from the other wheel.

But not always does the mechanic who uses this device understand its proper construction. Not long ago we saw in a large manufactory two of these bevel friction wheels working, the leather covering of one of which had been renewed several times, and our advice was asked. On examination we found that the driver was the solid wheel and the driven the leather covered. The work required was rather too much for the area of the faces of the wheels, and while the driver continued to revolve the driven frequently stopped. Both run at a high velocity, and the result was that the iron-faced driver revolved under pressure against one spot of the stationary driven, cutting recesses across the face of the leather and destroying its perfect circularity. The remedy was simple. The driver should be the leather covered, and not the driven. Then, if the driver continued to revolve while the driven was stationary, the wear of the leather would be uniform, while it could make but little if any impression upon the polished iron. These matters should receive attention from mechanics. Such mistakes are not in any degree creditable.

THE HANDWRITING ON THE WALL.

Uneasy lies the head that wears a crown, and British commercial, manufacturing and maritime supremacy costs its adorers much needful sleep, as well as great annual subsidies from the national wealth. It is a sort of nightmare that gives them periodical gasping fits. Their navy, their coal mines, and now their iron exports, have caused successive spasms within a year or two. Belgium and France are looming up as rivals in iron so formidable as to cause certain well informed English writers to declare that "we are now face to face with the greatest obstruction British industry has ever been checked by. . . . Belgium and France have thrust us out of foreign markets to an extent which the trade will hardly credit." In the Russian market "the Belgian and the Frenchman hold the principal position, and are in a fair way of obtaining an absolute monopoly." Against this alarm a Birmingham paper takes ground by showing from trade returns that the annual export of British iron had more than doubled in fifteen years, and had increased at the rate of one half to three quarters of a million dollars per annum for three years, ending with 1865, when it amounted to $59,784,200. It shows that the export of iron to Russia in ten months of 1866 amounted to 65,211 tuns, being 8,526 tuns more than the average of the last six years; while it asserts that in 1864 France sent no iron to Russia, and Belgium but 3,844 tuns. But in the absence of any statistics of the recent vast growth of the foreign trade in which Britain has gained at the rate of but one per cent. per annum for three years past, or of the progress of her rivals since two years ago, it does not seem that the Birmingham organ has made out a very clear case against alarmists whose responsibility and competency to treat the subject it fully admits.

The truth seems to us to be, that the day when a single imperial city or a little island could sway the destinies of the world and draw all nations around her as dependent and subservient satellites, pertained to the infancy of man, and has forever gone by. Man has come into the rights of his majority, the rights of knowledge and power, in this western republic, and that full age is near at hand for the peoples of Europe. The world is to be a mighty commonwealth, and every sceptre must be broken, whether military, intellectual, manufacturing, or commercial. The drift our cousins are struggling against is irresistible. Britain must resign her extraneous possessions and pretensions, and content herself to subside gradually to the position of a peer, not a prince, among the nations. A fair share of the world for you, neighbor, and welcome; but no more lion's share, in the future.

A NEW FUEL.—At some of the towns on the Western lakes the sturgeons that get too stale for market are sold on the wharves to the steamboat stokers, who thrust them into their furnaces, and add greatly to the fierceness of the fire. Twenty of these large fish are said to be equal to a cord of wood in raising steam.

AMBITIOUS APPRENTICES.

Nothing relating to the management of apprentices is more vexatious to the master mechanic or foreman than the ambition some of them exhibit to be advanced to a higher quality of work than their experience and judgment will warrant. It is eminently proper that the apprentice should have a degree of pride in his occupation and an ambition to become a superior workman, but this is very different from a discontent and dissatisfaction with his proper position. The foreman should be a judge of the attainments of his apprentices as well as of the qualifications of his journeymen, and it is as much his interest to forward the apprentice as it is to the apprentice himself, as fast as it is safe to do so.

Even in the roughest and least delicate manipulations the mechanic's apprentice may learn something. In the work of operating a simple machine which may be almost entirely self-acting dexterity is acquired which can be readily turned to other objects as the novice advances. Experience in the use of the simplest hand tools is acquired only by practice. No amount of oral instruction can ever inform the apprentice as to the proper use of the common cold chisel and hammer. If, for instance, he is employed in dressing castings he must use great care not to mutilate the casting or break the chisel. The experience thus gained is of great value in his after progress. So with every other manipulation upon either wood, the metals, or other materials. Patient plodding, with the exercise of judgment and observation, will in time make the finished workman, and not attempts at fine work without the experience necessary to complete the job in a creditable manner.

GLASS FROM NATIVE ORE.

On the 27th of February, 1866, a patent was issued through the SCIENTIFIC AMERICAN Agency to Richard Washburn, of Monsey, N. Y., for the manufacture of glass from the native ore. This ore, which is really pure glass, or silicate of iron, in a crystallized and hence opaque condition, exists in abundance in many parts of the world, as in the columnar basaltic rock of the Palisades of the Hudson, of St. Helena, and of the famous "Giant's Causeway." But all efforts to utilize it for the manufacture of glass had proved singularly unsuccessful until the invention we have referred to. Messrs. Chance, Son & Co., the celebrated manufacturers of Birmingham, who export great quantities of plate glass to this country, are reported to have expended not less than a quarter of a million dollars, some years ago, for this purpose. It is gratifying to be able to add this important source of wealth to the list of those opened to mankind by American inventive genius, and to record the fact that the Newburgh (N. Y.) Glass Manufacturing Company, organized to work the ore of that vicinity under this patent, are already successfully turning out quantities of glassware with the two peculiarities of unequalled toughness and unapproachable cheapness. The artificial glass hitherto produced, requiring some thirty per cent. of soda or other oxides as a base, consuming much fuel, and losing much dross, evidently could never be cheapened sufficiently for many of the uses for which it is very desirable. The simplicity of this manufacture direct from the native article, the abundance and accessibility of the material, and the extraordinary tenacity of the product—common quart bottles of the Newburgh manufacture may be freely used in driving nails into solid timber without risk to their contents —must eventually extend existing applications of glass in a beneficent degree, and bring it into many uses from which it has hitherto been excluded. The native glass in this region, and in fact generally, being the silicate of iron, has a dark color, and it is yet to be seen how far it can be whitened by modification of the base and admixture of other bases, so as to become available for the finer purposes. That common window-glass may be produced at a great reduction of cost, seems not to admit of doubt, and this alone involves great improvement in the structure of houses, in common horticulture, and in many other respects which will occur to the reader.

We have thought it of interest to numerous readers who may not have turned their attention to the chemistry of glass, to take this opportunity for giving a popular sketch of its character. And first:

WHAT IS GLASS?—Most persons probably take for granted that glass is a simple mineral substance found in the earth, and would be surprised to learn that it is a *salt* formed by the chemical union of at least two and often three or four compound substances, and thus composed of from three to five very different and interesting ingredients. In fact, taking all the varieties of glass in actual use, it may be said to contain a dozen or more ingredients. Now, the popular notion of a salt is derived in part from the usual appearance of that class of substances in crystals, or small angular grains. Glass does not appear in that form, for the same reason that hot maple syrup, or any other melted sugar, "waxes" or candies when poured upon ice, as many of our readers may remember treating it in younger days in the maple orchards of New England. The reason is that, being cooled suddenly from the boiling point, the atoms are not allowed time to segregate and settle themselves into individual crystals, according to their natural disposition, but are overtaken by solidity as they are, in a single unitary mass. Suffer molten glass or any other salt to cool slowly enough, and its atoms will group themselves in multiplied units instead of one, forming a semi-opaque and crumbling mass: a striking instance and illustration in the lowest sphere, of that union of the kind and the individual which pervades the universe, from grains up to worlds and from cell-life up to that of immortal spirits. Another part of the popular notion of a salt is derived from the ready solubility of most salts, and their consequent pungent effect upon the

tongue. Glass is considered almost a synonym for insolubility; and yet it has all degrees of solubility according to its composition, and there is a kind of glass, differing from the common article only in the proportions in which the ingredients are combined, which will dissolve in water like any other sa't, and not only yields a strong alkaline taste to the tongue, but will also wash the hands, if you please, of dirt and skin at once. It is sometimes used in making soap, but in Prussia this is prohibited, on account of its destructive effect upon textile fabrics. Hence we may understand the taste of a glass tumbler, although we can get at it only by imagination because the substance is too hard to dissolve on the tongue.

But again, more particularly, what is glass?—Silicon, oxygen, and any metal or metals the maker chooses, according to the color or hardness he wishes to produce: the metals being necessarily taken in their oxides—of which that of sodium (soda) and that of potassium (potash) are most used—and the silicon also in its combination with oxygen, with which its quick and tenacious affinity for that element keeps it always united, forming silicic acid. Most persons who have observed rock crystal or quartz, everywhere veining or specking the rocks, or gleaming in sand, wherever sand is washed clean, have as little suspected that this apparently tasteless because almost utterly insoluble substance is an acid, as that glass is a salt. It is silicic acid, or one part of silicon with three of oxygen. The base silicon, like boron (to the analogy of which to carbon we referred in an article on borax) becomes a wonderfully interesting substance under the light of "chemic fire." From what has just been said, it is apparent that silicon is the main characteristic constituent of the inorganic earth, as carbon is of the animal and vegetable kingdoms. It is capable of the three allotropic conditions of boron and carbon, described in a former article, and is only hardened by the action of heat, unless exposed to air or oxygen, in which it takes fire and burns superficially; the silicic acid formed on the surface protecting the mass from oxidization. Silicic acid, silica, or quartz, can be melted by nothing short of the oxy hydrogen blow pipe; but when heated with metallic oxides, the silicates resulting from union with those substances are melted at various temperatures, according to the metal involved, and the result is glass.

We might go on to describe numerous beautiful forms besides common quartz, in which silica presents itself in nature, such as opal, amethyst, chalcedony, cornelian, onyx, sardonyx, agate, and others, which owe their brilliant variety to various tinging materials, chiefly oxides of iron and other metals. Besides these, it is the stiffening in the framework of plants and leaves and animal cartilages. But as our object in setting out was merely to define the nature of glass, we close with a mere reference to the principal metals used in producing the usual varieties of that "salt."

What may be termed the highest variety of glass, is the *strass*, or "paste," used in imitation of precious stones. This is made with potassa and oxide of lead: the latter metal being remarkable for the high lustre, refractive power or brilliancy, specific gravity and softness, which it gives to the silicate. These qualities appear to be proportioned to the atomic weight of the bases employed, that of lead being among the greatest. Flint glass and crystal for optical purposes, are of like composition with strass. Common window glass and English crown, are silicates of potassa or soda, lime and alumina. Plate glass differs from this only in the purity of the materials. Oxides of gold, silver, copper and other metals, are employed to impart a variety of brilliant colors. The native glass which gives occasion to this article, as we have observed, is silicate of iron, with some added mixture of alkalies, alumina, or other "fluxes" (bases) of which we are not precisely informed, but which are among the usual elements of green bottle glass

FRICTION OF ROLLING STOCK.

A series of practical experiments of great importance to railroad men, were inaugurated on Wednesday, Jan. 16th, on the New Jersey Central Railroad. The trials were made by Mr. Wm. Loughridge, of Paterson, N. J., under the patronage of some of the leading railways of the country, who have appropriated funds for the purpose of investigating the laws of friction in their practical relation to rolling stock. Many circumstances made it impossible on this occasion to obtain very accurate results, but the mode of operation was shown, and a report of careful experiments now being conducted, was promised at some future time.

The programme for the day's proceedings embraced the solution of nine problems, including the testing of wrought, cast and chilled iron and wooden shoes under the same pressure against the wheels, to determine which will produce the greatest retarding effect on the car. Applying different pressures on the several shoes and noting if the retarding effect is proportional to the weight of the car, and if the same at all velocities. Also whether the resistance is in proportion to the pressure on the brakes. Determining by means of a dynamometer the average strength of brakemen. The resistance of journals, or the power required to start a car, or several coupled together. Observing in a moving train whether a car or train has a retarding power with it, proportional to its weight, when the brakes are applied in proportion to the weight of the car. Lastly, the determination of the effect of using different sized journals. As intimated above, the results were not perfectly satisfactory, but we have been promised a full copy of the final report, and will then present to our readers a full solution of these important problems.

Mr. Loughridge is the inventor of a steam brake giving the engineer complete control over the train, which he can stop almost instantly even when under full head of steam. The locomotive has a small cylinder secured under the foot board, the piston of which works the brakes and steam is admitted directly from the boiler. The length of stroke is augmented by a combination of pulleys, and by a series of rods and chains under the cars all the brakes are operated simultaneously, and the braking up of the train is accomplished, by the movement of a lever. In case of any derangement intertering with the working of the steam brake, hand power can be applied and the train stopped as usual. In several trials made the other day, a full train of five cars running at the rate of thirty miles per hour, was brought to a dead halt in thirty seconds. By a simple contrivance, the amount of brake pressure which can be applied to the wheels is regulated, being greater in a heavy train, and so changed in a light train that the sliding of wheels is a thing absolutely impossible.

The experiments were witnessed by engineers and master mechanics from various parts of the country. Unavoidable delays, and the necessity of leaving the tracks open for the regular trains prevented the completion of all the proposed trials at the time. The remainder were promised to take place upon the following day, but the severe storm caused an indefinite postponement of the public trial.

Science Familiarly Illustrated.

Under this caption we propose, occasionally, perhaps weekly, to publish facts well known to scientists and experienced mechanics but not familiar to the juvenile portion of our readers. We are daily in receipt of letters from young persons—mechanics' apprentices and workmen—soliciting replies to them which it is hardly appropriate to place in the column usually devoted to replies to correspondents. These requests imply a want of the information which is possessed by experienced mechanics and scientific students, and an ardent desire to understand those fundamental truths which lie at the foundation of philosophy. As our object in the issue of the Scientific American is to educate, elevate, and improve those who are to become the pioneers of material progress, as well as to note the improvements now being made in the domain of physics, we deem it but proper that a portion of our columns should be set apart for the instruction of the younger and less experienced of our readers.

Suction.

Suction is a common term applied to the force of the atmosphere, and is simply weight or gravitation. Air, however, unlike some more solid substances, acts equally in every direction, up or down having no influence on its action. By the way "up" and "down" are simply relative terms, having no absolute signification, but meaning simply toward or from the surface, or rather the center of the earth. The atmosphere which surrounds the earth exerts a pressure on it and every object upon it of about fifteen pounds to every square inch exposed to its action. Now, then, if the air can be kept from acting on the under surfaces of bodies they would adhere to whatever surface they were placed upon and would stick or "suck," so that the object, if not too heavy, could be lifted. Boys frequently cut out disks or circular pieces of leather and put a string through their centers by which to lift them. The leather being moistened with water can be pressed upon a smooth surface, and the edges adhering air-tight prevents the atmosphere from acting on the under surfaces. By this simple device we have seen a common bucket, full of water, lifted with a "sucker" of only about four inches diameter. It was done by the pressure of the atmosphere on the upper surface of the disk, amounting in the aggregate to over one hundred and ninety pounds, as the area of a disk four inches diameter is over twelve and a half inches, each inch sustaining the pressure of fifteen pounds.

So the water in the pump barrel is elevated by the pressure of the atmosphere on the surface of that on the outside of the pump. The upward movement of the plunger containing an upward lifting valve, draws or lifts the air out of the barrel between the plunger and the fixed valve near the bottom of the barrel. This creates a vacuum more or less perfect, and the pressure of the atmosphere on the outside water forces the liquid up through the fixed valve into the pump barrel.

The sucking of cider through a straw, which every boy who lives in the country has often done, is another exemplification of this same property in the atmosphere. The boy inserts one end of the straw into the cider, and with his lungs draws out the air, when the atmosphere at once lifts the cider up through the tube. If the straw was secured air-tight in the barrel and no atmosphere admitted, or if the pump well was so covered in that no air could have access to the water, "suction" would be merely a name without any reality.

Extension of Patents.

Many valuable patents are allowed to expire every year for the want of a little care on the part of patentees in not applying for an extension. The petition must be filed in the Patent Office at least ninety days before the expiration of the patent, which gives time for the preparation of testimony. Inventors who have patents dated in 1853 and who may wish to have them extended for seven years, can receive all necessary advice how to proceed by addressing Munn & Co., this office.

American Inventions in Europe.

American inventors are taking a renewed interest in patenting their valuable inventions in European countries. As an evidence of the fact we may state that since January 1st we have entered twenty-three foreign applications upon our records. Parties wishing to take foreign patents can, through our Agency, depend upon prompt and careful attention to their interests.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING JAN. 15, 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ 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.

61,133.—Mode of Finishing Tools, etc.—John Allen, New York City, and Gaston D. Smith, Washington, D. C.

First, We claim the finishing devices of machinery, engines, sewing machines, tools, etc., instruments of all descriptions, by the mode and means hereinbefore described, and for the purpose of preserving them from damage by oxidation or corrosion, as set forth.

Second, The restoration of damaged tools and machinery to good condition by the method and means set forth.

61,134.—Drill.—Leonard Andrews, Biddeford, Me.

First, I claim the combination of the tube, a, rod, b, ring and springs, e f f, horizontal cutters, g g, as and for the purpose set forth.

Second, The combination of the double drill, fig. 5, constructed as described, with the tube, r, as and for the purposes specified.

61,135.—Turning Lathe.—Frantz A. Armbruster, New York City. Antedated Jan. 3d, 1867.

First, I claim the oscillating spindle, E, in combination with the chuck, I, carrying one or more tools, and with the longitudinally-sliding back center, F, constructed and operating substantially as and for the purpose described.

Second, Controlling the oscillation of the spindle, E, by means of the chain, c, and adjustable cranks, e, substantially as and for the purpose described.

Third, Giving the oscillating motion to the cutter head by means of two shafts, l l', carrying the cranks, e, and chain, c, substantially as and for the purpose set forth.

61,136.—Apparatus for Bundling Scrap Metal.—Lewis J. Atwood, Waterbury, Conn.

I claim the bundling or consolidation of scraps of sheet metal, by the means and substantially as set forth.

61,137.—Water Elevator.—W. E. Babcock, East Pembroke, N. Y.

I claim the drum, A, shaft, B, the head, C, the ratchet cone, e', and the spiral spring, o, when arranged and combined substantially as described for the purposes herein set forth.

61,138.—Cattle Tie for Stalls.—Cyrus M. Baker, Bingham, Me.

I claim the tie chain herein described, the same consisting of the bar, B, chains, D and E, and rings, G G, when all connected together, so as to be used for the fastening or hitching of cattle and other animals, substantially as described.

61,139.—Photographic Camera.—Thomas Barbour, Boston, Mass.

First, I claim the arrangement of the plate, f f, racks, g g, pinions, h h, rod, i i, wheel, k k, and adjustable arm, p p, as hereinabove described and for the purpose specified.

Second, Arranging a case upon a pivot so as to turn thereon, in combination with suitable stops, as herein described and for the purpose specified.

Third, The use of the lever, e e, for elevating and depressing the case, as described.

Fourth, The use of the movable plate or frame, f f, operating as described and for the purpose specified.

61,140.—Apparatus for Making Envelopes.—E. L. Barrett, Springfield, Ohio.

First, I claim the plates, e f and g, in combination with the slides, a a', substantially as and for the purpose set forth.

Second, The stop, c, gage, d, in combination with the slide, a', and plate, f, substantially as and for the purpose specified.

Third, Pivoting or hinging the plate, g e f, to the slides, a a', substantially as and for the purpose described.

Fourth, The stuffer, M, fig. 7, constructed and operating as and for the purpose substantially as set forth in the herein described process of making envelopes.

61,141.—Valves of Steam Engines.—Louis D. Bartlett (assignor to the Putnam Machine Company), Fitchburg, Mass.

I claim the arrangement of the casings, steam passages, and valves, within the steam chest, in relation to each other and operating substantially as described.

61,142.—Neck Yoke.—Alonzo Benedict, Jonesville, N. Y.

I claim the curved or U-shaped metallic bars, D D, attached to the neck yoke by means of clips, C C, and grooved at their inner parts to receive and clamp the chafing leather, E, substantially as herein shown and described.

61,143.—Mode of Protecting Armor Plates.—Mayeul Bernabe, Toulon, France.

I claim the herein described method or process of covering the steel, iron, or cast-iron plates, with an insulating and protective coating of copper for neutralizing the electric currents and rendering the plates inoxidizable.

61,144.—Apparatus for Charging and Drawing Gas Retorts, etc.—Sealy James Best and James John Holden, London, England.

We claim the apparatus and machinery, substantially as herein described.

61,145.—Wool Dryer.—Carl Beu, Dessau, Dukedom of Anhault Dessau. Antedated Jan. 2, 1867.

First, The arrangement of a series of drying boxes, placed one above the other, in a suitable case, A, in combination with a suitable mechanism, whereby an automatic downward motion is imparted to said boxes, substantially as and for the purpose set forth.

Second, The recesses, t, in the drying boxes, f g h, etc., in combination with the cams, q, constructed and operating substantially as and for the purpose set forth.

Third, The stop motion, a' b' c', in combination with the drying boxes, f g h, etc, constructed and operating substantially as and for the purpose described.

61,146.—Sprinkler for Clothes and Flowers.—Dana Bickford, Boston, Mass.

I claim the combination of the elastic bulb, A, the valve, B, the perforated nozzle, c, all constructed as and for the purpose specified.

61,147.—Rudder Bearing.—Joseph N. Bitting, Sr., Camden, N. J.

I claim the projection, c, on the rudder post, in combination with the plate, D, and its inclined recess on the edge, when the latter and the said projection are formed in relation to each other, as described.

61,148.—Apparatus for Storing Petroleum and other Inflammable Liquids.—Felix Bizard and Pierre Labarre, Marseilles, France.

We claim, First, An oil tank of ordinary or suitable construction, provided at the top thereof, with a pipe through which said tank is supplied with or discharged of oil, in combination with a pipe, also passing through the top, into and down to near the bottom of said tank, said pipe being branched and provided with cocks and level indicator for regulating the flow of water to and from the tank, in the manner and for the purpose set forth.

Second, The combination, in an oil tank or reservoir, of an elevated manhole and pipes connected therewith for supplying or drawing off the oil to or from the tank at a point higher than the top or dome of said tank, as herein shown and described.

Third, In combination with the arrangement claimed in the last preceding clause, we claim the level indicator, when constructed to operate in the manner substantially as described.

Fourth, The channel or depression formed in the bottom of the reservoir for receiving and collecting the sediment, and facilitating the entrance to the dome, substantially as specified.

61,149.—Brick Kiln.—George C. Bovey, Cincinnati, Ohio.

I claim a brick kiln entirely open at top and provided with folding covers, substantially as and for the purposes set forth.

61,150.—DEVICE FOR PLANTING HEDGES.—C. D. Brown, Sterling, Ill.

I claim, First, The employment of clamping beams, A A, and post, B B, in the operation of planting hedges, substantially as described.

Second, Providing for adjusting the beams or clamps, A A, vertically as well as horizontally, substantially as described.

61,151.—SULKEY PLOW.—George Burket and Samuel M. Gaskill, Bluffton, Ohio.

We claim, First, The attaching of the rear part of the plow beam by a chain or rope, b, to a pulley, d, on a shaft, H, on the bounds, a a, of the draft pole, said shaft, H, having a lever, I, attached, and all arranged substantially as and for the purpose specified.

Second, The slotted plate, K, attached to the platform, D, in such a manner that it may be turned forward to embrace the plow handle so as to serve as a bearing or fulcrum for it, and be turned backward free from the plow handle when it is necessary to liberate the latter, substantially as set forth.

61,152.—LAMP.—Francis Burrows, Peoria, Ill.

First, I claim the chamber, C', formed in the manner herein described, and adapted for the reception of water to prevent the heating of the reservoir, as and for the purpose explained.

Second, I claim the combination and arrangement of the reservoir, A, two-part wick tube, D D1, and casing, C1 C2 C3, with their several adjuncts, applied and operating in the manner and for the purpose explained.

61,153.—SEED PLANTER.—John W. Buttrick, Farmington, Wis.

I claim, First, The cam, Z, when constructed and used substantially in the manner and for the purpose set forth.

Second, The combination and arrangement of the cam, Z, feed bar, Q, spring, P, and part, M, substantially as and for the purpose set forth.

Third, The combination and arrangement of the cam, Z, feed bar, Q, and shut-off lever, K, substantially as and for the purpose set forth.

Fourth, The combination of the wheel, A', constructed with the cam, Z, and pins, c, and the brake, G', and operating lever, I, when constructed and used substantially as and for the purpose set forth.

Fifth, The combination and arrangement of the shovels, U, and operating bars or levers, R and M, substantially as and for the purpose set forth.

61,154.—CASE FOR PEN AND INK.—A. G. Buzby, Philadelphia, Pa.

I claim the pen, B, with its flange and collar, a, and button, c, and the case, A, with the cover, A', and operating for the reception of the pen, the whole being constructed as described.

Second, The cover, A', with its cap, d, and recess for the reception of the bottle, D, in combination with the case, A, and its pen, B, as set forth.

61,155.—PUMP VALVE.—Adam S. Cameron, New York City.

First, I claim a valve composed of a metallic case, A, in which india-rubber or other suitable material, B, is confined so as to form faces, a b, to operate in combination with the seat, C, substantially as and for the purpose described.

Second, A valve formed by putting the rubber into the case or recess in a plastic state, and vulcanizing it therein, substantially as and for the purpose specified.

61,156.—PEN.—R. M. and D. Cameron, Edinburgh, North Britain.

We claim the construction of pens possessing the improved qualities in the manner substantially as hereinbefore described and shown in the accompanying drawings.

61,157.—TRUNK.—Lazare Cantel, New York City.

I claim the grooved wooden frames, c d, secured to the edge of the trunk, or similar article, by the bands, e and f, and hinge, h, and suitable nails, in combination with the elastic strip or pipe, i, as and for the purposes specified.

61,158.—RAILROAD RAIL.—Robert Chambers, Cincinnati, Ohio.

I claim, First, The compound railroad rail, A a c A' a' c' B b, secured or locked together by the same spike or spikes which fasten the rail to the sleeper or crosstie, substantially as set forth.

Second, In combination with the aforesaid compound rail I claim the single-lipped chair, E e.

61,159.—COTTON AND HAY PRESS.—Nathan Chapman, Milford, Mass.

I claim traversing and holding the ratchet rods which work the follower by the stationary locking boxes, P P, provided with ratchet wedges or pawls, and connected by vibrating links and crank rock shafts to traversing locking boxes, N N, provided with ratchet wedges or pawls to work the press by levers inserted in the holes in the rock shafts and vibrated.

I claim the four arms on the follower, extending through the press box and fastened to the ratchet rods working at the corners of the press.

I claim the use of four rods, or one at each corner of the follower, to move it even and keep it from tipping.

61,160.—CHURN.—James M. Chritton, Joliet, Ill.

I claim the water pockets, e, in combination with the movable box, d, the movable pinion and shaft, b, and the air tubes, f and g, when constructed and operating substantially as described.

61,161.—CAN OPENER.—S. O. Church (assignor to himself and S. S. Wilcox), West Meriden, Conn.

I claim the lever, A, provided with a fulcrum, a, in combination with a hook, C, and the handle, B, constructed and arranged so as to operate in the manner described.

61,162.—STEAM GENERATOR.—Mirtillow R. Clapp (assignor to himself and E. P. Jones), New York City.

First, I claim the water and steam generating tubes, G, exposed to the action of the fire or heated gases, as specified, and provided with diaphragms, g, having openings, s, in them inclining downwardly, substantially as and for the purpose or purposes herein set forth.

Second, The construction of the diaphragms, g, within the tubes, G, whereby they support or retain each other in place, as described.

61,163.—CRACKER CRUSHER.—Arthur Clarke and Thomas Reece, Philadelphia, Pa.

We claim the arrangement of section, B, with its perforated or bottomless cup, C, and ribs, a, or their equivalents, and section, A, with the flange, D, and ribs, b, or their equivalents, both of said sections having suitable handles, and hinged together in either of the modes herein described, and operating substantially as and for the purposes set forth.

61,164.—BEEHIVE.—Orson Colvin, Belvidere, Ill.

First, I claim the inner case, B, provided with inclined sides, a a, and a perforated top piece, c, in combination with an outer box, A, to receive, B, with an air space allowed between, and the ventilating openings, j m, in the box, A, substantially as and for the purpose set forth.

Second, The spare box, C, with perforated bottom, registering with the perforated partition plate, c, and with the perforated top piece, C, in combination with the case, B, with perforated sides registering with the perforated spare boxes, D, whereby air will be admitted into all parts of the hive, in the manner described for the purpose specified.

61,165.—MILKING STOOL.—David Connor, Fulton, Ill.

I claim the circular frame, F, bench, H, and seat, A, when constructed, arranged, and operating substantially as and for the purpose set forth.

61,166.—TOOL REST FOR LATHES.—T. J. Currier and A. M. Black, Worcester, Mass.

We claim the combination with the poppet block, A, of the tool rest, D, shaft, H, and screw, G, substantially as set forth.

61,167.—JET CONDENSER.—J. P. F. Datichy, West Hoboken, N. J., assignor to himself and John H. Bonn, Hoboken, N. J.

I claim a condenser composed of three compartments, A B F, valves, a a M, rose, C, and connecting pipes, E G I, all constructed and operating substantially as and for the purpose described.

61,168.—FAGOT FOR RAILROAD RAILS.—Herbert Davis, Troy, N. Y.

I claim the rolling or making of rails for railroads of a pile composed of a series of iron bars, A, provided with a steel cap, B, formed or rolled with a pendent flange at each side, and with longitudinal grooves and projections, c b, at its under surface, and the upper iron bars of the pile rolled or formed with corresponding grooves or projections, a d, to admit of the steel cap and upper iron bars being locked together, substantially as shown and described.

I further claim forming the iron portion of the pile of bars, A A', of superior and inferior iron, arranged or disposed substantially in the manner and for the purpose set forth.

61,169.—HOOP SKIRT.—Thomas B. De Forest, Birmingham, Conn.

I claim protecting the attachment of the lower hoop to the tapes by extending the tapes below the bottom hoop, and covering this extension with metal, substantially in the manner and for the purpose specified.

61,170.—HOOP SKIRT.—Thomas B. De Forest, Birmingham, Conn.

I claim attaching a cord to skirt wire outside the covering which incloses the wire, substantially as herein set forth.

61,171.—BINDING FOR SKIRTS.—Thomas B. De Forest, Birmingham, Conn.

I claim a binding having one edge protected substantially as described, as a new article of manufacture.

61,172.—BINDING FOR SKIRTS.—Thomas B. De Forest, Birmingham, Conn.

I claim a binding presenting an india-rubber or similar flexible edge, substantially as herein described, as a new article of manufacture.

61,173.—MANUFACTURE OF RUBBER BELTING.—George Pomeroy Dodge, London, England, assignor to Nathaniel Shattwell Dodge, Washington, D. C.

I claim the mode of manufacturing bands or belts composed of fabrics and gum or sticky substances, substantially as herein described.

61,174.—VULCANIZING FLASK FOR DENTISTS.—Levi W Dowlin, Sherbrooke, Canada West.

First, I claim the employment of the middle part, B, of the flask, substantially as and for the purpose herein specified.

Second, I also claim the separate union of the parts, B and C, before the rubber is packed in by means of screw bolts, b b, or their equivalent, substantially as and for the purpose herein set forth.

Third, I also claim the combination and arrangement of the counter die part, A, with the parts, B and C, substantially as herein specified.

61,175.—STEAM-PUMP VALVE GEAR.—George Doyle, Worcester, Mass.

First, I claim the arrangement of the spring, h, the dogs, j j, and the lugs, i i, on the valve stem, substantially as and for the purpose specified.

Second, I also claim the arrangement of the dogs, j j, for putting tension on the spring by restraining it during the stroke or part of the stroke of the piston, substantially as and for the purpose specified.

61,176.—SEWING MACHINE.—Jehiel C. Driggs, New York City, assignor to Matthew T. Higgins.

First, I claim the combination in needle-feeding machines of the horizontally-slotted arm, G, operated by a crank or eccentric pin, D, and carrying the vertically-slotted needle arm, H, with its adjustable branch and spring, J, and rotating cam, F, for giving to the needle its two-fold motion, substantially as specified.

Second, The combination with a needle working from below up through the table, of a looper, L, above the table, acted upon by a spring, q, and guide, p, and pivoted to a rod or arm, o, radiating from a rocking shaft, M, essentially as herein set forth, and for the production of a single thread or chain stitch.

61,177.—DEVICE FOR PROTECTING TREES FROM THE BORER.—George W. Dudderar, Unionville, Md.

I claim the application of an adjustable appliance to the trunks of fruit trees to protect them, as herein described, using for that purpose the aforesaid cylinder and oil-cloth top or addition, or any other substantially the same, and which will produce the intended effect.

61,178.—HEAD BLOCKS FOR SAW MILLS.—J. W. and W. Ebert, Zanesville, Ohio.

First, We claim providing for adjusting knees upon head blocks by means of rectilinear reciprocating pawls, which are allowed to vibrate vertically, in combination with a lever, H, which will admit of said pawls being engaged with or disengaged from their knees at pleasure, substantially as described.

Second, The locking plates, J J, applied so as to take into the racks of adjustable knees of head blocks, substantially as and for the purpose described.

Third, The construction of the bar, H, substantially as and for the purpose described.

Fourth, The combination of the locking plates, J J, or their equivalents, with rack, D, upon the knees, C C, and with the bar, H, which raises and depresses the pawls, b b, substantially as and for the purpose described.

Fifth, The combination of the pawls, b b, arms, b' b', and angular lever, c c, with the reciprocating bar, E, and a lever, whose movements are regulated by adjustable stops, f f, substantially as and for the purposes described.

61,179.—CONVERTING MOTION.—Augustus Eckbert, Trenton, Ohio.

I claim the lever, C, with its nose, c, pivoted at one end to the link, I, and to the other end to the pendulum, D, connected by the rod, b, to the elbow lever, e f, having its fulcrum on the stationary hanger, operating in combination with the escape wheel, B, with pins, b, in the manner described for the purpose specified.

61,180.—RAILWAY-CAR AXLE.—Albert E. Elmer, Greenfield, Mass.

I claim my improved railway carriage axle, made as described, viz.: with the concave and convex shoulders, d e, arranged and combined with the tubular and cylindrical parts, a b, and with respect to the wheels, substantially as described.

61,181.—STEAM GENERATOR.—John R. Fish and H. C. Hartman, Fort Wayne, Ind.

First, We claim the heater, B, when placed inside the fire box of a tubular or flue boiler, in such a manner as to be exposed to the direct action of the fire before the heat passes through the flues of the boiler, in combination with the pipe, C, and the check valve, C,' and pipe, D, arranged substantially as set forth.

Second, In combination with the heater, B, we claim the blow-off pipe, E, arranged substantially as and for the purpose set forth.

61,181.—MACHINE FOR FINISHING LEATHER.—Edward Fitz-Henry and Isaac Ball, Portland, Oregon.

First, We claim the set screws D', and rod, D, with the springs, E, substantially as and for the purpose set forth.

Second, We claim the plate, B, pivoted to the plates, A, so as to communicate motion to the rubber centrally, and without pressing upon the springs attached to the slickers.

Third, In combination with the plate, B, we claim the rods, G, and pins, G', for the purpose of raising the slickers and brushes when not in action, substantially as set forth.

Fourth, We claim the jaws, F and I, hinged substantially as set forth, in combination with the hair spring, I, substantially as and for the purpose set forth.

Fifth, In combination with the jaws, F, we claim the springs, K', and brushes, K, substantially as set forth.

Sixth, We claim the cleaner, S, in combination with the slickers, F', operating substantially as and for the purpose set forth.

Seventh, We claim the lever, L, and notched plates, O, or the equivalent, in combination with the rods, G, attached to the jaw, F, substantially as and for the purpose set forth.

Eighth, We claim the arrangement of the points, M', so as to permit the raising of one or all of the rubbers, substantially in the manner and for the purpose set forth.

61,183.—DEVICE FOR FORMING HASSOCKS OR STOOLS.—John G. Flagg, Philadelphia, Pa. Antedated Jan. 10, 1867.

I claim an apparatus for making hassocks, consisting of the screw, D, disk, E, mold, F, and a suitable frame, all arranged and operating substantially as herein specified.

61,184.—METHOD OF ATTACHING ROOFING TO BUILDINGS.—Lorenzo D. Ford, Canaan, Columbia County, N. Y.

I claim the connecting of the edges of the sheets or strips of plastic roofing by means of a lock joint, formed by bending the edges or selvedges of the fabric, substantially as shown and described.

61,185.—DOOR BOLT.—Benjamin E. Fowler, Hartford, Conn.

I claim the rack bolt, b, in combination with the pinion, c, spindle, d, pin and groove, h g, substantially as and for the purpose described.

61,186.—PRINTING PRESS.—James H. Frey and William Heckert, Sharon, Pa., assignors to themselves and E. A. Wheeler.

First, We claim so constructing and operating the platen, B, that it shall move bodily in a right line up to and from the form bed, C, and also assume an inclined position when at the termination of its outward stroke, the said platen performing these movements without revolving, substantially as described.

Second, Supporting and guiding the platen, B, by means of four bearings, a a a' a', which move in slots, a2, substantially as described.

Third, Communicating motion in opposite directions to the plates of the plates of the inking table, and also a separate and independent motion to either of the plates, c c', at will, all by means substantially as described.

Fourth, Communicating motion to the rock shaft of the inking roller arms, c c, by means of segments, b b, which are on a crank, E', that is connected to the shaft, D3, substantially as herein described.

Fifth, Providing for giving a rapid and slow motion to the platen and its appendages by the employment of two cranks, in conjunction with the treadle and its rod, either of which cranks will communicate motion to the shaft of the crank wheels, D1 D2, substantially as described.

61,187.—PAPER PANTELET.—Edward P. Furlong, Portland, Me., assignor to himself and Henry Inman.

I claim a paper pantalet constructed and applied to drawers, substantially as described.

61,188.—CARRIAGE BOOT.—P. Tenny Gates, Plattsburgh, N. Y.

I claim, First, The boot, A, constructed substantially as described, and used as and for the purposes herein set forth.

Second, The dash cover, provided with its flaps, D, and straps, d, constructed as set forth and used as specified.

Third, The combination of the dash cover, C, and boot, A, when formed as herein fully described, and used with the dash of a vehicle either stationary or adjustable, in the manner and for the objects described.

61,189.—HOG PEN.—Burton Gifford, Pedee, Iowa.

I claim, First, Attaching the trough to the outside of the pen, with graduated openings leading into it from the inside of said pen, substantially as herein shown and described.

Second, The combination of the hinged cover, G, chains or cords, H, and sliding board, J, with the trough, E, and with the perforated side of the pen, substantially as herein shown and described.

Third, Forming a portion of the bottom or floor, B, of the pen of slats, or with slots, substantially as herein shown and described and for the reason set forth.

Fourth, The combination of a removable box, D, with the slotted portion of the floor, B, substantially as herein shown and described, and for the purpose set forth.

61,190.—SHEEP PEN.—Burton Gifford, Pedee, Iowa.

I claim, First, Forming a feed box, D, upon, or attaching it to, the outside of the sheep pen, A substantially as herein shown and described.

Second, The combination of the sliding board, H and G, and levers, L, with the feed box, D, substantially as herein shown and described.

Third, The combination of the adjustable board, J, with the sliding boards, H and G, and with the feed box, D, substantially as herein shown and described.

Fourth, Connecting the feeding trough, B, with the feed box, D, by the spout or channel, F, substantially as herein shown and described.

61,191.—MACHINE FOR SOLDERING EAVE TROUGHS.—H. C. Hatten and J. P. Angleberger, New Carlisle, Ohio.

We claim a reversible frame for soldering eave troughs, constructed and arranged for use substantially as set forth.

61,192.—BUCKLE.—J. B. Hawley, New Haven, Conn.

I claim a buckle constructed substantially in the manner herein described, combined with a hook or eye, substantially as herein fully set forth.

61,193.—SKATE.—William W. Hendricks (assignor to The Cooper Fire Arms Manufactory) Philadelphia, Pa.

I claim the combination and arrangement of the plate, A, the lever jaws, D D' E and E', with their lugs, d e, and the straps F and F', or equivalent devices for operating the said levers beneath the plate, A, the whole being constructed and operating as and for the purpose described.

61,194.—MATERIAL FOR STUFFING MATTRESSES AND FOR OTHER PURPOSES.—H. R. Hildreth and W. H. Smith (assignors to H. R. Hildreth, George B. Hobbs and John Dibblee) Dutch Flat, Cal.

We claim as a new article of manufacture and as a substitute for the ordinary curled hair, the fibre of the soap plant when properly heated and manipulated therefor.

Treating the fibre of the soap plant, substantially as herein described and for the purpose specified.

61,195.—CORN PLOW.—John Hindmarsh, Henry, Ill.

First, I claim the lever, N, in combination with the standard, O', for sustaining the plow in an elevated position when required.

Second, The rods, O O, plow beams, G G, cross bar, P, and screw, Q, combined and operating as described.

Third, The combination of the plow beams, G G, standards, L L, lever, N, and brace rods, j, all arranged and applied to a mounted frame, A, to operate in the manner substantially as and for the purpose specified.

61,196.—ARTIFICIAL SLATES.—Henry W. Holly and Sidney L. Geer, Norwich, Conn.

First, We claim the use of liquid silex as a menstruum or binding material in liquid slating.

Second, Liquid slating, composed of the ingredients specified in or about the proportions set forth.

61,197.—SMOKING STAND.—John Holmes, New York.

I claim a smoking stand constructed as herein shown and described.

61,198.—SAD IRON.—Phineas B. Hood, Milford, N. H.

I claim a sad iron, composed of a metallic face, and with a body of soapstone, when constructed and arranged substantially as herein shown and described.

61,199.—PUMP VALVES.—Wm. D. Hooker, San Francisco, Cal., assignor to himself and Volney Cushing.

I claim the valve, A, constructed with guides, b b b b, upon its sides, arranged substantially as described and for the purpose set forth.

61,200.—FILTERING, EVAPORATING AND GRANULATING SACCHARINE LIQUIDS.—James R. Hopkins (assignor to himself and Jacob O. Joice, Dayton, Ohio.

First, I claim the evaporator lid or cover, A, as described and for the purposes set forth.

Second, The mode herein described for filtering and purifying the juice, in combination with the granulating process, substantially as and for the purposes set forth.

Third, The mode herein set forth for producing granulation, in combination with the evaporator lid, A, and the filtering process, substantially as described.

61,201.—SEEDING MACHINE.—Benj. F. Horton, Ithaca, N. Y.

First, I claim the combination and use of the stationary bar, C, with the two movable bars or slides, B B, when made as described, and the use therewith of one or more series of studs in the opening between the bars, or immediately connected with the said opening.

Second, I claim the bars, B B, when held in constant parallelism with each other by means of the rods, H H H, thus securing a uniform and adjustable opening between the bars, and the even sowing of the seed; and I claim the set clamp, I, and its set screw, J, for the purpose of adjusting the opening for the sowing of various seeds or articles.

Third, I claim the arrangement of the studs, G, one series on the fixed bar, C, and at least one on the vibrating bars, B B.

Fourth, I claim the combination of the wheeled carriage, the cam, E, seed box, vibrating bars, stationary bars, gear lever, when made as described, the same constructing one whole or machine.

Fifth, I claim the making of the zigzag cam adjustable by set screws, so that it can be applied to the wheels of the horse rakes, and the use of my machine in combination with the wheels and carriage of horse rakes, as shown and described.

61,202.—FLOORING FOR MALT KILNS.—Wm. W. Hughes, and James C. Adams, Philadelphia, Pa.

First, We claim constructing malt-kiln floors of perforated flanged plates, extending over two or more joists stiffened by the side bars or clips, G H, and the transverse bars or strips, J K, the flanges of said plates being also secured together by pin bolts or rivets passing through the contiguous flanges.

Second, We claim securing the flanged plates, constructed as above described, to the iron joists below by means of clips, m m, and wires or their equivalents.

61,203.—PLOW.—William S. Huntington, Byron, Mich., assignor to himself and C. P. Devereaux, North Newburgh, Mich.

I claim the iron elbow scraper, a, suspended to the beam, A, of a plow, in combination with the drawing rod, b, arranged and operating substantially as and for the purpose herein described.

61,204.—REGULATORS FOR WATCHES.—J. Little Hyde, New York City.

I claim so constructing the index and scale of the regulator that the edge of the index shall form such an angle with the lines of the scale that one of the said lines shall always be but partially covered by the index, substantially as herein described for the purpose specified.

61,205.—SWEEPING MACHINE.—Allen S. Jimmerson, Greenpoint, N. Y.

First, I claim the combination of the transverse rotating brush, D, with the two oblique rotary brushes, C, arranged and operating substantially as herein set forth for the purpose specified.

Second, The construction of the sections, F, with the brushing splints, i, clamped between the two metallic strips or plates, a, substantially as herein set forth for the purpose specified.

62,206.—DOUGH KNEADER.—H. P. Jones, Davenport, Iowa.

First, I claim the employment of a traversing rotary blade, of a hexagonal form, in connection with a box, A, having flaring sides and ends, substantially as described, and for the purposes set forth.

Second, The construction of the blade, C, with toothed gudgeons, g g, on its ends, in combination with the sliding keepers, e e, and shouldered rack plates, B B, substantially as and for the purposes described.

61,207.—STEM SETTING WATCHES.—Jules Jurgensen, Locle, Switzerland.

First, I claim, in combination with mechanism for setting the hands of the watch, the pendant bow, C, constructed and arranged so that by its movement said mechanism is thrown in or out of gear, substantially as specified.

Second, The combination of the cap or guard, E, with the pendant bow, C, and hand-setting mechanism, whereby the said cap while closed is made to prevent the bow from throwing the hand-setting mechanism in gear, essentially as specified.

Third, The combination of the spindle, D, pendant bow, C, with the eccentric pin, m, sliding rod, h, spring, i, clutch lever, k, clutch, b, contrate wheel, c, and pinion, d, in gear with the cannon pinion of the watch, substantially as shown and described.

61,208.—AUGER.—A. C. Kasson, Milwaukee, Wis.

First, I claim an auger having a twist whose front or working faces are concave, and whose rear surfaces are convex, substantially as represented in Fig. 2 of the drawings.

Second, An augur constructed substantially as herein shown and described, which permits the formation of cutting lips at any point in its length, by simply sharpening its edges.

61,209.—PUMP.—William S. Kelley, Schenectady, N. Y.

First I claim the construction of the piston, B C, with outlets, a a, and with a valve seat formed in its lower end for receiving a valve, D, which is applied on the lower end of the piston rod, substantially as described.

Second, The combination of the flanged tapering collars, F G', and packing, e, or their equivalents, with the piston, B C a, and valve, D, on the piston rod, E, substantially as and for the purpose described.

Third, The construction of the packing-expanders, F G', substantially in the manner and for the purpose described.

Fourth, The employment of a tapering flanged collar, and a split flanged collar under, over and back of the packing, in such manner that the column of fluid above the piston valve will expand the packing as the piston is raised, substantially as described.

Fifth, The pump constructed substantially as herein shown and described, so that the packing, e, is expanded laterally, by the column of water being lifted, and the valve, D, opened and closed by a direct force or pull upon the piston, substantially in the manner described.

61,210.—STEAM GENERATOR.—Martin C. Kilgore, Washington, Iowa.

First, I claim the pockets, H, constructed substantially as and for the purposes specified.

Second, The dome, K, in combination with the tubes, L and M, constructed and operating substantially as set forth.

Third, A steam boiler having sections, A and B, flanges, C and D, flue box, E, and dome, and tubes and pockets as described, constructed, combined and arranged substantially as herein specified.

61,211.—MARINE MOTOR.—W. P. Kirkland, San Francisco, Cal.

I claim the pipe, A, having stop-cocks, B B, water wheel, D, and water pipe, G, in combination with any suitable device connected with the said water wheel, for transmitting its power, when arranged together substantially in the manner and for the purpose specified.

61,212.—CURTAIN FIXTURE.—Christian F. Knauer, Pittsburgh, Pa.

I claim the combination of the guard, D, stud, m, and toothed rim, d, on the bearing of a window shade fixture, substantially as specified and for the purpose specified.

61,213.—SAFETY CHAMBER FOR OIL TANKS, ETC.—Edward H. Knight, Washington, D. C.

I claim the safety chamber operating substantially as described and so arranged as to be attached to and removed from the tank or barrel as required.

51,214.—SPIKE MACHINE.—William Koplin, New Castle, Pa.

I claim the arrangement of the moving die, g, and knife, h, with the descending pointer, K, actuated by the cam so as to cause the pointer to follow the cutting movement of the knife and precede the withdrawal of the latter for the purposes described.

61,215.—Gate.—S. A. Kroner, Doylestown, Pa.

First, I claim the combination of the arm, J, and brace, K, with the rear end of the gate, substantially as herein shown and described and for the purpose set forth.

Second, The combination of the horizontal track bars, H and I, with the gate and with the friction pulleys or rollers, D E F G, substantially as herein shown and described and for the purpose set forth.

Third, In the arrangement of the pulleys or rollers, D E F G, in connection with the posts, B C, and track rails, H I, substantially as herein shown and described and for the purpose set forth.

61,216.—Apparatus for Extracting Honey from the Comb.—L. L. Langstroth, Oxford, Ohio, and S. Wagner Washington, D. C.

First, We claim the frame, T, with the adjustable arms, b, and the support or post, D, for supporting and operating the revolving frame, B, substantially as set forth.

Second, The frame, B, suspended by a shaft, C, from the frame, T, and arranged to hold the comb while being rotated substantially as herein described.

Third, We claim providing the comb holder or frame, B, with adjustable post, l, or their equivalents, for adjusting it to receive and hold frames or combs of various sizes.

Fourth, In combination with the stationary posts, m, and the adjustable post, l, we claim the wire gauze, B, or its equivalent, arranged to support the comb and at the same time permit the escape of the honey, substantially as described.

61,217.—Cotton-bale Tie.—R. G. Latting, New Orleans, La.

First, I claim the toothed ridge, G g, as and for the purpose described.

Second, The shoulder, h, in the bar of the loop, C, as and for the purpose described.

Third, The arched central bar, G, substantially as described and represented.

61,218.—Let-off Mechanism for Narrow-ware Looms.—J. N. Leavenworth (assignor to himself and Bela A. Mann), Hamden, Conn.

I claim the let-off mechanism constructed and arranged to operate as described, the same consisting of the weight, I, suspended by the warp, the weighted lever, E, and its shoe, f, bearing on the warp spool.

61,219.—Self Feed for Carding Engines.—R. W. Lewis, Beacon Falls, Conn.

First, I claim the doffer ring, d, arranged in combination with the main cylinder, A, so as to take therefrom the outside or waste roofing.

Second, The combination of the creeper, E, with the doffer rings, d, and the main cylinder of second breaker, substantially in the manner described so as to receive the waste roving directly from the main cylinder and transfer it to the second breaker substantially as set forth.

61,220.—Stone-cutting Machine.—James W. Maloy (assignor to the American Marble Cutting Company), Boston, Mass.

First, I claim the combination with the revolving cutting tool, D, of the toothed wheel, H, and projection, p, or their equivalents, for imparting a reciprocating motion to the said cutting tool, as set forth.

Second, The combination of the vibrating shaft, F, with the movable bearing, l, and spring, S, and for the purpose set forth.

61,221.—Cog Rail for Railroads.—Sylvester Marsh, Littleton, N. H.

First, I claim a ratchet or cog rail composed of cylindrical cogs free to revolve upon their axles or trunnions, substantially as herein shown and described.

Second, In a ratchet or cog rail, constructed as described, I claim forming the uprights which support the cogs or rollers of angle iron, substantially as herein shown and for the purposes set forth.

61,222.—Metallic Safety Seat for Railroad Cars.—Henry Martin, Chicago, Ill., assignor to himself, A. H. Towne, and A. I. Ambler.

I claim a metallic seat consisting of a tapering strip of metal which is constructed for receiving an eyelet and having its ends secured together thereby, substantially as described.

61,223.—Hot-air Furnace.—Peter Martin, Cincinnati, Ohio.

First, I claim the arrangement of the fire chamber, A, the ash pit, F, the series of descending flues, J J J, leading from the top of the fire chamber to the ash pit and the ascending flue, O, leading directly into the discharge flue, O', all as herein described and for the purposes set forth.

Second, The combination of the elbows, K L, collars, M, and flanges, N, with the fire place, A, ash pit, F, and flues, J and O, as and for the purposes explained.

Third, The combination of the supporting crank, H, lever, I, and divided grate, G G', all constructed and arranged to operate as described.

Fourth, I claim surmounting the fire chamber of a hot-air furnace with an arched and corrugated sheet-metal crown plate, B b, as herein set forth.

Fifth, In combination with the elements of the claim, I also claim the door, Q, and its accessories, when located as described and operating for the purpose set forth.

Sixth, The sliding shutter, Y Z Z', constructed and employed as and for the purposes set forth.

61,224.—Manufacture of Sugar.—Frantz O. Matthiessen, Jersey City, N. J.

First, I claim the process, substantially as herein described, of separating the products as discharged from the centrifugal machine by first running off the green syrup and afterward the cleansing liquid or liquoring into distinct vessels or reservoirs for separate treatment or use, substantially as specified.

Second, The combination with the discharge spout, D, of the centrifugal machine of a swivelling spout, E, or spouts controlled by a valve or valves, substantially as and for the purpose or purposes herein set forth.

61,225.—Priming Metallic Cartridges.—Edward Maynard, Tarrytown, N. Y. Antedated Dec. 5, 1866.

I claim a primed metallic cap for the base of a cartridge when the fulminate is secured at a single point on the inner side of said cap and the priming point or receptacle does not project externally therefrom beyond its base, all substantially in the manner and for the purpose herein set forth.

61,226.—Machine for Dressing Barrel Hoops.—Albert McAlpine, Pittston, Pa.

I claim dressing barrel hoops their entire length to a thickness by the cutter wheel, B, when arranged to operate with the guide or head block, H, pressure roller, V and feed roller, L, all constructed substantially as described.

61,227.—Dredging Machine.—James R. McClintock, and John K. Scott, New Orleans, La.

First, We claim the adjustable frame work or guide, C, for adjusting and holding in proper position the lower ends of the pipes or hose, B, and for supporting the stirrer, D, when the same is used as described for the purpose set forth.

Second, The combination of the adjustable guide, C, with the pipes or horse, B, and forcing pumps, A, as described for the purpose set forth.

Third, The combination of the forcing pumps, A, pipes or hose, B, adjustable guide, C, with the stirrer, D, or its mechanical equivalent, substantially as described for the purpose set forth.

61,228.—Harvester.—Leander J. McCormick and Lambert Erpelding, Chicago, Ill., assignor to said McCormick.

First, We claim the combination, as set forth, of the main frame, supplementary frame and hinged and pivoted finger beam, all constructed and arranged as described.

Second, The combination of the supplementary frame, the hinged finger beam, and the coupling arm with the rocking lever, when arranged for joint operation, as described.

Third, The combination of the shoe, O, locking piece, r, and crescent cam, s, with the lever, S, all arranged as described for the purposes both of locking the finger beam and lifting it horizontally.

Fourth, The combination with the main and supplementary frames of the hinged finger beam, the locking lever, the coupling bar, Q, and the rocking lever, all arranged and operating as described.

Fifth, The combination of the cross piece, N, and coupling bar, Q, with the shoe, O, constructed and arranged as described.

61,229.—Pocket Knife.—Royal B. Milliken, Springfield, Vt. Antedated Jan. 5, 1867.

I claim a knife handle in two parts, connected one to the other and to the blade, and otherwise constructed, substantially as described.

61,230.—Carriage-thill Coupling.—Simeon Mills, Madison, Wis.

First, I claim the socket, D, formed solid with the exception of the slot for the pivot, substantially as described, whether fastened to the draw bar or clip or an axle band.

Second, The combination of the solid socket, D, slide, F, and flanges, b b, on the thill iron.

61,231.—Locomotive for Plowing, Etc.—Thos. S. Minniss, Meadville, Pa.

First, I claim an endless chain or track composed of plates, B, hinged as described, with vertical flanges, E, and truck, C, in combination with the frame track, A, and wheel, D, as and for the purpose set forth.

Second, The clutch, M, operated by lever, N, in described combination with wheel, D, and endless chain or track, for the purpose specified.

Third, The platform, O, with guide wheel, H J, and cam-headed lever, I, as and for the purpose set forth.

61,232.—Sewing-machine Shuttle.—Stephen Moulton, Hartford, Conn.

First, I claim a shuttle for sewing machines in which the removable bobbin, C, and adjustable tension spring, D, are arranged in the manner shown upon a plate, A, which is pivoted to a case, B, in such a manner as to cover and protect the parts named and the thread, when in use, and also that the parts named may be readily exposed for several of the threads or adjustment of the tension spring by means of the screw, H, substantially as shown.

Second, I claim the manner of arranging the tension spring, D, so as to form a bearing for the spring, x, which holds the bobbin in place, said spring being inverted in a hole drilled directly through one end of the bobbin support, A.

61,233.—Glassware.—Jeremiah Myers, Dorchester, Mass.

I claim the arrangement and combination of the eccentric segment gears, n and r, with the platen or plunger, c, connecting rods, l, and levers, s, the whole being connected to operate together substantially as set forth

61,234.—Apparatus for the Use of Smokers.—Myer Myers, Maurice Myers and Wm. Hill, Birmingham, Eng.

We claim the sliding cutting edges defined as d and g, and the connecting of the same with a stiletto and means for expanding and holding the parts in position, substantially in the manner and for the purpose set forth.

61,235.—Carriage-thill Coupling.—Peter Myers, Newton, Ill.

I claim the construction and arrangement of the coupling iron, J, spring, E, follower, F, thill iron, G, safety button or spring, C, grooves, P P, all for the purposes as above set forth.

61,236.—Skirt Elevator.—A. F. Nathan, New Haven, Conn.

I claim the arrangement of the slide, A, upon the loop, B, in the manner described, in combination with the tape, C, substantially as herein set forth.

61,237.—Dynamometer.—Chas. Neer, Brooklyn, N. Y.

First, I claim the peripheral power scale, c, in combination with the chain, l, and a steelyard or other measure of actual force, the parts being constructed and combined substantially as and for the purposes set forth.

Second, I claim constructing the steelyard carrier, f, in two parts so as to apply the dynamometer to a shaft without removing it from its bearings, substantially as set forth.

Third, I claim the ring, 2, and columns, 1, in combination with the peripheral power scale, c, for connecting the same to the coupling, c, as set forth.

Fourth, I claim the power indicator, n, and fork, 6, combined with steelyard head, h, for the purposes and as set forth.

Fifth, I claim the dial, q, applied to indicate the proportion of speed, in combination with the indicator, n, so as to determine the actual power consumed, substantially as set forth.

Sixth, I claim the friction tester consisting of the cylinder, r, the boxes, s t, in combination with the dynamometer, substantially as and for the purposes set forth.

61,238.—Brick Machine.—Anthony Nulsen, E. Haueisen and Albert Wagner (assignors to A. Nulsen), Cincinnati, Ohio.

First, We claim the hopper, B, traveling bottom, E, rollers, C D and F, throat, H, and shaver or knife, G, for the purpose set forth.

Second, The compressing rollers, N N', when combined with the trunk composed of the two endless aprons, Q Q, rollers, R R', and back boards, S S'.

Third, The combination of trunk, Q Q R R' S S', and conducting and separating throat, T U u.

Fourth, The described combination of separating throat, T U u, reciprocating knife, 9, and removable molds, 3.

Fifth, The endless carrier, Y Y' Z z 1, when combined with the reciprocating hooks or claws, 5, substantially as described.

61,239.—Cotton Gin and Picker.—Enoch Osgood, Boston, Mass.

First, I claim the elastic roller, B, made of rubber and cloth, the latter running edgewise from the center or core to or towards the outer circumference with the flanged metallic rings between the several compound rings as described, the same constructed and operating in the manner as shown and described and for the purpose set forth.

Second, The elastic roller, B, made of rubber and cloth wound around its shaft or core spirally, with strips in the manner described and for the purpose set forth.

Third, I claim the combination of elastic roller, B, with the concave bar, C.

Fourth, The combination of elastic rollers, B B, with the double concave or angular bar, L, and clearer, M, as described.

Fifth, The combination of elastic roller, B, corrugated clearers, D D, and concave bar, C, as described.

Sixth, The combination of elastic roller, B, revolving clearer, E, and concave, C, as described.

Seventh, The combination of picking cylinder, P', cylinders, u v and w, belts, L L', rack, k, elastic roller, B, and revolving clearer, E, constructed, arranged and operating in the manner substantially as described and for the purpose set forth.

Eighth, In combination with the clearers, D D, I claim the pitman, c, constructed and operating in the manner shown and described and for the purpose set forth.

Ninth, The combination of the elastic roller, B, with the revolving doffer, Z, constructed, arranged and operating in the manner substantially as shown and described and for the purpose set forth.

61,240.—Combined Tongs, Lid Lifter, Hook, Etc., Etc.—B. Owen and B. Pickering, Dayton, Ohio.

We claim the above described lid lifter as a new article of manufacture, the same being constructed and used substantially in the manner and for the purposes set forth.

61,241.—Reed and Pipe Musical Instruments.—Isaac T. Packard, Chicago, Ill.

I claim as my invention the use of an elastic band, or its equivalent, for the purpose herein described and set forth.

61,242.—Bed Bottom.—H. H. Palmer, Rockford, Ill.

I claim a spring bed bottom composed of a series of parallel wooden slats, D, connected near their ends by strips, b, of leather or other suitable flexible material, with wire springs, C, attached to the head and foot pieces, a a, of the frame, A, and connected to the strips, b, centrally between the slats, D, substantially as set forth.

61,243.—Railroad Frog.—Sidney Parker, Chicago, Ill.

I claim a railroad frog consisting of the bed plate, B, plate, A, and the steel rails, x y and z, combined and constructed as herein shown and described.

61,244.—Machine for Preparing the Fiber of Plants.—Edward Juanes y Patrullo, New York City.

I claim the combination of the apron, C, with the sliding frame, D, operated by the lever, E, and arranged substantially as and for the purposes herein described.

61,245.—Knife Clearer.—R. R. Pattison, Chicago, Ill.

I claim, First, The bed or cushion, J, or its equivalent, upon which the knives, etc., are laid to be acted upon by the scourer, in combination with the cleaning material box or reservoir, L, when the two are combined substantially as and for the purpose specified.

Second, The holder, M, for the handles of the knives or forks, etc., made in a box form and provided with a cover, plate, or board, Q, so hung thereto as to accommodate itself to handles of varying thicknesses, substantially as described.

61,246.—Carriage Brace.—Jas. B. Pelton (assignor to D. H. Wood), Sandusky, N. Y.

I claim the combination and arrangement of the braces, G, with the ordinary elliptic springs, C, and the body, A, in the manner shown and described, that is to say, the braces forming simple bars attaching to the body and connecting with the upper half of the elliptic springs, so that while both the body and spring are united and braced against rocking and swaying, the springs are unincumbered and allowed their natural free and unimpeded elastic action, and the bars hidden from sight, as herein set forth.

61,247.—Lighting Gas by Electricity.—Geo. G. Percival, Brooklyn, N. Y.

I claim the attachment to a gas burner of any kind, or to the fixtures thereof, of a secondary pile, which may be charged, as it were, with voltaic electricity, by being properly connected with any suitable source of electricity, and which will retain the charge until given off from time to time, as may be required for the purpose of lighting the gas, the whole substantially as herein described.

61,248.—Carpenter's Gage.—Russell Phillips, Gardiner, Me.

I claim the combination of the stock having the grooves and rails and the two slides on its opposite sides, the slides having the recesses, the lips, the projections and thumb screws, as and for the purposes herein set forth.

61,249.—Scissors Sharpener.—D'Arcy Porter, Cleveland, Ohio, assignor to G. S. Newcomb & Co.

I claim the adjustable knife, C, arm, B, and stand, A, in combination with the gage, D, points, a, and screw, E, arranged in the manner and for the purpose set forth.

61,250.—Machine for Scouring Leather.—Ira W. Pray and Edward Fitzhenry, Portland, Oregon.

We claim, First, A mechanism by which dually arranged sets of rubbers or scrapers, L, in a machine for finishing leather, may be alternately brought into action, by the reciprocating motion of a crank, substantially in the manner set forth.

Second, In combination with the crank, N', and pitman, N, we claim the frame, A, pivoted substantially in the manner and for the purposes set forth.

Third, In combination with the hinged arms, H, with or without the arms, I, with the springs, K, the parts being constructed and arranged for use substantially as set forth.

Fourth, The springs, K, pivoted cross-pieces, K', and lens, O, with the hinged arms, H and I, substantially as and for the purpose set forth.

Fifth, In combination with the table, G, we claim the roller, E, adjustably suspended by the rods, E', and cross bar, P, substantially as and for the purpose set forth.

61,251.—Lemon Squeezer.—Thomas Reece and Arthur Clarke, Philadelphia, Pa.

We claim the combination of the two handles, C and D, hinged together as shown with the two cups, A and B, one provided with a slotted recess, and the other with a flange, d, the several parts being constructed and used as and for the purpose herein set forth.

61,252.—Mill Pick.—H. N. Relyea, Warsaw, N. Y., assignor to himself and Mills L. Rice.

I claim the diamond-shaped truncated head, A, formed of malleable metal, and provided with sockets, a a, and transverse holes, b b, in combination with the hardened blades, B B, and key, c, constructed and arranged substantially as and for the purposes set forth.

61,253.—Frame for Artificial Slates.—Wm. Jones Rhees, Washington, D. C.

First, I claim the combination of a hollow in a slate frame, to be used as a receptacle for pencils, sharpeners, and other utensils, with a suitable covering, constituting a ruler and gage, substantially as described.

Second, Marking upon said ruler, so arranged, measures of length, substantially as shown and described.

Third, Marking upon the frame of a slate measures of length, substantially as described.

61,254.—Frame for Slates.—Wm. J. Rhees, Washington D. C.

First, I claim making the frame to a slate of a box, or boxes, as and for the purpose substantially as described.

Second, Using the box frame of a slate as a receptacle for pencils, rulers, sponge, or any other utensils or articles, substantially as described.

Third, Dividing the box frame of a slate into compartments, as and for the purposes described.

Fourth, Making letters, drawings, and measures of length on the box frame of a slate, either outside or inside.

61,255.—Apparatus for Inserting Corks.—Wm. Rheiner and L. H. Wolf, Detroit, Mich.

First, We claim the combination and arrangement of the base, B, cone, A, standard, a, holder, C, lever, D, and plunger, b b', in the manner and for the purpose described.

Second, Hinging the top, F, to the part, E, and fitting the plunger to said hinged part, F, all in the manner shown and described.

61,256.—Dish Washing Machine.—Gilbert Richards, Cummington, Mass.

I claim the combination and arrangement of the wire screen, G, extending longitudinally of the cylindrical vessel, A, from one end to the other thereof, the horizontal winged shaft, E, and gear wheels, C and D, with each other, and with the cylindrical vessel, A, as herein described and for the purpose specified.

61,257.—Fruit Picker.—George S. Richardson, Stow, Ohio.

I claim the guards, B, of unequal lengths, and single curved fingers, B, connected with the hoops or bands, A, in combination with the socket rings, F, bag, D, and staff or handle arranged in relation to each other as and for the purpose specified.

61,258.—Harrow.—John W. Richardson, Sligo, Ohio.

First, I claim the provision in a harrow of the cimeter shaped blades, J, adapted to revolve on their shanks or axes, boxed within the frame when employed with chambered metallic boxes, H, constructed as represented in figure 2, for the purpose explained.

Second, The arrangement in a mounted or wheel supported harrow, of one or more shafts, K K', journaled transversely of the frame, and armed with teeth or blades, L, in combination with the notched rod, Q, projection, Q, lever, N, and treadle R, as and for the purpose set forth.

Third, In combination with the elements of the clause immediately preceding, I claim the handle, S, on the rear part of the rod, O, for the several objects stated.

61,259.—Potato Digger.—S. Richardson, Jericho, and J. S. Adams, Burlington, Vt.

We claim the combination of the digger, B, cylinder gage wheels, D D', and supporting wheels, E E', arranged and operating substantially as described.

61,260.—Whiffletree Attachment to Plows.—J. B. Ripsom, Kendall, N. Y.

I claim the application of the wheel, A, projecting beyond the end of the whiffletrees, as shown in figure 1.

I also claim the brace, B, and pivot, a, for the purpose of securing the wheel to the whiffletree substantially as herein described.

In combination with the wheel, A, I also claim the long staple, C, for the purpose herein set forth.

I also claim the special arrangement and combination of the whole thing as herein set forth.

61,261.—Covering Wire with Fine Wire.—William H. Rodgers, Brooklyn, E. D., N. Y.

I claim the hollow fixed head, l, separate from the hollow axis, b, in combination with the revolving head carrying the spools or bobbins of fine wire, and revolved around the axis, b, as and for the purposes set forth.

I also claim the grooved roller, g, in combination with the revolving head and spools around which rollers, g, the fine covering wire is wound to give the required tension from the friction as set forth.

61,262.—Amalgamator.—D. E. Rose, Cincinnati, Ohio.

First, I claim the combination of the spring bearing, H, and inclined sectional shaft, B, provided with spiral flange, revolving in the case, X, which enter the kettle, E, near the bottom, substantially as described.

Second, I claim combination of the inclined casing, X, provided at its lower end with stationary grinding flange, D, and the shaft, B, provided with a grinding disc, C, introduced through the side of the kettle, and operating near its bottom, substantially as described.

Third, In combination with the kettle, arranged as described, I claim the revolving paddle, G, as described and represented.

61,263.—Draining Machine.—A. P. Routt, Liberty Mills, Va.

I claim the adjustable flaring wings, G G, applied to the double mold board, D, in the manner described, and operating to clear away the dirt from the edges of the ditch as and for the purpose set forth.

61,264.—Planing Machine.—Gilbert J. Rugg, Worcester, Mass.

I claim the combination of the lever, F, with roll, D, cross-piece, G, and rods, b and c, when constructed and operating substantially as shown and set forth.

61,265.—Legging.—William G. Rule, New York City.

I claim the combination of the elastic metal frame, substantially as described, with the covering of the same, whether made of leather or other material, for the purpose of making spatter dashes as set forth.

61,266.—Steam Governor.—Robert Sanderson, Cleveland, Ohio.

I claim the auxiliary lever, O, yoke, N, and pivot joint, b', extending through the lever, M, in combination with the lever, J, pawls, K K', lifting toes, H, ball, P, and yoke, L, as and for the purpose set forth.

61,267.—Manufacture of Paper and Treatment of Paper Pulp.—A. T. Schmidt, Pittsburg, Pa.

I claim the process hereinbefore described of treating paper, paper pulp, and textile fabrics of vegetable fiber, with a mixture of glycerin, oil of vitriol and water, and subsequently with an alkaline bath, or the equivalent of such process, substantially as and for the purposes hereinbefore described.

61,268.—Churn.—Thomas D. Shaw, Westfield, Ohio.

I claim the dashers, I and J, provided with tubes, L M, in combination with the sleeve, N, shaft, K, and operating conjointly by the gearings, O P and G, as and for the purpose set forth.

61,269.—Automatic Fly Brush and Fan.—Charles C. Short, Osgood, Ind.

I claim the combination and arrangement of the shaft, H, automatically actuated by clock work, and the cross head, H', screw head, I, and the extension arms, K K', attached adjustably to the cross head by hooks, K", substantially as and for the purpose set forth.

61,270.—Sewing Machine.—Isaac Merritt Singer, Yonkers, N. Y.

First, I claim the combination of a round needle bar, and a round presser foot stem, by means of sliding bracket, substantially as set forth.

Second, The combination of a reciprocating spring shuttle holder, with a shuttle guide in such manner that the former, while moving with the shuttle, is caused during a part of its movement to press strongly against the shuttle, by the action of the shuttle guide, substantially as set forth.

Third, The combination of a shuttle constructed to oscillate in a sewing machine, with a projecting thread guide for the delivery of thread, substantially as set forth.

Fourth, The construction in a sewing machine of the lateral support for the oscillating shuttle, with a central opening, substantially as set forth.

Fifth, The shuttle constructed with an ear, projecting at its butt, beyond the bobbin socket, substantially as set forth.

Sixth, The combination of the shuttle with a spring ring so arranged as to hold the bobbin in its socket in the shuttle, substantially as set forth.

Seventh, The combination of the shuttle with a spring ring provided with a branch to make pressure upon the bobbin, substantially as set forth.

Eighth, The combination of the shuttle, with a lining in the bottom of its bobbin socket, substantially as set forth.

Ninth, The combination of the shuttle with a hoop lining in its bobbin socket, substantially as set forth.

Tenth, The combination of several sections of a sectional thread tension, with one movable stock, substantially as set forth.

Eleventh, The combination of the arm of the thread take up with its stock by means of an adjustable connection, substantially as set forth.

Twelfth, The combination of the regulating lever of a reversible feed mechanism, with a stop carried by said lever, substantially as set forth.

Thirteenth, The combination of the turning regulating plate and feeding instrument of a sewing machine, by means of a bent reciprocating bar, substantially as set forth.

61,271.—Composition Fuel.—Henry Slatter, Covington, Ky.

I claim as new, and of my invention, the composition fuel composed and compounded as set forth.

61,272.—Grain Binder.—Andrew J. Smith, New York City.

First, I claim the lever, F, provided with the notched forks, E, when arranged and used as and for the purpose herein set forth.

Second, The sliding gear block, K, constructed arranged and operating substantially as and for the purpose herein specified.

61,273.—Corn Planter.—Ellis F. Smith, Orangeville, Ill.

I claim the traction wheel, A', provided with the markers, c c c, in combination with the gear wheels, C and D, so constructed that a hill will be planted, when the marker is on the ground for the purposes and substantially as described.

61,274.—Amalgamator.—Syramus Standish, Pacha, Cal.

First, I claim the spiral shaped flanges or lips, M, of the rotating muller-arms, L, substantially as and for the purposes specified.

Second, The shoes, M2, hung to the muller arms, L, so as to be susceptible of a lateral play upon such arms, substantially as and for the purpose described.

Third, The shoes, M2, having spiral shaped flanges or lips, O, upon their outer ends as and for the purpose specified.

61,275.—Mode of Utilizing Tobacco Dust.—A. F. Stayman, Baltimore, Md.

First, I claim the utilizing of tobacco dust, substantially as herein described.

Second The process herein described of preparing tobacco dust for use.

Third, I claim a material for smoking composed of tobacco dust, prepared in any of the methods herein described, or in any equivalent manner.

Fourth, I claim a granulated smoking tobacco composed of tobacco dust, treated, substantially as herein set forth.

Fifth, I claim as a new article of manufacture, the smoking tobacco, composed prince pally of tobacco dust, and prepared substantially as herein described, whether the same be used in a granular or solid form.

61,276.—WATCH CASE.—O. F. Stedman, Ravenna, Ohio.

I claim the spring, L, as arranged in combination with the watch case in the manner and for the purpose as herein set forth.

61,277.—MACHINE FOR FILING SAWS.—Eli Stubbs, West Elkton, Ohio.

I claim the adjustable clamp, A, in combination with the hinged adjustable guides, B B, constructed and arranged as described, as a new article of manufacture applied and used in the manner specified.

61,278.—STEAM GENERATOR.—James H. Sturdy, Attleton, Mass.

I claim a boiler constructed with helical ascending and descending grooves or flues arranged to extend around it and made to communicate at or near their upper extremities, substantially as set forth.

I also claim the cap, B, as made with the central passage, g, and one or more chambers, e f, the same being arranged in it, substantially in the manner and for the purpose as specified.

I also claim the combination of the cap, B, or its equivalent, with the boiler formed with two or any other greater number of helical flues, arranged in it, substantially as described.

61,279.—BOAT-DETACHING TACKLE.—James R. Taylor, New York City.

I claim combining with the central windlass or shaft, C, and the hooks or bolts, i i, at the ends of the boat, the rods, levers, and links, b, b' d d', f f' and g g' for connecting and detaching boats, substantially as herein described and represented.

61,280.—BOAT DETACHING TACKLE.—James R. Taylor, New York City.

I claim in a boat, connecting and detaching apparatus the combination of the slotted ring bolt key, and friction rollers arranged to operate together, substantially as herein described, and for the purpose set forth.

61,281.—BOAT-DETACHING TACKLE.—James R. Taylor, New York City.

I claim in connection with the hook in the davit block, and the ring in the boat, the lever, A, with its foot piece, e, the whole constructed, arranged and operating in connection therewith, substantially as described.

61,282.—ELASTIC TIPS FOR LEGS OF FURNITURE.—E. S. Torrey, New York City.

I claim the combination of soft elastic tips and divided sockets, substantially as herein set forth for connecting said elastic tips with furniture as above described.

61,283.—TOBACCO PIPE.—James W. Truman, Macon, Ga.

I claim the combination of the flanged tube, b, and rubber packing, A, with the pipe stem, B, substantially as and for the purpose herein shown and described.

61,284.—APPARATUS FOR LIGHTING LAMPS, GAS BURNERS, ETC.—Philos B. Tyler, and Wm. M. Chandler, Springfield, Mass., and L. F. Standish, Chicopee, Mass., assignors to Repeating Light Company, Springfield, Mass.

We claim the tube and its appendages for holding and controlling a continuous or repeating match, substantially as herein described, in combination with the wick tube or equivalent gas-burner, and an igniter, substantially as described, and for the purpose specified.

61,285.—COOKING STOVE.—Samuel S. Ulter, New York City.

I claim the air channels, g g, arranged within the smoke channel, l l, and employed in connection with the main chamber, c, and additional air chamber, d, as and for the purpose specified.

61,286.—QUARTZ CRUSHER.—I. Varney and A. Rix, San Francisco, Cal.

I claim iron binder, K, the toggle bar, M, and jaws, B and E, constructed and arranged substantially in the manner and for the purposes set forth.

61,287.—BOOTS AND SHOES.—George Wagner, Washington, D. C.

I claim the combination of the piece a b c, and the piece leaving the opening on the side covered by flap, D, in the manner described for the purpose specified.

61,288.—PAINT BURNER.—W. W. Wakeman, Jr., New York City and R. Ross, Brooklyn, N. Y.

First, We claim the within described apparatus adapted for projecting flame obliquely in a central stream upon painted surfaces, and allowing of being moved and tilted, substantially as and for the purpose herein set forth.

Second, The cover, K, k, in combination with the disk, formed and provided as above represented, and adapted to receive sufficient quantity of air at the sides and to expose only a small area of the upper surface of the vessel, through which the jet of flame may issue, substantially as and for the purpose herein specified.

61,289.—EYE GLASSES.—Edwin Want, New Haven, Conn.

First, I claim attaching the handle, D, and the arm, E, each to their respective bows, and the spring, E, to the two bows in position relatively to the said handle and arm, so that when closed the two points at which the spring is attached and the two glasses correspond in position, the one with the other, in the manner herein described.

Second, Attaching the spring to the bows, by means of the square shoulder described and the nut, t, substantially as and for the purpose specified.

Third, The handle, D, and catch p n, d, when formed in one and the same piece, as and for the purpose specified.

61,290.—VEGETABLE CUTTER.—William Weaver, Phœnixville, Pa.

I claim the cylindrical revolving hopper, B, its spiral vanes, m, the plate, A, and rounded knives, n n, in combination with the annular rack, d, and pinion, e, the whole being arranged and operating as set forth.

61,291.—STILL FOR PETROLEUM.—William C. Wells, Parkersburg, W. Va.

First, The frame work, B, for the bottom of the still and to receive the fire sheets or plate, substantially as described, and for the purpose specified

Second, In combination with the bottom frame work, B, of the still, the return flues, G, of the furnace, corresponding with the fire sheets, C, substantially as and for the purpose described.

61,292.—PAINT AND VARNISH BRUSH.—George A. White, Boston, Mass.

I claim combining with the ferrule, a, the fender wires, c, and binder end, d, substantially as described, also in combination with such binder and the paper cylinder, e, or its equivalent, substantially as forth.

61,293.—CARRIAGE HUB.—James M. Whitney, Providence, R. I.

I claim, First, A carriage hub, made with its central part for receiving the spokes and elastic cylinders of bronze combined with the conical sleeves of iron, forming in two pieces the axle box and nut for comprising the elastic cylinders, and the external covering these, and forming the two ends of the hub.

Second, I claim the conical shaped elastic cylinders or packing.

Third, I claim the ventilated air space, between the axle box and the packing.

Fourth, I claim the tips and slats for preventing the turning of the sleeve in screwing and unscrewing with the holes giving access to the external air, all made and operating substantially as described or their mechanical equivalents.

61,294.—CULTIVATOR.—Silas M. Whitney, Galesburg, Ill.

I claim, First, The screwing of the standard, D, to the beam, A, through the medium of the sockets, B, and screw bolts, C, provided with eyes, a, all constructed and arranged substantially in the manner as and for the purpose set forth.

Second, The braces, E, applied to the beam and standards, suqstantially in the manner and for the purpose specified.

Third, The caster or gage wheel, H, applied substantially in the manner and for the purpose set forth.

61,295.—COAL SCUTTLE.—D. Wight, New London, Conn.

I claim a coal hod or scuttle provided with a discharge opening or spout at or near its lower or bottom plate, for the removal of the coal therefrom, substantially as described.

61,296.—CAR COUPLER.—J. T. Wilson, East Liberty, and T. J. Louis, Port Rug, Pa.

We claim, in combination with the draw bolt, d, and the flanged or beveled face plate, b, the coupling lever, c, when hung from the upper bar of the coupling frame, so as to leave a free space for the reception of an extra link, o, and allow the connecting link, c, to slide back into the coupling frame when necessary, the parts being constructed and arranged substantially as and for the purpose above described.

61,297.—ALARM FOR MONEY DRAWER.—James F. Winchell, Springfield, Ohio, assignor to himself, George C. Steele, and S. A. Simms.

First, I claim the combination of the drawer, B, lever, D, and sliding block, F, and spring, s, with the bell, G, all arranged and operating substantially as described.

Second, In combination with the above-named parts, I claim the treadle, E, for the purpose of enabling the drawer to be closed without sounding the alarm, as set forth.

Third, I claim the locking device, consisting of the knob, C, and opening, b, arranged to operate as set forth.

61,298.—BRICK MACHINE.—Robert Wolff (assignor to himself and John H. Thielding), New York City.

First, I claim in connection with the mud box, a, and grinding shaft, B b, the molding pocket, D, sliding cover, k, throat slide, h, plunger, E, levers, G I, and cams, P R S, all constructed, arranged, and operating substantially as and for the purpose herein described.

Second, I claim a duplication of the above in connection with a single mud box, a, and grinding device, B b b, substantially in the manner and for the purpose hereinbefore described.

61,299.—WATER WHEEL.—Albert A. Wood, Manlius, N. Y.

I claim the adjustable chuteboard or lip, b, extending down between the guide curves and parallel therewith, to conduct the water in an unbroken stream, and always in the same direction, upon the wheel, substantially as and for the purpose set forth.

61,300.—FASTENING FOR SHIRT COLLARS.—Alonzo Wood, East Henrietta, N. Y.

First, I claim the combination of the spring clamping device a b, with the stud, l, operating as described and for the purpose set forth.

Second, In combination with the spring clamping device, a b, and the holding stud, l, I also claim the stud or catch, n, as and for the purpose specified.

61,301.—COAL HOD.—A. A. Yeatman and J. M. Mason, Washington, D. C.

First, I claim placing a sieve, B, of suitable construction with the mouth of a coal bucket, so that the lump of coal may be passed over said sieve, and the dust thereof fall through it, as herein specified.

Second, The combination of the bucket, A, with chamber, C, forming shoulder, x, at its top, and sieve, B, when constructed and used substantially as herein specified.

61,302.—HORSE HAY FORK.—Edmund Yeiser and J. S. Sheetz, Sheridan, Pa. Antedated Jan. 5, 1867.

First, I claim the metallic body, A, provided with a sliding bar, B, lever, E, catch, F, and boot, D, arranged and operating substantially as herein specified.

Second, The spears, a and a', connected as described, spear a' being slightly longer than spear a, spear a shutting within a shoulder on the end of spear a', to form a perfect joint, the whole arranged and operating as and for the purposes set forth.

61,303.—MOLDING FLASKS.—James Ycump, Philadelphia, Pa. Antedated Jan. 5, 1867.

I claim the detachable bars, C, with their arms or enlargements, g, in combination with a molding flask, the whole being constructed and operating substantially as and for the purpose described.

RE-ISSUES.

2,451.—LOOM.—George Crompton, Worcester, Mass., assignor of James Greenhalgh. Patented Nov. 2, 1852. Extended 9 years.

First, I claim a series of long upright levers, one for each leaf of heddles, and each connected at each end substantially as described in combination with a series of vibrating attachments capable of motion in at least two directions as specified, the combination being as described, whereby power may be applied either to lift or depress leaves of heddles in the manner specified.

Second, I claim a series of long upright levers, one for each leaf of heddles, and each connected to a leaf of heddles substantially as specified in combination with a series of vibrating attachments capable of motion in at least two directions as described, and a pattern cylinder or chain which determines the position of said attachments, and consequently the direction in which each lever shall be reciprocated prior to the movement thereof, the combination being substantially such as hereinbefore described.

Third, I claim the series of upright levers and of vibrating attachments, and the pattern chain or cylinder, all in combinat on as specified in the second claim in combination with reciprocating mechanism, which, through the intervention of the vibrating attachments, and the series of upright levers, and the connections, shifts the sheds by acting on the leaves of heddles, the combination being such as herein set forth.

Fourth, In combination with leaves of heddles, and a series of upright levers, having characteristics as described, I claim an adjustable connection between said levers and leaves of heddles, whereby the range of perpendicular motion of the heddles may be changed without altering range of horizontal motion of the levers, or the range of motion of the reciprocating mechanism, the combination being and acting as described.

Fifth, In combination with a series of upright levers having characteristics as specified and operating to elevate and depress leaves of heddles, I claim eveners or adjusters operating substantially in the manner and for the purpose described, and also in combination with said series of levers, eveners and vibrating attachments, reciprocating mechanism to move the levers which are returned to their mean position by the eveners, these three combinations each being and operating as specified.

Sixth, In combination with a series of upright levers, having characteristics as specified, a pattern chain or cylinder, and a series of vibrating attachments, I claim toes through which the chain or cylinder acts upon the vibrating attachments, this combination being and acting substantially as described.

Seventh, I claim the arrangement substantially as described of leaves of heddles side of the loom frame series of the upright levers and pattern cylinder or chain substantially as described, the gist of the arrangement being that the leaves of heddles are within the frame, the upright levers close to but outside of the frame, and the pattern chain outside of the levers, whereby the advantages herein described are attained.

Eighth, I claim arranging the vibrating attachments and their pivots above the axis, upon which the upright levers oscillate with the pattern chain below the vibrating attachment substantially in the manner and for the purpose specified.

Ninth, I claim a series of upright levers, having characteristics as specified in combination with leaves of heddles and a pattern cylinder or chain as described; and I also claim these elements of a machine in combination with reciprocating mechanism, the combination being substantially such as herein specified.

Tenth, I claim in combination with a series of upright levers, and heddle leaves, and cords connecting them, an adjustable mechanism as described, whereby the tension of the cords may be varied as set forth.

Eleventh, I claim in combination reciprocating mechanism and vibrating mechanism, when the two gear together in manner described, whereby the vibrating attachments are prevented from moving faster than the reciprocating mechanism as set forth; and also these mechanisms thus constructed, to gear together in combination with a pattern chain substantially as described.

Twelfth, I claim in combination with vibrating pieces so constructed as to embrace reciprocating mechanism, a reciprocating mechanism, a pattern chain or cylinder, and a series of long upright levers, having characteristics as set forth, all substantially such as described, and acting in combination as set forth.

Thirteenth, I claim constructing long upright levers, having characteristics as described, with a bend therein as specified, so that their weight is outside of the axis upon which they oscillate, thereby attaining the results desired and described.

2,452.—HARVESTER.—Andrew J. Holman, Philadelphia, Pa., assignee of J. S. Butterfield. Patented March 2, 1858.

I claim the driver's seat, D, supported as described, lever, G, and wheel, H, in combination with the main frame and cutting apparatus, substantially as described.

Second, I claim the reversible arm, Q, constructed as and for the purposes set forth.

2,453.—HARVESTER.—Andrew J. Holman, Philadelphia, Pa., assignee of J. S. Butterfield. Patented March 2, 1858.

First, I claim, in combination with a reel supported on a single post, an adjustable mechanism by which the reel may be raised up or let down upon the post, substantially as described.

Second, I claim supporting a reel on a single pivoted post, so arranged that it may be leaned more toward or from the standing grain or grass in combination with an adjusting mechanism by which the reel can be raised up or let down upon the post, substantially as and for the purpose set forth.

2,454.—HARVESTER.—Andrew J. Holman, Philadelphia, Pa., assignee by mesne assignment of McClintock Young, Jr. Patented July 9, 1861.

First, I claim driving an automatic rake on a two-wheel hinged bar machine by mechanism located outside of the wheels instead of between the wheels.

Second, Locating the vertical axle of an automatic revolving rake upon the platform of a harvester at or near its inner front corner.

Third, Driving an automatic rake located on the platform of a two-wheel hinged bar machine by means of a jointed tumbling shaft driven from the end of the main axle.

Fourth, The combination of a hinged platform with an automatic rake located at or near its inner front corner.

Fifth, I claim in a floating finger bar machine the combination of a revolving rake and reel supported wholly upon the platform at or near its inner front corner in a removable frame so that said machine can be readily converted from a mower to an automatic reaper and vice versa.

Sixth, I claim in a hinged finger bar machine rigidly connecting the rake frame to the platform on which it is supported in such manner that the rake shaft does not change its relative position to the platform in passing over uneven ground.

Seventh, Attaching the revolving rake and reel arms directly to the upper side of the crown or bevel wheel by which they are driven.

Eighth, Locating the crown or bevel wheel to which the arms of the revolving rake or reel are attached below the top of the driving wheel.

Ninth, Combining a segmental cam or guide with a series of rake and reel arms so attached together in pairs diametrically that while one rake is moving in contact with the grain its opposite arm shall be thrown up to any desired extent to clear the driving wheel and main frame.

Tenth, Arranging the shaft which drives the revolving rake and reel located on the platform of a floating finger-cutting apparatus in such a manner that the said shaft shall vibrate around the main shaft at a center when the cutting apparatus is raised and lowered.

Eleventh, The construction and adaptation of a combined rake and reel which revolves entirely around a vertical center so that the revolving rake and reel arms may be attached to the driving hub or wheel inside of the plane of the main driving gear wheel and below the highest point of said wheel.

Twelfth, The combination of a revolving rake and reel and a hinged bar machine when the arms of said revolving rake and reel are attached together to the head at such an angle as in their revolution to be thrown up so as to leave an unobstructed space on the machine.

Thirteenth, Attaching the frame or support of the continually-revolving rake to the removable platform so that the entire rake apparatus can be removed with the platform for converting the machine from a reaper to a mower.

Fourteenth, Driving the continuously-revolving rake arms by the upper surface of a crown wheel in combination with supporting that crown wheel on top of a vertical standard and attaching to the same vertical standard a horizontal stud on which the driving pinion revolves.

Fifteenth, A rake rotating upon an axis which is perpendicular to the top surface of the platform and having its arms successively elevated, substantially as and for the purpose described.

Sixteenth, A standard or support which sustains the sweep rake above the draft frame or driving wheel rail standard being mounted wholly upon the platform of the hinged machine and below the top of the driving wheel.

Seventeenth, Making a finger bar in two sections, one long one and one short, the short sections being connected to the platform and removable with it, so that as the platform is attached to adopt the machine for harvesting grain or removed to adapt it to the cutting of grass, the finger bar shall be correspondingly lengthened and shortened as has been found advantageous in harvesting the different materials, substantially as described.

2,455.—GAS APPARATUS.—E. A. Pond and M. S. Richardson, Rutland, Vt. Patented March 27, 1866.

First, We claim the use of hydrocarbureted air for head lights of locomotives substantially as herein described.

Second, The application to locomotive engines of an air pump, operated from an independent steam cylinder deriving its steam from the locomotive boiler, said air pump being connected with a suitable apparatus for carbureting atmospheric air, and with burners in the head lantern and the cars, substantially as set forth.

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

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

2,456.—RAKE FOR HARVESTERS.—Lewis C. Ruse, Phillipsburg, N. J., assignee of Thomas S. Whitenack. Patented Feb. 5, 1861.

First, I claim constructing and arranging the raking and reeling apparatus in such a manner that the rake may act as a reeling apparatus, and at the will of the operator the raking teeth may be kept above the platform so as not to sweep the grain from the platform.

Second, A combination of a revolving rake on an axis, vertical or nearly so, and an unobstructed space for the driver to sit on the machine.

Third, The combination of a continuously revolving rake, whose arm is pivoted to an axis, vertical or nearly so, and an unobstructed space for the driver to sit on the main frame.

Fourth, The employment or use of the slides, G, when applied to the arms, F, substantially as shown for the adjustment of the same as set forth.

Fifth, The rollers I I', I'', when applied to the main frame, A, and used in connection with the arms, E, to operate as and for the purpose set forth.

Sixth, Attaching the beaters, I, and rake, R, to the arms, E, by means of the sockets, J, constructed and arranged as shown to admit of the adjustment of the beaters and rake, specifically as set forth.

Seventh, In combination with the arms, F, the lever, A, attached to the main frame, A, and provided with the curved bar, l, placed in such relation with the arms to operate as and for the purpose set forth.

2,457.—HARVESTER RAKE.—Samuel S. Sherman and Jeremiah G. Sherman, McHenry, Ill. Patented March 6, 1866.

First, We claim providing the arm, C D, which attaches the rake to the reel, with an elbow or joint which allows the rake at the proper time to drop down from the reel upon the platform, substantially as and for the purpose herein specified.

Second, In combination with the rake we claim an arm with one end attached to the rake, and the other end attached to a reel arm or its equivalent, directly behind the rake and operating upon the rake so as to cause it to sweep the platform in an arc of a circle, while one end of the rake is held stationary or nearly so, substantially as and for the purpose described.

Third, We claim the employment of the rod, J, and cam, K, in combination with the reel and arm, C D, for the purpose of raising the rake up from the platform when desired and arranging it upon the reel as and for the purposes specified.

Fourth, We claim in combination with said reel jointed arm and rake, an automatic catch operating in connection therewith so as to secure the rake to the reel until released therefrom, substantially in the manner described.

2,458.—COOKING STOVE.—Joseph C. Henderson, Albany, N. Y. Patented May 29, 1860. Reissued Jan. 30, 1863.

I claim, First, The employment of a supply chamber, e, separated from the combustion chamber, l, by means of the division plate, g, or any equivalent therefore, and each so arranged that the fresh fuel shall be fed at the side of the burning fuel, in the manner and substantially as and for the purposes described and set forth.

Second, I claim the combustion chamber, l, contracted at the top to prevent the too rapid escape of the gases of combustion, in combination with the supply chamber, e, substantially in the manner and for the purposes hereinbefore described and set forth.

Third, I claim the employment of the division plate or partition, g, or its equivalent so constructed and arranged as to divide the fire chamber or chamber of combustion and thereby constitute the chambers, l and e, in the manner and for the purposes substantially as herein described and set forth.

Fourth, I claim so constructing and arranging the said division plate, g, between said chambers, l and e, that atmospheric air may be admitted into and through it to the fire, so as to more perfectly consume the gases as they are evolved from the burning fuel, in the manner substantially as herein described and set forth.

Fifth, I claim the employment of the plate, p, for the purpose of retaining the gases in contact with the fire until they are entirely consumed, substantially as hereinbefore described and set forth.

Sixth, I claim constructing the said plate, p, in such a manner that air can be introduced through it to the surface of the fire, substantially as and for the purpose hereinbefore specified and set forth.

Seventh, I claim the supply chamber, e, combustion chamber, l, division plate, g, and plate, p, all combined and operating substantially in the manner and for the purpose hereinbefore specified and set forth.

Eighth, I claim the employment of the narrower contracted throat, q, when applied to cooking stoves or furnaces, in the manner and for the purposes substantially as herein described and set forth.

Ninth, I claim the employment of the supply chamber, e, when applied to cooking stoves or furnaces and therein constructed and arranged immediately in front of the combustion chamber, substantially in the manner and for the purposes as herein described and set forth.

2,459.—HEATING AND OTHER STOVES.—Joseph C. Henderson, Albany, N. Y. Patented May 29, 1860. Reissued June 30, 1863.

I claim, First, A reservoir or hopper contracted at its lower end to contain and supply fuel, in combination with a fire pot separate from said reservoir, and to which the coal is supplied at or near its center, so that the products of combustion pass away from the surface of the fire around the contracted base of the said hopper, substantially as specified.

Second, I claim a chamber or horizontal flue around the base of the reservoir or hopper supplying coal, and over the surface of the fire, to receive and detain the products of combustion in contact with the fire heat until perfectly consumed, substantially as herein fully described and set forth.

Third, I claim a contracted outlet or opening from the said chamber or horizontal flue formed as aforesaid, to prevent a too rapid escape of the products of combustion, as specified and set forth fully hereinbefore.

Fourth, I claim the surrounding case, b, in combination with the said hopper, fire pot and chamber above the fire, for receiving the products of combustion from the said chamber and radiating heat, substantially as and for the purposes hereinbefore fully described and set forth.

Fifth, I claim, in combination with a hopper over the fire, a circulating current of air surrounding such hopper, to aid in cooling the fuel in said hopper, substantially as hereinbefore fully described and set forth.

Sixth, I claim the supply door, f, and register, e', in combination with the hopper, e, and draft space, g, substantially as herein described and set forth.

Seventh, I claim a circulating current of air passing through the hollow lower end of the supply hopper and entering the combustion chamber over the fire, for promoting combustion and keeping the hopper from injury by heat, as described and set forth.

2,460.—METHOD OF BRAKING AND STARTING STREET RAILWAY CARS.—Aaron Highley, South Bend, Ind. Patented Aug. 14, 1866.

First, I claim the construction and arrangement of the wheels, pullies levers, chains, and windlasses in their relation to each other, in the manner and for the purpose herein described.

Second, I claim the combination of the loose pulley, E E', and the loose clutch pulley, F and D'', with the clutch wheel D', which latter is rigidly attached to the axle, a, in the manner and for the purpose herein described.

2,461.—MEANS FOR OPERATING STAMPS AND HAMMERS.—Christopher R. James and Nathan W. Condeit, Jr., Jersey City, N. J., assignees of C. R. James. Patented June 19, 1866.

First, In combination with the steam cylinder of a hammer or stamp, a reservoir containing steam, compressed air or other aeriform fluid, of sufficient pressure to elevate the stamp but sensibly less than that of the steam in the boiler, when constructed, arranged and operating substantially as set forth.

Second, The arrangement in combination with two stamps or hammers, worked by pistons moving in separate cylinders, of the valve operated by said stamps or hammers in the manner described, with passages controlled by it, so arranged as to bring each cylinder alternately into communication with the boiler, and thereby produce the alternate action of the pistons and their attached stamps or hammers, essentially as herein set forth.

2,462.—LANTERN.—Eugene N. Jenkins, Chicago, Ill. Patented July 24, 1866.

I claim, First, The hand, D, provided with a plate or disk, E, for supporting the lantern globe, substantially as specified.

Second, The combination of the band, D, disk, E, springs, a, or ledges, c, with the base, C, substantially as and for the purposes specified.

Third, Extending the guard rods, F, and connecting them directly to the bottom or flanged part of an annular base having an opening in it sufficiently large to allow the globe to pass through it, substantially as set forth.

DESIGNS.

2,548.—HANDLE OF A SPOON OR FORK.—Henry H. Hayden, New York City, assignor to Holmes, Booth & Hayden, Waterbury, Conn.

2,549.—BOTTOM OF A FRYING PAN.—Henry D. Musselman, Lancaster, Pa.

2,550.—COPYING PRESS.—Joseph Naylor, Newark, N. J. Antedated Dec. 18, 1866.

2,551.—HANDLE OF A FORK OR SPOON.—Le Roy S. White, Waterbury, Conn.

2,552.—BURIAL CASE.—Martin H. Crane (assignor to Crane, Breed & Co.), Cincinnati, Ohio.

2,553.—MATCH SAFE.—Russel Frisbee (assignor to J. & E. Stevens & Co.), Cromwell, Conn.

2,554.—MOLDING.—Samuel Kellett, San Francisco, Cal.

2,555.—ROUND COMB.—W. S. Mingis, New York City.

2,556 and 2,557.—STANDARDS FOR SCHOOL FURNITURE.—Calvin W. Sherwood, Chicago, Ill.

2,558.—SCISSORS.—Samuel W. Valentine, Bristol, Conn.

2,559.—FLOWER GARDEN.—Wm. Webster, Rochester, N. Y.

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Locomotive Department, West Division,
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CHARLES WILSON, G. Chief Engineer,
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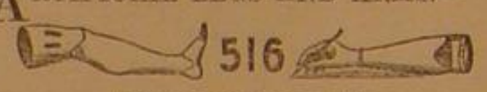

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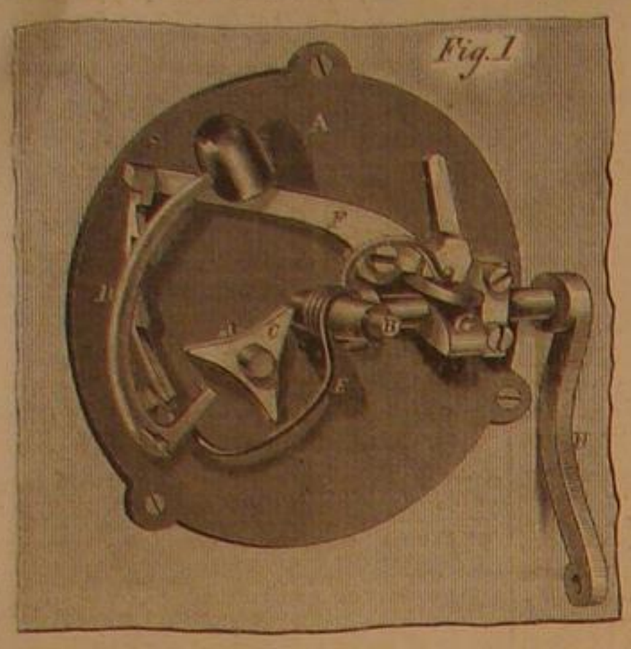
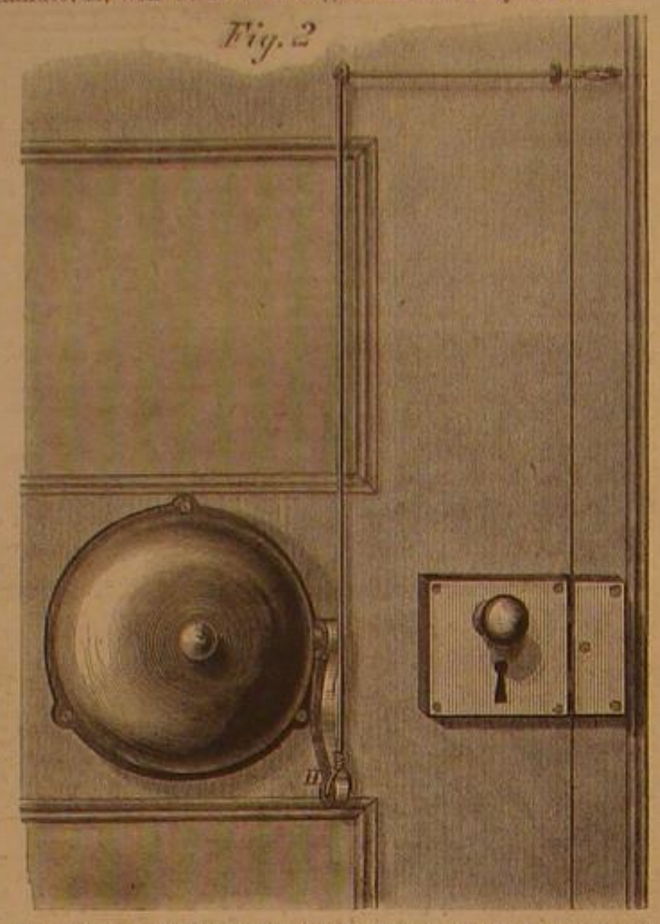
Fig. 1



a plate of metal to be secured to the inside of the door. The bell—the ordinary gong-shaped bell—is screwed on the center spindle, B. C is a cam secured to a shaft passing through the door, and fitted on the outside with an ornamental crank. When it is turned the points engage with the arm end of the hammer lever, D, bringing the hammer back toward the center of the plate for a blow. The spring, E, when the hammer is released from the cam, throws the hammer against the bell. This is the mechanism for the ordinary purposes of a door bell.

When, however it is to be used as a burglar alarm another device comes into play. The curved lever, F, is provided with notches at one end which are arranged so as to come in contact with the lower end of the hammer lever. This notched lever is operated by a cam, G, on the horizontal shaft which actuates the lever, F, against its short end, and depressing the notched end, brings the hammer back for a blow. To the shaft is attached a handle, H, which may be connected by a cord, or wire and hook to a staple on the door jamb, as in Fig. 2. It will be seen that if the door is then opened the handle, H, will be lifted and give an alarm by the bell.

Fig. 2



There appears to be nothing in this device liable to derangement or breaking. It is certainly simple enough to be durable. It was patented through the Scientific American Patent Agency, Nov. 20th, 1866 by D. L. Collins, or Elbridge Sims, Antwerp, N. Y., whom address for additional particulars.

THE WASTING OF COINS.

It is stated by an eminent English authority that the life of coins is much briefer now than before the introduction of steam for passenger travel. This is attributed to the almost constant attrition to which they are subjected by being carried about and the consequent passage of them from hand to hand. The authority we quote states that it takes on an average a hundred old shillings to make eighty new ones. This is a fearful waste, and as we expect some time to see gold and silver again a common medium of exchange in this country, it is of some importance to ascertain a remedy for the deterioration of coins. With copper and bronze coins it may be of no consequence, as they never bear intrinsically the value which they nominally possess, so that there is really no actual loss from wear. Gold and silver coins, however, are really worth their face or nominal value.

The method of manufacturing coins is opposed to their longevity. The plain disk is placed between the dies, as soft as the most perfect annealing can make it. When minted the recessed surface is hardened by compression, while the raised surfaces are left in a state very near that of their original softness. But these parts, unfortunately, are just those most exposed to attrition. The only remedy that suggests itself under these circumstances is a broad and projecting rim which, presenting less surface than the other figures, and being higher, would in a measure defend and protect them from rapid deterioration.

The Prussian Patent Law.

In our last number we discussed the defects of the Prussian patent system, and intimated that measures were in progress to improve it. We have since received a letter from the U.S. minister at Berlin, Hon. Jos. A. Wright, in answer to one we addressed to him on this subject in November last. He says the whole subject of patents in Prussia is practically under the direction of a Minister who changes and controls it from time to time as he sees fit. He also says that a gentleman is now preparing an act—or new law—for the "New North German Confederation" which will embrace all modern reforms such as will meet the requirements of the present time. Mr. Wright has given this subject considerable attention and deserves the thanks of his countrymen.

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SCIENTIFIC AMERICAN

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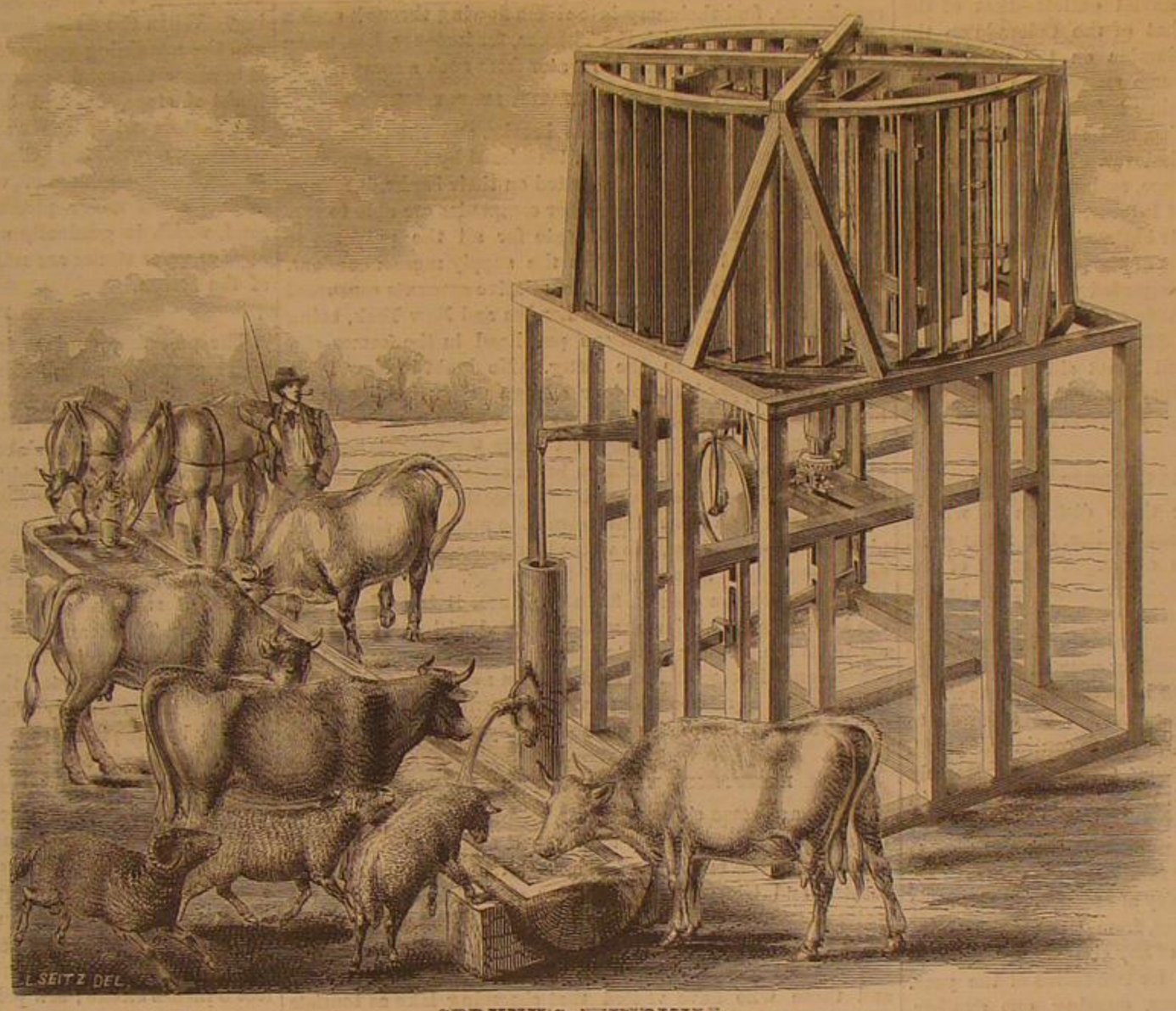
Vol. XVI.—No. 6. [NEW SERIES.] NEW YORK, FEBRUARY 9, 1867. $3 per Annum. [IN ADVANCE.]

Improved Windmill.

Although the force of wind is an unreliable motor for some manufacturing purposes, yet it affords a cheap and ready means for driving machines the proper action of which does not depend upon absolute steadiness of motion. It has been and is still extensively employed in some sections of this country for pumping and other purposes. For service, at railway stations and on farms, it is a valuable aid to man. Much of this value, however, depends upon the plan and construction of the wind wheel or mill. The one represented herewith appears to be constructed on right principles and is calculated to work satisfactorily under all circumstances, whatever the force or direction of the wind. It is a horizontal wheel, mounted on a vertical shaft, and having eight fans or buckets hinged at their inner edge on uprights secured to radial arms. These fans are connected in pairs by pivoted iron rods so as to insure each one of each pair moving together when the angles of their inclination are changed. One fan of each pair has also a projecting brace, which connects by an iron rod with a bell crank lever on an upright bar near the central shaft. From this lever a rod passes down to an enveloping and sliding collar on the upright shaft, There are four of these bell cranks, one to each pair of fans, and by the raising or lowering of the sliding collar the fans are set at any required angle to suit the force of the wind. This collar is raised or lowered by a lever having a sliding weight by which its action on the collar can be regulated. This lever will also operate a lever brake in case of a gale—being self-operating under great pressure—which bears upon the rim of the fly-wheel. At the foot of the vertical shaft is a beveled gear engaging with another on a horizontal shaft, which carries a balance wheel having a crank to operate a walking beam for pumping purposes. The wind wheel is inclosed in a circular frame having upright slats set at an angle, to divert or guide the current of air upon the fans, giving a rotary motion always in one direction.



STRUNK'S WINDMILL.

The labor of raising water from wells for cattle is an onerous one. Where all the water used must be obtained from wells sometimes of great depth—one hundred and more feet, as on the prairies—the task is no small one. It has been estimated that cattle ordinarily consume fourteen gallons per head daily. Twenty head of cattle—not a large number on a farm—will therefore consume about three thousand barrels of water annually. In such cases an apparatus like that illustrated in the engraving would be invaluable, and also for railroads where the water for the locomotives is drawn from wells.

The inventor says that this machine will work equally well in a gale as in a moderate wind.

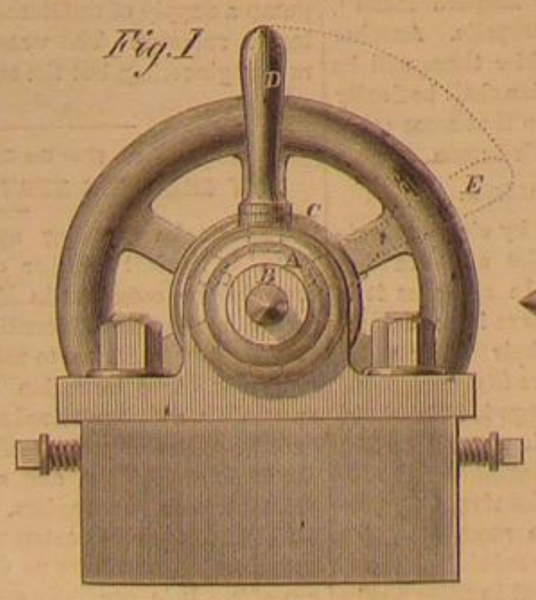
At the late State Fair of Wisconsin one of these machines pumped nearly all the water used for the stock on the grounds, from a depth of more than one hundred feet. The lower part of the structure can be boarded in and roofed, making a convenient granary, store-house, or carriage shed; or the wheel can be erected upon any building.

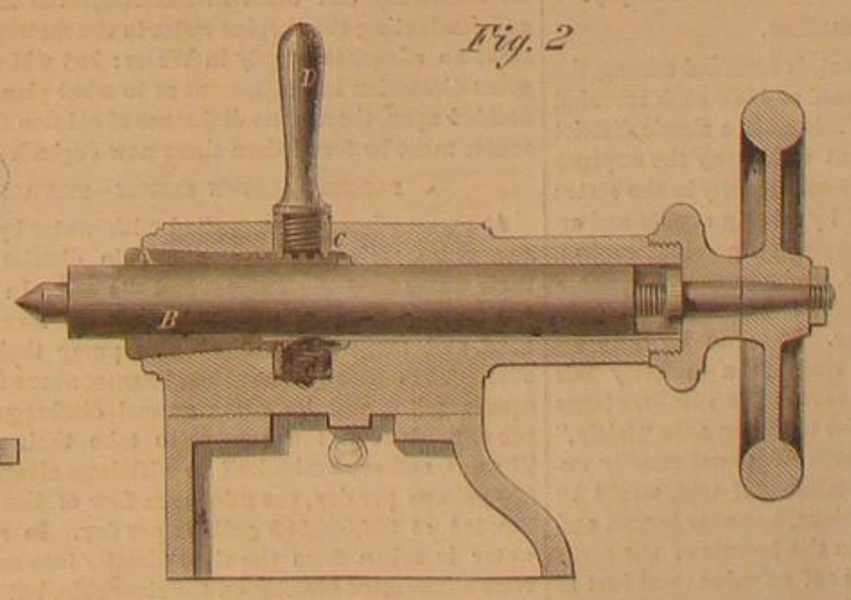
The device was patented through the Scientific American Patent Agency Nov. 13, 1866. For further particulars address F. & D. Strunk, Janesville, Wis.

Improved Lathe Arbor Tightener.

The most common methods of securing the dead arbor of a lathe at any point is either by a set screw bearing on its upper surface, or a ring with threaded stem set up with a lever nut. There are objections to both, especially when the tail stock is worn and the spindle becomes loose. The device herewith illustrated shows a sleeve, A, enveloping the arbor, B, and having the front end slightly cone shaped. The cylindrical part has a coarse thread cut on it and the whole sleeve fits a corresponding recess in the stock. It should be made of steel. It is slotted on the inside its whole length to receive a feather on the arbor as usual. The cone-shaped portion is cut through, to give it sufficient spring to close around the arbor when drawn back into the stock. C is a circular nut in a transverse recess which engages with the thread on the sleeve and has on its periphery tapped holes for receiving the handle, D.

By depressing this handle, as at E, Fig. 1, the sleeve is drawn back into the stock and holds the spindle with a perfect gripe, as it has a bearing around its whole circumference.





FAUGHT'S LATHE ARBOR TIGHTENER.

If at any time the spindle, sleeve, or the recess in the stock is worn by use, the handle, D, may be unscrewed and placed in another tapped hole.

The advantages of this device, so far at least as holding the arbor perfectly stiff is concerned, may be understood by any machinist. We regard it as a valuable device, as it cannot fail to keep the spindle always in line, and prevent the annoyances of finding the dead arbor out of line when set up. It is the invention of Luther R. Faught, who secured a patent through the Scientific American Patent Agency, Dec. 14, 1866, and who will reply to all inquiries in relation thereto. Address him at Sixteenth and Callowhill streets, Philadelphia, Pa.

The "Miantonomoh."

The visit of the United States turret-ship *Miantonomoh* to Gibraltar called forth the following remarks in the *Chronicle* of the 15th Dec.:—"The American iron-clad turret-ship *Miantonomoh*, which arrived in this port yesterday, is the first vessel of her class that has visited Gibraltar, and is naturally the object of much curiosity. The feeling that would be uppermost in most minds on first beholding this *monstrum, informe, ingens*, of the waters would be one of surprise that she should cross the Atlantic. Two huge turrets, the funnel and the ship's boats suspended on their davits high in air, are nearly all that is seen above water. The ship herself is a great platform rising little more above the surface of the sea than her own boats. Molière's fencing master says that the whole art of fence is comprised in two things—to hit your adversary and not to get hit yourself: the *Miantonomoh* seems constructed to carry out this doctrine in naval warfare. Her hitting apparatus, the two impenetrable towers with their Dahlgren 480-pounders, of which she carries two in each turret, is the only part she presents to an enemy, while the only part that he could hit to do her an injury is wisely screened below the waves, except the narrow rim that, like the tower, is invulnerable. We have not heard what thickness of iron is beneath the platform deck that supports the fighting part of the ship; but, unless the deck is made as invulnerable to heavy shot as are the sides and turrets, a vertical fire would still find a weak point in these formidable ships. If ever Gibraltar should be attacked again by floating batteries, they will be of harder and less inflammable material than those employed in the celebrated siege. General Elliott's red-hot shot, instead of setting fire to the floating batteries of the present day, would fly off from their sides in a thousand glowing fragments, like the sparks from heated iron beneath the blacksmith's hammer. If, then, heated shot are useless, and cold shot cannot penetrate the sides of modern iron-clads, it would be a satisfaction, in case of attack, if our artillery could penetrate them in another way, by plunging shot upon their deck from the level of the signal house or the rock gun. To send shot through an attacking ship from top to bottom would be much more damaging to her than sending it through from side to side. After all, however, we cannot feel quite sure that our ability to launch a vertical fire against an attacking squadron will ever prove of practical advantage, There is just now the keenest competition between the science of attack and that of defence. Who knows whether an enemy attacking Gibraltar from the sea on some future day may not have provided his vessels with impenetrable iron roofs, beneath which he may hammer away at our walls quite regardless of the shot that is pattering overhead like hail upon the slates."

150 FEET is understood to be about the maximum depth of the Straits of Dover. At this depth a leak in the proposed tunnel of only one square foot in area would require a steam engine of 1,600 horse-powor to overcome it, while the pressure on every square foot of the bed, and, of course, if the bed were soft and capable of transmitting the pressure, on each square foot of tunnel, would exeeed four tuns.

AT the Oaks colliery, England, where so many perished, the workings reach to a distance of two miles, and the air-ways are sixty miles in length.

SILVER MINING IN THE GREAT BASIN.

We have been favored, through the politeness of the author, with a copy of a paper read by Richard Williams, Esq., before the Buffalo Historical Society, on the Great Basin, with its Agricultural and Mineral Wealth. These personal observations of an experienced and practical eye, are interesting and instructive on whatever they touch. We reproduce a few leading points in a condensed abstract.

STRUCTURE OF THE BASIN.

The great chain of the Andes, extending the whole length of South America and the Isthmus of Darien, branches at the Isthmus of Tehuantepec, sending one of its arms up on the western side, very near the Pacific coast, under the name of the Sierra Nevada, in California, and the other to the eastward, under the name of the Rocky Mountains. These branches diverge to a distance of nearly 800 miles apart, and come nearly together again where they are lost in the Arctic Ocean. Thus they form an intramontane Basin of vast extent, nearly one-fifth of the whole continent, 5,500 feet above the sea, and having only three fluvial outlets—that of the Rio Grande on the south-east, that of the Colorado on the South-west, and that of the Columbia on the north-west. This basin is broken up by transverse ranges, like bulkheads or girders from rim to rim, forming inferior basins, two of which—that of the city of Mexico, and that of Great Salt Lake—have no visible outlets whatever. The latter is the great mineral basin, 400 miles square, mainly occupied by the State of Nevada, where the chief interest of these remarks centers. Here the rivers find their outlets in "sinks," and go down into the unexplored bowels of the earth. The lakes are "salt," and the flats are impregnated with alkali, which Mr. Williams attributes to the settling of the rivers, leaving their suspended soluble contents filtered out in the earth or deposited by evaporation. The soil is not silicious—a sandy desert—but contains within it every element of fertility except water, and produces abundantly wherever irrigated by nature or art.

THE GOLD AND SILVER MINES.

In this basin, above all, occur those districts in which, throughout a square of ten to twenty miles, the rocky crust of the earth has been cracked in numerous fissures of unmeasured depth which the underlying volcanic ocean has injected and gorged with mineral treasure. These fissures are either entire, extending great lengths and to impracticable depths, and filled with silver-ore-bearing quartz; or they are but gashes in the surface, broken up by past convulsions which destroyed their continuity, and they cannot be followed to any considerable length or depth, or with continued profit. Appearances are very deceptive, being sometimes extremely flattering at an outcropping point, while the rest of the vein is barren. A true vein is not always rich; a rich vein is not always true, *i. e.* continuous. A fissure, both rich and true, is not always practically valuable for mining at the present day, from its remoteness or other difficulty of access, from the want of water, fuel, salt, or other supplies, from the neighborhood of hostile Indians, or the distance of any civilized community or from being covered with snow for two-thirds of the year. Difficulties from conflicting claims, crossing one another, sometimes occur. All these things, and more, have to be considered, and there is, in fact, but one way of getting at the certainty of any vein, and that is by personal examination of all the circumstances, and, regardless of representations from interested parties, mining engineers, or even eminent geologists, actually going down on the lead far enough to ascertain its true character, and by large assays determining the general productiveness of the ore. So great is the uncertainty attending these ventures at the best, that Mr. Williams thinks it the true policy for all who engage in silver mining to take up a sufficient number of lodes together to be morally certain by the average of chances that some one or other will pay.

SWINDLING OPERATIONS.

Everything, good, bad or indifferent, is recorded among the mining claims of a district, and upward of 4,500 such recorded locations are referred to by Mr. Williams in a single district where not a dozen of them at present would pay the expense of working. All the good claims are sold readily in the state: the rest are sent east and jobbed off by mining agents and organizers of mining companies of mammoth nominal capital. Mr. Williams lays it down as a rule, that no one can make a purchase of these unscrupulous speculators in mining property without being swindled every time. This can be done, according to the common ethics of trade, in a perfectly fair manner. No man is held bound to reveal the disadvantages of his property: if he states only the truth, he sells "fairly," when the whole truth (which the buyer does not usually undertake the difficult task of ascertaining) if told, would be fatal to the bargain. Scientific opinions, however honest and eminent, as to what is to be found in the bowels of the earth under a particular spot, are treated as of no value: and just as little worth is attributed to the advice of the so-called "experienced men." They never agree as to a uniform law, and their deductions are from a narrow and unscientific range of observation. Above all, our lecturer is severe upon a class of self-styled mining engineers, professors, etc., who infest the country, whose names are found in every yellow-covered prospectus, and whose favorable opinions can always be had for a consideration. Of all the mammoth millionaire prospectuses he has seen, not one but was filled with the grossest misrepresentations. Beware of all such enterprises as are associated with the names of distinguished military and scientific men, governors, politicians, bishops and doctors of divinity. These names are generally connected with a present of stock, which the recipient perhaps may value highly. But "good wine needs no bush." The few, very few really valuable mines are owned by quiet unpretending men, and carried on, financially and practically, without public proclamation and parade. You never see their prospectuses and their stock in the market, are bored with the one, or importuned to buy the other.

[Our Foreign Correspondence.]

WATER SUPPLY OF TOWNS.

London, Dec. 29, 1866.

A variety of causes render the obtaining a good supply of water for the large cities here a more difficult problem than with us. Although the amount of annual rainfall is large, yet, as the drainage area is in no case large, the rivers are all small, and the water is made use of for manufacturing purposes. Then again, as the population is everywhere dense, the watercourses are all unavoidably contaminated with sewage, and though by acts of parliament towns and villages situated on rivers from which water is taken for city use have been prohibited from discharging their sewage into the streams, yet the impurities that will in any case, even with the strictest regulations, find their way into rivers flowing through such a country as that in which the Thames, for instance, lies, make it impossible to obtain potable water from such a source.

THE ISLAND TOO SMALL—WATER SUPPLY LIMITED.

As these rivers also are mere brooks, and the cities large and numerous, and as the water is claimed by the many manufacturing establishments situated on their banks, it follows that the amount which the water companies are able to supply to the towns is very inadequate for all the purposes to which it would be applied were the supply more abundant. This is strikingly shown in the relative amounts consumed daily per head of population in London and New York, being at the rate of about 33 gallons per head in the former city against 60 gallons in the latter. No doubt in New York, where the supply is so copious, a large proportion is wasted, but it is a luxury to feel that it may be wasted to some extent with impunity. To guard against waste, the water is not kept at constant service in the mains, but a certain quantity is supplied each day to the houses by "turncocks," who allow the water to run for a few minutes from the main into the service pipes of the dwellings, the water being received into tanks, and the supply is then shut off for the day. Although these tanks may contain enough for a day's use, it is evident that the knowledge that the amount is limited will enforce economy in its use. But as stated in my last, this is a serious inconvenience in case of fire, as it is often necessary to hunt up the turncock at a time when every moment is precious. On Sundays some companies do not supply water to their customers.

EXCEPTIONS—MANCHESTER AND GLASGOW.

There are some cities, however, which are more highly favored in their water supply and present a pleasing contrast to London and the majority of the large cities. Such are Manchester and Glasgow, in the latter of which especially the water is excellent in quality and very abundant. The works for the supply of this city are, I think, the most extended of any in Great Britain. The water is drawn from Loch Katrine, and those who have visited that charming lake as tourists will not have failed to be struck with the remarkable clearness of the water, objects being plainly visible on the bottom at a great depth. It is conducted a distance of forty miles to the city through two cast-iron mains.

NEW SCHEMES FOR LONDON.

There are at present several plans being brought forward with considerable earnestness for procuring a better supply for London, and no doubt some of them will eventually be adopted. One plan is to build an aqueduct more than two hundred miles in length, or rather a succession of aqueducts connecting together some of the lakes of Westmoreland (or as we commonly call them in America, "the English lakes") and conducting the surplus water to the metropolis. Another seeks an adequate supply in Wales: but while there will be great discussion in Parliament as to what plan shall be finally decided upon, there is no difference of opinion that some other source must be found than those now depended upon.

PRESENT LONDON SYSTEM—FILTRATION.

At present London is supplied with water by eight private companies, each supplying a certain district and drawing their water from the Thames and the sea. In all cases it is necessary to employ pumping engines, as there is no natural head, and many of the companies pump their water twice over. The drainage area of the Thames above Staines is 3,086 square miles, and its mean annual discharge is 900,000,000 per day. Five of the companies take their water from the Thames, and are authorized to withdraw altogether 100,000,000 gallons per day, the minimum flow of the river being estimated at 362,000,000 gallons per day. In most cases the water is taken from the river directly into subsiding reservoirs constructed directly on the river side, but in some works it goes immediately to the filter beds. The necessity for the use of these is quite imperative, as was clearly shown last summer, when some of the severest ravages of the cholera followed the delivery by one of the companies of unfiltrated water to its consumers.

They consist of a series of layers of gravel and sand of about five or six feet thickness in all, the arrangement being about as follows:—First, coarse gravel about twelve inches in depth is laid on the concrete bottom of the bed, and upon this nine inches of rough screened gravel, followed by nine inches of fine gravel, or in some cases six inches of cockle and other shells: upon this again is a layer of coarse sand twelve inches thick, and lastly fine sand two or three feet thick on top of all. The water is admitted by a main passing through the bed and having a vertical branch rising above the filtering material, the water welling over the top of this delivery pipe upon the filter. In the coarse gravel at the bottom are imbedded perforated pipes laid with open joints arranged as lateral branches of a central main, and these receive the water as it percolates through the gravel, and deliver it to the pump wells. The amount of impurity removed from the water by these filters varies largely with the season of the year. In summer the surface of the water in the reservoirs previous to filtering is often thickly covered with green vegetable matter, which forms with great rapidity. The upper film of sand requires cleaning on an average once a week. For this purpose the bed is emptied of water by a centrifugal pump, or otherwise, and a layer of sand about three eighths of an inch in thickness scraped off and taken to be washed. Once a year the whole bed is made up anew. The washing is effected in a number of ways, one being by placing the sand in an iron cylinder seven feet six inches in diameter and three feet deep, having a perforated false bottom under which water is admitted under some pressure, and flowing up through the sand, stirs it up thoroughly and carries off the impurities as it flows over the top of the cylinder, the sand by its gravity remaining. When the water flows over clear the process is stopped and the remaining water drawn off by a cock. Another plan is to allow the sand to flow with a current of water down a flight of steps, the sand being caught in shallow ditches at the bottom while the water flows on with the impurities. Or again, a revolving cylindrical screen slightly inclined may be employed, a stream of water being admitted through the central shaft under pressure and allowed to play upon the sand, which is gradually washed through the meshes, while any lumps or stones are retained and fall out at the lower end of the screen.

PUMPING.

The pumping engines in use are of two classes, viz: Cornish and compound cylinder rotative engines. The advocates of each claim the superiority for their favorite style, and practically there is very little difference in the economy with which they work. On elaborate trials to ascertain their duty, they have raised from eighty to eighty-four million pounds of water one foot per hundred weight of Welsh coal, but with the ordinary Newcastle slack commonly used the duty is not seventy millions. The largest of the Cornish engines is at Battersea, being 112 inches diameter of cylinder with 10 feet stroke: it raises a weight of 75 tuns on a plunger 50 inches diameter. The steam is cut off at ·45 of the stroke. There are five other engines in the same building, with cylinders from 55 to 70 inches diameter, the latter being a "bull," or engine with the pump directly under the steam cylinder, and worked directly by the piston rod. Steam is furnished by 19 boilers, from 28 feet to 32 feet long and 5 feet to 6 feet diameter. The cylinders are all steam jacketed.

The rotative engines have the high and low pressure cylinders close together and connected to the same end of the beam, the high pressure piston taking hold nearer the center, and hence the strokes are unequal. The expansion in these engines is eightfold, the steam being cut off at half stroke in the smaller cylinder. A number of this class are of the following dimensions:—High pressure, cylinder 28 inches diameter, 5 feet 3 inches stroke; low pressure, cylinder 46 inches by 8 feet stroke. The pumps are of the bucket and plunger type, with a stroke of 7 feet, the buckets being 24 inches diameter, and the plungers 17 inches, or half the area of the bucket. The pressure of steam is 40 lbs. The pump valves are of the double beat construction, with brass and soft metal bearings. In other cases wooden seatings are used. The steam pistons are packed with steel rings three quarters of an inch square, on Ramsbottom's plan: these are used in cylinders up to 60 inches diameter.

The engines pump the water through mains to reservoirs near the city. These are almost invariably covered, brick arches being used for this purpose. Some of the works also pump a supply of unfiltered water to be used for street watering in summer. The water works show a good deal of first-rate engineering, but the supply is intrinsically only passable.

Slade.

[For the Scientific American.]

HOW SHALL WE BURN COAL MOST ECONOMICALLY?

The smoke burning apparatus of Messrs. Roby, illustrated in the last number of the Scientific American, has caused some comment in English mechanical journals. The results are declared incredible and the principle paradoxical. It does not seem so to me, for reasons which I shall state presently. The invention is simply, as may be seen by the engraving, a device to reduce the tube area at the smoke-box end, by contracting the orifices of the tubes, thereby choking the draft apparently, and, as it would seem, retarding the combustion in the fire-box. That this result does not follow we have the public statement of Messrs. Roby; and from my own convictions I have no doubt of great economy from the use of it. It is generally conceded that but a tenth part of the heating power of fuel is utilized, the rest being dissipated in various ways: it is lost, at all events, to the pocket of the manufacturer. To save a portion of the missing nine tenths has been the object of inventors for many years, but in my opinion more attention has been given to devising peculiar shapes and motions for the steam engine to cut off the steam at any desired point of the stroke than in seeking greater economy by more perfect combustion in the boiler.

While such inventions are both desirable and necessary, it seems to me that in this respect the steam engine is as near perfect as possible, and that the proper place to save the fuel is in the boiler, a good steam engine with a good variable automatic cut-off being assumed in all cases. This is only another way of saying that fuel is improperly burned, or burned to waste, which is just what I desire to say.

If by any means whatever, by the employment of natural or artificial draft, we can urge the combustion of fuel and yet retain the heat or detain it from being driven off before it has given up its calorific power—if, I say, we can do this at a moderate cost, we shall obtain something approaching perfect combustion, and far greater economy than we have at present. A steam boiler furnace is in the nature of a retort for distilling the gases from the coal and applying them to the evaporation of water: but from its defective construction the gases are allowed to pass off without being ignited and the principal agents from which heat is derived are lost. In Siemens's furnace and in some others the gases are consumed in a combustion chamber, which is supplied with air when the gases are at a proper temperature to ignite, and great economy is the result. The same principle has been adopted in other ways, and the value of a given quantity of fuel noticeably enhanced. It has even been applied to cooking stoves with good results.

The efficiency of Roby's apparatus is in my opinion owing to the detention of the products of combustion in the flues (not in the smoke box as many do) until they are at the proper temperature to ignite. This view seems to me reasonable from the fact that the smoke is consumed. Smoke contains not only the watery vapor evolved from the incandescent fuel, but also pure carbon in the form of soot, which is nothing but unburned coal and is usually deposited along the surface of the tubes. In this boiler, however, no soot forms, for the simple reason that none is made: it is burned with the gases in the furnace before it is "born." I do not think that this apparatus would be universally successful in all cases, as the temperature at which the gases would ignite without escaping from the boiler would depend greatly on the length of the tubes and the diameter of them, also the velocity with which they passed through the tubes. The velocity could of course be regulated by the dampers, for such they are in effect.

Many years ago an apparatus similar to this was invented, having the same object in view. It consisted of a series of slats like a Venetian blind, hung in such a way that the exit of the gases was delayed, but I know nothing of its efficiency.

It would also seem that this boiler must be fired or run for some little while as an ordinary boiler before throwing the dampers into gear; so as to allow the tubes to get hot enough to perform the office which is demanded of them. The increased evaporation may also be simply owing to the retardation of heat in the boiler by the dampers, checking the flow, as it were, and compelling it to give up its virtue: but in this case, unless combustion were nearly perfect, the tubes would soon be stopped with soot. No doubt if air in jets were admitted to the flues the result would be still more satisfactory.

I have no doubt but we shall find in the future that multitubular boilers are imperfect both in point of expense and heating surface. If we can get the same amount of fire surface in another form, I do not see any good reasons for continuing to use many-flued boilers. They are always leaking, get clogged with soot unless anthracite is used, are in no wise efficient in proportion to the amount of heating surface exposed to the fire directly and of that most remote from it, and are always a source of anxiety.

I do not see any reason why a funnel turned bottom side up would not represent a plan for an economical steam boiler. In this case we should have enormous grate surface which would enable us to carry light fires instead of piling coal on a foot deep as is universally the case. We should then roast the gas out of the coal and burn it in the boiler, not at the top of the chimney as is now done; we should have large fire surface, plain in form, to which no soot could adhere, and if necessary we might fill the top with short flues that could be easily cleaned and repaired and in which there would not be 600 degrees difference in the heat at the ends, as is now found. I noticed a boiler of this general plan in a late number of the London *Engineer*, as built by Messrs. Shand & Mason: but this design was made by me and described to the Editor of this paper a long time before the engraving appeared. This form of boiler would not require to be so large for a given efficiency, I think, as a locomotive boiler, (though I do not assert this for I have made no calculation) and could be as readily braced as any other generator.

Economy of fuel is a question of the greatest importance, and it seems to me that appliances, such as cut-offs, are often mistaken for principles, though I do not wish to be thought hostile to working steam expansively in saying so. I am confident that we are on the eve of reform in this respect, and that where we at the best evaporate ten or twelve pounds of water for one pound of coal we shall increase the evaporation four fold.

EGBERT P. WATSON.

New York, Jan. 23, 1867.

VARYING IDEAS OF MODEL MAKERS.

In our last issue we spoke of model making as a business, and alluded to the beauty of which models are capable. It is singular to see what varying and sometimes crude ideas persons who attempt to ultimate their notions into visible forms have in relation to what constitutes a proper model. We have frequent opportunities to judge upon this subject. One of the most remarkable comparisons came under our observation a few days ago. One of the models was a simple household device, capable of being a working model if made no more than one inch square, yet it occupied almost as much room as an ordinary wheelbarrow, and was built in the most clumsy manner, of inch boards, fastened together with large nails, and betraying, in shape and workmanship, the clumsiest and crudest mechanical ability.

The other was a model of models. A grindstone for household and shop purposes, which could be secured temporarily to the edge of a bench or table, having its trough for water, its rest for the implement to be ground, and a scraper or detainer to prevent the water from escaping by centrifugal force. The stone was a real grindstone, and the frame was of brass, a perfect working model, complete in every part, yet weighing less than one ounce, and occupied less than a cubic inch of space. One was the effort of a man who either possessed small mechanical abilities or felt no pride in his handiwork, and the other was the product of a true mechanic.

Editorial Summary.

AMERICAN GREATNESS.—If the Yankees have acquired the name of great boasters they may be excused on the ground of having so much to be proud of, even in the natural features of their country. The greatest cave in the world is in Kentucky; the greatest river and the largest valley in the world are the Mississippi river and valley; the largest inland sea of the world is Lake Superior; the greatest mass of solid iron is the Iron Mountain of Missouri; the Falls of Niagara is the greatest cataract in the world; Chicago is the largest grain port and lumber market; New York has the largest acqueduct in the world, while Pennsylvania contains the largest deposits of anthracite, and Illinois the greatest extent of bituminous coal fields in the known world.

THE FIRST SUBAQUEOUS TUNNEL IN AMERICA.—Chicago, having made a good beginning, goes on tunnelling. The next work in order is a tunnel under the Chicago river, where it is crossed by Washington street, which will be 1,800 feet long, having two passage ways for trains, each eleven feet wide, with a third for general purposes. The masonry will be protected by a heavy sheathing of lead. Instead of boring under the bed from the ends in the usual way, this tunnel will be constructed by sections in coffer dams, taking up a portion of the river bed at a time, so as to obstruct navigation as little as possible. We see it stated that the contractors have agreed to complete the work in March, 1868, for $271,646·04—mills, we suppose, not counted.

OUR WONDERFUL CLIMATE.—Here we are in the midst of what is conventionally called "winter," with roses blooming in the open air, strawberries ripening as in summer, orange trees in blossom where there are any orange trees at all, bouquets of open air violets selling at a bit on the streets, second crop apples that have just ripened exhibited in market, and grapes that have never suffered from contact with sawdust, still plump, plentiful and cheap at all the fruit stands. Gardening to supply the city with early vegetables has actively commenced around the bay, and young radishes and green peas can even now be bought at luxurious prices. Winter! The word should be abolished from our vocabulary as a superfluity.—*San Francisco Bulletin, Dec. 20th.*

MERCURY IN HUMAN REMAINS.—A French journal relates a story of a wealthy farmer who died many years ago, and on digging a grave in close proximity to where he had been buried, the bones were accidentally exhumed. On examination brilliant particles of a metallic luster were found, which on being collected presented a considerable quantity of oxide of mercury. Thus for thirty-five years the mercury had been preserved almost without alteration in the body of the deceased who had probably made frequent use of the metal during the latter part of his life.

MORTALITY AMONG MINERS.—In the county of Redruth, England, which abounds in copper mines, it is stated that in every 100,000 of the population 220 males annually die of pulmonary diseases more than females, This is not so bad as in the lead-mining districts where the excess is 320 in every 100,000 and the death rate of men is double that of women. In the tin-mining districts of Penzance the superior waste of male over female life in the mining population of all ages is 104.

SUBTERRANEAN CITY RAILWAYS.—The London tunnel railway, with its enormous cost, from peculiar local conditions, of five and a half millions of dollars per mile, has paid from the start, five per cent in 1863, six and a half per cent in 1864, and seven per cent in 1865, which are considered very large returns for money invested in England. Over twenty millions of passengers were conveyed by it in 1866.

NATIVE SILVER.—The most celebrated silver mine in Europe is that of Königsberg, in Norway, which is 180 fathoms deep. In the Museum of Natural History at Copenhagen an enormous mass of native silver is on exhibition, taken from this mine, which measures six feet in length, two feet in width, and eight inches thick, and is estimated to contain five hundred pounds of pure silver.

PHOTOGRAPHERS who use large quantities of nitrate of silver should allow all the excess of silver acetic acid and other matters from the plates undergoing development to run into stone jars containing fragments of zinc. By this means the metallic silver may be collected, digested with dilute sulphuric acid, washed and dried in the oven, and thus by a little pains quite a large saving may result.

STREAKY WEATHER.—During the tremendous rain storm of December 20th in California, a curious exception is reported to have occurred at Fair Oaks, near Menlo Park, where for the greater part of the day little rain fell; men plowing in their shirt sleeves while torrents were falling at San Jose and Redwood City, on both sides. The rainfall at San Francisco was 7·16 inches in 20 hours nearly double the heaviest on record.

SMALL ARMS IN THE WAR.—A report by the Chief of Ordnance shows that the Springfield armory furnished 801,997 new rifled muskets, of calibre .58, for the suppression of the rebellion, average cost $11.97; besides 670,617 of the same description purchased of American manufacturers at $19.23 and 54,117 at $28.15: 393,961 breech-loading carbines were purchased of American manufacturers at an average of $22.73, and 359,449 revolvers at $15.92, with 548 at $6.10. Foreign arms: 428, 292 Enfield rifles, at $20.07; 736,049 other muskets at $13 66; 10,251 carbines at $6.90; 12,374 revolvers at $16.57. This foots up nearly three and a half millions (3,467,955) of small arms of all sorts and sizes.

STATIONARY-ENGINE PLOWING.—Mr. James Howard, the implement maker of Bedford, Eng., patents a mode of working two gangs of steam plows or cultivators by two stationary engines on opposite sides of a field. Each engine has two winding-drums, one connected with each gang, by means of which each is drawn to the meeting point in the middle of the field by one of the engines, and then drawn back by the other engine while the other gang goes forward; all without shifting the connections.

A FRENCH FIRE ALARM, invented by M. Robert Houdin, the well known ex-conjuror, is set in operation by the action of a very slight degree of heat upon a thin metallic strip formed of a ribbon of copper and another of steel, soldered together by their flat surfaces. The copper expanding by warmth more than the steel, bends the strip so as to bring it in contact with a conductor and complete an electro-magnetic circuit, causing an alarm bell to ring continuously as long as the warmth is kept up.

EXTINGUISHING FIRES by the gaseous products of combustion, is an expedient which has been brought forward in England by Messrs. Dawson & Broadbent. They propose to connect buildings, by means of pipes similar to the gas system, or otherwise, with reservoirs of gas collected from furnaces and cooled, from which it can be driven by steam power into any apartment in which a fire may occur; thus displacing and shutting off the supply of oxygen by the energetic interposition of incombustible gases.

SALT ON CITY CAR TRACKS.—One who knows, a Philadelphia conductor, says that to protect his feet from cold when the tracks are salted, he is obliged to wear boots that are not only double-soled, but that have two thicknesses of upper leather, and over these a pair of extra thick fur-lined moccasins, and even then he suffers from extreme cold." The City Council has prohibited the use of salt in the streets.

THE ELECTRIC LIGHT has been used on a large scale in the construction of the Northern Railway of Spain, to enable work to be done by night during hot weather, as well as in tunnelling, where the absence of ordinary combustion and its products proved a great advantage. The entire expense involved in illuminating a space of 4,000 by 1,500 feet did not exceed, as reported, $1.75 per hour.

FIVE SNOW STORMS have been experienced at New Orleans, in 87 years. In December, 1800, snow fell for the first time in twenty years. Snow again fell in 1817, and again on New Year day, 1822. The next snow storm was on February 8th, 1831, after which twenty-one years elapsed before the next snow storm occurred, in 1852. Since that period no snow has fallen in Louisiana.

A NEW COMPETITOR IN SUGAR.—The Sandwich Islands exported 3,005,603 pounds in 1862, and 5,262,112 pounds in 1863, and in 1864 the exportation almost doubled, having reached 10,414,441 pounds. New sugar plantations are constantly started, and the area of sugar land as yet untouched is very large.

THE GOLD AND SILVER PRODUCT.—The report of J. Ross Browne, Special Commissioner on the mineral resources of the States and Territories west of the Rocky Mountains, gives an estimate of the product for 1866 of gold and silver at $106,000,000 from California, Montana, Idaho, Colorado, Nevada, Oregon and other sections.

GOLD MINING IN VERMONT.—Parties interested report that from four to six mills will probably be put up next season at Bridgewater, Vt., for reducing the quartz of that region, and that a yield of from $15 to $30 per tun is expected. Work has been going on constantly during the past season, and four or five new and promising openings have been made.

SKATING GIRLS.—A young lady of fifteen summers (not winters) skated one day this winter from Minneapolis to Dayton, 40 miles, in six hours. Another miss of the same age is performing fancy skating to the admiration of large assemblies in western cities.

BREECH-LOADING RIFLES.—About eighty a day of the new breech-loaders are now being turned out at the Springfield armory, and the number will be constantly increased until in February two hundred will be the daily production.

THE PRUSSIAN LEGISLATURE voted to Count Bismarck $375,000, and to the war minister and five generals, 150,000 each, in acknowledgment of services in the late war. The presents were delivered on Christmas eve.

THE LONDON TELEGRAPH boasts a daily circulation of 138,704 copies—the largest daily newspaper circulation in the world.

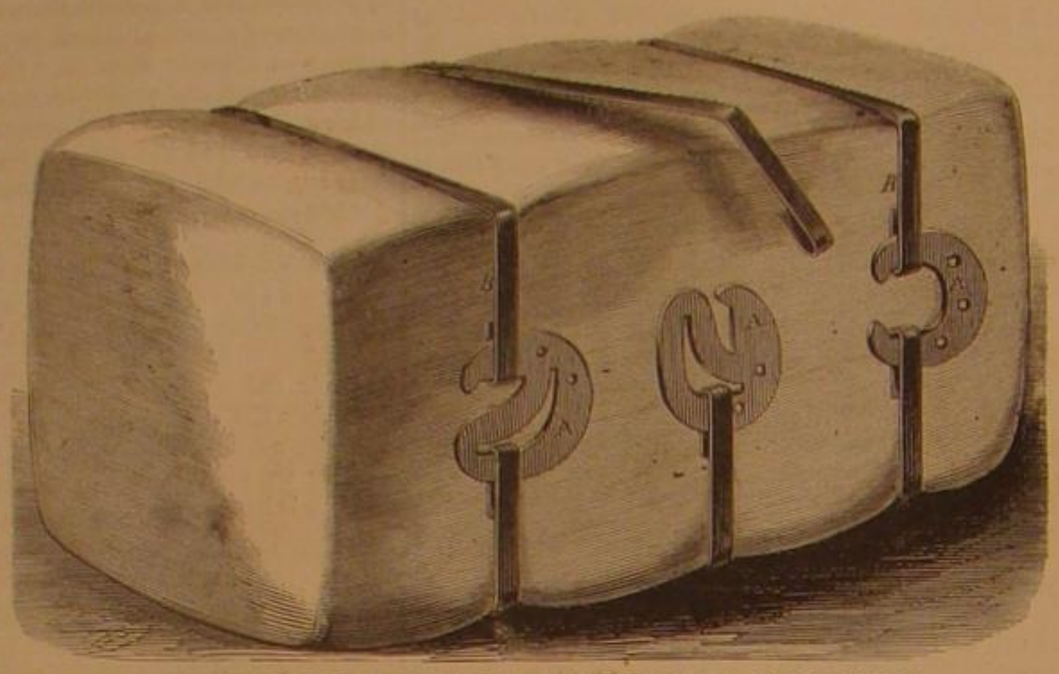
HEAVY PUNCHING.—The patentees of the punched gun manufacture have punched a 10¼ in. hole down through a steel ingot four feet high and weighing three tons.

Improved Metallic Cotton-bale Fastener.

Metal bands are fast superseding the use of ropes to fasten bales of goods, and especially for the purpose of securing raw cotton. It is well known that a bale of cotton as usually compressed is not readily combustible. It is only when the fastenings become loosened, allowing the cotton to spread and the air to permeate its mass, that free combustion is possible. If the fastenings are of rope—often tarred, or if not, of a loose texture—they soon burn away and allow the elasticity of the cotton to open its fibers to the flame. When the bale is opened the rope is frequently unfit for using again, and as junk, is worth only about 33 per cent of the value of the iron bands. But metallic bands, as used with this fastener, it is claimed, can be used over and over again.

The device consists of clasps, A, of metal—malleable iron being most suitable—in combination with bands, B, of hoop iron. The clasps may be of two forms as shown. Each has its peculiar advantages, although both are constructed on the same principle. In one form one end of the strap is passed through a curved slot, and in this the clasp can be removed by turning only one way. In the other, the perfect C-shaped, both jaws are alike and it can be turned either way, opening from either end of the strap.

The bale, being under pressure, one end of the band is pssed around it and bent as shown at C, the other being bent at the proper point when the jaws are slipped through the loop. These loops may be riveted if desired, although the grasp of the fasteners is such that it is not considered necessary. The bearing of each jaw on the loop is perfectly square, as seen, preventing any accidental disengagement. When it is required to loosen the bands to open the bale, it can be done by means of the holes seen in the face of the couplers. By inserting a cotton hook in these the fastener may be easily slipped, when it and the band are ready to again do duty as fasteners.



BARBARIN'S METALIC COTTON-BALE FASTENER.

The device is the subject of patents in this country and Great Britain, a United States patent having been obtained Oct. 20, 1866, and an English patent Oct. 29th, same year. The patentee is desirous of disposing of the entire right, Address Arthur Barbarin, Lock Box 691, P. O., New Orleans, La.

The Composition of Alloyed Metals.

Below are a few of the alloys commonly used in the arts:—

Chinese White Copper.—Copper, 40·4; nickel, 31·6; zinc, 25·4; and iron, 2·6 parts.

Manheim Gold.—Copper, 3; zinc, 1 part; and a small quantity of tin.

Bath Metal.—Brass, 32; and zinc, 9 parts.

Speculum Metal.—Copper, 6; tin, 2; and arsenic, 1 part: or copper, 7; zinc, 3; and tin, 4 parts.

Hard Solder.—Copper, 2; zinc, 1 part.

Blanched Copper.—Copper, 8, and arsenic, ½ part.

Britannia Metal.—Brass, 4; tin, 4 parts; when fused, add bismuth, 4; and antimony, 4 parts. This composition is added at discretion to melted tin.

Plumber's Solder.—Lead, 2; tin, 1 part.

Tinman's Solder.—Lead, 1: tin, 1 part.

Pewterer's Solder.—Tin, 2; lead one part.

Common Pewter.—Tin, 4; lead, 1 part.

Best Pewter.—Tin, 100; antimony, 17 parts.

A Metal that Expands in Cooling.—Lead, 9; antimony, 2; bismuth, 1 part. This metal is very useful in filling small defects in iron castings, etc.

Queen's Metal.—Tin, 9; antimony, 1; bismuth, 1; lead, 1 part.

Mock Platinum.—Brass, 8; zinc, 5 parts.

Ring Gold.—Pure copper, 6½ pwts.; fine silver, 3½ pwts.; pure gold, 1 oz. and 5 pwts.

Mock Gold.—Fuse together copper, 16; platinum, 7; zinc 1 part.

Scientific Snow Storm.

The *Springfield Republican* thus picks up the New York *Tribune* on its very scientific account of our recent snow storm:—"The snow storm in New York must have been astounding. Its effect upon the intellects of the metropolitans may be inferred from the philosophical deduction of the *Tribune*, that 'immense forces, imperfectly explained on the hypothesis of an ever-shifting vacuum, dwell in the atmosphere, and we are continually surprised by their action.' Up here in the country we know that snow is only frozen vapor, and that when the wind blows it drifts, and we are not in the least astonished thereat. The 'ever-shifting vacuum' we suspect to be exclusively metropolitan."

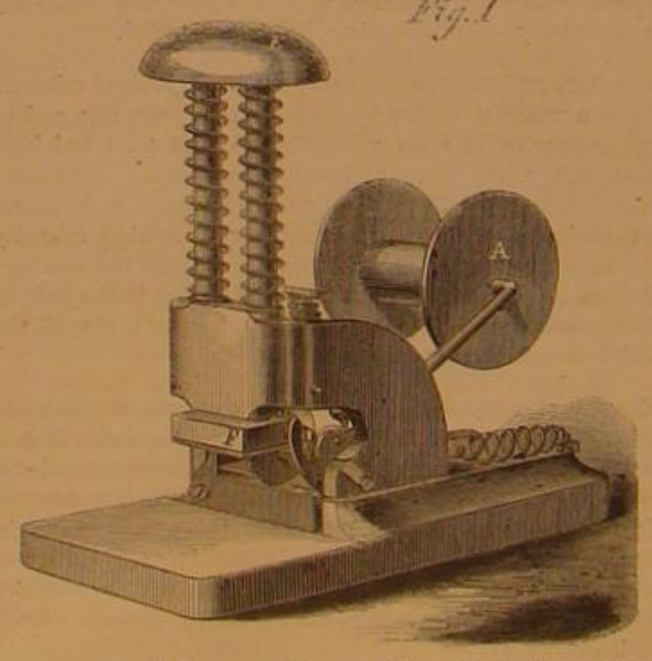
Government Tests for Iron.

During the last few weeks considerable quantities of the plate iron sent into Chatham Dockyard by the contractors supplying that establishment have been rejected by the officials, on the ground of its alleged inferior quality and its failing to reach the standard of excellence insisted upon. The contractors have appealed to the Admiralty on the subject, and, after a long correspondence and numerous official reports, their lordships have upheld the decision of their officers. The standard of excellence insisted upon by the Admiralty is that the plate iron shall stand a strain of from 20 to 22 tuns to the square inch with the grain, and 18 to 20 tuns across the grain—a degree of excellence which, under the trials with the apparatus in use at Chatham, the iron rejected has failed to attain. The contractors, however, assert that the iron thus rejected is superior to the standard laid down, and refuse to submit to the dockyard tests, which, they contend, are not to be relied on, inasmuch as the testing apparatus is imperfect. In proof of this they have placed in the hands of the Admiralty reports from two of the most eminent iron testers, in which the samples of iron rejected by the dockyard officials were, on being tested by them, found to be of even better quality than the standard required by the board. Private and perfectly independent tests have likewise been made, and again the results have been adverse to the ruling of the Admiralty officials. Under these circumstances the firm more particularly concerned has intimated the intention of commencing legal proceedings against the Admiralty for the heavy loss they have sustained.—*London Times.*

Sill's Stamp Affixer.

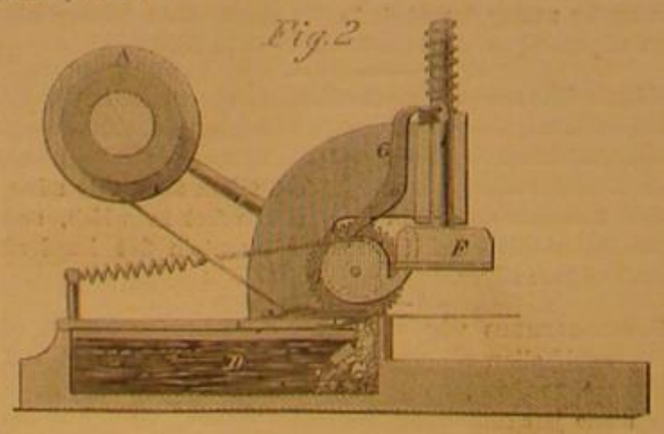
The engraving represents, in perspective and in section, a handy office implement intended to obviate the slow and disagreeable process of affixing stamps. Where the amount of correspondence is large, or in an office which issues many documents to which stamps are necessary to give them validity, the work of affiixing them is not only laborious but very annoying. The friction of the stamps on the tongue and lips induces sores, and the operation, after long exercise, becomes painful.

Fig. 1



With this machine all this annoyance is obviated. The stamps in slips are wound on the reel, A, and led under the ratchet wheel, B, and over a sponge, C, in the water reservoir, D. By pressure upon the handle, E, the affixer, F, is thrown down and the pawl, G, is actuated against teeth on the wheel, B, rotating it and bringing forward the strip the length of a stamp. The affixer or platen, F, has a steel edge on its inner surface which acts against a fixed steel blade on the platform, the two forming shears for clipping off the stamp.

Fig. 2

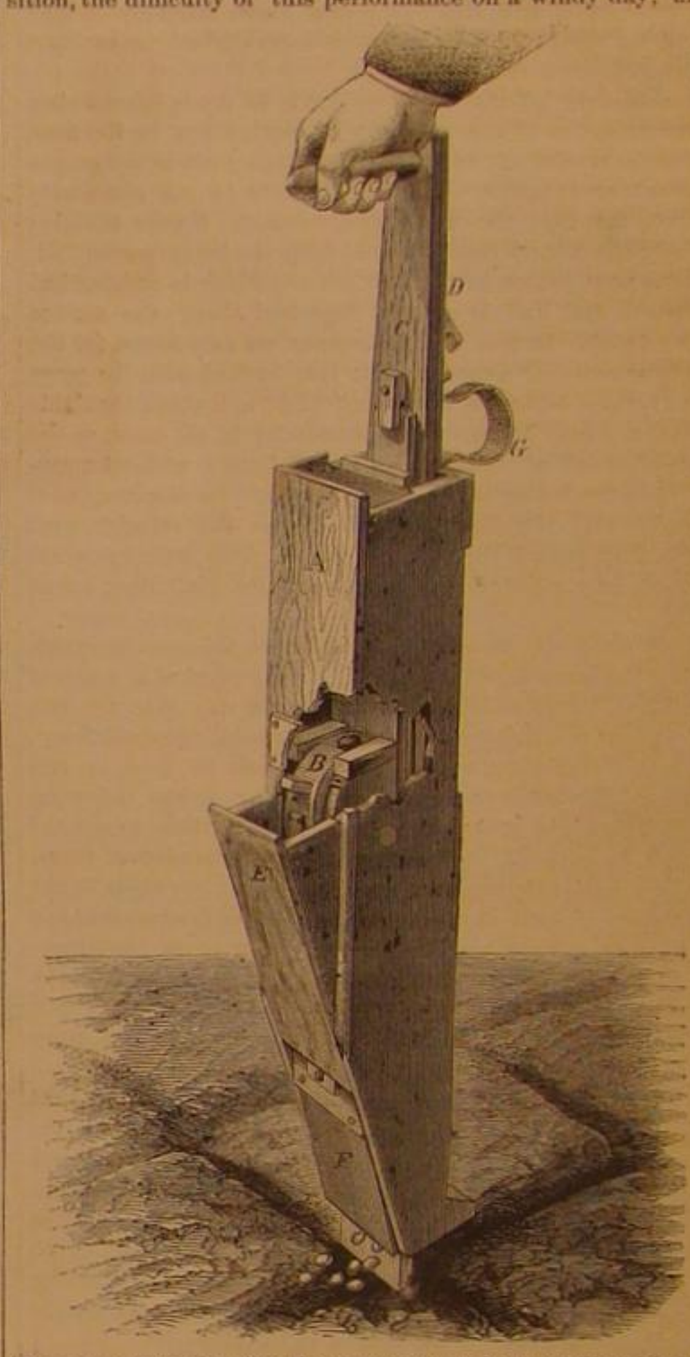


The pressure downward on the handle, E, not only moves the platen and cutter, but operates the pawl, G, thus rotating the wheel, B, and bringing forward the stamp to position. The upward movement of the plungers does not rotate the feed wheel as the pawl is prevented from acting by a minute coiled spring under its upper end. Its operation can be readily understood by an examination of the engraving.

Application for a patent is pending through the Scientific American Patent Agency, by C. B. Sill, Wilkins P. O., Pa. Address as above or at 308 North Sixteenth st., Philadelphia, Pa.

Batcheller's Hand Planter.

Those of our readers who twenty years ago were engaged in the operations of the farm can well remember the wearisome labor of dropping the corn from a bag suspended to the waist, the care required to place every kernel in its proper position, the difficulty of this performance on a windy day, and



the annoyance of seeing the corn come up in straggling blades, some in and some between the hills. All this is obviated by simple implements like that shown in the engraving. We have illustrated the instrument as in actual use, with a portion cut away to show the main working parts. Externally it is a rectangular box the lower part inclined at one side at an angle. The upper portion, A, is a seed receptacle, the bottom of it being formed by the roller, B. This roller is insured a partial rotation as the slide, C, is raised or depressed by the hand, by means of straps secured at one end of the periphery of the roller and at the other to another parallel slide, D, which raises and falls with C. The roller has a depression or cell on its circumference which by the rotation of the roller is presented to the seed in the hopper when the slide, C, is depressed. By raising the slide the roller is turned in the opposite direction and the seed is thrown into the trough, E, and falls to the bottom, where it it held by the spring plate, F, until a downward movement of the plunger opens the plate and permits the seed to escape. A simple device of a friction brush bearing against the periphery of the roller, retains the seed in the sell until it arrives in the proper position to be dropped; the strap, G, with a snug on the roller, determines the length of the reciprocating movement of the plunger, C.

No further description appears to be necessary to insure a perfect understanding of the device. It is the subject of two patents obtained through the Scientific American Patent Agency, and dated March 9th, 1858, and Oct. 13th 1863, by H. F. Batcheller, Sterling, Ill., whom address for rights, etc.

A New Anchor.

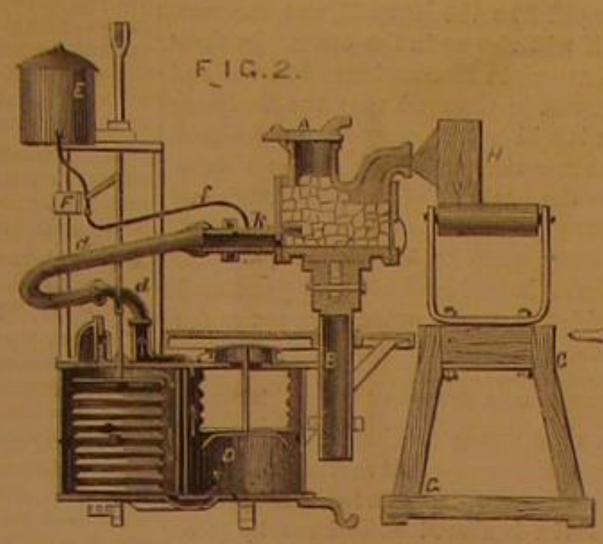
An anchor weighing twenty-six hundred weight called Martin's self-canting anchor, was lately tested by the Admiralty trial near Newcastle, England, which, after sustaining the full Admiralty proof of twenty-five and five-eighths tons was further tested by an additional strain of fifty per cent, and exhibited no signs of permanent deflection. The anchor is of peculiar shape and construction. Both arms, or flukes, take hold of the bottom and the steadying stock, set at a certain angle, and of a particular form, acts in conjunction with the arms and increases their hold to a great degree, especially on soft and yielding bottoms. As every usually projecting part is brought into action no portion really projects, so that fouling is almost, if not quite, impossible. Alongside the ship it cats as flat as a board. It is made without welds, being of three separate pieces.

Carbonizing Wood and Blasting Rock with Fire.

We give herewith engravings illustrating processes for carbonizing wood to be exposed to moisture and for disintegrating rock without the use of gunpowder. It was originally proposed by M. L'Apparent but perfected by M. Hugon. It is in use by the French Telegraphic Company, giving excellent results. We condense a discription from the London *Mechanics Magazine* translated from the *Annales du Conservatoire Imperial*. The invention consists in a movable and portable furnace and a reflector which is a curved plate, M, Fig. 1, from 12 to 16 inches diameter, mounted on a vertical shaft on the tail piece, C, Fig. 1, of the bench, G, Fig. 2. By means of this tail piece any timber placed upon it and exposed to the jet of the furnace has every part presented to the action of the flame by the reflective powers of the plate, M. The ends of the posts or piece of timber are carbonized by means of the lever, N, Fig. 1, which turns the whole movable support with the plate, M, around the central point, O. Fig. 2, is a vertical section of the whole apparatus and Fig. 3, an elevation. A, is the furnace for coal with a door at the top for introducing the fuel; B, is a movable column supporting the furnace and allowing it to be raised and lowered by the lever, P Q, with the counterpoise, R, or moved horizontally around its axis. D, Fig. 2, is a double bellows injecting air below the furnace through the reservoir, D' and a flexible tube, *d*; E is a water reservoir; F is a cock for introducing water into the reservoir, D', and *f* a small pipe for injecting water upon the blast in *k*. A sleeper or other piece of timber is represented at H, exposed to the flame. The railway company at Vierzon, carbonize 288 sleepers daily with four mabhines, at a cost of less than one centime per stick.

Fig. 4 shows the application of this device to rock cutting. For this purpose the apparatus is mounted on wheels running on temporary rails *c*. In the engraving A is the furnace; B is the door for chargingit; H is the air blast pipe; F is a cock communicating with a reservoir to regulate the quantity to be injected into the air passage, and G, a valve to intercept the blast. The concern is so arranged that by a lever it can be inclined at any angle to direct the force of the flame upon any portion of the cutting. It takes only about 15 or 20 minutes after starting the fire before the flame blast is sufficiently strong to work effectively. The intense heat, thus generated by the acid of the air blast and the decomposition of the water, rapidly breaks and splinters the rock. The furnace is then removed and cold water thrown against the rock dislodging large quantities of the obdurate material.

It is said that in the hardest rock, as quartz, this apparatus can dislodge triple and quadruple the amount which gunpowder can. It is the application by improved devices of a principle known and used from the earliest times by the most uncivilized of people.



APPARATUS FOR CARBONIZING WOOD AND BLASTING ROCK.

A New Movement for Locomotive Throttles.

It is stated that an engineer of Greenfield, Mass., has invented a new movement to take the place of the common lever on throttle valves for locomotives. In this improvement the throttle is moved by right and left screws attached to a wheel from twelve to eighteen inches in diameter. The throttle valve cannot be moved unless the wheel is moved, and, in attaching the wheel, friction enough is produced by putting a large thumb screw through the yoke or frame so that the wheel will remain stationary at the ordinary pressure of the steam. Two of these valve movements have been applied on locomotives on the Hartford and Springfield Railway, and the engineers find them a great improvement on the lever arrangement.

From this brief statement, which is all we have to guide us in forming an opinion, we should suppose that the action of the device would not be rapid enough for all contingencies. There are cases where the engineer needs to shut off his steam instantly, reverse his engines, and apply the steam again at once, as when an obstruction is on the road and a collision is to be avoided. Whirling a wheel, however rapidly, which actuates a screw, occupies time, and we think some quicker-acting device might be contrived which would be superior to the commonly used lever and at the same time obviate the supposed objections to this.

Wind Mills in New York City.

Minnit, the first Dutch governor, built, according to Moulton, "two or three wind mills at Manhattan, by which corn was ground and boards sawed." One of these, a flour mill, stood on a hill which occupied a part of the present Battery, so near the fort that the latter, which was rebuilt by Van Twiller, in 1633, intercepted the southeast wind, and rendered the mill nearly useless. But one of three wind mills previously erected was in operation in 1638, when Keift came to the government.

On one of their farms, of which they reserved several in different parts of the island, the West India Company erected a "Wint molen" (wind mill) for the use of the town. It stood near Broadway, between the present Liberty and Cortlandt streets. After having gone to decay, it was ordered, in 1662, that there be another erected on the same ground, "outside of the city landport (gate) on the company's farm." "Old Wind Mill Lane," running from Broadway to Greenwich street, and between Cortlandt and Liberty street, upon which it probably stood, was, in Lyne's survey of New York, in 1729, the most northern street west of Broadway, all beyond being the King's farm.

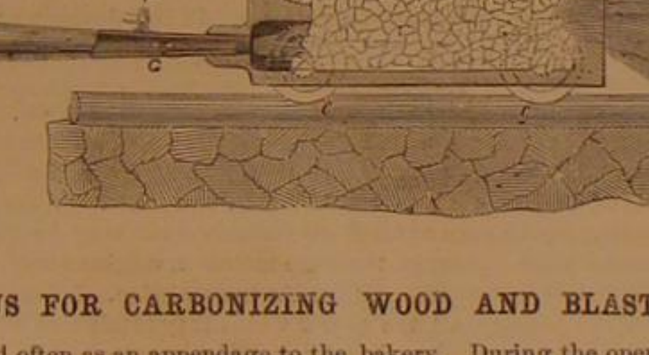
Mills of this class were also built by private enterprise. Jan Teunizen had a wind mill in 1665, which was standing sixty years after, near the corner of Chatham and Duane streets. This mill was then some distance beyond the limits of the city, on the public road.

The bolting of flour, in those days, was usually carried on as a separate business, and in establishments constructed for that purpose, sometimes at a distance from the grinding mill and often as an appendage to the bakery. During the operation of an Act of the Assembly, made in 1684, giving to New York the exclusive right of bolting flour within the province, mills sprang rapidly into existence in the vicinity of the town, and the manufacture of flour became a principal source of emolument to the city. Two years after, under Governor Dungan, the city received a new charter, giving additional municipal privileges, and confirming the ancient Dutch franchises. A new seal, more rich and elaborate than the old one, was now granted the city, which, as indicative of the principal sources of its prosperity, retained the beaver to represent its ancient commercial interests, and added a wind mill and a flour barrel as emblems of its present industry.

A wind mill once stood on the hill in the rear of the old jail, or the present Hall of Records, and an eminence near the Chatham Theater was called "Wind Mill Hill." In 1760, John Burling advertised for sale a wind mill near Bowery Lane, having two pair of stones.

CONVERSE'S IMPROVEMENT IN POCKET FIRE-ARMS.

Our engraving illustrates an admirable little improvement in pocket repeaters, the invention of Mr. Charles A. Converse,



of Norwich, Ct., which he has very appropriately christened the "Ladies' Companion." It is not much larger than a good sized knife, our cut being almost the actual size of the article. The improvement consists in the use of a short pivot, *b*, upon which the rear of the barrel, *a*, turns, and in the use of a ring, *c*, which clasps the barrel, and while permitting it freely to revolve, secures it firmly to the stock of the pistol. To remove the barrel it is only necessary to loosen the screw, *d*. This little repeater is an elegant specimen of Yankee simplicity and mechanical skill. It is used with metallic cartridges, which are inserted at *e*.

The pistol can be loaded and fired with great rapidity, is simple to the last degree in construction, therefore durable and little liable to disorders. We have yet to see a five-shooter which combines so many practical excellences in so small a space, and is sold for so low a price as this. The "Ladies' Companion" is a decided success and we think will have an extensive introduction. Patented Aug. 28, 1866. Manufactured by the Continental Fire-Arms Company, Norwich, Conn., Charles A. Converse General Agent.

Chunks of Gold.

We copy from a California paper an Alladin-like statement, with comments, on the discovery of gold nuggets. It says that the miners in the Woodside Quartz Mine near George-town were "blocking out a nearly pure, solid mass of gold three feet in length. If such a statement had come from a stranger, we should have received it with incredulity, but we can vouch for the sincerity and intelligence of the author of the message. The finding of gold in such large masses in a lode, is without a parallel in the history of mining. The metal in veins of auriferous quartz is usually in small particles, and pieces are very seldom obtained weighing more than a few ounces. Probably the largest piece of gold heretofore taken from any lode in this State did not weigh more than a pound. But our telegram mentions one lump, obtained in the Woodside Mine, weighing 100 pounds, and it is implied that the piece three feet long will weigh very much more. The large nuggets, however, which have been found in the placers, must have come from quartz veins. Australia produced one nugget weighing about 225 pounds; and in 1854 a lump of 160 pounds was obtained in Calaveras county; and this State has produced a multitude of nuggets weighing ten or twenty pounds. All these must have come from quartz veins, and surprise has been expressed by several writers that the particles of the precious metal found in our lode mines are so small. If the accounts from the Woodside Mine should be verified, our largest mass of gold must hereafter be credited, not to placer deposits, but to quartz. It is worthy of note that the Sonora *Democrat* of the 3d inst., asserted that, in the previous week, some Italians had found a streak of gold four inches thick in a quartz mine in Deer Flat, Tuolumne county, and had to cut out the metal with cold chisels. This report was considered so improbable that it scarcely deserved repetition, but it may be true for all that. A number of the quartz mines of the State are yielding better now, at great depths, than everbefore, and the confirmation of these statements from Georgetown and Deer Flat would assist to give a new impulse to the branch of mining which must be the chief reliance of our gold miners in the future."

Snow in Cities.

It is curious to note how the same circumstances are viewed in different localities. *The Engineer*, London, says:—"The large masses of snow at present lying in our streets impede the traffic to an enormous extent. Why do not the authorities adopt some measures to remove it? We have seen the scavengers, employed in clearing the street gutters, deliberately throw the snow they had removed into the middle of the street."

This complaint sounds queer to the dwellers hereabouts. In Boston, if not in this city, the "scavengers employed in clearing the street gutters," are employed for the very purpose of throwing the snow into the streets. That is just where we want it. Where else? Certainly if we clear our *trottoirs* and gutters for the passage of pedestrians and water, we can do no less than to give the results of our labors to our sleds and cutters. We want snow in our streets. It is easier for horses, more comfortable for men, and profitable to owners of sleigh teams to let.

Cost of a Newspaper.

Some idea of the vast expense attending the publication of a first-class daily paper may be inferred from the annual statement made by the *New York Tribune* Association.

The gross receipts from subscriptions, sales, and advertising, in 1866, amounted to $909,417. The expenses were $885,158, showing a net profit of but $24,259 to be divided among the stockholders.

ITEMS:—The printing paper cost $418,199. Pressmen and Compositors, $133,000. Editorial expenses, $81,775. Correspondence, $49,300. News by Telegraph, $58,776. Mailing, counting, and packing papers, $35,000. Taxes on advertising, $10,082, besides many other expenses of less magnitude, but which help to eat up the profits of the publishers. In 1865 the receipts were $816,537, expenditures $646,107, showing a profit of $170,430. The combined circulation of the various editions of the *Tribune*, daily, weekly, and semi-weekly, probably exceeds that of any other general newspaper in America.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Earth Worms---How and What they Eat.

Messrs. Editors:—I see that you have published an article about the habits of earth worms, which useful little creatures seem to be much underrated. They may eat earth, as your author asserts, but I have never seen them do it, although I have seen them eat other things with great voracity, and have also seen them reject particles of earth which adhered to their proper food, such as dead spears of grass, roots and leaves.

I have watched them feeding for hours at a time, and retain a lively recollection of several rheumatic attacks, resulting from the wetting I got while so watching them. They feed at the surface only when the withered vegetation is wet with rain or dew and is in a soft and pliable state. When their food found at the surface is dry, and too harsh for their mouths to manage, they retire to the congenial depths of the ground, delighting in heaps of "long" manure, which they reduce to a homogeneous mass of compost with great rapidity by consuming the vegetable and undigested parts thereof, thus transforming the matter from a vegetable to an animal character, leaving the mass at its lowest chemical status and so fit for the food of plants. Indeed I doubt if any atoms of vegetation can decay and be again fit food for other vegetable organisms without an intervening decomposition in animal digestive apparatus. At all events, it is easy to prove that earth worms are the compost makers, and if we do not give them time to properly manufacture their "product" while the manure is in the compost heap, they will appear in the fields and then complete the job, and further, their work in fields yields another benefit by their boring and opening of the soil.

Their manner of eating is worth noticing. If you seat yourself upon a grass plat or beside the strawberry bed, during a light rain in warm weather, and have the patience to sit perfectly still for ten or fifteen minutes, you will see innumerable worm heads protruding cautiously from the ground, and feeling around until a spear of soft and recently killed grass is found. The worm touches it first with the extreme point of the head, and then the point retracts inward, much like the toe of a stocking when you touch it with your finger to commence turning it: then the worm shortens its length, the other end being fast anchored in the hole: this action makes a bight in the spear of grass, and then the worm crawls along the outside of his supper until the parts diverge too much, when he takes another pull, and so on until the grass is loosened from its own roots and safely swallowed. I have observed that if a particle of earth adhere to the food it is shoved along as the swallowing progresses, and not allowed to enter the mouth. The final act of swallowing the end, and biting off the lump of root which is sometimes attached, I have never seen, as that is performed within the hole: but I have frequently seen the worm re-appear with a pellet of earth balanced upon his head, or it may be only the piece of root if his supper was clean, which he deposits at the surface beside his hole, when he prowls around for more food while it is good.

When two worms seize opposite ends of the same spear, the pulling and hauling is most comical, reminding one strongly of his early days when he strung grains of corn upon opposite ends of a string and fed two rival gobblers. The worm fight generally ends by the breakage of the grass, but if too strong for their strength they both swallow until their heads touch each other, when they both "get," leaving the morsel, which they will not touch again. I have often seen these worms breaking off the dead parts of strawberry leaves, rejecting the living parts, and have also seen them apparently sucking the pollen from strawberry flowers. In the fall large tufts of dead leaves may be seen drawn partially within the worm holes, possibly by way of stoppers to keep out the cold.

* * *

Science Familiarly Illustrated.

Why Water Presses Sideways and Upward.

"Truth is stranger than fiction." The young philosopher is surrounded with mysteries and is called upon to accept as fact what seems to him incredible. Many of the fundamental truths of natural science are apparently inconsistent with his everyday experience and observation. It certainly is not all stupidity which makes the boy slow to learn that the earth is round, that the sun is bigger than the earth, and that the air has a weight which squeezes up his body with a force of five or six tuns. It is probably the case that the children who do learn these things, are helped on more by their natural credulity than by conviction of the judgement. And there are many grown up people who remember only the outline of facts taught them in childhood, and have never troubled themselves for reasons about them. How many skillful mechanics can give good orthodox scientific reasons for the fact that water presses sideways and upward as well as downward?

Bodies which make a pressure in consequence of their weight generally press downward only, and this pressure is exactly proportioned to the weight. In fact the pressure and weight in our common experience are the same thing, and upon this conception of the case our balances and other weighing machines are constructed. The weight is due to the force of gravity which pulls in no other direction than downwards, or towards the center of the earth. Then why can there be any movement sideways or upwards?

If a lot of bricks be piled on top of each other the pressure will be only downward, and there is no tendency in any other direction. But if we try to pile up sand in the form of a column we know it spreads out at the bottom, and thus in this case there is a tendency or pressure sideways. The reason of this can be made very clear by observing what takes place when a few grains only of sand are experimented with. Sand, however, is composed of little rounded pebbles, and it is better for the experiment to take large pebbles or bullets, as they can be better seen. Place two pebbles side by side, and then a third over and between them. The result is that the two are spread apart and the third falls between them; the third pebble has acted like a wedge to divide and push them laterally. Now what takes place in our experiment may by careful observation be observed in heaping a large body of sand.

Take a tube shaped like the letter L and pour in sand at the top and soon it runs out at the side and with a good deal of force. If the tube be shaped like the letter U, and the sand be poured in at one end it will rise up in the other. In these simple experiments we have plain illustrations of lateral and upward pressure. But it will be observed that the sand loses force in moving and that it will not go very far in the horizontal part of the L tube nor rise very high in the U tube. The reason is simply that the particles of sand are rough and the friction stops the motion; our sand needs to have a lubricator. The particles of water seem to be very smooth and slippery, so that none of the lateral and upward pressure is lost by friction, and the sideways and upward pressure at any given point are equal to the downward.

Machines Mediums and not Reservoirs of Power.

One notable fault with most young mechanics is the belief that machinery is a source of power—that mechanical appliances not merely transmit the force first exerted, but increase its power. In fact, this belief is shared sometimes by those of experience enough to know better, and is the source of the enormous waste of ingenuity and mechanical ability shown in the attempts at mechanical impossibilities and especially in the never-ending experiments for the discovery of a perpetual motion.

Mechanical appliances increase our ability to move objects, but so far as they do this they compel a loss in velocity. For instance: By the use of a lever a man may lift a rock which unaided by this simple means he would be unable to move, but if he could lift it without this aid he could move it much more rapidly. The lever is one of the most powerful of the simple mechanical powers. Archimides was not a senseless boaster when he said: "Give me a fulcrum for my lever and I will move the world." Its value may be seen in the common steelyard where a poise of one pound on the extremity of the bar will counterbalance one of a hundred at the end of the shorter arm. The safety valve lever is an example being what is called a lever of the second class, the weight being between the fulcrum and the power. In this device a weight of a few pounds or a spiral spring counterbalances the pressure or weight of hundreds of tuns.

The pulley and the gear, although not often classed as related to the lever, may be considered as modifications of the same mechanical power. The pulley may be called a double lever, having a common fulcrum in the shaft. So the gear acting by its cogs or teeth on another gear may be considered a lever. None of these are motors or originators of power but only conveniences for its transmission. Indeed they do not transmit all the power which they receive, as friction of the parts absorb or divert a certain percentage of it.

The inclined p'ane is commonly classed among the rudi mentary mechanical powers, but this is hardly correct unless we make a double incline, as the wedge, or a spiral incline, as the screw. In fact the lever is at the root of all mechanical powers, and all others partake, more or less of its nature.

STEEL-HEADED RAILS.

We published in No. 4, present volume, diagrams of a new steel-headed rail for roads and of the pile from which it was forged. Rails with steel faces have been used, the steel being simply a plate welded on the top of the iron. They did not prove very successful from the difficulty of making a perfect union of the two metals, and from the fact that the inside lip of the wheel abraded the iron, contributing to a more rapid deterioration. Since publishing the description of the improved steel-headed rail we have seen cross sections of them which show a perfect weld between the iron and steel, which we are informed by Mr. S. L. Potter, the Superintendent of the Wyandotte Mills, at Wyandotte, Mich., is obtained without the use of a flux and the result is secured by the pecular method of making the pile for heating. These rails are steel, not on the upper face alone, but on the sides sufficiently to take the wear of the wheel lips. They are used on several of the western railroads and give perfect satisfactfon. As they cost at the present price of steel only about forty per cent more than iron rails and much less than rails made wholly of Bessemer steel, they seem well adapted to supersede the ordinary rails whenever they are removed. Railroad men who are interested in the subject of steel rails would do well to correspond with Mr. Potter, at the Wyandotte Mills, as above, where the rails are at present manufactured.

The proportion of ammonia contained in rain water is liable to considerable variation. In one million parts of rain water collected in Paris during the last five months of 1851, Barral found 3·49 parts; Boussingault, at Liebfraunberg, in 1852, found only 0·744 parts; Lawes and Gilbert, at Rothamstead, in 1853 and 1854, found the average amount from March to August to be 1·42; from September to February 0·927 parts, or about one grain of ammonia in fourteen gallons of water.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

Explosive Compound.—H. A. Bleckmann, London.—Dated May 10, 1866.—This improved composition is composed of the following ingredients: Sawdust or other particles of wood, or other cellulose substance in a finely reduced or comminuted condition; saltpetsr, or nitrate of potassa, and charcoal or carbon, and sometimes ferro-cyanate of potassium. These materials, that is to say, the sawdust or other cellulose substance, the saltpeter or nitrate of potassa and charcoal, with or without the ferro-cyanate of potassium, form or constitute, when mixed together, a compound or agent which will not explode by impact, ramming, or friction, but only by ignition or the application of fire, or very strong heat.

Treating and Applying a Certain Vegetable Plant for the Purposes of the Tobacco Plant.—F. C. Buisson, Natiat, France.—Dated April 21, 1866.—This invention consists in treating the leaves of the tuberous sunflower or Jerusalem artichoke (*helianthus tuberosus*), and applying them to the purposes for which the leaves of the tobacco plant have been employed. The patentee collects the leaves of the tuberous sunflower, dries them, and submits them to the operations to which the leaves of the tobacco plant are ordinarily submitted in order to manufacture therefrom a tobacco for smoking—cigars, rolls, cakes, snuff, or other usual forms. The smoke arising from the tuberous sunflower leaves, when thus heated, is odorous, sweet, and slightly acidulous; it is not acrid, and has no poisonous effect.

Director.—W. G. Grant, Wakeman, Ohio.—This invention relates to a director for inserting a sponge or other similar or suitable pessary into the vagina, to act as a support to the mouth and neck of the uterus, in cases of female weakness.

Chemical Process.—René Cupper, New York City.—This invention relates to a process for the extraction of iodine from sea water, which is accomplished by precipitation.

Chimney Top or Cap.—W. F. G. Beenwkes, Holland, Mich.—This invention relates to a top or cap for chimneys. The principal object of this invention is to prevent the roof of the building through which the chimney extends, from becoming heated by the action of the heated currents of air and products of combustion passing through the chimney.

Copy Holder.—Charles B. Moseley, and Lucius L. Woolley, Medford, Mass.—This copy-holder is specially intended for the use of compositors, although it can be readily and easily adapted for use by various persons such as copyists of legal and other papers, proof-readers, etc.

Saw Set.—W. A. Alexander, Mobile, Ala.—This invention relates to an improved device for setting saw teeth, and consists of a clamp formed in two parts, one of which parts contains a recess for receiving the saw tooth when it is bent as desired, by means of a lever in the other part, the extent of the deflection of the tooth being regulated by a set screw in the recess, which limits it as desired.

Vise.—James S. Ralston, Indiana, Pa.—This invention relates to an improved plan of construction of a vise for blacksmiths, carpenters, or other mechanics, and consists in an arrangement for opening and closing the jaws of the vise by means of two eccentrics or cam disks placed outside of the jaws on a connecting and operating rod.

Tool for Cutting Boiler Tubes.—Richard H. Burke, New York City.—This invention relates to a tool which is intended to cut off boiler tubes inside the tube sheet, but which may also be used for cutting off the ends of such tubes. It consists of a pipe which contains a conical head provided with slots to retain the cutters, and with a feed screw in such a manner that by the action of the feed screw and conical head the cutter can be gradually fed out as the operation of cutting progresses, and boiler tubes of any desired thickness can be cut with the greatest ease and facility. The pipe, which contains the conical head and the cutters, is provided with a series of sleeves in such a manner that said pipe can be adapted to boiler tubes of different diameters.

Cooler for Coffee and Other Articles.—Jabez Burns, New York City.—This invention consists in an apparatus for cooling coffee as the same is discharged from the roaster, or other articles of a similar nature, by a downward draft produced by a suction blower or other suitable apparatus in such a manner that the smoke and dust which generally rise from the coffee or other article to be cooled, are prevented from filling the room, and all inconvenience and danger of fire arising from that source are avoided.

Roof for Railroad Cars.—John Stephenson, New York City.—This invention relates to the construction of the roofs of horse or street cars, and has for its object durability, a greater convenience than hitherto in shipping cars of this class, and a greater facility and economy in repairing the roof.

Peat Car.—Thomas J. Wells, St. Anthony, Minn.—This invention relates to a new car for transporting peat blocks or bricks from the machine or place where they are prepared to the drying house, where they remain until they become sufficiently dry for fuel. Also, in a novel construction of the car, whereby one person is enabled to load and unload the car, with the greatest facility.

Composition for Coating or Covering Ships' Bottoms.—R. Hamilton St. Helen's Place, London.—Dated April 19, 1866.—This composition is composed of fifty pounds of tallow, thirty pounds of white arsenic, and ten pounds of mercurial ointment.

Treating India Rubber—S. Bourne, Harrow, Eng.—Dated May 3, 1866.—This invention consists in heatingindia-rubber and India-rubber compounds in the presence of charcoal, by preference animal charcoal, whereby all unpleasant odor is removed from the India-rubber.

Composition for Removing and Preventing Incrustation In Steam Boilers.—G. Feasey, Camberwell, Eng.—Dated May 2, 1866.—This improved preparation or composition for removing and preventing incrustation steam boilers is composed, mainly, of carbonate of soda and co on salt, with a small quantity of borax, and sometimes sal ammoniac or hydrochlor ite of ammonia mixed with soap, a small quantity being added from time time, to the water in the boiler.

Combined Corset and Skirt Supporter.—Wm. Bacheller, Boston, Mass.—This invention relates to a skirt supporter and corset combined, the said supporter being made of sheet metal or other suitable material molded to fit the form of the person wearing it, and so secured to the corset as to form a part of the same and to be susceptible of being attached and detached at pleasure when the corset is to be washed or cleansed.

Globe Valve.—C. L. Frink, Rockville, Conn.—This invention consists in forming a peculiar-shaped disk by which a person is enabled to hold the elastic packing in globe or other valves in place.

Cultivator.—C. P. Norton, Roseville, Ill.—This invention relates to the construction and arrangement of the several parts of a corn cultivator whereby an efficient and very simple machine is produced.

Life-boat.—William Henry Wylly, Savannah, Ga.—The object of this invention is to provide a life-boat which shall not only combine lightness, strength and durability with safety, but be so constructed that it can be easily transported from place to place overland or on shipboard.

Pump.—J. G. Weisinger, Danville, Ky.—This invention consists in so constructing and arranging the various parts composing the pump as to secure continuous suction and thus discharge therefrom in a continuous stream.

Fan Blower.—George W. Bright, Philadelphia, Pa.—The object of this invention is to obtain a blast by the reaction of steam or other elastic substance discharged from the wings of the blower thereby causing them to revolve with great rapidity.

Plant Tray.—Dr. William W. Smith, Montrose, Pa.—This invention consists in forming a box or tray for the propagation or growth and cultivation of plants and flowers either for outdoor or indoor use.

Gold Condenser.—William G. Redman, Louisville, Ky.—This invention consists in constructing an instrument for condensing gold in the process of filling teeth, and for preparing the cavity for filling, whereby the operation is much more perfectly performed than by the old method.

DEVICE FOR NDING RAILROAD CAR WHEELS ON OR OFF THE TRACK.—George T. Lape and Jephthah Leathe, New York City.—This invention relates to a device to be used for guiding railroad cars on or off the track, the form being modified to adapt it to the rail either of a street horse-car railroad, or of a railroad for steam cars.

WASHING MACHINE.—Charles Daniel, Lamonte, Mo.—This invention consists principally in a slotted cylinder, adjustably pivoted to the sides of the tub or box, in combination with a slotted adjustable concave frame, pivoted to the sides of the box or tub, by means of which the clothes are held forward to be washed by the revolution of said cylinder.

FILTERING TUBULAR WELLS.—Charles C. Cole, Northfield, Vt.—This invention relates to the construction of lower sections of tubing, to be used for obtaining water cheaply and readily in clay or sandy regions without the expense and trouble of digging wells.

TETHER.—Daniel Kidder, Franklin, N. H.—The object sought to be attained by this invention is to provide a tether by the use of which it will be impossible for the rope or chain employed, and by which the animal is harnessed or connected with the tether, to become entangled with or about the limbs of such animal.

CANE STRIPPER.—Amos Bean, Canaanville, Ohio.—This invention has for its object to furnish an improved instrument by means of which cane may be stripped quickly and cleanly.

STEAMBOAT SIGNAL BELL.—Patrick Kenny, New York City.—This invention has for its object to furnish an improved apparatus, by means of which the pilot from the pilot house may readily and unmistakably communicate his directions to the engineer.

WINDOW BLIND FASTENER.—L. C. Wing, Concord, Mass., and A. R. Bradeen, Waterborough, Me.—This invention has for its object to furnish an improved means by which window blinds may be held and locked both when closed and when opened to any desired angle.

SCAFFOLD.—L. B. Carpenter, Milwaukee, Wis.—This invention has for its object to furnish an improved scaffold for masons' and bricklayers' use, by means of which they can raise themselves as their work advances to any desired height, without its being necessary for them to unload the scaffold and build it higher.

PUMP.—John Ross, Greenville, Mich.—This invention has for its object to furnish an improved pump, by means of which water can be raised from deep wells quicker and easier than with the pumps now in use.

OPENING AND CLEANING COTTON, ETC.—Samuel Fay, Lowell, Mass.—This invention is designed to furnish an improved machine for opening and cleaning cotton and other fibrous substances in a thorough manner, without injuring the fiber or rolling or curling it, as is the case when opened by ordinary means.

COTTON CHOPPER AND THINNER.—David P. Lewis, Huntsville, Ala.—This invention relates more particularly to the cultivation of cotton, but is adapted to other crops, and it consists in operating a double-bladed hoe by machinery.

COVERING COT OR ROLLS.—Edward Livingston Perry, New York City.—This invention consists in forming a cot or covering for the rolls of spinning and other machines, of three or more separate layers or thicknesses of material, secured or united together, by means of cement, glue, or other suitable adhesive material, or in any other proper manner, either independent of the roll on which the cot is to be used, or directly upon the same.

CUTTING FILES.—Charles Vogel, New York City.—This invention consists in an improved arrangement of mechanism for feeding the file bloks to the cutter, whereby the speed of the file may be varied according to the size of tooth required. Also, in an inproved file-bed, so constructed that files of varying sizes can be secured to it; and also, in a novel manner of hanging the cutting-tool, whereby it can be adjusted to suit the desired direction or angle of inclination of tooth with reference to the length of the file block.

BROOM.—Hy. E. Newton, Manchester, N. H.—This invention consists in attaching one or more springs to the broom head, and securing their upper ends to the handle, in such a manner that they form the connection between the handle and the broom head.

PLOW.—Israel Long, Terre Haute, Ind.—In this implement, which is a wheel or sulky plowing machine, a plow is attached to either end of the axle outside of the wheels by means of adjustable arms or beams, one plow being raised out of contact with the ground while the other is in operation. The working plow stands in close proximity to the wheel on that side of the machine, and prevents clogging by uprooting and deflecting the weeds, stones, etc.

MILL GOVERNOR.—William Bahme, New Media, Pa.—This device is intended to close the water gate and stop the water wheel when a certain speed is attained. When the grain ceases to feed between the mill stones the rapid revolution of the runner frequently fires the woodwork. To avoid this a revolving governor ball is pivoted by an arm to the mill shaft, so as by the rise due to a high rate of speed to strike a plate and release the water gate which controls the admission of water to the wheel.

GANG PLOW.—J. H. Doutbit, Albany, Oregon.—This invention relates to a gang plow, and consists in a novel construction and arrangement of parts, whereby the operator has full or perfect control over the plows.

CAMP COFFEE POT AND BOILER.—Luke Plumb, Biddeford, Maine.—This invention relates to the combination of a camp tea or coffee pot and boiler, or pitcher, whereby an ordinary coal-oil lamp may be rendered serviceable as a heater for cooking in a small way; such, for instance, as the making of coffee and tea, warming water, and keeping a meal warm during the delay or temporary absence of a person from the table.

SEED PLANTING MACHINE.—D. S. Holman, Conneautville, Pa.—This invention relates to a machine for planting seed, and it consists in a novel seed dropping device, with means for regulating the discharge of the seed, and also in an improved means for opening the furrows and covering the seed after being dropped therein.

HOOP-SKIRT HOLDER.—Emile Loiseau, New York City.—This invention consists in arranging a device whereby the lower or any one hoop of the skirt is secured to the petticoat, thereby making actually one garment out of the two.

COMBUSTIBLE AND INEXTINGUISHABLE COMPOUND.—J. Sharp and R. Smith, Blackford, Perthshire.—This invention relates to the combination or mixture of certain materials for the production of a combustible compound which, when once ignited, becomes inextinguishable by any agent at present known, as it burns without atmospheric air, and will burn in water, in carbonic acid gas, nitrogen, and all other gases which do not support combustion. Under one modification the compound may be formed by mixing nitre, charcoal, and sulphur, all in a powdered state, and then adding and thoroughly commingling therewith a quantity of unground or unpowdered gunpowder. The proportions are four parts nitre, two parts charcoal, and one part sulphur, with the addition of two parts gunpowder.

PULLING FLAX.—John Harrington, Minomonie, Wis.—This invention relates to a machine for pulling standing flax for the purpose of harvesting the same, and it consists in the employment or use of a reel provided with clamps and arranged in such a manner that it will rotate as the machine is drawn along and grasp the flax, draw it out of the earth and deposit it upon the platform.

CAR TRUCK.—J. W. Reynolds, Hyde Park, Pa.—This invention relates to a mode of attaching or applying the pivot or king-bolt to the truck, whereby said bolt may be readily applied to and detached from the truck and a new one applied at any time, when necessary, with the greatest facility. This invention also relates to a novel manner of applying the springs to the truck, and in an improved arrangement of the boxes.

APPARATUS FOR HEATING HOUSES AND APARTMENTS.—G. Davies, London.—The object of this invention is to utilize all the heat eliminated from the flame of gas, or that of any of the oils or fluids possessing illuminating properties, by causing such flame to pass over or come in contact with a system of heat-radiating materials, so arranged as to absorb, conduct, and radiate the heat imparted to the said radiating material from the burning gases or fluids. The smoke or vitiated air from the burning gases or fluids are conducted off in a separate pipe to the chimney or other place of exit, and pure heated air is conducted into the apartment when a heating apparatus is used, or radiated within the various compartments of a cooking stove or range when the latter used.

DRAWING OR PROPELLING BOATS, BARGES, RAFTS, AND OTHER SIMILAR STRUCTURES, ON CANALS, RIVERS, ETC.—C. E. Brooman, London.—This invention consists in constructing a continuous rail or bar, or its equivalent, along the side of the canal or navigable water, which rail or bar is grasped by traction or friction wheels operated by steam or other power in the boat to be removed. It is attached by any convenient means to upright posts firmly fixed and ranging along the direction of the canal.

SAFETY RECORD PAPER.—L. M. Crane, Ballston, N. Y.—This invention relates to a safety record paper for bills, deeds, currency bonds and other instruments or documents which are liable to be forged or fraudulently altered. This invention consists in inserting in the paper pulp and incorporating with it, during the process of manufacturing the paper, one or more threads or strips of gutta percha or other material which will soften under the heat of the drying cylinders of the paper-making machine, and become inseparably united with the paper so as to be incapable of being removed or detached without destroying the latter.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us: besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

R. L. B., of Mass.—The alloys of magnesium reported on at the present time are all brittle, and are generally more easily oxydized than magnesium alone. But we hope you will continue your experiments, and let us hear from you when you shall have produced a useful alloy.

J. C. M. & Co., of Pa.—The oxygen of the air can readily be removed by phosphorus. But in that way you dispose of only one-fifth of the whole. There is no substance that will take up the nitrogen. We think therefore you will not be able to secure a good vacuum on the absorption plan.

H. S. C., of Pa.—The coloring matter of clay is generally iron or organic matter. On baking clay, the organic matter is burned up, and if the clay contained no iron or other metal, the ware will be white. The iron may be removed by soaking the clay in hydrochloric acid. The ordinary blue clay gets most of its color from organic matter. The red color of bricks is due to an oxide of iron.

W. E. B., of Pa.—You will find in the text books on chemistry reliable tables of the expansion of metals by heat. Of the metals you name, zinc expands the most.

J. C., of Tenn., quotes from Hooper's Medical Dictionary, article Caloric, some contradictory statements regarding the density of melted and solid iron. When the doctors seem so disinclined to agree on matters touching their own art, it is not surprising that they should be inconsistent on outside matters.

C. A. G., of N. Y.—The tarnish on silver ware is most often due to sulphur. A gentleman, who wears a silver watch finds that it is tarnished from the sulphur fumes of the rubber ring which holds together his ferry tickets. Sulphur fumes enough get into the air to account for all ordinary cases of tarnishing. The sulphide of silver is black.

G D. C., of Conn.—Wheels of lead, or rather a mixture of lead and tin, will carry flour of emery or crocus and will not deface the corners of an object and will give a perfect polish.

J H. P., of Mass.—There is necessarily nothing in the matter on postage or other Government stamps, or on envelopes, to induce sores on the lips. When they occur, as in the case of preparing replies to numerous correspondents, the soreness is to be attributed to the friction on tongue and lips which is much increased by the adhering quality of the dextrine.

T. H. K., of N. Y.—You say that attached to your water wheel is a four-feet bevel gear, driving a sixteen-inch bevel gear, on a shaft carrying a thirty-six inch driving pulley with fifteen-inch belt, and ask whether more power can be obtained by the use of larger gears. Judging from the size of the belt used to transmit your power we think your gears are full small. Really no more power is developed by large than by small gears, but as bevel gears are at best but mechanical makeshifts, absorbing power, we think the nearer the two wheels approach in size the better they work. Better use bevel gears of equal size and speed upon your pulleys. This statement is a reply to both your questions.

H. B. L., of Ind.—A boiler begins to make steam as soon as the water begins to heat, and makes steam as long as the heat is applied, under all circumstances. The steam pressure in a boiler to the square inch is as great in the water space as in the steam space with the addition of the weight of water. Water does not, in our belief, present a barrier or wall to the pressure of steam. You are mistaken in saying that steam will not go down through water. Steam exists in water, and if you will carefully study "Heat and Steam by Charles Wye Williams," H. C. Baird, Publisher, 406 Walnut street, Philadelphia, you will probably modify your present opinions.

H. N. G., of Pa.—Turning tools for iron will cut better if ground on the side of the stone running toward you Never grind a tool the temper and edge of which you wish to preserve, on a dry stone. It is a certain and effectual method of drawing the temper of hardened steel.

R. O. N., of Mich.—A large part of the saltpeter (nitrate of potash) now used is an artificial product. Gun powder makers at first had a prejudice against saltpeter made from nitrate of soda, but there is no way of distinguishing the artificial from the natural product.

S. N. M., of Va.—Magnesia is an essential element in hydraulic cements. Any magnesian limestone, will give on burning, hydraulic lime.

R. D., of N. H.—Coal is found in several localities in New England, and has been mined in Rhode Island. But there is not enough coal in New England to affect the fuel question.

S. N., of Wis.—Copper is smelted on a tolerably large scale in this vicinity. The largest copper smelting works however, are located in Baltimore.

P. B., of O.—The reason that pickles, apple sauce etc. made in an iron kettle look dirty and black, is that some of the iron is dissolved by the acid, and this with a little tannin contained in the fruit, produces a black substance which is the same as ordinary ink. Acid fruits should be cooked in a porcelain lined kettle.

B. B. R., of Mo.—Lithographic stone is worth about 50 cents per lb. If you send your sample to any practical lithographer he can give you a reliable opinion of its value. But be prepared to find out that you have been mistaken, and that your article is not the genuine thing.

N. S. of Cal.—The best solvent of gold is aqua regia (nitric acid 1 part, hydrochloric acid 3 parts). There are also many other solvents.

S. L., of N. Y.—The expansion by heat is generally understood by gas and steam fitters. You should observe that steam pipes for warming buildings are arranged so that no harm can come from the expansion.

M. B., of Del.—Leather is chemically a compound of gelatine and tannin. Your article, which you say contains no gelatine, is not leather. We trust, however, you have something better than leather. . . . . You say that whenever you hear a fiddle you think of poor pussy cat. But you are misplacing your sympathy. Sheep and calves furnish us with catgut.

B. R., of Pa.—The fact that stretched rubber on contracting becomes cold is not new. You will find it mentioned in Grove's Correlation of the Physical Forces.

R. V., of Ind.—Sorgho sugar cannot be distinguished from ordinary sugar when thoroughly purified.

B. F. C., of Pa.—The question asked is this: If a cylindrical boiler of 3 feet diameter and 18 feet long has an extension attached, the inside dimensions of which are 18 inches long, 6 wide, and 1-64 high will the pressure to the square inch of surface to this contracted appendage equal that to the square inch on the boiler? We answer: The pressure will be the same, whatever the form and dimensions of the vessel, the only difficulty being to preserve the same temperature in the thin projection from the boiler as in the boiler itself. A thin film of steam at any noted pressure will exert the same force as a thicker stratum of one or more inches in depth.

G. W. J., of R. I.—There is no necessity of cutting large holes through your floors, or of cutting holes at random to lead belts from a shaft on one floor to one on another. The mechanic who resorts to such means is a bungler. The whole plan can be laid out full size on an unoccupied floor, or by a scale on a sheet of paper or a board. As an instance, if you wish to lead a belt through two floors, measure the distance of the center of the shaft carrying the driver from the first floor, taking the diameter of the pulley. Draw a line on the floor, sheet, or board representing the floor, and giving its thickness, with the diameter and position of the pulley. Then measure from the upper surface of the first floor to the ceiling of the next, making another line; then from the next floor or top of the ceiling—allowing for thickness between them—to center of driven shaft, giving the diameter of driven pulley. Draw lines from periphery of driver to driven, and where these intersect the floor lines, are the passages to be cut.

J. R. M., of Ohio.—You need have no fears on the point you suggest. We shall publish all that we think will afford interest and instruction to our readers. The society to which you referred, needed a strong hint. It will do the members no harm.

Sundry Answers:—E. K. C.—Mercury and oil are good examples.—J. B. C.—The royalty paid to the owner of a patent is always a subject of negotiation. The patentee has the right to fix the price so high that it amounts to a prohibition if he chooses. But we never heard of one who was such a fool as to do that. It is a matter of interest as well as of pride with a patentee, to have his invention used as extensively as possible.—C. H. M.—The best way is to advertise for an agent.—E. N.—In the back pages of the SCIENTIFIC AMERICAN, you will find information about dummy engines.—J. M. C.—Your perpetual motion will prove to be a perpetual stand-still.—C. A. S.—The screw jack simply enables a man to apply his strength to good advantage, but it does not increase his strength It is impossible for you to obtain any more power from your screw arrangement than you apply. Your perpetual motion is also a no-go.—R. H. S.—You would get a partial vacuum in the way you describe, but it is a roundabout way to do it. The part by which you obtain the vacuum namely, the air piston and cylinder, are shown in all natural philosophies.—C. R. S.—Cannot find the address without search.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

J. C. Haines, whose Patent Bridle was illustrated in No. 8, present Vol., wishes parties to address him hereafter at Lancaster, Pa., instead of Lewistown.

Reiner Brothers, Line Lexington, Pa., want manufacturers of cultivator hoes, also of tub and bucket machinery, to forward their address and price list

To Agricultural Implement Makers.—Send catalogues to W. A. O. D., Box 6810, Post-office, New York.

Wanted, a situation as foreman and superintendent of an Agriculture Tool and Machine Factory, by a first-class mechanic who has experience and good references. Address E. Peek, Chicago, Ill.

Watchmakers wishing cuts and circulars of Lakin's Lathe Tool will please address J. A. Lakin, Thompsonville, Conn.

C. G. Van Pappelendam, Charleston, Lee County, Iowa, wants a shop right to manufacture molasses out of corn.

NEW PUBLICATIONS.

The progress of the beautiful art of photography in this country, is indicated to some extent by the variety of books and other publications pertaining to the subject, which find a ready and extensive sale. From the publishing house of J. H. Ladd, 600 Broadway, we have lately received the following:

HUMPHREY'S JOURNAL FOR 1866. Semi-monthly, at $3 a year.

A fine volume of 400 pages, brim full of the latest and best things concerning photography that have been recorded during the past year. The journal is highly valued for the many original contributions by its experienced editor and home correspondents, and for its foreign reports.

THE SILVER SUNBEAM. 440 pages. Price $2 50.

This is a text book of photography, and has had a very extensive sale. It contains full explanations of almost every known photographic process, from the simplest to the most complicated, hot or cold, wet or dry. It has the rare merit of practical correctness in its directions, as probably all of its formulas and processes have been actually tested by the author, Professor Towler. The book presents the science of optics as applied to lenses, the history and progress of photography, complete directions as to preparation of photographic chemicals, collodions, developers, fixing agents, intensifiers, negatives, positives, ambrotypes, tintypes, silver printing, carbon printing, porcelain pictures, photographs on leather and cloth, transferring, relief printing, stereoscopes, engraving, Wothlytypes, eburneum process, how to glaze photographs, duplex pictures, irontype, etc., etc. All who desire to be fully posted in respect to photography should possess this work.

THE PHOTOGRAPHER'S GUIDE. Price $1 50. 150 pages.

This is a recent work from the pen of Prof. Towler, containing concise and brief instructions for conducting all the most approved forms of photographic operations, both in the gallery and in the field. Nothing can be more straight forward and plain than the directions here given. Solar printing, vignetting, saving of residues, opal pictures, and every branch of the photographic art, are admirably explained.

AMERICAN PHOTOGRAPHIC ALMANAC FOR 1867. Edited by Prof. Towler. 102 pages. 50 cents.

A record of the most valuable improvements, processes and formulas made during the past year. The almanacs for 1865, 1866, and 1867, are all in print.

THE MAGIC PHOTOGRAPH, 25 cents, the PORCELAIN PICTURE, with full instructions, $1 00, and DRY PLATE PHOTOGRAPHY, OR THE TANNIN PROCESS $1 00, all by Prof. Towler, are highly useful.

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

3,203.—PROCESS AND FURNACE OR APPARATUS FOR THE MANUFACTURE OF STEEL OR METAL HAVING SOME OF THE PROPERTIES OF STEEL.—Thomas J. Chubb, Brooklyn, N. Y. Dec. 5, 1866.

3,205.—APPARATUS FOR SEPARATING SUBSTANCES OF DIFFERENT SPECIFIC GRAVITIES.—Thomas J. Chubb, Brooklyn, N. Y. Dec. 5, 1866.

3,217.—LOOMS AND SHUTTLES FOR WEAVING.—Benjamin Oldfield and Edward Oldfield, Newark, N. J. Dec. 6, 1866.

3,246.—SEWING MACHINERY.—Frank Armstrong, Waterbury, Conn. Dec. 8, 1866.

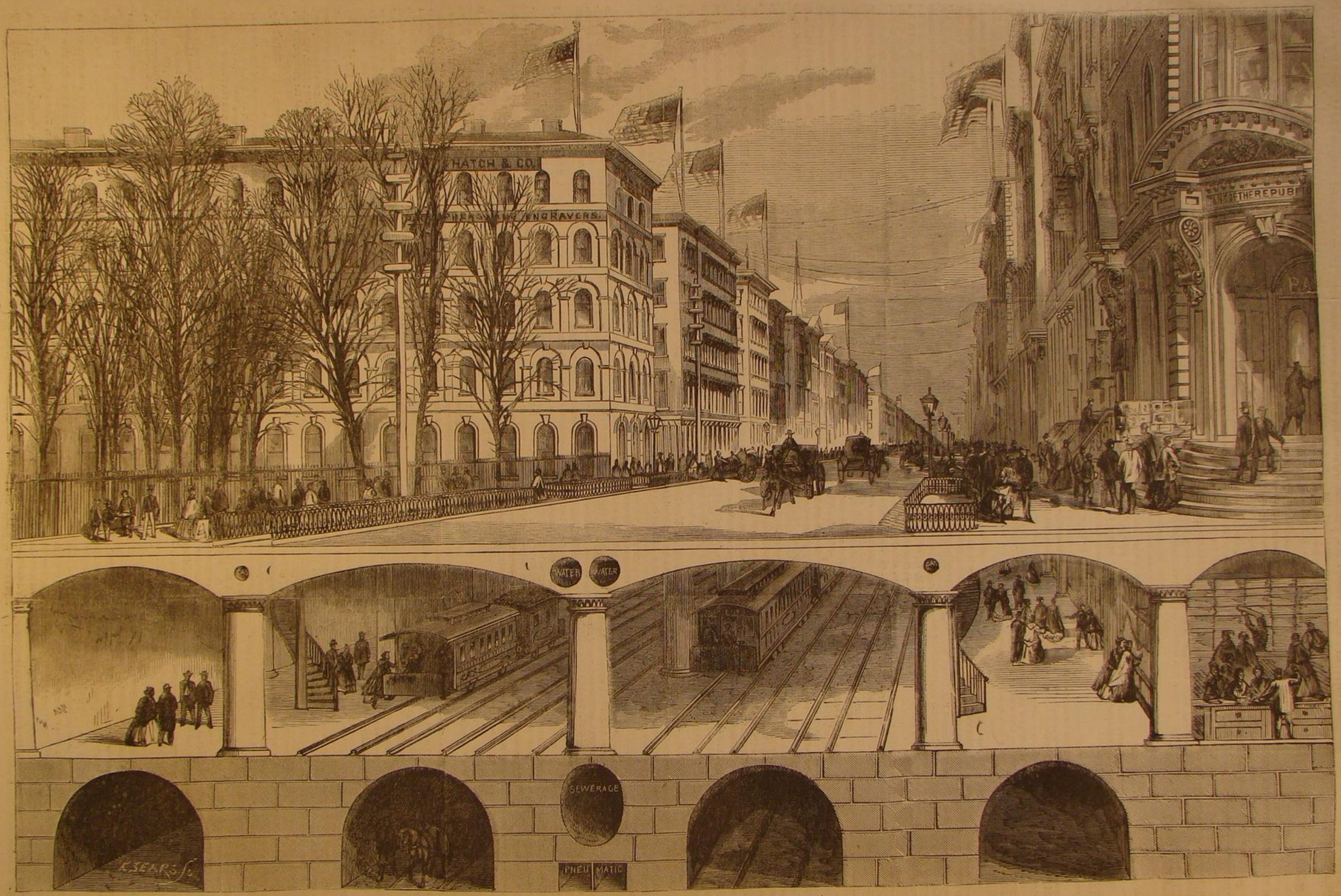
3,253.—BREECH-LOADING FIRE-ARM AND CARTRIDGES AND BULLETS FOR THE SAME.—Hiram Berden, New York City. Dec. 10, 1866.

4,256.—RAILWAY CARRIAGE AND WAGON.—Samuel Maynard, New York City. Dec. 11, 1866.

3,282.—SCRUBBING MACHINE.—Andrew Irion, Femme Osage, Mo. Dec. 13, 1866.

3,430.—NAUTICAL LOG.—Truman Hotchkiss, Stratford, Conn. Dec. 20, 1866

3,452.—METHOD OF EFFECTING THE CUTTING-OFF IN STEAM ENGINES, ALSO THE REGULATOR FOR CONTROLLING THE SPEED OF STEAM ENGINES.—Geo. H. Babcock and Stephen Wilcox, Jr., Providence, R. I. Dec. 21, 1866.



THE PROPOSED ARCADE RAILWAY AND AVENUE UNDER BROADWAY, DESIGNED BY S. B. B. NOWLAN, C. E.—[See next page.]

SCIENTIFIC AMERICAN.

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VOL. XVI., No. 6....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, FEBRUARY 9, 1867.

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HAVING AN OBJECT AND STICKING TO IT.

Persistence in any chosen vocation is an essential to success. This is a general rule, but we desire now only to apply it to the business of the mechanic. Constant practice, constant study, and constant application are conditions precedent to perfection. But even these will be wasted if the occupation chosen is unfitted to the natural qualifications of the workman. Some are born without any natural aptness for the mechanical arts. Every mechanic understands what is meant by a "mechanical eye." The want in the visual organs thus characterized does not necessarily imply that there is a disease or malformation of the optic nerve, but rather that there is no judgment to direct and guide the eye. The infant grasps as readily at the moon as at his rattle within a few inches of his face. In time, by repeated experiments, he learns the relative distances and dimensions of objects. All are capable of this amount of judgment, but in the practice of mechanics a much higher degree of experience is required and a much closer exercise of the judgment. There are some men who may practice at a mechanical trade their whole life long and never be even passable workmen. They never can tell whether a line is straight, or a surface level, even with the aid of levels and straight-edges. We remember an instance in point, where a young man ardently desirous of becoming a machinist was compelled to forego his favorite business because of this imperfection—the want of a "mechanical eye." His first job was the centering of some pieces of round iron, seven inches long and one and one-eighth inches diameter. He worked with vice, hammer, center punch, and bench centers half a day on twelve pieces, yet he did not correctly center a single one, although he received repeated instructions and examples from the foreman. Indeed he could not, even with the aid of chalk held against the revolving surfaces of the cylinders, see in what respect they were not true. Such an apprentice could never become a workman and his failure would result from no fault capable of remedy. Many employers have had a similar experience with their apprentices, or with those who called themselves workmen. The first requisite, therefore, is to have a proper object, one fitted to the capabilities.

Another of more importance is to stick to it. We take it for granted that every beginner at a mechanical business enters it with the intention and purpose of becoming a first class workman. If not it is more than probable he will never reach even mediocrity. If he is satisfied to serve his time, blundering through his work without understanding it, he will come out one of those nuisances to employers and disgracers to workmen, a "poor tool." Such professional workmen cannot stay long in any situation and are compelled to accept the most distasteful work with the lowest wages. Even under these circumstances there might be hope for them if they would, thus late, endeavor to stick to their business; but, being disheartened, they drift about "from pillar to post," trying this and attempting that, and succeeding in nothing because they will not thoroughly, and honestly, and persistently apply themselves to their business.

Soon apprentices think that when they have achieved the triumph of doing one job in a single department of their business their trade is learned and their position secure. They do not seem to realize that although the customary or legal term of their novitiate has expired they are still learners. New methods of doing work, new tools, new descriptions of work, new combinations of materials are continually being brought forward, and the mechanic who has attained the position of a first class workman by patient practice, must preserve and hold that position by constant endeavor.

There are others who "stick to it" in a different way. These are they who having spent a limited time in a shop assume to know all they have ever had to do and also all they have seen others do. They have done with learning. In their own estimation they are perfect. When seeking a job they assume a thorough knowledge of the work to be performed and the method of doing it. These men soon find their level. We knew once of such a prodigy who hired into a machine shop and had for his first job the turning of connecting bars tapering from center to ends. He asked a fellow workman how he should turn them. The answer was: "Set the tail of your lathe over," meaning to move transversely the upper portion of the tail-stock to the proper angle. He understood it literally and procuring a crow-bar was swinging the lathe frame out of line with the driving shaft when the foreman discovered him. His services were incontinently dispensed with.

Mechanical art does not need such helpers. It needs men with a purpose; men who are willing and ardent to learn; men who are not dismayed at obstacles, but who take a pride in either removing or overcoming them. Only such will ever become mechanics worthy the name. The others are abortions.

CROSSING THE WATER----FERRIES, TUNNELS, AND BRIDGES.

Those who are compelled to use the ferries running from Manhattan to Long Island and to the Jersey shore have been severely tried in temper during a portion of last month. Immense fields of fixed ice, or floating floes driven by keen cutting gales, have interrupted the only mode of transit between the metropolis and Brooklyn, Williamsburgh, Jersey City, Hoboken, and Staten Island, and crowds of anxious and disappointed people in all these places have been put to great inconvenience and expense. It would be a blessing not only to the dwellers in all these localities, but to the transient traveling public and the people of the whole country if some permanent remedy and preventive could be adopted and applied; for whatever delays the ordinary routine of business in this, the commercial heart of the country, must be felt in its effects, to a greater or less degree, throughout the land.

It may not be expected that human ingenuity and foresight can in all cases neutralize the opposition of the elements to the means of transportation; but in this case it would seem that there are several remedies, either one of which, or at least all combined, might bid defiance to wind, water, and frost. The boats used in fair summer weather might be so modified in construction as to be fitted for battling with the ice without impairing their convenience as comfortable vehicles for passengers. Or one, two, or more ice boats, intended for forcing their way through icy obstructions, might be provided to keep the paths of the different ferries open, and be employed in summer as powerful tugs, so that they would, during the fair-weather season, earn enough to at least partially pay for their needed pioneer winter service.

But there is a radical remedy better than either of these. That is to make a permanent crossing between New York and the suburbs on either side by means of tunnels, bridges, or both. There are no obstacles impossible to be surmounted in either of these. Tunnels may be drifted through the strata which form the beds of the rivers, or made of iron in sections, sunk and secured together to make continuous tubes. Tunnels of this latter class may be built of such weight and strength that even the anchors of vessels dragging in a gale would have no more effect on them than on the immovable rocks; but legal precautions could be taken to prevent such accidents.

There does not appear to be any insuperable impediments to the throwing of bridges across from one shore to the other on both sides of the city. The lowness of the shores on the New York margins, both sides, and on the North River Jersey shore, could be compensated for by extending the bridge on open causeways up some distance from the water's edge, landing passengers and teams in the heart of the cities; on the Brooklyn shore the Hights offer an excellent starting point, and from the termini of these bridges might radiate in every direction lines of horse railroads or other means of conveyance to whatever point to be reached. These bridges should be suspended at an elevation sufficient to allow the passage of shipping under them at all states of the tide. Probably a pneumatic tube across the East River will be *un fait accompli* ere long, but valuable as it might, and probably would be for the transmission of freight in parcels, it would be some time before it would become a favorite and popular route for passengers. People prefer to see unavoidable and certain dangers rather than to dread in darkness unknown perils, and the public demand would, we think, be better met by elevated bridges or well-managed ferries than by pneumatic or other tunnels.

But all these methods appear to be feasible. In the advanced stage of engineering science to which we have arrived it is puerile to denounce any such project on account of imaginary or estimated difficulties or the cost of the work. While English and French engineers are seriously considering and estimating upon the project of uniting their two countries by a tunnel of over twenty miles, under one of the stormiest seas on the globe, we ought not to shrink from so comparatively trifling a job as tunneling the narrow strips of inland water which separate us from almost contiguous shores. As to bridges, we have the example of the Menai Straits bridge, the Victoria, the Niagara, and lately the Cincinnati and Covington and the Havre de Grace structures. "What man has done man may do," and where the necessity is so apparent it is not creditable either to our enterprise, public spirit, or our mechanical progress that the people of the metropolis and of the whole country should be satisfied with such insufficient means of intercommunication as those which now so inadequately accommodate them.

THE ARCADE RAILWAY.

Upon the opposite page we present an illustration of the great Arcade Railway which is now proposed for immediate construction under Broadway, by H. C. Gardner, Esq., and Hon. Melville C. Smith, from designs by S. B. B. Nowlan, C. E.

This is probably the most thoroughly comprehensive and excellent of any of the various plans that have been suggested, for while it provides the most abundant means for rapid passenger transit and relief of the streets, it does not block up any part of the city, but, on the contrary, adds enormously to the available street space. In short this plan contemplates nothing less than the addition to the city of an immense avenue, which is to traverse the heart of the metropolis, increasing its wonderful attractions, augmenting the value of its property, and giving to the people the great boon of sure, rapid and cheap communication.

We think there are few persons who will not be at once favorably impressed with the practical excellence of this plan. The principal objection to be raised will be its apparently enormous expense. But the cost will be comparatively nothing compared with the immense public advantages that would result from its successful construction, and we trust that the enterprising men who have charge of the matter will receive all possible encouragement. It is estimated that the expense will not exceed $2,000,000 per mile. The cost of the London tunnel railway now in profitable operation is stated to have been $5,500,000 per mile, the greater portion of which must have been paid for the purchase of the right of way.

Our view is taken from near the corner of Wall street looking up Broadway. The plan, as seen, is not merely to tunnel under the street, but to remove the street itself, block by block, from wall to wall, and construct another street at the depth of fifteen feet, supporting the present street level on arches, and making stores in what are now the basements and sub-basements of buildings. Below all are the sewers, with tunnels for the passage of carts which reremove the offal, etc., that naturally finds its way to the lowest level. This lower portion is to be of the best masonry, strengthening the foundation walls of the buildings and giving ample support to the superstructure. Light—daylight—is afforded the sub-street or arcade by areas inclosed with iron railings between the upper roadway and sidewalk, ample room for which will be found when the upper street will be relieved by the construction of the lower. At convenient intervals flights of steps will lead from these areas to the street below, and the pedestrians as well as those who ride in the cars, will be sheltered from the storms of winter and the suns of summer.

This is a general idea of the plan. Those who have the matter in hand have omitted, apparently, no detail to insure entire success should the plan be adopted. We will mention a few of the most important.

To use the streets from the Battery along Broadway to Ninth avenue, thence to 150th street, thence to a junction with the Hudson River Railroad near Fort Washington. Also a branch beginning on Broadway below City Hall Park and running along Park Row, Chatham street and the Bowery to Third avenue, thence along that avenue to the Harlem River, thence along the river to a point intersecting the Harlem Railroad. The main road and branch to have at least four tracks with room for constructing additional tramways. The streets to be excavated their entire width to a depth of twenty-five feet, the lower ten feet to be occupied by sewers and vaults. Under the buildings exposed by this excavation a range of basement stores to be constructed by the company without cost to the adjoining proprietors and finished in the same or a corresponding style with those above. Walks to be laid as now on the streets above. The railroad to be covered by a roof supported on iron colonnades between walk and track and between the two roadways, covered with heavy plank filled in with concrete, supporting a water-tight iron pavement, constituting the upper roadway. Ample precautions for the support of the buildings and arrangements for conveying the sewage, gas, and water, to be provided by the company.

The method of construction proposed is that the street to be excavated will be taken up one half side of a block or square at a time, so as not to interrupt travel more than in the erection of any new building, the supply of gas, water, and the convenience of sewerage to be kept up during the progress of the work. The cars on the outside tracks in this lower street are to be run at the rate of about five miles per hour, and intended for way passengers. Those on the inside tracks to run at fifteen miles an hour, to stop only at stated points, all to be drawn by locomotives emitting neither smoke nor sparks.

The necessity of some thorough and permanent relief to our over crowded streets is too apparent to require argument. The advantages of this plan are readily seen from the foregoing remarks. Freight and passengers will be largely diverted from the present routes, both being sheltered from the elements, whether storm or shine. The upper roadway will be kept in more passable condition in respect to snow and ice by the latent heat from the immense mass of iron used in the building of the arcade. Property owners on the streets will be gainers by an addition to their rentable property, and the sub-roadway will become a favorite means of transit in stormy weather and as a shelter from torrid suns.

Better facilities than now exist will be afforded for the repair of our gas, water, and sewerage pipes, and it will be an attraction to out of town visitors second only to that of the great Central Park.

THE RECOIL OF GUNS—ACTION AND REACTION NOT EQUAL.

BY PROFESSOR CHARLES A. SEELY.

In my days of gunning, long time ago, one of the mysteries among the boys was the recoil of our guns. We had theories and superstitions about it which are not worth repeating. But out of my experience I have brought a very distinct remembrance that the "kicking" was something that we were afraid of and that there was a great difference in the vicious propensities of our guns. It must be borne in mind that the shoulder of a boy is tender, and cannot easily bear a blow which a stout man might not notice. The kicking power seemed to us one of the most noteworthy properties of guns. There was a gun which was famous all over the county as a great kicker: it was said it could kick us into the "middle of next week," a distance we thought to be very considerable.

During the progress of the rebellion, when every one was a strategist and a critic on the art of war, I assisted in many discussions on the philosophy of the recoil of guns. I found that no one lacked experience or an opinion. But the opinions were generally incorrect, and those which were right were not fortified by good reasons. So I think a renewal of the discussion may be interesting and profitable.

The expansive force of burning gunpowder is the source and the only source of the movement of the shot and the gun. The force of the powder is expended upon and divided between the shot and the gun, and for my present purpose it may be considered that the force of the powder equals the force of the shot plus the force of the recoil. So far all are agreed: there is no difference of opinion. The debatable question is this: What is the relation of the force of the shot to the force of the recoil; are they equal, and if nay, why not? To put the case in its simplest terms: the shot and the gun are two unequal weights acted on at the same time and for the same length of time by an elastic substance pushing them apart.

People generally think that the powder force is equally divided between the shot and the gun, and that the relative weights of the shot and the gun are not to be taken into account. They found their opinion upon a supposed law of motion, that action and reaction are equal, and upon a supposition that the pressure upon the gun is the same as upon the shot. Now as to the law of motion, it is either misunderstood or it is absolutely unfounded. If action implies motion and force, a simultaneous and equal reaction to my mind is inconceivable. If there be a motion, any obstruction or reaction to it, as long as the motion continues, surely cannot be equal to the impelling force. If my neighbor push me down, his action is greater than my simultaneous reaction: I may get up and get even with him, but then there comes into the case a new action and reaction. It may be that all motions will finally cease by reason of reactions, but when the rest takes place, it is hardly proper to say that there is still action and reaction. Is not the alleged law of motion a very imperfect way of expressing a self-evident fact about rest or equilibrium? It certainly is not easy to see how the little truth it embodies has any application to the question of the recoil of guns. The fact is that people who quote this law generally misapply it.

The pressure on the shot and the gun may be considered as equal (if there is any difference it is greater on the gun), and the expansive force acts an equal time on each. But those who infer an equal division of the force, overlook a very essential element in their calculation. The shot moves faster than the gun and the force acts on the ball through a much greater space. Is not the space through which a force acts something to be as carefully considered as the time?

Take two balls of equal weight and place a spring between them which will impel them apart. In this case the force of the spring is conveyed to the balls and is equally divided between them: one moves as far and with as much force as the other. Now place one end of the spring against an immovable abutment, and allow it to expand against a single ball. Here the pressure on the ball and the abutment are equal, but the spring expands to its full length and gives its whole force to the ball: there is nothing lost on the abutment. The force imparted to the ball is precisely twice that which it received in the first experiment. Repeat the first experiment with balls of different weights. For example, let one have double the weight of the other. The force will now be divided so that the light ball will receive twice as much as the heavy. From such experiments the conclusion will soon be reached, that the force of the spring will be divided between the balls in a ratio inversely as their weights: if the weights of the balls be as 1 to 10, they will receive the force in the ratio 10 to 1. If a well-made spiral spring be employed, it may be observed in each experiment that there is a neutral point which does not move at all and that it is the center of gravity of the two combined balls. Thus when two balls of equal weights and sizes are used, it will be in the middle of the spring: in the second experiment it will be in contact with the abutment: in the case of the balls of weights 1 to 2, it will be two thirds the distance between the balls from the ball, 1. Thus this point indicates the division line between the amounts of force going to the balls respectively.

Such experiments may be varied by using a contracting instead of an expanding force. Take two toy wagons, connected by a rubber cord, and use weights of any convenient material. Or the weights may be suspended by cords, to be drawn together by the contraction of a rubber spring. The result will always be arrived at that the forces will be divided inversely as the weights. Moreover it should be observed that the velocities communicated to the balls are inversely as their weights. In the case of the balls 1:2, the corresponding velocities will be 2:1.

In these experiments we have a fair representation of the case of the gun: the spring is the expansive force of the powder, the large ball is the gun, and the small ball is the shot Can the conclusion be doubted that the force of recoil is to the force of the shot as the weight of the shot is to the weight of the gun. If the weight of the gun be 100 lbs. and the shot 1 lb., then the force of the shot will be 100 times that of the gun.

Those who are well skilled in mechanics will reach the same conclusion by a shorter road. The formula MV^2 expresses the value of the force of a body. The weight (M) of the shot and of the gun of course are known, and as soon as it is determined that the velocities of shot and gun are inversely as their weights, the problem is solved. Thus, let the weights be as 1 to 100, then the velocities will be as 100 to 1, and the expression for the force of the shot will be $1\times(100)^2=10{,}000$, and the force of recoil $100\times(1)^2=100$. But $10{,}000:100::100:1$.

It is a plain result of the theory above given that the force of the recoil is directly proportioned to the amount of powder used. And in a given gun is proportioned to the weight of the shot, or if the shot be the same, to the weight of the gun. By doubling the weight of the shot the recoil is doubled.

If the prevailing notion about recoil were true, we should have a very different system of warfare, for the danger in battle would be to those who fired the guns. It involves, also, other absurd consequences, such as that in the steam engine half of the force of the steam is lost on the end of the cylinder, and that we can never utilize the whole of any force.

In conclusion, I am obliged to say that the guns and shot I have spoken of are model and theoretical guns, and that there are difficulties in the way of directly applying the theory to actual practice. The force of the powder does not show the whole of itself in the shot and in the recoil. A notable amount is lost in the concussion of the gun, windage, and in overcoming the friction of the shot. This last is a very important circumstance, as it holds back the shot, giving the gun a longer time than due it to absorb the powder force. The ratio of recoil to shot will always be greater than by the simple formula I have given. The guns need more lubricators. And it will be seen that there is plenty of room for practical experiments; nothing to-day would more please me than to read reports of intelligent practical tests.

PROVING A GREAT GUN.—The second big gun (20 inch) cast at the Fort Pitt Foundery has been tested with charges of 60, 80, and 100 pounds of powder, and shot weighing 1,020 pounds. The trial was under the inspection of Commodore Taylor, of the United States Navy, now on inspection duty at the works, who was well satisfied with the trial and pronounced the gun thoroughly fitted for duty.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING JAN. 22, 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ 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.

61,304.—CABBAGE CUTTER.—Henry Aeuer, Muscatine, Iowa.

First, I claim the manner substantially as herein described and shown of arranging a series of scroll knives on a rotary bed, and beneath a stationary hopper, so that two or more knives are made to cut at the same time, under the same hoppers, as shown.

Second, The arranging with a cabbage cutter bed, such as described, of the frame, A B, with box, E, hinged legs, G G, guard board, F, and bracket extension, substantially as described, and for the purposes set forth.

61,305.—MELODEON.—Charles Austin, Concord, N. H.

I claim as my invention the arrangement as well as the combination substantially as above specified, of a lever, E, and one or more additional reeds, I I, and the operative apparatus thereof, as explained, with the exhaust chamber, D, and a main reed key, A or B, thereof, the same being so that on pressing down the said key for the purpose of opening the main reed valve thereof, the lever, E, shall be moved so as to put in operation each additional reed operative apparatus, whereby its reed or reeds may be sounded simultaneously with the main reed.

61,306.—FAN TOOL FOR CUTTING MOLDINGS.—Edwin C. Austin, Monroe Village, Wisconsin.

First, I claim the knives, C, constructed with the projections or bearings, c, pressing upon the surface of the wood in advance of the cutting edge, substantially as and for the purposes specified.

Second, The tool herein described for cutting rope or screw molding, constructed and operating substantially as described.

61,307.—DOUGH MIXER AND ROLLER.—J. Baillie and J. Gervers, Cincinnati, Ohio.

First, We claim the combination of the rolls, D D, with the worm or screw dough mixer, A, in the manner and for the purpose set forth.

Second, We claim the combination of the carrying band or belt, I, and slabbing rolls, D D', with a worm or screw dough mixer, in the manner and for the purpose substantially as specified.

Third, We further claim the combination and arrangement of the spur and worm gear as shown for regulating the speed and giving a positive motion to the screw, A, slabbing rolls, D D', and carrying band, I", for the purpose and in the manner substantially as described.

61,308.—BILLIARD CUSHION.—A. Bassford, New York City.

First, I claim in a billiard cushion the use of metall c ribbon or other hard and elastic strip interposed between two pieces of vulcanized india rubber of different degrees of elasticity, or within a rubber cushion substantially as herein set forth.

Second, In billiard cushions constructed substantially as set forth, I claim the arrangement herein described and represented, whereby one block of india rubber is backed and supported by the other.

Third, I claim the two blocks or strips of vulcanized rubber, of unequal degrees of elasticity as described, in combination with the spring steel ribbon and rubber packing, arranged substantially as and for the purposes herein set forth.

61,309.—APPARATUS FOR CARBURETING GAS AND AIR.—John F. Boynton, Syracuse, N. Y.

First, I claim in a carbureting box or vessel a tube or tubes, whether flat, cylindrical, or of other form, filled with fibrous or capillary material, and so arranged with openings at the bottom that the carbonizing fluid will be constantly drawn by capillary action from the lower and heavier strata, and subjected to evaporization in the upper portion of the vessel, substantially as described.

Second, In a carbureting box or vessel constructed and operating as herein described, I claim so arranging the capillary tubes that the gas in its passage through the vessel will move slowly in a thin stratum over the ends of the wicks containing the carbonizing fluid substantially as described.

Third, I also claim dividing the carbureting vessel into two or more compartments, by soldering one of the plates forming each of the double partitions or wick tubes to the bottom and sides of the vessel, so that two or more different carbonizing fluids may be used in the same vessel, without mixing previous to evaporation.

61,310.—THILL COUPLING.—John F. Bridget, Washington, D. C.

I claim the combination of the set screw, G, and socket plate, H, and spring, K, operating to raise the end of the thill in its bearings, substantially as and for the purpose described.

61,311.—BASKET ATTACHMENT FOR PISTONS OF DEEP WELL PUMPS.—Erasmus D. Brown, Buffalo, N. Y.

I claim the slitted flaring basket, A, for the purposes and substantially as described.

61,312.—BOAT DETACHING TACKLE.—Samuel Brown (assignor to the Brown and Level Life Saving Tackle Company), New York City.

I claim a boat-connecting apparatus, composed of the ring, a, hook, c, and chains, b g, and which is disconnected from the block by slacking the chain, g, in the boat to be launched, substantially in the manner and for the purpose described.

61,313.—MANUFACTURE OF BRANDY.—D. Jay Browne, Cambridge, Mass., and Stephen T. Bacon, Boston, Mass. Antedated Jan. 14, 1867.

First, We claim the blending of brandy or spirits distilled from sorghum syrup, with brandy distilled from fermented grape juice, water and sorghum syrup, or glucose, substantially as herein set forth.

Second, In the production of brandy from the combination of the above-named materials, we also claim the mode of fermenting in close casks, or vats, furnished with tubes or coils within, for regulating the temperature of the liquids while fermenting, substantially as herein specified.

Third, In the production of brandy from the above-named ingredients, as necessary to secure success, we also claim the process of distilling in vacuo, substantially as and for the purposes herein described.

61,314.—PROCESS OF MAKING SUGAR.—Duncan Bruce, Rossville, N. Y. Antedated Jan. 17, 1867.

First, I claim the combination of the vacuum chamber and condensing chamber, with one or more evaporatory chambers, having steam or hot water heaters applied to them, substantially as described.

Second, The combination of one or more air-tight vessels with one or more air-tight evaporators and a condensing chamber, D, which communicates with a vacuum chamber, E, substantially as described.

61,315.—APPARATUS FOR DECOMPOSING ANIMAL AND VEGETABLE SUBSTANCES, FOR CURING MEAT, TANNING, ETC.—Duncan Bruce, Rossville, N. Y. Antedated Jan. 17, 1867.

First, I claim an apparatus consisting of a series of air-tight vessels communicating with a condensing vessel, and also with a vacuum reservoir, having a forcing and exhausting engine applied to it, the whole to be used substantially as described in the treatment of vegetable and animal matters.

Second, Curing meat by the means and in the manner substantially as herein described.

Third, The process, substantially as described, of obtaining grease from fatty substances, by subjecting these substances to the action of moist heat in a vacuum.

61,316.—PRESERVING GREEN CORN.—S. John Carroll, Baltimore, Md.

I claim preserving green corn in the manner substantially as herein set forth and described.

I also claim the new article of manufacture and commerce, green corn preserved substantially as herein set forth and described.

61,317.—BUTTON.—Henry T. Carter, Portland, Me.

I claim a button provided with a slitted and pointed shank, c, in combination with the disk, d, and washer, b, substantially as described and for the the purpose specified.

61,318.—MACHINE FOR PRESSING FUEL INTO BLOCKS OR BRICKS.—John B. Collen, Philadelphia, Pa.

I claim a machine constructed, arranged, and operated substantially as herein described and represented, for the purpose of pressing artificial or natural fuel in a fine or granular state into blocks or bricks for transportation and for burning, as set forth.

61,319.—PUMP.—H. Comstock, Seneca Falls, N. Y.

I claim, First, The combination of the rubber cup or flange, f, with the metallic leather packing, c, operating substantially in the manner and for the purpose specified.

Second, The groove, g, in the bottom of the cylinder, in combination with the valve yoke, C, operating substantially as and for the purpose set forth.

61,320.—DENTIFRICE.—John G. Cook, Lewiston, Me.

I claim as a dentifrice a chlorate compound, made up of ingredients, substantially as described.

61,321.—SAFETY PAPER.—L. M. Crane, Ballston, N. Y.

I claim, First, The inserting or incorporating of one or more threads or strips of gutta percha, or a material possessing like properties, into the pulp or fiber of paper during the manufacture of the same, and in such a manner that said threads or strips will be softened and firmly united to the fiber under the heat of the drying cylinders, substantially as set forth.

Second, I also claim, as an improved article of manufacture, a safety record paper, made substantially as herein shown and described.

61,322.—MACHINE FOR PREPARING COTTON, ETC.—W. Crighton and F. W. Crighton, Manchester, Eng. Patented in England April 3d, 1861.

We claim, First, The arrangement hereinbefore described consisting of placing the beaters or openers on a vertical axis, and forming the place or opening for the delivery of the cotton at the top of said case, or at a point higher than that at which the cotton is fed into the machine, said machine being also constructed and its parts so arranged that a considerable portion of the dirt will be delivered either at the bottom of the beater case or cone, or through open rings at a lower point than that at which the prepared cotton is delivered, substantially as hereinbefore set forth.

Second, The combination with a beater case, and beaters, or other similar apparatus for cleaning cotton of the carrier or series of dirt boxes, d, substantially as hereinabove set forth.

61,323.—BLAST FOR IRON AND OTHER FURNACES.—Felix A. T. de Beauregard, Paris, France.

I claim surrounding the furnace by a tank the water within which is converted into steam by the heat of said furnace and then discharged through suitable pipes or conduits arranged substantially as herein described, so the discharge of the said steam shall induce a blast within and through the furnace, as set forth.

61,324.—STEAM GENERATOR.—Jules Delery, St. Bernard Parish, La.

I claim the isolating check valve, b, connecting rods, E and L, and lever, J, in combination with the generator and water communication pipe, substantially in the manner shown and described.

61,325.—TELEGRAPHIC CABLE.—A. J. B. De Morat, Philadelphia, Pa.

I claim the construction of telegraphic cable by means of insulated tubes or continuous cylinders, formed of helically wound strips in such manner as to preserve uninterrupted linear conduction in case of stretching, as herein set forth, or any other substantially the same, and which will produce these intended effects.

61,326.—WHEAT DRILL.—Geo. W. Doolittle, Lincoln, Ill.

First, I claim the jointed frame, A C, to which the compressing wheels, D E, are attached, in combination with the funnels, L L, depositing tubes, K, angular bars, I I, cutter blades, H H, substantially as arranged for the purposes set forth.

Second, I claim the arrangement of the standard, P, lever, m, caster, n, for controlling the depth of the drills, K, or lifting them out of the earth in combination with the drills or delivery tubes, and the mechanism for regulating the quantity of seed, substantially as herein described for the purposes specified.

61,327.—WASHING MACHINE.—George H. Dow, Freeport, Ill.

I claim the arms, E E', roller upper board, C', and pressure board, F, in combination with the concave washboard, H, lower roller board, C, and springs, D, arranged as and for the purpose set forth.

61,328.—BARREL BUNGS.—M. S. Drake, Newark, N. Y.

I claim, as a new article of manufacture, a bung for barrels, casks, or cases, constructed substantially as specified.

61,329.—TAIL BOARD FOR WAGONS.—Joseph O. Farrell, Chicago, Ill.

I claim providing the tail boards with a double latch, constructed substantially as described, that is to say, consisting of a rod and two rack bars rigidly connected and vibrating in journals in or on the tail board under the impulse of the hand, or of the spring, so that they shall traverse the openings in the braces, I, as the tail board is moved, and when abandoned to the influence of the spring shall afford support to the tail board by the engagement of the notches, substantially as described.

61,330.—SAFETY VALVE.—John H. Fitz Simmons, Susquehanna Depot, Penn.

I claim the combined valves, F and E, with valve seats, A and C, the steam pipes, G G, together with the releasing screw, X, as herein described and for the purpose set forth.

61,331.—CHERRY STONER.—F. G. and E. A. Floyd, Macomb, Ill.

First, We claim the knife or stone retainer, o, when constructed in the manner shown, and supported on the single arm to permit it to operate in connection with the reciprocating bar, c, substantially as herein set forth.

Second, The reciprocating bar, c, having the plates, n, attached and provided with the holes, e, when used in combination with the knives, o, substantially as shown and described.

Third, The hopper, B, reciprocating bar, c, knives, o, and bed piece, e, all arranged and operating as described.

61,332.—CLAMP FOR RAISING TIMBER FRAMES.—E. G. Ford and H. Weible, Delphos, Ohio, assignors to E. G. and J. G. Ford.

We claim the hinged bars, C D, constructed and arranged to operate substantially as and for the purpose set forth.

61,333.—SHAKER ATTACHMENT FOR THRASHING MACHINES.—David Frost, Dupage, Ill.

I claim the application of the slotted lapping plates, confined together by a thumb screw, to the pitman and vibrating knockers or shakers of a straw-carrier belt all in the manner and for the purpose described.

61,334.—MACHINE FOR RIVETING BUTTONS TO FABRICS.—W. J. Gordon, Philadelphia, Pa.

I claim, First, The lever, H, in combination with the spindle, D, having a pointed projection, l, when the lever is provided with a beveled eccentric projection, w, or its equivalent, and when the spindle is so constructed and arranged, in respect to the lever, that on operating the latter, the spindle will turn around as it descends, for the purpose specified.

Second, The combination of the above with the sleeve, E, having a projection adapted to the cavity in the button, and with the springs, h and n, the whole being arranged for joint action, as and for the purpose described.

Third, The concavity so formed in the base, A, in respect to the head of the rivet, and to the devices for spreading the latter, that, on forcing the rivet into the said concavity, the edges of the said head will be turned up, as and for the purpose described.

61,335.—SUPPORT FOR WINDOW SASH.—Ellen M. Griswold, Hagerstown, Md.

I claim the application to window frames of a sash support composed of the adjustable pieces, C C' C'', connected by hinges, substantially as and for the purposes set forth.

61,336.—APPARATUS FOR DETACHING BOATS.—Increase S. Hill, Boston, Mass, and Andrew Burnham, Chelsea, Mass.

We claim, First, The arrangement of curved disengaging rods in guides along by the gunwale of a boat, substantially as herein described, when the same are connected with a pivoted lever through the operation of which the disengaging rods are simultaneously retracted liberating the links by which the boat is suspended.

Second, A graduating coupling in the disengaging rods by means of which the lengths thereof may be so adjusted as to secure simultaneous disengagement of the suspending links, as and for the purpose described.

61,337.—CAN FOR PAINT, ETC.—William A. Hopkins, New York City.

I claim the combination of the can, cover, ears and clamps when the same are combined, constructed, and operate substantially as shown for the purpose specified.

61,338.—WRITING PAPER.—J. E. Hover, Philadelphia, Pa.

I claim as a new manufacture, writing paper, the surface of which is coated with chalk or other material which will neutrlaize the acids in writing inks or fluids.

61,339.—APPARATUS FOR OBTAINING AND APPLYING MOTIVE POWER.—William Huston (assignor to himself and H. N. Wickersham), Wilmington, Del. Antedated Jan. 19, 1867.

First, I claim the combination of the disk, F, and its chamber, X, and the disk, F', and its chamber, X', with the piston, G, the whole being arranged for joint action, substantially as and for the purpose herein set forth.

Second, In combination with the above, I claim the heads, B and B', with the recesses and openings arranged substantially as described.

Third, The combination of said disks, piston and heads with a casing, A.

61,340.—WRENCH.—Joel C. Jackson, Rochester, N. Y. Antedated Jan. 17, 1867.

I claim the peripheral recesses or groove, o, in the wrench barrel, c, formed with ratchet teeth in its bottom surface, in combination with the stop lever pawl, d, within the stock, b, as and for the purposes set forth.

61,341.—FILE CUTTING MACHINE.—A. F. Johnson, Boston, Mass., and M. P. Griffin, Medford, Mass.

First, We claim the combination of a swiveling head with a rotary stock, substantially as described.

Second, The combination of a chisel and adjuster with a rotary stock, in the manner substantially as described.

Third, Placing the chisel and adjuster together in the same stock, when constructed and arranged as described.

Fourth, The lever, D, in combination with the tool stock.

Fifth, The adjustable screw jaws, T U, in combination with the ratchet, f, the screw, S, and bed, B.

Sixth, Inserting rubber blocks at the ends and between the bows of the elliptic springs, I I', in a file-cutting machine, constructed substantially as described.

61,342.—CAST-IRON CHIMNEY.—David June, Fremont, Ohio.

I claim the section, B, in two parts, C C', with cavities, E E, in combination with section, B', in two parts, constructed and arranged together as and for the purpose herein described.

61,343.—WASHING MACHINE.—C. H. Knox, Mt. Pleasant, Iowa.

I claim the bolt, R, in combination with the clamp, T, friction roller, L, plates, K and F, as set forth.

61,344.—SELF TRACK-LAYING CAR.—Jesse S. Lake, Smith's Landing, N. J.

First, I claim the combination with a track car or vehicle of the within-described revolving track consisting of an endless series of trucks or floats, I P Q L, connected together by flexible chains, cords or straps, K, and operating in the manner and for the purpose specified.

Second, I claim the combination with the runners or ways, H H, cylinder, G, and crutch, M, of the flanges, B B B' B', the latter, B', being hinged or pivoted to admit of lateral adjustment in order to vary the course of the car or vehicle, substantially as described.

61,345.—CARTRIDGE BOX.—M. C. Leonard, Washington, D. C.

I claim a cartridge lined with sheep skin, or other equivalent material, and for the purpose set forth.

61,346.—WINDOW-SHADE SUPPORTER.—T. J. Marinus, Independence, Iowa.

I claim, in a window shade, the combination of the clamp composed of the lever, H, the hollow frame, F, and spring, I, with the cord for raising the shade, all constructed in the manner and for the purpose herein set forth.

61,347.—QUARTZ CRUSHER.—Carlile Mason, Chicago, Ill.

First, I claim the conical crushing disks, m, having their faces corrugated, substantially as shown, and arranged to operate in connection with each other, as set forth.

Second, The tension frame consisting of the rods, y, and the keys or wedges, s, arranged to operate in connection with the crushing disks, m, as shown and described.

Third, In combination with the tension frame as above described, I claim the spring beams, w, and the set screws, e, arranged and operating as and for the purpose set forth.

61,348.—BUNG FOR BEER BARRELS.—J. E. McBeth, New Orleans, La., assignor to himself and J. W. Chamberlain.

First, I claim the rubber ring, D, substantially in the manner and for the purposes described.

Second, I claim the combination of the parts, B and C, substantially in the manner and for the purpose described.

Third, I claim the combination of the parts, B C and D, substantially in the manner and for the purposes described.

61,349.—INSTRUMENT FOR GUIDING TAILORS IN CUTTING OUT COATS AND VESTS.—Herrman Mengel, Philadelphia, Pa.

I claim a plate, A, and adjustable strip, E, in combination with an adjustable plate, B, adjustable strip, C, and strip, D, or its equivalent, the whole being constructed, graduated and arranged substantially as and for the purpose described.

61,350.—MODE OF PRINTING ON GLASS.—Isaac L. Miles, Charlestown, Mass.

I claim transferring an impression form of elastic type having a rounded or curved surface to flat plate or sheet of glass by rolling the latter over and in contact with ways arranged adjacent to and having a curvature corresponding with that of the face of the form of type, as described.

61,351.—CENTER BOARD AND BOX FOR VESSELS.—D. P. Nickerson, Cleveland, Ohio.

First, I claim the arrangement of a metallic center board constructed with the two sides, G G, the brace, I, and stay bolts, H, in combination with the metallic box, B, for the purpose and in the manner set forth.

Second, The portable metallic center board box constructed with braces, C, and angle irons, D, as and for the purpose set forth.

61,352.—WASHING MACHINE.—George Palmer, Littlestown, Pa.

I claim the washing cylinder, D D, as constructed with the revolving bars or rollers, F F, into which cylinder the clothes are placed and secured to be washed with the balls, I I I, constructed as shown and described, the washing apparatus being arranged and combined with the gear wheels, d and e, and the crank handle, E, operating substantially in the manner herein described for the purposes specified.

61,353.—CLOTHES WRINGER.—George Palmer, Littlestown, Pa.

First, I claim placing ribs of metal longitudinally in hard wood rollers for clothes wringer, when covered with elastic substances, substantially as herein set forth.

Second, I claim, in combination with clothes wringer rollers as described, the pressure lever, Q, balls, v, or other equivalent, spring and rack bar, Y, operating as and for the purposes herein specified.

61,354.—DEVICE FOR PREVENTING COLLISION OF LOCOMOTIVES.—Henry Payne, Sr., Mount Vernon, Ohio.

I claim the affixing to locomotive boilers one or more tubes in such manner as herein described, as that by letting steam into them from the boiler, a shaft will be driven or forced forward from each tube to meet any opposing object, and thus prevent collision of the locomotive with the object opposing, or much diminish its force.

61,355.—WRENCH.—John L. Peake (assignor to himself and Louis Guillander), New York City. Antedated January 6, 1867.

I claim the recessed face, a a, on the jaw, A, in combination with the tooth, b, on the jaw, B, adapted to traverse backward and forward by means of the rack, N, segment, M, and lever, C, all arranged for joint operation, so as to act on cylindrical bodies or pipes of different diameters, all in lines at uniform distances from their centres, substantially as herein set forth.

61,356.—COAL SCUTTLE.—John Pfeifer, Philadelphia, Pa.

Producing a close joint between the body, A, and the bottom, B, of the said coal hod, by means of the concavo-convex bead, a' b', substantially as and for the purpose described.

61,357.—SHUTTLE BINDER FOR LOOMS.—J. C. Poland, Jr., Auburn, Maine, and B. R. Cotton, Lewiston, Maine.

We claim a shuttle binder made as a lever, pivoted at or near its centre, when arranged with adjusting screws, d d' by which the angle of the binder can be changed and the binder can be fixed in position, substantially as described.

Also, in the arrangement claimed above, mounting the pivot of the binder on a screw, by which the distance of the whole binder is adjusted with reference to the opposite side of the shuttle box.

61,358.—FLY TRAP.—M. M. Preble, Kokomo, Ind.

I claim the combination of the boxes, A and E, and slides, G and F, the said parts being constructed and arranged substantially in the manner and for the purpose set forth.

61,359.—STEREOSCOPE.—De Witt S. Rawson, Peru, Ill.

I claim the picture box, H, the swinging front, D, and shelves or brackets, E E, substantially as herein described.

61,360.—ICE CREAM FREEZER.—John E. Robinson, Boston, Mass.

I claim, in combination with a freezing vessel, a, the arrangement of a series of cream cylinders, b, to be simultaneously rotated within the same, when each cylinder is so mounted as to be capable of disconnection from the driving mechanism and removed from the freezing vessel, without disturbing the other cream cylinders, substantially as set forth.

I also claim, in combination with such an arrangement and method of operation of the cylinders, the stationary scrapers, held in place during the rotation of the cylinders substantially as described.

Also, mounting each cylinder on a screw shaft, and so as to be removable therefrom, substantially as and for the purpose described.

61,361.—TRUNK LOCKS.—E. A. G. Roulstone, Roxbury, Mass.

I claim the combination of the spring bolt, l, and tumblers, e, or locking mechanism, when constructed and arranged to lock and unlock substantially as set forth.

Also, combining with the projection, o, of the bolt, the flange, r, with the pin, p, for receiving the strain of the bolt, substantially as described.

61,362.—PORTABLE WATER POWER.—Abram Rowe, Macomb, Ill., assignor to himself, Lorenzo F. Whitman and Reson A. Bowie.

First, I claim a portable hydraulic motor for operating machinery, consisting of the propeller or screw wheel, B, enclosed in a case, E, and located in the central bottom portion of a boat, A, as herein shown and described.

In combination with the wheel, E, arranged as shown, I claim the sluice, C, in the front end of the boat having its sides converging as represented.

61,363.—ABRASIVE POWDER.—Jesse Russell, Bath, Maine.

I claim abrasive powders, made by reducing and grading the material above described.

61,364.—METHOD OF UTILIZING WASTE EXTRACTS OF FIBROUS PLANTS.—George E. Sellers, Sellers' Landing, Ill.

First, I claim the vegetable extract of fibrous plants, when obtained in the process of preparing fiber paper stock, in the manner and for the purpose substantially as described.

Second, the utilization of the vegetable extract of cane (arundinaria macrosperma) and other fibrous plants, when obtained from them in the process of preparing their fiber for paper stock without other chemical agencies than water or heat, as a new article of commerce.

61,365.—BASE BURNING STOVE.—Charles J. Shepard, Brooklyn, N. Y.

First, I claim the use or employment of the chamber, B, constructed and operating substantially as described, for the purposes set forth.

Second, I claim in a stove with the upper or reservoir chamber constructed substantially as shown, a door placed in position relatively to the grate as shown for the purposes herein fully indicated.

Third, The use or employment of water, substantially as shown, for the purposes set forth.

61,366.—HYDRANT.—Joseph Nottingham Smith, Jersey City, N. J.

I claim the tubular flanged valve, F, operating substantially as herein specified.

I also claim the inverted cup-shaped valve seat, D, in combination with the valve, F, substantially as herein described.

I also claim the filter, L y, arranged in the hydrant as herein set forth.

I also claim the combination of the filter tube, L, with the valve, F, substantially as and for the purpose herein set forth.

I also claim the flexible packing, Q, in combination with the cups, P and T, substantially in the manner and for the purpose herein specified.

61,367.—WINDOW-SCREEN FOR RAILROAD CAR.—F. U. Stokes, Cincinnati, Ohio. Antedated Jan. 6, 1867.

I claim a sash frame for a railway car window, constructed in such a manner that the upper half may be set with glass, and the lower with wire gauze or analogous material, the whole being combined together in the manner and for the purpose herein set forth.

61,368.—MODE OF PRINTING PHOTOGRAPHS.—Joseph Wilson Swan, Newcastle-upon-Tyne, England.

First, I claim the preparation and use of colored gelatinous tissues, substantially in the manner and for the purpose set forth.

Second, The mounting of undeveloped prints, obtained by the use of colored gelatinous tissues, in the manner and for the purpose set forth.

Third, The retransfer of developed prints, produced as above described, from a temporary to a permanent basis.

61,369.—MANUFACTURE OF SHOE LACINGS.—J. P. Ferrell, North Bridgewater, Mass.

I claim combining with friction surfaces having a relative reciprocation, a co-operating mechanism which shall draw or feed the strip between these surfaces, substantially as and for the purpose set forth.

I also claim in combination with such an arrangement or organization mechanism for releasing the strip from the nippers, mechanism for separating the abrading surfaces, and mechanism for returning the parts to normal position, substantially as set forth.

61,370.—HANGER BOX FOR CRANK SHAFTS.—Thomas Welch, Churchville, N. Y.

First, I claim providing the hanger journal of the crank shaft or other journals of harvesters with self-adjusting or self-lining bearings, or boxes, substantially as and for the purposes shown and described.

Second, The application of the wedge, E, with or without a set screw when used in combination with the box in which the journal revolves, for the purpose of compensating for the slack that might otherwise occur, by the wearing away of the parts.

Third, The set screw, S, in combination with the self-adjusting or self-lining boxes of harvesters, substantially as and for the purposes set forth.

Fourth, In combination with the self-lining or adjusting boxes and journals, the oil reservoir substantially as shown, and for the purpose described.

Fifth, In combination with a set screw and self-lining or self-adjusting boxes in harvesters, the cap, I, or its equivalent for the purposes described.

61,371.—PROCESS FOR PURIFYING AND CLEANSING SIZING FOR PAPER, ETC.—Norman J. Wells, Huntington, Mass.

I claim the use of alum or other equivalent mentioned, in the process of preparing sizing, when used and applied in the manner substantially as herein described and for the purpose set forth.

61,372.—CHEESE VAT.—Amos Westcott, Syracuse, N. Y.

I claim the method above described of constructing, attaching and rendering adjustable, the leg, D, substantially as and for the purposes set forth.

61,373.—PISTON FOR STEAM ENGINES.—William D. Whitmore, Boston, Mass.

I claim my improved ring section and wedge piston as made not only with its ring sections and their wedges wholly within and suported by a case, C, separate from and to be attached to the cap, B, by screws, but as having the cap, B, applied to the piston rod, A, the whole being substantially as and for the purposes hereinbefore set forth.

61,374.—BED BOTTOM.—Newel J. Willis, Waltham, Mass., assignor to himself and Ammi Brown, Boston, Mass.

I claim the improved construction of the slat lifter, B, and arrangement of it and its springs relatively to the slat, A, the whole being as described, the part, c, of such lifter under such arrangement, being made throughout its length to bear against the underside of the slat and the springs to extend wholly below the part, c, and the slat as explained.

61,375.—SEED DRILL AND CULTIVATOR COMBINED.—John P. Zeller, Bourbon, Ind.

I claim, First, The frame, A, constructed as described, with the hinges, d loop, g g, studs, h h, loops, f f, studs, 5 5, and tongue, D, in the manner and for the purposes herein fully set forth.

Second, The wheels, B and B' with corrugations upon their inner faces and connected to the frame by the short axle, cog bars, P, and metal slides in the manner and for the purposes specified.

Third, The arrangement of the shaft, C, with cog segments, O O, which mesh into the cog bars, P P, and used for elevating or depressing the frame, A, in the manner as set forth.

Fourth, The drag, L, with shoe, M, and roller, constructed as set forth, and used with the frame, A, as specified.

Fifth, The arrangement of the detachable drilling device, G, constructed specified and used in combination with the frame as specified.

Sixth, The corn cultivator attachment, H, when used with the frame, A, as set forth.

61,376.—A GIG OR MACHINE FOR RAISING THE NAP UPON CLOTH, COMPOSED OF THE FOLLOWING ELEMENTS.—Anton Zschille, Grossenhain, Kingdom of Saxony, assignors to L. T. Downes.

I claim, First, A gig or machine for raising the nap upon cloth, composed of the following elements. 1st, A mechanism for moving the cloth through the machine so as to present plane surfaces to the action of the teazles. 2d, One, two or more pairs of plane surfaced independent teazle plates with mechanism for moving the same, while maintaining their parallelism with the cloth, in arcs of a circle or otherwise, so that each plate shall continuously move toward the cloth, sweep transversely and in contact with the cloth from the center toward the sides thereof, and then recede, and return toward the center.

Second, I also claim the means herein described for engaging or disengaging the cloth with or from the teazle plates, and regulating their pressure of contact, substantially as shown and set forth.

Third, I also claim the method of teazling cloth by machinery, substantially as herein shown and described, that is to say by imparting to the teazling surfaces the following motions, viz: to and from the cloth and also at right angles to the run thereof, so that the nap shall be raised crosswise from the center or thereabouts to the sides as described.

61,377.—SAW SET.—W. A. Alexander, Mobile, Ala.

I claim the combination of the lever, B, pivoted in the block, A', with the recess, b, and the set screw, c, in the block, A, forming an adjustable saw set, constructed and operating substantially as herein described.

61,378.—KINDLING FIRES.—Dexter B. Andrews, Fort Wayne, Ind.

I claim a composition for kindling fires compounded from the materials and substantially as set forth.

61,379.—COMPOSITION FOR THE MANUFACTURE AND PRESERVING LEATHER.—Robert Andrews, Milwaukee, Wis.

I claim making the composition out of the materials named in the manner named and to secure to me the right of using such a composition, and of applying it to leather in the process of manufacture or after it is manufactured and to all articles made of leather, disclaiming every thing but the composition.

61,380.—CORSET AND SKIRT SUPPORTER COMBINED.—William Bacheller, West Newberry, Mass.

I claim in combination with an ordinary corset, the skirt supporter for which Letters Patent were granted me May 29, 1866, adapted to be worn and secured together in the manner as and for the purpose specified.

61,381.—GOVERNOR.—William Bakme, New Media, Pa.

I claim the arrangement upon the mill shaft of a pivoted governor ball and arm to actuate a detaching apparatus for the water gate levers, substantially as described.

61,382.—PAPER RULING MACHINE.—George A. Ball, San Francisco, Cal.

First, I claim the division of the cylinder into any number of sections with nippers working between each section and the introducing the movable blocks, i i i, between each nipper to preserve the circular form of the cylinder in combination with the nippers, substantially as described.

Second, Covering the cylinder with India-rubber cloth, Z, and placing upon the edge of each section where the nippers strike a strip of gutta percha, Z', as described and for the purposes set forth.

Third, The gage, j, rolls, l l, and lock nuts, m m, affixed to the feed board, in combination with the feed board R.

61,383.—APPARATUS FOR AMALGAMATING ORES.—Abner Bassett, Virginia City, Nevada.

First, I claim the barrel, e, or its equivalent, having a hollow shaft, o, passing through it, by which heat is introduced by exhaust steam or otherwise, substantially as described and for the purpose set forth.

Second, I claim the hot-air shell or bath, g, for the purpose of applying heat by exhaust steam or otherwise, to the outside of the vessel containing the pulp, whereby obdurate ores are made to amalgamate more freely, substantially as described and for the purpose specified.

Third, I claim the application of steam or heat to the ore or pulp, both through and around it, without coming in direct contact with it, the said ore or pulp being confined in some suitable vessel, said vessel being inclosed in a shell or bath, for the purpose herein set forth.

61,384.—EDGE PLANE FOR BOOTS AND SHOES.—Williams Bayhouse, Portland, Oregon.

First, I claim an edge plane having a cutter, D, with straight and concave edges, and the adjustable slotted guard, F, placed over the said cutter, substantially as described and for the purpose set forth.

Second, The guay, C B, with slots, b and b', and the screw, I, for elevating the cutter, in combination with the screw, G, and thumb nut, H, substantially as described and for the purposes set forth.

61,385.—SORGHUM STRIPPER.—Amos Bean, Canaanville, Ohio.

First, I claim an improved cane stripper, formed by the combination of the adjustable spring knives, B, and cast iron box or frame, A, said parts being constructed and arranged substantially as herein shown and described.

Second, The combination of the levers, C, with the spring knives, B, and box or frame, A, substantially as herein shown and described, and for the purpose set forth.

61,386.—SIFTING DEVICE FOR GRATES.—Jacob Beesley, Philadelphia, Pa.

First, I claim a grate, d, for receiving the ashes and cinders, in combination with the sliding frame, C, and projections, e e, the whole being constructed and operating beneath the fire grate of a stove heater or furnace, substantially as and for the purpose herein set forth.

Second, The ribs, c c, with their recesses, x x, in combination with a grate d, and with the sliding frame, C, and its lugs, e e, the whole being arranged substantially as described.

Third, The combination of the detachable box, B, grate, d, and sliding frame, C, the whole being constructed and operating substantially as specified.

61,387.—COWL.—W. F. G. Beeuwkes, Holland, Mich.

I claim the arrangement of the guard pipes or casings, C F, plate, H, and short cylinder, J, for projecting the roof from the heat of the chimney, substantially as herein shown and described.

61,388.—APPARATUS AND PRESERVER FOR RECTIFYING ALCOHOL AND OTHER SPIRITS.—Jean Gustave Bequet, Paris, France, assignor to himself and Moritz Pinner, New York City.

First, I claim introducing chemicals into a rectifying or distilling column for the purpose of analyzing or purifying, in whole or in part, the contents of such column.

Second, Introducing such chemicals at option either in their natural state or mixed with water or other suitable liquids.

Third, Introducing water into a rectifying or distilling column, in such a manner as to cause the mixing of such water with all or part of the contents of such column, for the purposes herein set forth.

Fourth, Introducing such chemicals, pure or mixed, or such water into such column, substantially by the means or in the manner herein described.

Fifth, Constructing a rectifying or distilling apparatus, in such a manner that one boiler or still can supply and keep at work two columns, or at option more, at a time.

Sixth, Constructing a rectifying or distilling apparatus, in which two columns, or at option more, are connected with each other in such a manner that thereby the contents of one column can, in whole or in part, be passed into another column without interrupting the process of rectification, distillation, analyzation, or condensation.

Seventh, Constructing an analyzer of a series of tubes or cylinders, substantially like the upper compartment of the analyzing condenser, G 4, herein described.

Eighth, Constructing a condenser of a series of tubes or cylinders, substantially like the lower compartment of the analyzing condenser, G4, herein described.

Ninth, Constructing the analyzing condenser, G4, of a series of tubes or cylinders, and dividing the same into compartments, substantially as described and for the purposes named.

Tenth, Providing a rectifying or distilling apparatus, with a vessel, V28, for the reception or distribution of chemicals, substantially as described and for the purposes set forth.

Eleventh, Providing a rectifying or distilling apparatus with one or more tubs or vessels, T29, for the mixing of chemicals with liquids, substantially as described and for the purposes set forth.

Twelfth, Supplying each or all of such tubs, T29, with a float or self-acting stop cock, 30, for the purpose of regulating the quantity of liquid required in each tub.

Thirteenth, The three-way stop cock, 75 76 77 78, or any desirable number of the kind, constructed substantially as herein set forth and used as described.

Fourteenth, Connecting such three-way stop cocks with steam chambers or pipes, substantially in the manner and for the purposes herein set forth and described.

Fifteenth, The pipes, 15a and 15b, in connection with pipes, 16a 16b 16c and 16d, and stop cock, 90 10 and 9, the whole substantially arranged in such a way as to enable the condensed impurities of any given column to be returned or directed into any given still, substantially as described and for the purposes set forth.

Sixteenth, Regulating by means of valves, 27a and 27b, the quantity of vapors required in any given column for rectifying or distilling purposes, all substantially as described.

51,389.—CHURN.—Jehial Borst, East Cobbleskill, N. Y.

I claim the arrangement of the two dashers, the outer revolving faster than the inner, and both being operated by means of shaft, S, toothed plate, n, idle wheel, o, and gear wheel, m', with its shaft, m, the several parts being constructed and used as and for the purpose specified.

61,390.—Compound for Telegraph Insulators and for other Purposes.—John F. Boynton, Syracuse, N. Y.

First, I claim as a composition for an electric insulator, a combination of hydrocarbons with silicic acid and silicate of alumina.

Second, I claim the combination of sulphur with the silicate of alumina and silicic acid, for the purpose set forth.

Third, I claim the combination of sulphur, hydrocarbons, silicic acid, and silicate of alumina, as and for the purpose herein set forth.

Fourth, I claim any combination of silicates with sulphur or hydrocarbons, so arranged or combined that when formed into an electric insulator it will be black or dark colored, for the purpose herein specified.

Fifth, I also claim saturating earthen ware, brick tiles, drain pipes, porous stone, wood, cast iron, and other hard, porous substances, with the compounds herein described, after subjecting said substances to a sufficient degree of heat to expel the air and moisture therefrom, substantially as and for the purposes described.

61,391.—Steam Blower.—G. W. Bright, Philadelphia, Pa.

I claim the arrangement of the shaft, A, the hub, B, the wings, C, the screw, b, and the nut, c, with the jets, e, substantially as herein described for the purposes set forth.

61,392.—Tool for Cutting off Boiler Tubes.—R. H. Burke, Greenpoint, N. Y.

First, I claim the cutter head, G, with feed screw, F, and tubular nut, E, in combination with the cutters, H, and pipe, A, constructed and operating substantially as and for the purpose described.

Second, The supplementary sleeves, I, in combination with the pipe, A, and head, G, carrying the cutters, H, substantially as and for the purpose set forth.

61,393.—Cooler for Coffee, etc.—J. Burns, New York City.

First, I claim, as an article of manufacture, the portable cooler herein described, the same consisting of the open mounted pan, A, with perforated false bottom, B, and connecting tube, D, as and for the purpose specified.

Second, The arrangement of the stationary suction blower, E, on the floor, with the pipe, b, below it, in combination with the removable mounted cooler, A B C, supported by its tube, D, as and for the purpose specified.

61,394.—Harvester Cutter.—Caleb Cadwell, Waukegan, Ill.

First, I claim a rotary cutter, consisting of the teeth, I, and links, H, in combination with the blocks, G G' g, when constructed and arranged in the manner and for the purpose specified.

Second, I claim the arrangement of the cutter, H I, blocks, G G', guides, M M', roller, L, spring, L', gearing, D E, shaft, B, and bevel pinions, C C, as herein described and represented.

61,395.—Scaffold.—L. B. Carpenter, Milwaukee, Wis.

I claim the combination and arrangement of the posts, A, the horizontal sliding timbers, E, the arms, F, crank shafts, H, cranks, I, ropes, J, and pulleys, K, with each other, substantially as herein described and for the purposes set forth.

61,396.—Hand Stamp.—Dexter H. Chamberlain, West Roxbury, Mass.

First, I claim the the type wheels, a b c, of different diameters, mounted upon separate and independent axes, as and for the purpose set forth.

Second, I claim the combination of the inking ribbon with two reels and a stud, in such a manner as to form a double fold of the ribbon underneath the type wheels or die block, substantially as and for the purpose specified.

61,397.—Repairing Railroad Rails.—Octave Chanute, Chicago, Ill.

I claim a pile for forming a railway bar, composed of an old or worn rail and a new bar of iron or steel for the head and foot, or either, substantially as herein shown and described.

61,398.—Measuring Funnels.—W. B. Cleves, Binghamton, N. Y.

I claim the peculiar construction of the measure, A, in combination with the gage tube, B, communicating with the inside of the measure above the faucet, C, with the single scale to indicate the quantity in the vessel, and the stand, D, with the adjustable clamp to hold the measure in its upright position, substantially as described and for the purposes set forth.

61,399.—Car Coupling.—Wm. B. Coates, Philadelphia, Pa.

I claim the coupling pins constructed in the manner and for the purpose described in this specification.

61,400.—Filtering Tube for Wells.—Chas. C. Cole, Northfield, Vt.

First, I claim protecting the countersunk strainers, A, by hinged plates, D or stationary plates, B, substantially as represented and described.

Second, The combination of the cone or cup-shaped strainers, G, with the tubing, substantially as herein shown and described.

61,401.—Furnace Shield.—Edward S. Collins, U. S. Navy.

I claim the shield, B, so hung or arranged upon a frame, C H and G, that it can be adjusted to the required angle with regard to the furnace door, substantially as and for the purpose specified.

The combination with the door shield, B, of the fender, A, when arranged

61,402.—Wheel and Axle Connection.—Henry S. Cook, Boston, Mass.

I claim the improved carriage wheel and axle connection consisting of the plates, a and e, with their studs, c c c, and openings, f f f, operating in combination with the collar, h, as described.

I also claim, in combination with the above-described arrangement of parts, the pawl, I, or its equivalent, substantially in the manner and for the purpose as set forth.

61,403.—Covering for the Head.—Edwin Copleston, Wrentham, Mass

I claim a head covering produced as herein described as a new article of manufacture.

61,404.—Extracting Iodine from Sea Water.—Rene Cupper, New York City.

I claim the process substantially as herein described, for the purpose specified.

61,405.—Washing Machine.—Chas. Daniel, Lamont, Mo.

First, I claim the combination of the adjustable slotted cylinder, C, and the adjustable slotted concave frame, G, with each other and with the box or hub, A, when said cylinder and frame are constructed and operated substantially as herein shown and described.

Second, The clamping device formed by the combination of the movable jointed frame, J, with the concave frame, G, substantially as herein shown and described and for the purpose set forth.

61,406.—Boat-detaching Tackle.—Wm. A. Devon, Port Richmond, N. Y.

I claim the combination of the jaws, A and B, of the pivoted locking clasp, C, with its cam-shaped lever, h, and cheek or face piece, i, for operation on the jaws, substantially as specified.

61,407.—Filter.—Justus Doering, Philadelphia, Pa.

First, I claim the perforated vessel, B, and its pipes, c and d, in combination with the casing, A, and its pipes, f and g, the whole being constructed and arranged substantially as specified.

Second, An inclined discharge pipe, arranged in respect to the concave bottom of a filter, substantially as and for the purpose described.

Third, The pipe, d, with its openings, i, in combination with a filter, substantially as and for the purpose set forth.

61,408.—Gang Plow.—J. H. Douthit, Albany, Oregon.

First, I claim the attaching of the plow beams, F F, to slides, H A, fitted between suitable guides, c c, at the inner sides of the bars, A A, in connection with the foot lever, I, attached to one of the slides, H, and the pin, K, passing

Second, The windlass, L, having the cords or chains, M M', attached, and the latter connected to the plow beams, F F, to operate in the manner substantially as and for the purpose specified.

Third, the windlass, K, having a cord or chain, A, attached, which is connected to the plow beams, F F, one of the bearings of the windlass being fitted in a slide, S, and having a pulley, V, on one end, around which and a pulley, W, on wheel, D, a belt, h, passes in combination with the lever, T, attached to slide, S, all being arranged to operate in the manner substantially as and for the purpose set forth.

61,409.—Skate.—Robt. E. Ellerbeck, Washington, D. C.

First, I claim the laterally adjustable clips, a, attached to the skate on a line diagonal to the longitudinal plane of the blade, A, for the purpose of grasping and securely holding the boot or shoe, when applied thereto, substantially as shown and described.

Second, The projection, o, having a groove formed therein and arranged to operate in connection with the plate, n, and secured by the catch, c, or its equivalent, substantially as set forth.

Third, in combination with the clips, a, arranged as described, I claim the grooved projection, o, and plate, n, spring, f, and catch, c, arranged to operate as and for the purpose set forth.

61,410.—Machine for Cutting Files.—Alfred B. Ely, Newton, Mass.

First, I claim fixing the socket and graping the tool in the stock or head with rubber, when the parts are arranged and constructed to operate substantially as and for the purposes described.

Second, Connecting the tool holder or head with the arm shaft, substantially as described.

Third, The spring arm, D, in combination with the rubber lined head, substantially as described.

Fourth, The arrangement of the bars, G, with the head and arm, substantially as and for the purpose described.

Fifth, Regulating the angle of the cutting edge of the tool to the arm or shaft by means of bars and clamps, substantially as described.

Sixth, The combination of the rubber-lined socket with the vertically swiveling head, substantially as described.

Seventh, The combination of the rubber-lined socket with the vertically swiveling and horizontally turning head, substantially as described.

61,411.—Machine for Opening and Cleaning Cotton.—Samuel Fay, Lowell, Mass.

I claim the combination of the beaters, G H and I J, arranged the one within the other, and revolved with the same or different velocities, and in the same or opposite directions, substantially as shown and described.

61,412.—Device for Changing Water into Steam Generators.—Thomas F. Field, Saugerties, N. Y.

I claim the valve, D, applied to and in combination with the change water-feed nozzle of steam boilers, and operating in connection with a feed pipe or hose under pressure, substantially as and for the purposes herein set forth.

61,413.—Knitting-machine Needle.—Levi W. Fifield, Melrose, Mass.

I claim the closer or latch, as made furcated, and with one or more shoulders, d, arranged with respect to the fork as and for the purpose set forth.

I also claim the pivoted closer or latch, as made with the slot, f, to enable it not only to turn upon but slide on its pin, e, as set forth.

61,414.—Globe Valve.—C. L. Frink, Rockville, Conn.

I claim the attachment of the disk, H, to the stem, B, by means of the pin which is fast in the stem, and working in a groove in the disk as herein shown and described.

61,415.—Churn.—Stephen M. Golden, Marcelline, Ill.

First, I claim the arm, D, as operating on the wrist, G, shaft, B, and adjustable bolt, F, as herein described, and for the purposes set forth.

Second, I also claim the construction of the frame, C, with its toothed wheels, K and L, fly-wheel, H, and adjustable piston, D, in combination with the shaft, B, and churn, A, when arranged and operated as herein described and for the purposes set forth.

61,416.—Automatic Toy.—William F. Goodwin, Washington, D. C.

I claim constructing the legs of toys or hobby horses, with bars or pieces joining them together, making hinged or vibrating joints at the several points where the legs are required to bend so that when attached or pivoted on the studs, S, or their equivalents on the shoulders and hips, and acting by the rotating of the cranks, B', the legs are made to move, bending all the joints, raising and turning the foot, stepping, walking, and trotting with both the fore and hind legs and feet, in imitation of the movements of the horse or animal which the toy is made to represent, in the manner and for the purpose substantially as described.

Second, The cranks, B', or their equivalents, operated in any manner or by any means whereby they can be made to rotate, the rotating of which imparts to the legs their vibrating and reciprocating motions, arranged to operate in the manner and for the purpose substantially as described.

61,417.—Director for Uterine Support.—W. G. Grant, Wakeman, Ohio.

I claim the director, A, made in two parts or sections, B, and connected together substantially as and for the purpose specified.

I also claim the pusher, E, in combination with the director, A, substantially as described, and for the purpose set forth.

61,418.—Peat Machine.—Stephen B. Greacen, Norwich, Conn.

First, I claim the combination with the eccentric outer cylinder, B, and irregular cam, E, of the revolving inner cylinder, D, with its separately operating radial slides, b, forming sides to the molds, the whole being constructed and arranged for operation together substantially as and for the purpose herein set forth.

Second, The combination with the revolving cylinder, D, slides, b, and cam, E, of the knife or scraper, f, arranged for operation in relation thereto, as shown and described.

61,419.—Toy Gun.—Albert Hall, New York City.

First, I claim the construction of the stock of a spring toy gun, in two longitudinal halves or sections, a b, secured together by the barrel, C, substantially as herein set forth.

Second, The cylindrical india-rubber spring, g, arranged in relation with the piston, f, barrel, c, and trigger, k, substantially as herein set forth, for the purposes specified.

61,420.—Tool Holder for Planing Machines.—Charles Hall, New York City.

I claim the combination of the tool stock of a planer, with its support or rest, by means substantially as above set forth, so that the tool stock can move a limited distance in two directions, in the line of cutting, whereby two opposite cutting edges may be alternately brought into operation and held there.

61,421.—Reversible Butt Hinge.—William Hancock, Saco, Maine. Antedated Jan. 14, 1867.

First, I claim the hinge, in combination with the washer, for the purpose specified.

Second, I claim a double round edge hinge, as specified in combination with a movable pin or pintle, whereby I am enabled to obtain a "right or left hand" hinge movement from one and the same hinge.

61,422.—Machine for Pulling Flax.—John Harrington, Menomonie, Wisconsin.

First, I claim the rotating reel provided with fixed radial plates, c, and movable plates, J, arranged so as to operate as clamps, and as the machine is drawn along pull the standing flax and deposit it on the platform substantially as set forth.

Second, The cam-shaped grooves, L, at the inner sides of the plates, M, and the pivoted arms, K, to which the plates J are attached, in connection with the purpose of operating the plates, J, substantially as set forth.

The shafts, j, at the outer ends of the plates, c, in connection with the yielding bars, k, at the outer ends of the plates, J, substantially as and for the purpose specified.

Fourth, The combination of the main frame and platform, with the reel arranged with clamps to operate as set forth.

61,423.—Traveling-bag Frame.—George Havell, Newark, N. J.

I claim as an article of manufacture the within-described frame for traveling bags, when constructed and used as and for the purpose specified.

61,424.—Meat Cutter.—James L. Haven, Cincinnati, Ohio.

I claim the mode of securing an entire series of meat cutting or mincing knives, G, by means of a single set screw, L, ribbed plate, F, and slotted case, A B, substantially as set forth.

Second, The provision of ribs, f, on the side of a meat cutter, whether cast on the case or separately, in combination with a correspondingly ribbed loose part, when arranged so that one lateral movement will firmly hold all the knives substantially as set forth.

Third, The mode of securing a series of meat cutting or mincing knives, G, by means of the lateral movement of a ribbed plate, F, against corresponding ribs on the slotted case, A B, substantially as set forth.

61,425.—Apparatus for Automatically Weighing Spirits and Other Liquors.—Samuel K. Hawkins, Lansingburgh, N. Y.

I claim the automatic weighing machine, constructed and operating substantially as and for the purpose herein described.

Second, In combination with the levers, D and C, and the clutch hooks, p p, I claim the drop weight, F, so arranged that the clutch hooks will alternately lift and drop the weight substantially as and for the purpose described.

Third, The combination of the balance levers, D and C, with the mechanism for operating the valves, a, and b b, substantially as described.

Fourth, The combination of the balance lever, D, the gripping bars, G G, the clutch hooks, p p, the weight, F, and the V-shaped slot, V, constructed and operating substantially as described.

Fifth, The dial plate, M, in combination with the index, m, the ratchet-wheel, N', the pawl, n, and the arm, O, operated by a rock shaft substantially as and for the purpose described.

Sixth, In combination with the balance lever, D, and its attachments, I claim the sliding weight, D', substantially as and for the purpose described.

Seventh, In combination with the lower lever, C, and the drop weight, E, I claim the elastic platform, E', substantially as and for the purpose described.

Eighth, In combination with the lower lever, C, the connecting bars, H and h', and the valve, a, I claim the inclines, J and J', constructed and operating substantially as and for the purpose described.

61,426.—Revolving Sluice for Saving Metals.—T. D. and W. A. Hedger, Meadow Lake, Cal.

We claim a sluice with revolving belt, D, so constructed that the sides will form flexible joints, b b, in passing around the drums, closing up and forming close joints while passing and down the incline, forming a sufficient channel between them for the purpose described, substantially as set forth.

Second, The mouthpiece or opening, G, beneath the platform, so that the sand or pulp which is fed to the machine may enter a sufficient distance below to give the action and force to the water introduced through the opening, G, to sweep down the incline and carry with it the sand and debris, substantially as described, and for the purpose set forth.

Third, Separating the ore passing the valuable portions, up the incline, and the debris down to the foot, as waste matter, as described.

61,427.—Composition for Roofing.—Cyrus Hill, Dover, Maine.

I claim the composition for covering roofs, and for similar purposes, consisting of the ingredients herein named, and united in the proportions substantially as set forth.

61,428.—Corn Husker.—Joseph Hindman, Olathe, Kansas.

I claim a corn husker having the tang, B, turned back and pointing toward the wrist, as herein shown and described.

61,429.—Bench Vise.—John S. Hoar, West Acton, Mass.

I claim the adjustable jaw, B, made as described I also claim its combination and arrangement with the vise jaw,

I also claim the arrangement and combination of the slotted hook, C, and its set screw, b, with the vise jaw, A, and with the adjustable jaw, B, made as described.

61,430.—Muff.—Charles Hollwede and Julius Brzezinsky, New York City.

A fur muff having its ends turned and set upon a former, by means substantially as shown and described,

61,431.—Seed Planter.—D. S. Holman, Conneautville, Pa.

I claim the two seed slides, H H', placed one above the other at the upper part of the tubes, G, and having springs, d, bearing against them, in combination with the wheels, i, and projections, e, having pins, f g, in their peripheries all arranged to operate substantially in the manner as and for the purpose set forth.

Second, The regulating slides, J, in combination with the seed slides, H H', arranged substantially as and for the purpose specified.

Third, The combination of the metallic tubes, L, and covering shares, O, all arranged and applied so as to be capable of operating and being adjusted substantially as shown and described.

61,432.—Burner for Vapor Stoves.—R. L. Howell (assignor to himself, E. M. Wilkins and W. S. Browning), Baltimore, Md.

First, I claim the residuum chamber, N N, and the pipe, B, arranged substantially as described, in combination with a vapor stove.

Second, The conical headed pin, H, within the aperture, J, of the retort, operated by the screw plug, E, substantially as and for the purpose specified.

Third, The retort, F having stands, L, and partition, K, cast solid therewith, the latter having vent, J, extending through it, and valve seat, I, on its side, as and for the purpose specified.

61,433.—Window Sash and Fastener.—Anthony Iske, Lancaster, Pa.

I claim the tongue and groove connection of the strip, B, with the sides, A of the sash, in combination with the turning button, for either locking both parts, A B, together, so as to move up and down jointly, or for locking both to the casing, the whole arranged and operating in the manner and for the purpose specified.

61,434.—Steamboat Signal Apparatus.—Patrick Kenny, New York City.

First, I claim the combination of the signal handles with each other in the manner described, so that each signal handle will have a different line of movement, as and for the purposes set forth.

Second, Attaching the connecting-cords to the index shaft at intervals proportioned and corresponding to the intervals between the signal marks upon the dial, substantially as described.

Third, the combination of one or more levers, G, or their equivalents, with the index shaft, substantially as described.

61,435.—Apparatus for Tethering Animals.—Daniel Kidder, Franklin, N. H.

I claim the spring, E, applied to the pole, D, in combination with the stake A, substantially as and for the purpose described.

61,436.—Churn.—Norman S. Kinyon, Chenango Forks, N. Y.

I claim the combination, construction and arrangement of the dasher blades or floats, with the angular blades, s s, on the lower end of the shaft, B, substantially as described and for the purpose set forth.

61,437.—Railroad Switch.—George T. Lape and Jephthah Leathe, New York City.

We claim the street car replacer, consisting of the side pieces, B B, groove A, lug, a, when constructed and operating as herein set forth for the purpose specified.

61,438.—Cotton Chopper and Thinner.—David P. Lewis, Huntsville, Ala.

I claim a machine for cutting and thinning cotton and for other purposes, constructed, arranged and combined substantially as herein shown and described.

61,439.—Stop Motion for Looms.—Alphonse Julien Loiseau, New York City.

I claim the oscillating plate, F, and cross bar, E, in combination with weights or rods, a, dog, e, catch bar, N, and stop, K, constructed and operating substantially as and for the purpose described.

61,440.—Attachment for Holding Skirts Together.—Emile Loiseau, New York City.

I claim a strap, A, whereby a lady's hoop skirt is attached to a petticoat said strap being made substantially as herein shown and described.

61,441.—Balance Slide Valve.—Isaac V. Lynn and George I. Snowden, Pittsburgh, Pa.

I claim the packing ring, D, or its equivalent, when used in combination with the cylinders, f and C, plate, B, and valve, A, constructed, arranged and operating substantially as herein described, and for the purpose set forth.

61,442.—Wood Turning Lathe.—John McMichael (assignor to Joseph Wright), Philadelphia, Pa.

First, I claim the rocking frame, H, arranged with the cutters, G and G', and the standing frame, A, substantially as hereinbefore described, and for the purposes specified.

Second, Combining the cam, V, with the rocking shaft, T, and rocking frame, H, for giving a reciprocating motion to the latter, substantially as and for the purpose above described.

Third, The combination of the cam-lever, O', with the centre, O', and lever, P, the latter being operated by the lever, Q, or its equivalent, substantially as and for the purpose set forth.

Fourth, arranging the sliding handle, Y, and spring, X, with the upright W, for the double purpose of giving a rocking motion to the frame, H, by means of the cam, V, and actuating the cam lever, O', through the intermediate levers, P Q, substantially as described and for the purposes specified.

61,443.—Caloric Radiator for Stove Pipes.—Benjamin F. Miller, New York City.

First, I claim the septa or plates, f, in combination with the diaphragm, e and radiating case, c d, substantially as and for the purposes set forth.

Second, I claim arranging the diaphragm, e, and case, c, in the manner shown in Figs. 1 and 3, so that the space through which the heated gases or products of combustion pass shall be nearly of equal area to the pipe, a, for the purposes and as set forth.

61,444.—Copy Holder.—Charles B. Moseley and Lucius L. Woolley, Medford, Mass.

We claim the cylinder, D, or its equivalent, having a spring jaw, F, when hung in a suitable frame, substantially as and for the purpose described.

We also claim, in combination with the above, the swinging lid, H, arranged substantially as described, and for the purpose specified.

We also claim the notched head of the cylinder, D, or its equivalent, in combination with the pawl or catch, N, for the purpose described.

We also claim the iron frame on which the working portion of the machine rests, and which holds the same in position, substantially as specified.

61,445.—Railway Chair.—Michael C. Murray, West Acton, Mass.

I claim the improved chair as constructed with the base plate, A, separate from and to extend under and support the jaw, C, as having the rebate, a, and as provided with the projections, c c', and the shoulders, b b, arranged with respect to the base plate, A, and the jaws, B C, and so as to intend into and under the rails, as specified.

I also claim the rails as made with the notches, d d, arranged in them at their joints or ends as specified and to be used with the chair made as explained.

I also claim the nut holder, d, as made with the nut recesses, 11, and the flanges, k, or their equivalents.

61,446.—Broom.—Henry E. Newton (assignor to himself and W. A. Newton), Manchester, N. H.

I claim one or more springs, B, which connect the handle, C, with the broom head, A, substantially in the manner and for the purpose herein shown and described.

61,447.—Pumps.—John Nicholson, Allegheny City, Pa.

I claim providing the upper end of the valve chamber or working barrel, h, of a pump with a lock, f f', furnished with catches, g, and springs, e, said lock being used in connection with a coupling, A, case, C, seat, J, nuts, k, 8 and 9, spiral spring, r, and rollers, r', on the pump rod, D, the whole being constructed, arranged and operating substantially as herein described and for the purpose set forth.

61,448.—Brick Kiln.—L. R. Norman, and W. F. Dieterichs, Jr., St. Louis, Mo.

We claim, First, The construction and arrangement of the smoke flues, D d D', as described and set forth.

Second, We claim the cold air or supply chambers, C, with the distribution of the air to the furnaces through a series of orifices, c, as described and set forth.

Third, We claim the construction of the vertical walls of the kiln, with concave sides so as to resist the entire pressure from the expansive force of the heat and steam.

61,449.—Brick Kiln.—L. R. Norman and W. F. Dieterichs, Jr., St. Louis, Mo.

We claim, First, Constructing the sides of our improved brick kiln of double walls to enclose a hot air chamber when the outer wall is inwardly curved or arched, the inner wall being straight, all substantially in the manner described and for the purpose set forth.

Third, We claim also the arrangement of a hot air chamber, D, over the cold air supply chamber, B, between the fire spaces of our improved kiln constructed and operating substantially in the manner and for the purpose herein specified.

Third, The combination and arrangement of the outer chimneys, F, the valves, F' and the air chambers, A2 and D, enclosing the kiln, all substantially in the manner and for the purpose herein set forth.

Fourth, We claim also the arrangement of the fire boxes with grate bars extending entirely across our improved kiln, substantially or herein set forth.

61,450.—Cultivator.—C. P. Norton, Roseville, Ill.

First, I claim the pole, B, arch, C, and supporting wheels, D D, constructed and arranged substantially as and for the purpose herein set forth.

Third, I claim the pole, B b, fig. 1, sliding box, f, loop, F, and set screw, k, in connection with the plough beam, A, all arranged and operating as and for the purpose described.

61,451.—Hat Body.—Julius A. Pease, New York City.

I claim a hat or hat body made from raw or untanned hide, substantially as before described.

61,452.—Cot or Covering for Rolls for Spinning, etc.—Edward L. Perry, New York City.

I claim a cot or covering for rolls of spinning or other machines when made or composed of three or more separate layers or thicknesses joined together of which the outer layers, a and b, consist of leather and the intermediate layer, c, of fibrous or elastic material, substantially as described.

61,453.—Oil Tank.—H. Pierce and J. C. Button, Cleveland, Ohio.

We claim, First, The arrangement of the sills, B, keys, C, abutment brace, F, in combination with the foundation floor, G, for the purpose set forth.

Second, The construction and arrangement of the bottom, C', placed within the tank, the interlayer, d', in combination with the tank, H angle irons, b, and floor, G, for the purpose and in the manner set forth.

61,454.—COMBINED LAMP, COFFEE POT AND BOILER.—Luke A. Plumb, Biddeford, Me.

I claim, First, The tube, D, attached to a cone, C, of the burner of the lamp when used in connection with a vessel provided with a central draft tube to fit over said tube, D, substantially as and for the purpose herein set forth.

Second, The employment or use in a vessel provided with a central draft tube for a lamp of a vessel, E, provided with two or more removable chambers, J, substantially as and for the purpose specified.

Third, The combination with a lamp of two or more vessels, E H, provided with central draft tubes arranged so that the draft tube of one vessel will extend above its top to admit of the lower end of the tube of the other vessel being fitted upon it, substantially as and for the purpose set forth.

61,455.—CARRIAGE JACK.—Oscar T. Potter, Scott, N. Y.

I claim the arrangement of the arm, b, with its fork, d, and crooked lever, m, in combination with the standard, a, when used as and for the purpose set forth.

61,456.—CARTRIDGE FILLING MACHINE.—Timothy J. Powers (assignor to Fitch and Van Vechten), New York City.

I claim, First, The spring or contractible crimping die or device for closing the mouths of the shells on to or in the bullet, constructed to operate substantially as described.

Second, I further claim said contractible crimping die or its equivalent in combination with an intermittent shell carrier for operation together, as essentially as herein set forth.

Third, The combination of an automatic bullet feeder, with an automatic shell carrier, substantially as specified.

Fourth, The combination of an automatic shell feeder, shell carrier, and bullet feeder for action, together as herein set forth.

Fifth, The combination with an automatic bullet feeder of a bullet, take up or slide to deposit the bullet over the shell.

Sixth, In combination with an automatic bullet feeder, a divided or opening and closing conducting die to guide the bullet to its place in or over the shell and to hold it while the charge is being rammed, substantially as specified.

Seventh, Providing the bottom of the powder hopper or space intervening between it and the charge measurer or distributor, with an independent bush and rubber packing, or their equivalents for operation together and in combination with the distributor, essentially as and for the purpose herein set forth.

Eighth, Griping the shell, while being crimped by an independent slide or its equivalent arranged to close upon the mouths of the shell chambers in the carrier and afterwards and retire therefrom, essentially as specified.

Ninth, The combination in one machine of an automatic shell carrier bullet feeder, powder charger or measurer and distributor and crimping device or die for operation together, substantially as herein set forth.

Tenth, While not claiming irrespective of the mode herein described raising the shell at certain points within its chamber in the carrier, I do claim in combination with an intermitting rotating carrier provided with chambers, substantially as described the lifting rod, i, arranged to raise during a pause in the motion of the carrier the shell further up within its chamber, and then to retreat, essentially as and for the purpose herein set forth.

Eleventh, Also elevating the upper end of the shell, prior to crimping above the top surface of the carrier and retaining it there while crimping by means of an intermittently reciprocating rod, e, arranged to operate in connection with the carrier and suitable crimping device, substantially as specified.

61,457.—VISE.—James S. Ralston, Indiana, Pa.

I claim in combination with the A A', of a vise, the cam disks, C C, placed on a coupling rod, B, for opening and closing the jaws to be held to their work by the ratchet wheel, c, and spring dog, e, constructed and operating substantially as herein described.

61,458.—BUTT HINGE.—Andrew Remkin, Philadelphia, Pa.

I claim the roller, m, adapted to the two plates of a lift off hinge, substantially in the manner and for the purpose herein set forth.

61,459.—GLOBE CLOCK.—Smith E. G. Rawson, Saratoga Springs, N. Y.

I claim, First, Providing for the winding up of a globe clock through an aperture in the shaft or axle of rotation of the globe within which the clock is contained.

Second, Having the winding up shaft of a globe clock coincident with the axis of rotation of the globe within which the clock mechanism is contained.

Third, Sustaining a globe clock upon an adjustable support, C, or its equivalent, substantially as described.

Fourth, Supporting a globe clock by means of a vertical spindle upon a pedestal in such manner that the globe can be rotated about a vertical axis, substantially as described.

Fifth, The combination of a fixed index, k, and movable index, n, with a globe which is rotated automatically, substantially as described.

Sixth, Sustaining a globe which is rotated by means of clockwork upon a tubular shaft, in such a manner that the clock spring can be wound up without detaching the sections of the globe, substantially as described.

61,460.—DENTAL PLUNGER.—William G. Redman, Louisville, Ky.

First, I claim the casing as represented in form by A and A', containing the bar, D D', the let-off bar, f, the spiral spring, h, the spring and stop, z and z', E, constructed substantially as described for the purpose specified.

Second, I claim the arm or lever, C, connected with the spring helve by slot and bolt, substantially as described.

Third, I claim the spring helve, b, and its connection with the case at 11, and also the spring, d, acting against the helve.

61,461.—CAR TRUCK.—J. W. Reynolds, Hyde Park, Pa., assignor to himself and S. H. Cutler.

I claim, First, The construction and arrangement of the pivot or king bolt, D, of the truck on a socket, C, applied to the cross bar, B, substantially as and for the purpose set forth.

Second, The combination and arrangement of the springs, I, bars, G, and the boxes, F, substantially as and for the purpose specified.

Third, The openings, d, in the outer sides of the boxes, F, in combination with the slides, e, substantially as and for the purpose set forth.

61,462.—VALVE GEAR FOR DIRECT-ACTING ENGINES.—M. S. Richardson and Erasmus A. Pond, Portland, Vt.

We claim, First, The piston valves connected with and directly actuated by a system of levers operated by the steam piston as herein described, so as to effect the induction and eduction of steam to and from the steam cylinder

Second, The combination of the piston valves with an oscillating lever actuated by auxiliary levers arranged within the steam chest and cylinder, substantially as shown and set forth.

Third, The combination with a system of levers located within the steam chest and cylinder and actuated by the steam piston as described of the cylindrical plungers or piston valves sliding in recesses formed in the steam chest on each side of the central steam admission and exhaust chambers, substantially as herein shown and specified.

61,463.—EXTRACTING OIL FROM SEEDS.—John Robertson, Brooklyn, N. Y., assignor to himself and Abraham Barthholf.

I claim, First, The process substantially as herein described of treating seeds or other substances for the extraction of oil by subjecting the same to the action of beaters in a heated cylinder or case, essentially as herein set forth.

Second, The within-described process of extracting the oil from seeds or other substances reduced to a pulp by exposing the same to the action of a centrifugal machine, substantially as specified.

Third, The combination with a centrifugal machine of revolving beaters working in a cylinder or case as described and to which steam is or may be admitted for separate or joint action on the material from which the oil is to be extracted, essentially as specified.

Fourth, The arrangement in a loose or detachable manner within the revolving cylinder or holder of a centrifugal machine and so as to rotate with said holder of the reticulated cylinder or screen in which the material is placed for action, as described.

61,464.—PEAT MACHINE.—Almon Robertson, McLean, N. Y.

First, I claim the carriage molds, a a, arranged relatively to each other and to the grinding and depositing mechanism, D1 D2, or their equivalents, substantially as and for the purpose herein set forth.

Second, I claim the presser, G, in combination with the carrier molds, a a, and arranged to operate relatively, substantially as herein specified.

Third, I claim the slack cloth, g, arranged on the presser, G, so as to be pulled off by a motion commencing at the edge or edges, as represented and described for the purpose herein specified.

Fourth, I claim the slack cloth, M, arranged as herein shown relatively to the section of molds, a a, so as to unfold, peel off and expel, in the manner and with the effect substantially as herein specified.

Fifth, I claim the roller, I, arranged to pass into and out of the several molds and replace the slack cloth, M, or its equivalent, in the manner herein shown.

61,465.—AMALGAMATOR.—Juan A. Robinson, Jr., San Francisco, Cal.

I claim an amalgamator constructed of copper and wood or an alloy of copper with frictional surfaces, substantially as and for the purposes described.

61,466.—MANUFACTURE OF SOAP.—George W. Rogers, Lancaster, N. Y., assignor to himself and John D. Shepard.

I claim the within-described manufacture of soap by subjecting the material to a high pressure at a moderate temperature, substantially as and for the purpose herein specified.

61,467.—CARPET SACK.—Adaline Rose, Bath, N. Y

I claim the carpet sack, A, with the straps, B, and buckles, and with the keepers, C, as and for the purpose specified.

61,468.—PUMP.—John Ross, Greenville, Mich.

First, I claim the arrangement of the bore, B, bores, F F, chamber, C, chambers, L M, and piston rods, P R, secured to racks, S T, in combination with the stock, A, and valve cylinders, H I, and operating substantially as described for the purpose specified.

Second, In combination therewith the vent tube, X, of the chamber, C, and notched rod, A', arranged to operate substantially as and for the purpose specified.

61,469.—MODE OF MOUNTING PHOTOGRAPHS FOR EXHIBITION.—Isaac Rowell and Francis E. Mills, San Francisco, Cal.

First, We claim arranging or mounting photograph likenesses on a plane divergent from the plane of the background and foreground, substantially as and for the purposes herein set forth.

Second, We claim the picture frame or case, A, with the sloping back for holding the background and likeness on separate and divergent planes, substantially as and for the purpose described.

Third, The combination of parallel wheels revolving independently around the same axis, for the purpose of changing the grouping and scenery of the picture, and bringing different figures in juxtaposition successively, substantially as set forth.

16,470.—PLOUGH.—Israel Long, Terre Haute, Ind.

First, I claim the adjustable beams, F F, occupying positions at opposite sides of the machine and outside of the wheels, and each adapted for the attachment of one or more ploughs, substantially as and for the purpose herein specified.

Second, I claim the combination with the ploughs, G G', beams, F F, of the collars, E E, fitted to turn upon the ends of the axle, and adjusted by means of levers or otherwise, as and for the purpose specified.

Third, I claim the combination of the plough beams, F F, collars, E E, levers, H, and notched bars, I I, all arranged and operating in the manner and for the purpose herein set forth.

Fourth, I claim the adjustable double-tree, K, in combination with the independent hounds, D D', whereby the draft may be transferred to either side of the machine, substantially as and for the purpose described.

61,471.—MACHINE FOR SEPARATING IRON FROM SAND.—George H. Sanborn, Boston, Mass.

I claim the use of the cylinder, B, when provided with the magnets, g g g, one or more rows arranged substantially as and for the purposes described, in combination with the brush, C, the hopper, D, the spout, E, the trough, F, and the drawer, J, substantially as and for the purposes set forth.

61,472.—EMBALMING BODIES.—George W. Scollay, St. Louis, Mo.

First, I claim embalming dead bodies or preserving them from putrefaction, by introducing an antiseptic gas or gases into the arterial or vascular system, substantially as described.

Second, Embalming dead bodies or preserving them from putrefaction by the introduction of an antiseptic gas or gases into the bowels, stomach, or lungs, substantially as set forth.

Third, Embalming dead bodies or preserving them from putrefaction by combining the internal and external application of the gases thereto, substantially in the manner described.

61,473.—CLOTHES DRYER.—John Seeman and Silas P. Catrow, Middletown, Ohio.

We claim, in combination with the hinged frames, B, the frame, E, hung thereto and locking together, substantially as described for the purpose specified.

61,474.—PETROLEUM STILL.—John S. Shapter, New York City.

First, I claim the arrangement of the boiler superheated and still, by which the heat from the boiler is made to pass through the superheated, and then through under and around the still.

Second, The arrangement of the furnaces, L L, collar, C, and dampers, N N N N, in combination with the coil, F, for superheated steam within the still.

Third, Inclosing a petroleum still in brick work with two side channels, one above and the other below the collar, c, and a third beneath the still, substantially in the manner and for the purpose described.

Fourth, Placing the eyeglass, Q, in a tube connected with the still, so that the operation within the still can be seen, although enclosed in brick walls with channels for smoke and hot air between the masonry and the still.

Fifth, The air pipe, S, when applied to a petroleum still for regulating the vacuum.

61,475.—RAILROAD SWITCH.—Benjamin Shiverick and Thos. L. Calkins, Philadelphia, Pa.

First, We claim the switch lever, I, contained within a building or inclosure, and arranged in respect to the door of the same substantially as set forth.

Second, The combination and arrangement of the frog rails, D and D', and switch rails, E and E', the bar, H, with inclinations, x and y, yielding plates, G and J, and rods, F and K, the whole being arranged for joint action, substantially as and for the purpose herein set forth.

61,476.—CRANBERRY GATHERER.—George Shove, Yarmouthport, Mass.

I claim the combination as well as the arrangement of the guard wires or guards, c c, with the inclined comb or series of wires, b b b.

I also claim the combination as well as the arrangement of the guards, c, the inclined comb and the trough, B.

I also claim the combination as well as the arrangement of the side plates, a a, the comb, b b b, the guards, c c, and the trough, B, the whole being substantially as hereinbefore explained.

61,477.—BUCKLE.—Earl A. Smith, Waterbury, Conn.

I claim the combination of the bow part, Fig. 4, with the lever part, Fig. 3, when they are constructed, connected and fitted for use substantially as herein described and set forth.

61,478.—GRIDDLE OR COOKING UTENSIL.—E. J. Smith, Washington, D. C.

I claim as a new article of manufacture the cooking utensil herein described, composed of plates, B B', removable rests, a a, and support, A, substantially as and for the purpose set forth.

61,479.—TRANSPLANTING TRAY.—Wm. W. Smith, Montrose, Pa.

I claim a plant tray constructed substantially as described for the propogation and growth of plants and flowers, as herein set forth.

61,480.—MACHINE FOR COMBING AND ASSORTING BRISTLES.—Nathan H. Spafford, Baltimore, Md.

First, I claim the endless apron and feed roller, E e, with the picker, E', on the shaft, F, having a continuous motion as described, in combination with the intermitting endless apron and feed roller, E' e', operated substantially as herein set forth, for the purpose described.

Second, The comb, J, with its appurtenances, consisting of the comb stock and teeth stem, J', gage plate, K, arms, K', and spring, l, all combined substantially as and for the purpose set forth.

Third, The manner of operating the comb, J, by means of the shaft, g, and crank wrist, I, in combination with the sliding stem, J', and its socket and with the adjustable joint, K, and cams, m m, substantially as set forth: and this I claim whether the intermittent motion of the comb be derived from the action of the segment, H, in the pinion, h, or from any equivalent device,

Fourth, The comb, J, and its appurtenances, in combination with the gage plate, M, operated by means of the rock shaft, L, stud, n, and toe, n', or their equivalents, substantially as and for the purpose hereinbefore set forth.

Fifth, The jaws, O, furnished with one or two yielding lips, and the levers, O" O", in combination with the cams, R, and springs, s, and either with or without the toggle-joint levers, q q, all combined with and operating by means of the windlass, P', and chains or any equivalent device, substantially as and for the purpose set forth.

Sixth, The dogs, u u, on the shaft, t", in combination with and operated by the tumbler, t, slotted bar, t', and lever, v, or its equivalent, substantially in the manner and for the purpose described.

Seventh, The endless platform, u u, arranged substantially as described, and having an intermittent motion in combination with the endless apron, W, over the deposit box, W, for the purpose set forth.

Eighth, The sweeping fingers, x' x', operating as set forth, and by means substantially as described, in combination with the moving platform, w w.

Ninth, I claim the cam, Y, rods, y y, and studs, y' y', when combined substantially as herein described, for the purpose of giving a tremulous lateral movement to the sides of the box, W, for the object set forth.

Tenth, I claim the combination of the jaws, o, with the comb, J, and the endless apron and feed roller, E' e', each with their several appurtenances arranged and operating substantially as and for the purpose set forth.

61,481.—STREET CAR.—John Stephenson, New York City.

First, I claim the pedestals, B, formed or provided with pendant jaws, a a, in combination with springs, D, located at each side of the axle box, and applied or arranged in such a manner as to admit of an universal motion or pendulous vibration of the car body, substantially as shown and described.

Second, The inverted T, connecting the lower ends of the jaws, a a, of the pedestals and arranged or applied in relation to the axle boxes, substantially as and for the purpose set forth.

Third, The truck, M, constructed with its horizontal side bars not under the springs or pendants, but at the sides thereof, and free therefrom, and connected with the axle boxes, C, or the housings, G, by means of the arms, N, substantially as described.

Fourth, The yoke, or housing, G, with one or both of the arms as described and applied to the axle boxes, C, either with or without the elastic substance, b*, substantially as and for the purpose specified.

Fifth, The clog arms, N and O, both or either of them connected with the axle boxes, or with the yokes or housings, G, substantially as and for the purpose specified.

61,482.—ROOF FOR RAILROAD CAR.—John Stephenson, New York City.

First, I claim the canopy, D, for the covering of the platforms of cars constructed separately from the roof and body of the car, and attached thereto substantially as and for the purpose specified.

Second, The smaller canopy or "frontlet," F, applied to the ends of the car roof, A, over the end ventilators, c, substantially as and for the purpose set forth.

61,483.—SOUNDING BOARD FOR PIANOS.—F. Strothmann, Louisville, Ky., assignor to Peters, Webb & Co.

I claim the improvements in sounding board for pianofortes and other musical instruments herein specified, the same consisting in separating or dividing the board, substantially as and for the purpose specified.

61,484.—CAN OPENER.—Sinius E. Totten, Brooklyn, N. Y., assignor to himself and C. L. Topliff.

I claim a tool, A, provided with a sharp edged end, c, from which projects a pointed tooth, d, substantially as and for the purpose described.

61,485.—CORK SCREW.—William H. Van Gieson, Passaic, N. J.

First, I claim constructing the upper part, B, of the stem, in the form of a twist, spiral or screw, turned in a direction the reverse of that of the lower part, A, substantially as and for the purpose set forth.

Second, The combination with the stem, A B, constructed substantially as described, of the tube, E, plate, H, or its equivalent, spring catch, I, and handle, F, the whole working together in the manner and to accomplish the result set forth.

61,486.—MACHINE FOR CUTTING TILES.—Charles Vogel, New York City.

First, I claim the sliding carriage, D, for the file blank, arranged to move forward and backward upon the bed piece, A, or its equivalent, when operated through a driving shaft, O, gears, P 2, and Q-shaft, R, having ratchet wheel, S, with which engages a pawl, T, that is operated through a pitman rod, V, hung to an adjustable arm, W, of the crank arm, Y, at one end of the shaft, Z, substantially as and for the purpose described.

Second, The combination with the file bed, or block, of the notched plate, K, for receiving the tang of the file, and side clutches or jaws, L or M, each arranged and applied to the said block, so as to be operated substantially as and for the purpose described.

Third, The springs, O 2, constructed and arranged as described in combination with the lifting beam, D 2, and eccentric or cam pulleys, T 2, substantially as and for the purpose described.

Fourth, The combination with one or more of the springs, O 2, of the lifting arm, W 2, arranged with regard to the same as and for the purpose specified.

Fifth, The arm, f 4, attached to file carriage, D, in combination with the lever, g 4, connection rod, h 4' catch, i 4, and m 4, and notched arm, e 4, of the beam shaft, O 3, when all arranged and connected together so as to be operated by the arm, f 4, substantially as described, and for the purpose specified.

61,487.—BOOT OR SHOE.—Rudolph Vollschwitz, New York City.

I claim the combination of a flexible wedge, B, with zig-zag loops, a, attached to the opposite edges of the slit or opening in a shoe or gaiter boot, substantially as and for the purpose described.

61,488.—CORK EXTRACTOR.—James Walker, Cincinnati, Ohio.

First, I claim the arrangement of adjustable guide, E, cylindrical stock, K, collar, I, crank, H, and cam headed lever, J J' K, for the purpose set forth.

Second, The provision, in combination with the above, of the thimbles, I, of equal external but dissimilar interior diameters, as and for the purpose explained.

61,489.—MACHINE FOR CUTTING SOLES.—J. H. Walker, Worcester, Mass.

First, I claim the combination and arrangement of the broad table, D, for supporting the side of leather with the adjustable bed or cutting block, L, and the reciprocating platen, K, substantially as and for the purposes set forth.

Second, The combination and arrangement with the table, D, bed, L, platen, K, and shaft, J, of the peculiarly constructed frame composed of the parts marked E H H', and G, substantially as described.

61,490.—HAND CORN PLANTER.—Lewis Weaver, Canton, Ohio.

I claim the bar, L, in connection with the valve standard, C, and opening, N, substantially in the manner and for the purpose specified.

61,491.—RAILROAD CHAIR.—Geo. Webb, Williamsport, Pa.

First, I claim the joint plate, A, resting on the ties, C, in combination with the flanged clamp, D, and rail, B, constructed and secured in the manner as and for the purpose specified.

Second, The combination of the joint plate, A, flanged clamp, D, gibs, d, split keys, e, as and for the purpose specified.

61,492.—PUMP.—J. R. Weisiger, Danville, Ky.

I claim the pump cylinder or tube, A, provided with a piston, B, partition plate, D, and valve, G, in combination with the tubes, H J L, having valves, I K M, respectively, when all arranged with regard to each other so as to operate substantially in the manner and for the purpose described.

61,493.—PEAT CAR.—Thomas J. Wells, St. Anthony, Minn.

I claim a car for transporting and drying peat, constructed with a series of frames, arranged substantially in the manner as herein shown and described.

61,494.—CHURN AND EGG BEATER COMBINED.—George C. Westover, Paducah, Ky.

I claim the construction and combination of the churn, with its devices, G H I J L M, as herein described and for the purposes set forth.

61,495.—LIME KILN.—George W. White, Greensburg, Ind.

I claim the horizontal taper lime kiln, A, when constructed as described, and provided with the doors, b, and dividing perforated partition, c, in the manner and for the purposes set forth.

61,496.—WASHING MACHINE.—Isaac Whitney, Dayton, Ohio.

First, I claim the hinged soaping box, I, with its bars, n n, and removable trough, L, adapted to contain either bar, or soft soap, substantially as described.

Second, The combination of the brush roller, F, with the corrugated wooden roller, E, substantially as described.

Third, In combination with the brush roller, F, and corrugated wooden roller, E, I claim the treadle, k, substantially as and for the purpose set forth.

Fourth, The arms, C, operating independently of each other by means of the elastic bands, D D, in combination with the corrugated roller, E, in the manner and for the purposes described.

Fifth, The combination of the corrugated wooden roller, E, brush roller, F, treadle, k, gear wheels, H c, arms, C, spring, D, and soaping cover, I, and trough, K and L, substantially as and for the purposes set forth.

61,497.—WINDOW FASTENER.—L. C. Wing, Concord, Mass., and A. R. Bradeen, Waterborough, Me.

We claim an improved window blind fastener, formed by the combination of the arm, A, bars, B and C, perforated plate, D, and spring bolt, E, with each other, substantially as herein shown and described and for the purpose set forth.

61,498.—CLOTHES DRYER.—Leonard Wordworth, Morrison, Ill.

I claim the braces, D D, in combination with the standards, A A B B B B, and bars, e e e e, substantially as and for the purpose set forth.

61,499.—TOOL FOR CUTTING OFF BOILER TUBES.—Nathan Wright, Jersey City, N. J.

I claim a tool for cutting off boiler and other tubes, constructed substantially as described, or in any other equivalent manner, so that a thrusting cut is given to the tool, and whereby the same action that thrusts the cutter through the tube also serves to complete the operation of severing the same by a draw cut, essentially as specified.

61,500.—LIFE BOAT.—William H. Wylly, Savannah, Ga.

I claim the boat consisting of the gutta percha or elastic sides, A B, keel, C', copper covering, b, flexible tube, c, force pumps, D, bars, I, seats, J, supporting bars, f f, rudder, D', when all are constructed and arranged as herein set forth and for the purpose specified.

REISSUES.

2,463.—SEALING FRUIT JARS.—Wm. H. Lyman, Boston, Mass., assignee by mesne assignments of Elbridge Harris. Patented Feb. 9, 1864.

First, I claim forming a groove or depression in or around the neck of a can, for the retention of an elastic ring or band impervious to air, substantially as and for the purpose described.

Second, The employment of an elastic ring or band when used between the rim of a cover and the neck of a can, substantially as and for the purpose described.

Third, I claim as a new article of manufacture, fruit jars composed of the rim cap, G G', elastic ring or band, D, and jar or can, D, substantially as and for the purpose described.

Fourth, I claim the rebate formation, C, in combination with the elastic band, B, and the flange, G' substantially as and for the purpose described.

2,464.—HARVESTER RAKE.—Adam R. Reese, Phillipsburg, N. J. Patented Feb. 16, 1864.

First, In a floating beam harvester I claim a rake standard rigidly attached to and vibrating with the platform and supporting the rake shaft between the driving wheels.

Second, I claim the combination of radial rake arms pivoted between the vertical rake shaft and the rake head, and a guide located between the rake shaft and the pivot.

Third, The combination of revolving rake and reel arms with a camway between two parallel cams, for the purpose of keeping the rake and reel arms firmly in position while revolving.

Fourth, The combination of a hinged platform, a support of the revolving rake rigidly attached to and moving with the said platform or finger beam and radial pivoted rake arms.

Fifth, the combination of the rake shaft, K, with the driving shaft, o, by means of the endless chain, M, when arranged and operating substantially in the manner described, for the purpose of driving the rake in any position of its shaft without the intervention of gearing, as set forth.

2,465.—HARVESTER RAKE.—Adam R. Reese, Phillipsburg, N. J. Patented May 1, 1866.

I claim, First, In a harvester having a hinged cutting apparatus, the combination of a revolving rake and reel attached to and vibrating with the platform of said harvester, and a driver's seat located upon the main frame, the whole so arranged and operating that the rakes shall not revolve over the driver.

Second, The combination of a hinged cutting apparatus, a driver's seat on the main frame, and hinged radial rake or reel arms.

Third, The combination of the finger beam and main frame with the tubular X-shaped frame, G G', as described, for the purpose of supporting and bracing the rake shaft.

Fourth, The combination of a revolving rake and reel attached to and moving with the platform of a hinged finger beam machine and endless chain and shives having pockets or cells, whereby the revolving rake and reel can be driven while it is free to rise and fall with the platform.

Fifth, The combination of an endless driving chain, a pulley on the main shaft, a corresponding pulley on the vertical or nearly vertical revolving reel and rake shaft mounted on the finger beam or its extension and the intermediate guide for guiding the chain, between the main shaft and rake shaft.

DESIGNS.

2,560.—COAL SHOVEL.—Samuel W. Gibbs, Albany, N. Y.

2,561.—TRADE MARK.—August Heidelberger, New York City.

2,562 and 2,563.—CLOCK CASE.—Nicholas Muller, New York City.

2,564 and 2,565.—CASTER FRAME.—Horace C. Wilcox (assignor to the Meriden Britannia Company), West Meriden, Conn.

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CONTENTS:

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Weight of slabs to produce boiler plates (from 10 feet to 18 feet, superficial measure, from ¼ inch to 1 inch in thickness, allowing for heating, rolling, and cropping).
Weight of piles to produce boiler plates (from 2 feet to 9½ feet, superficial measure, from ¼ inch to 1 inch in thickness, allowing for heating, rolling, and cropping).
Weight of piles to produce boiler plates (from 10 feet to 18 feet, superficial measure, from ¼ inch to 1 inch in thickness, allowing for heating, rolling, and cropping).
Weight of piles to produce sheet iron (from 2 feet to 9½ feet, superficial measure, from 4 wire gage to 14 wire gage allowing for heating, rolling, and cropping).
Weight of piles to produce sheet iron (from 10 feet to 18 feet, superficial measure, from 4 wire gage to 14 wire gage, allowing for heating, rolling and cropping).
Weight of piles to produce sheet iron (from 2 feet to 9½ feet, superficial measure, from 14 wire gage to 30 wire gage in thickness, allowing for heating, rolling and cropping, both bar and sheet).
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Table showing the thickness of the bar gage in decimals.
Table showing the weight per foot and the thickness on the bar or wire gage of the fractional parts of an inch.
Table showing the weight per foot, and the thickness on the wire gage of the fractional parts of an inch.
Table showing the weight per sheet, and the thickness on the wire gage of sheet iron 2 feet long by 1½ feet wide, from 4 sheets to 70 sheets, to weigh 112 lbs. per bundle.
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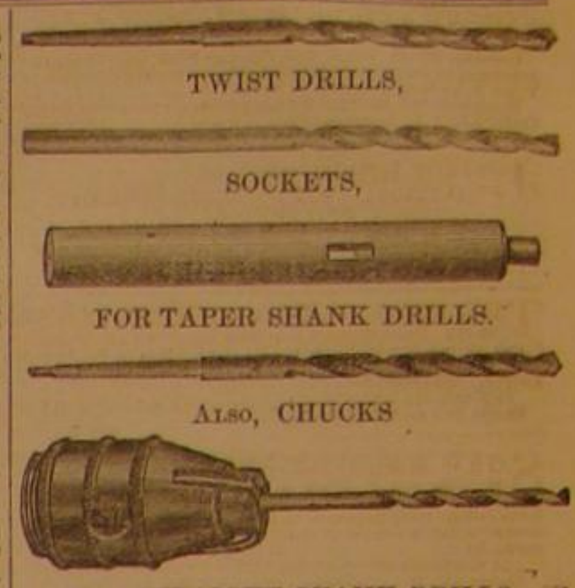

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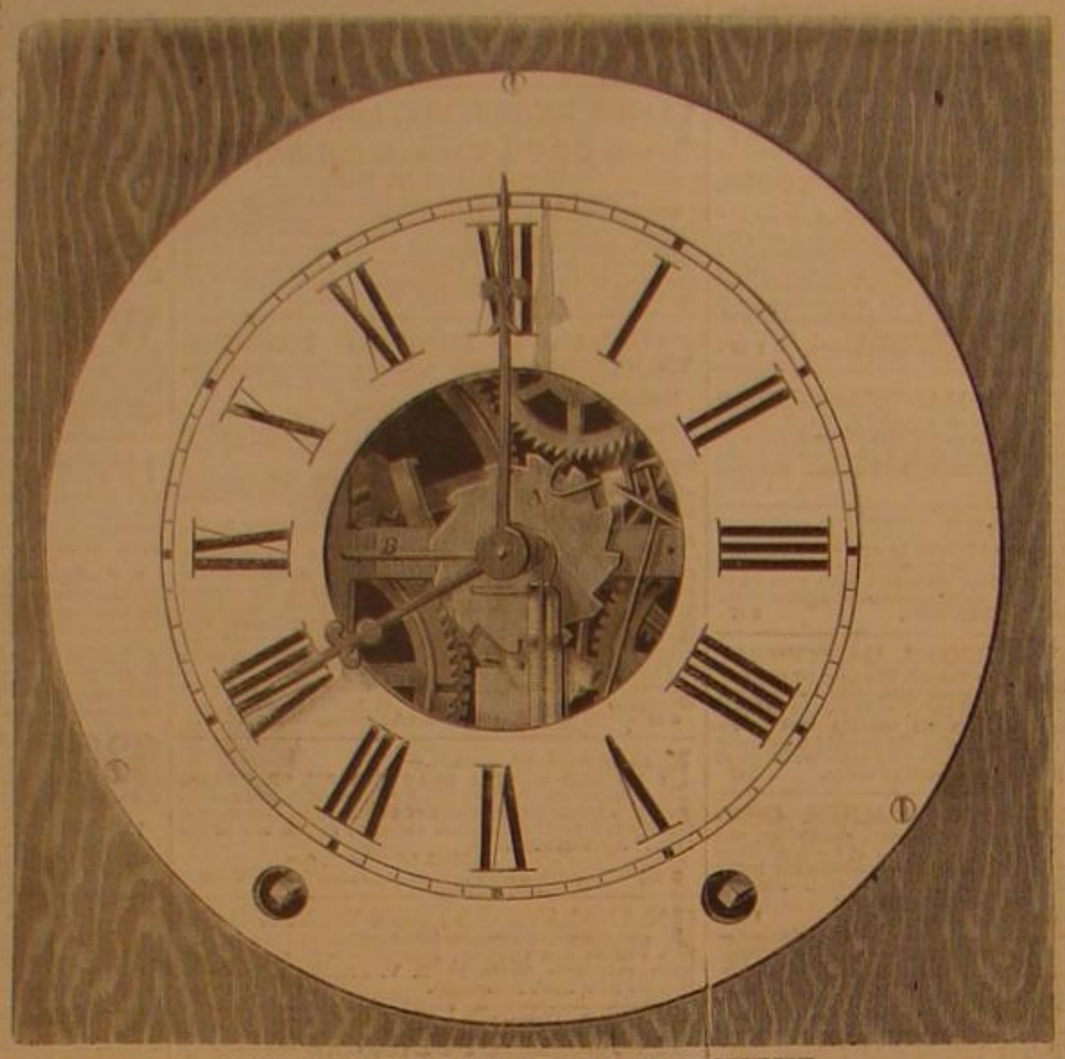
Improved Differential Movement.

The three engravings herewith presented show different views of a device for taking the place of the cannon wheel, lifting wire, and connections, which constitute the differential movement. Fig. 1 is a clock face showing a front view of the attachment; Fig. 2 a face view of a temporary model, and Fig. 3 a reverse view of the same. The hour hand is rigidly secured to the ratchet wheel, A, which turns on the spindle that carries the minute hand. This wheel is held against the face plate by a spring, B. The minute hand is attached to the spindle by a sleeve in a manner similar to the ordinary way of attaching the hour hand. The minute hour spindle has attached at the rear of the face plate two cams, C, the outer one of which gives a reciprocating movement to a long lever, D, and carries a shorter one—jaw seen at E—which is pivoted at F, and has a projecting pin G, that engages with the teeth of the wheel, A.

The operation is as follows: When the clock is to be set to the hour the minute hand is turned two-thirds or five-sixths of a revolution as the cams may be set. The pin, G, by the movement to the lever, E, is carried out of the wheel teeth and transversely across and up sufficiently to again engage a tooth before the hour hand receives any motion. The wheel is then turned by the pin one tooth or one-twelfth of a revolution. From this brief description watch and clock makers may understand the device and its objects. The inventor claims it is cheaper than the common differential movement in a clock, that there would be no pin and washer to be lost, that applied to a watch the face could be made permanently fast and the wheels would not get changed by watch tinkerers. It is the subject of a patent obtained March 13, 1866, by Hoban J. Holden, of Genoa, N. Y. He will furnish any additional explanations.



HOLDEN'S DIFFERENTIAL MOVEMENT.

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Should the question be propounded to any one haphazard; "what machine is most generally used?" he might reply, the sewing machine. But although the number of these useful machines which have been manufactured and sold within the past fifteen years is almost incalculable, and they are in common use, we are disposed to award the palm to the pump.

Just glance at the variety of form, the numberless adaptations of one single principle, to say nothing of the designs which are the product of the fancy, and we find among the list, pumps with one bucket and those with two in the same chamber; pumps with and without valves; those with valves of leather, brass, wood, lead, glass, india-rubber, canvas, and combinations of several of these; pumps in which the bucket is the valve; those with flexible barrels or cylinders and others with them of rigid material; those the barrel of which works on a fixed piston, and others having a compressible air chamber for ejecting the water. Every manufacturer seemed to suppose his pump could be of little value unless it was as different from all others as it was possible to make it; still the same principle is at the bottom of all of whatever style and operation; that of atmospheric pressure, vulgarly called suction.

As pumps are the most generally used of machines, so they are the most generally abused. The common household pump is used to pump turgid and sandy water, which rapidly cuts away the valves, of whatever material made. It is left with water in the barrel and the valves allowed to freeze. It is exposed to the action of the salts held in solution in spring water, and is operated by the mechanically inclined, by adults, children, and by anybody. It is evident, then, that the simpler the pump, the fewer its parts, the stronger its build, the better it is fitted for its work. That pump which fulfils these conditions and can be repaired by any person of ordinary ability, being made of material not likely to injuriously affect the water for domestic purposes is the best common pump for ordinary uses. The object, then, of the improvers of the pump who are continually claiming to perfect this implement should be to make it so simple and durable that getting out of order shall be nearly impossible unless from legitimate wear. Such a pump would, to be sure, largely diminish the amount of work now expended in repairs, but as these repairs are not the special business of any workshop but are generally done by home tinkerers, this loss would not be felt except as diminishing vexation and annoyance.

Fig. 2

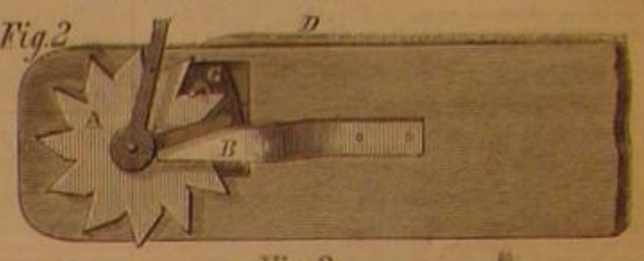
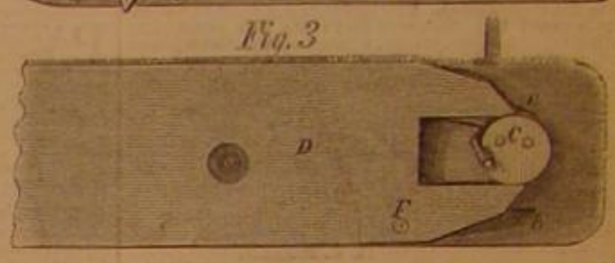


Fig. 3



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National Academy of Design.

Forty-two years ago the resident artists of the city of New York united in forming a "Drawing Assocition," having for their object the study of art and social intercourse among the members. The Association prospered in such a degree that, during the following year, their organization was extended and perfected, and in January, 1826, they adopted the name of the National Academy of Design, soon after obtaining a charter from the State Legislature. Although thus auspiciously inaugurated, the subsequent record of the society shows for many years a varied and precarious existence, with no permanent abiding place, but removing from place to place, as convenience or circumstances dictated, holding its annual exhibitions with commendable regularity, but too often attended with pecuniary loss to the members. But two years since marks an important era in the history of the organization as witnessing the completion of the magnificent edifice located on Twenty-third street, corner of Fourth Avenue, and represented in the accompanying engraving.

The building is eighty feet wide on the street, and ninety-four feet long on the avenue, and stands three stories high. On the ground floor are the janitor's rooms and the apartments occupied by the School of Design, including three studios or alcoves on Fourth Avenue, a hall for casts and models, and the spacious rooms of the Life school.

The story above is devoted to the reception rooms, library, and the commodious lecture hall. This floor is reached by a a double flight of marble steps on the Twenty-third street front. The principal doorway is surmounted with a broad archivolt enriched with sculpture and varied by alternately white and gray voussoirs. The supporting pillars, two on either side, are of red Vermont marble with white marble capitals and bases.

Entering at this main entrance, passing through the vestibule, a double flight of broad stairs leads to the grand hall on the upper story. This hall measures thirty-four by forty feet, and is divided by a double arcades supported on columns of polished marble. Here are hung the works of art belonging to the Academy, and opening out of it are the exhibition galleries, four in number, and the gallery of sculpture.

The halls and vestibules throughout the building are floored with mosaic of tiles. The stairs, doors, windows, and door and window trimmings, are of oak and walnut combined oiled and polished. On the exterior, the basement walls are of Westchester gray marble with bands of North River graywacke. The white marble of the first story walls is similarly banded. The walls of the third story have a checkered pattern, being built up of small oblong blocks of white and gray marble. The School of Design is lighted by double windows with segmental arches, the middle supporting column having richly carved capitals and bases. The archivolts of all the windows are decorated by voussoirs of alternately white and gray marble. In the upper story there are no windows, but circular openings for ventilation, filled with elaborate plate-tracery. Under the platform of the principal stairway is a triple arcade inclosing a drinking fountain, and having decorations of sculpture, which, with the elaborate mosaics on the tympanum above the main door, give a richness to the front of the edifice to which an engraving of this character can not possibly do justice.

The style of architecture may be designated the "revived Gothic," embracing the features of the different schools of architecture of the Middle Ages, which are most appropriate for our buildings of modern date. The building was designed by, and erected under the supervision of, Mr. P. B. Wight of this city. All the exquisite sculpturing throughout the building was executed under his directions by stone-carvers who cut each leaf and flower from natural models gathered from the woods and fields. The contract for the building did not include this work, but the whole was paid for by the day, a special appropriation being made for this purpose. The result has been the adornment of a building which, thus completed, stands as an honor to the city, and well sustains its character as the first Academy of Fine Arts on this side of the Atlantic.

NATIONAL ACADEMY OF DESIGN.

New Chemical Toy.

"Pharaoh's serpents" and "Vesuvian tea" have paved the way for the reception of a new Chinese wonder in the shape of "ferns growing out of burning paper." This is a neat little experiment, free from many of the disadvantages appertaining both to the "Devil's tears" and the lozenge-shaped crystals of bichromate of ammonia, which may chance to prove too inviting to children's tastes. The instructions direct us to crimp or fold the yellow papers backwards and forwards, so that when opened out they may be supported upright in a zig-zag form. One of these slips is then placed upright on a plate, and ignited in two or three places along the upper edge, but without being allowed to blaze. It will burn slowly down with a red glow, diffusing an agreeable perfume, while the ash of the paper assumes the most fantastic arborescent shapes, together with a green color, which, to a lively imagination, may be suggestive of the growth of ferns or lichens. We had no difficulty in imitating this effect by saturating thin cartridge paper, in the first instance, with an alcoholic solution of gum benzoin, and, when dry, applying an aqueous solution of the bichromate of ammonia. The decomposition of the latter substance by heat in contact with burning paper affords an explanation of the phenomena observed.—*Chemical News.*

SELF-ACTING GUN CARRIAGE.—The invention of Captain Moncrieff (Scotland) for gun carriages, is designed to utilize the force of the recoil to throw the gun into covered position for reloading, and afterward to return it to position *en barbette* by means of a residue of the same force stored, as it were, in a counter weight which is raised by the recoil; regulating the recoil and then aiding the return.

SOUTH-WEST ALLEGHANIES.

VEGETABLE DEVELOPMENT—GRAPES, FRUITS, FROSTS—WATER POWER.

As public attention is now directed to the South as the future field upon which Northern enterprise is to expend its energies, all well-ascertained facts become of importance.

The progress of vegetable development is a question of great moment when considered in connection with its relations to the different altitudes of the mountains, and the production of certain articles which are to become future staple commodities in the trade of the country.

Difference in elevation has the same influence, relatively, upon the advancement of vegetation that is produced upon it by difference of latitude. To the horticulturist, a careful investigation of this subject is of more than ordinary interest.

Take the facts as they were collected. Leaving Cincinnati on the 10th of March, 1859, I found the vegetation still locked up in the embrace of winter, though the weather for many days had promised an early spring. On the 11th, at Louisville, the buds of the swamp elm, the swamp maple, and sweet gum, were considerably swollen, and the blossoms of the elm forming. On the 12th, at Smithland, Ky., the peach blossoms were out, the leaves of the apple tree forming, and the lilac in leaf. From thence to Murphy, Cherokee county, North Carolina, I found the vegetation in the valleys gradually progressing. Here my investigations assumed a systematic form.

On the 27th of April, a special examination was made of the relative progress of vegetation between the valleys and the mountains. The point selected was the head of Valley River, where I had previously made a measurement of the hight of the mountain intervening between that river and the Nantahala River. In the valley, the leaves of the forest trees had attained half size. In ascending the mountain they gradually diminished, so that at the hight of one thousand feet, they were about the size of the feet of rats. This, however, was only in the more advanced trees, while in others the buds were just beginning to swell, but had not bursted. At two thousand feet above the valley all the trees seemed unconscious of the presence of spring. The plants and grasses at that elevation, were pretty well forward, because the sun's heat had reached their roots and quickened them into life.

On the 9th of May, this point was again examined. The leaves on most of the trees in the valley had attained their full size, and at one thousand feet they were at half size; while at two thousand feet they were but little advanced and none of them larger than rat's feet. Thus it appears that there is at least two weeks' difference to each thousand feet in the vegetable progress in these mountains. From two thousand to three thousand feet, the buds of the trees on the day named were only beginning to swell, while the grass was well up the whole distance and some of the flowering plants in full bloom.

To verify the deductions made up to the 9th of May, the investigations were extended, on the 20th of the same month, to Tusquitta Mountain, ten miles south of Valley River. The trip was made in company with a hunting party. Vegetation, of course, was in advance of what I found it on the 9th; but it was advanced in the third thousand feet only to the condition prevailing in the second thousand at the latter date.

The oak leaves were yet very small as we neared the summit of the mountain, and still retained their varied hues of red. They would not be fully spread and assume their summer's green, I was assured, until the first of June. The leaves of the chestnut were about one-fourth size, being in advance of the oaks. The grass and common herbage was in fine condition, and the strawberries in bloom. The stock raisers of the valleys were driving their cattle to the prairie grounds on the mountain's summit, to leave them there until winter without any other attention than an occasional supply of salt.

It may be considered a well-ascertained fact, that there is about two months' difference between the progress of vegetation in the valleys and upon the summits of the highest mountains in the section of country under consideration. The intelligent horticulturist will know how to take advantage of this condition of things.

A few facts will serve to show the adaptation of this section of country to wine making and the cultivation of fruits.

Near sixteen years since, Mr. N. E. Guerin, an educated and intelligent French gentleman, settled in the southwest Alleghanies. Soon his attention was directed to the abundance of the wild-grape vines which he found growing luxuriantly at different elevations in the mountains. From this fact he was induced to attempt the cultivation of the grape, with an intention of entering upon the manufacture of wine. Before his arrival several Swiss and Germans had attempted vine culture in the valleys, but it had turned out badly. Having spent a long time in the vine country of south and middle France, M. Guerin hoped to overcome the difficulties which had discouraged his predecessors; and, accordingly, began his vineyards on the declivities of the hills, about six hundred to eleven hundred feet above the valley of the Ocooe River. In these situations the effort has been very successful, mildew and rot, which had been so destructive in the valleys, never affecting the grapes, and frost very seldom killing the fruit buds. The vine here, M. Guerin says, produces a third more than in France, and the wines may be made of as good quality, differing only in *bouquet*. They keep very well, and, like those of France, improve in quality by age. He depended mainly on the Catawba and Isabella grapes, both of which are natives of the mountain range upon which he is located.

That the highlands of Tennessee and the mountains of North Carolina can be made to yield the peach to the greatest perfection, is a question about which there is no longer any doubt. The only obstacle at present to the extended cultivation of the peach in the South, for the markets of the North, is the want of railroad facilities for transportation. This difficulty may now be overcome; and then the only remaining problem will be whether the peach crop will be as certain as that of corn, or but once in every three to five years, as at the North.

This brings me to the consideration of the subject of the extent and effects of the frosts in these mountain regions, a point that has been but partially understood or examined. I found a number of places in the mountains where peach orchards had borne for nearly twenty years without any failures, except from winter freezes—no white frosts ever having fallen upon the vegetation.

In the valleys, and extending to a hight of about three hundred feet above the beds of streams, the white frosts are severe: but the next four or five hundred feet above the first three hundred is found to be exempt from white frosts. So definite is this rule, that in corn fields and among the ordinary wild vegetation everything in the valley and upward through the first belt, may be killed down, while all in the next belt remains perfectly green, sometimes the lower half of a plant being killed while the upper half remains unaffected. Thus, all orchards and vineyards in this upper belt are exempt from the action of the white frosts, and continuous annual crops are rendered secure.

At one time, when it was the fashion to disparage the South, I listened to a harangue from a member of Congress at Portland, Me., who, among other assertions, declared that the South had no water power, and that the establishment of manufactories, to any considerable extent, in rivalry of New England, could never be effected. Well, having then but recently returned from the South-west Alleghanies, I was surprised to find such gross ignorance of its natural resources.

Take a few facts as to one of many similar localities. Take Cherokee county, North Carolina. First, there is the Little Tennessee River bordering it on the east, with a number of creeks running into it upon the east; then Cheoah River, made up of Tellulah, Long Creek, Atoah, Big Snowbird, Little Snowbird, West Buffalo, Santeetlah and Slick Rock Creeks, on the west, with one or two on the east; then Valley River, with its tributaries; Hiwassee River, with Peach Tree, Fier's Creek, Tusquitta and Shooting Creeks, on the east, and several others on the west; then Notley River, and other streams which it is needless to enumerate. The amount of water in many of the creeks is ample for water power, and the rivers, if not available, will be useless because of a superabundance of water.

The fall in many of the mountain streams is very considerable, often fifty to eighty feet to the mile and sometimes more. The rivers have a proximate uniformity of fall, that may be understood from the investigations in relation to one of them. The Ocooe River, for a distance of twenty-four miles, from Ducktown Copper Mines to Park's Mill, has a fall of nine hundred and sixty-four feet, or about forty feet to the mile. From thence to its junction with the Tennessee River, the fall is sixty-two feet, and the distance about twenty-five miles. The other rivers being equal to the Ocooe in the amount of fall they possess, it will be easy to estimate their adaptation to manufacturing. And when the mildness of the climate, the healthiness of the country, and its central position between the grain-growing and cotton districts is considered, it needs no prophet to foretell that this region must one day be the Manchester of the United States.

In relation to timber, it is only necessary to say that the varieties are the same that prevail throughout Tennessee, Kentucky, Ohio, and Pennsylvania, only that in many of the coves and mountain sides, the trees are often much superior in size and symmetry. As a store house of ship timber, the section of country under consideration has few rivals in any other part of the country, oak being the prevailing timber.

D. C.

Coloring Steel and Other Metals.

[For the Scientific American.]

Besides transparent varnishes, which are sometimes used to give different shades of color to metals, and which are liable to the objection intimated in my note, page 354 of the present volume, of being removed by use, there is another method which consists of covering the metal with a very thin film of its oxide, sulphide, phosphide, etc., or with some other metal: the color produced by such film is a result of the interference of the luminous rays, and is produced by the same cause as the color in the soap bubble, in the mother of pearl, or in the rings seen when a glass lens of very slight curvature is pressed on a flat piece of plate glass, and which are called the rings of Newton, as he first discovered them and attempted an explanation.

These almost incomprehensibly thin films show no colors when their thickness is 1-200,000th part of an inch or less, as Newton has demonstrated: when 1-180,000th part thick they show a yellow color; when 1-165,000th, orange; 1-150,000th, red; 1-135,000th, violet; 1:120,000th, indigo; 1-100,000th, blue. These quantities correspond with the length of the luminous waves, and this correspondence is the cause of the color. When the thickness of the film becomes greater, the series of colors is repeated several times, with slight modifications.

The same series of colors show themselves in different circumstances, as by the tempering of steel, in which case the temperature required to give to the steel the right degree of hardness for its especial destination is recognized by the color it takes under the influence of a well-regulated heat, and this test is for the practical workman more reliable than probably could be found by the thermometer. Steel first heated and then suddenly cooled is too hard for most purposes, and is to be tempered afterward: to do this, part of the object is cleaned and made bright, in order to observe the color of the film of oxide which covers it when it is reheated.

When steel is not tempered afterward, but left as hard as the first heating and sudden cooling down makes it, it is called glass hard: this is the case with files. Other tools for working metals are very slightly tempered, till they show a pale straw yellow color, which indicates a temperature of 380° Fah.: razors are tempered straw yellow color, which indicates a temperature of 410°; chisels for carpenters, yellow, 446°; penknives, brown yellow, 432°; common knives, dark pink, 500°; swords, blue, 530°; watch springs, deep blue, 555°; loss of all hardness, dirty or greenish white, 600. If the last case happens by carelessness, the heating to some 1000° and sudden cooling has to be repeated, in order to make the steel glass hard first before tempering.

In some special cases the hardening and tempering is done by one single operation, namely, heating the steel only to 700°, 800° or 900° and then suddenly cooling, in which case the hardness will be greater in proportion as the heat was greater.

The hands of watches and clocks and other small objects are made blue or dark pink in the same manner, not for the sake of tempering but as a preventive against rusting. The best way to color such small objects is to lay them on a heavy piece of iron made hot beforehand: they are then easily watched, and will be seen to become successively yellow, brownish, reddish, violet, blue, and must be removed from the iron just before the desired color is ready to appear.

Another method is to cover iron with a thin coating of sulphur of phosphorus, or rather, not with the substance itself but a compound of it with the iron, thus properly, to coat it with sulphide of iron: so the beautiful blue protective coating of the Russian sheet iron is nothing but phosphide of iron.

The same series of colors are seen in the silver daguerreotype plate when it is exposed to the vapor of iodine: the thin film of iodide of silver during its steadily increasing thickness exhibits the very same color as we see in tempering steel, only purer, as the silver is a whiter metal. Such a plate will show in succession the same series mentioned above—straw yellow, dark yellow, reddish pink, violet blue, greenish, white, straw yellow, reddish, and then comes about the same series again: but it is a singular fact, of which very few photographers who practice the daguerreotype process are aware, that not only the first thin yellow and reddish film is sensitive to light, which property is not shown by following films, but that again the afterward-appearing much thicker film of yellow color is again sensitive to the chemical luminous impressions.

An entirely different and much more beautiful method of producing these colors is by the chemical action of the galvanic battery. This was first discovered by Nobili, who connected a bright metallic plate with one pole of the battery, and with the other pole he connected a platinum point, and then immersed both plate and point in a solution of some metallic salt. When the point was kept very near to the metallic plate without touching it, colored rings were formed on the plate around the point, similar to the rings of Newton above mentioned, and of which the color depended also on the thickness of the deposit, which was either the oxide of the metal itself or a precipitate from the solution, according to the connection of the metal with the positive or negative pole of the battery.

Becquerel has made a practical application of the principle, in covering easily oxidizable metals with a preserving coat of oxide, in place of covering them with a film of gold or platinum: he found that a coating of peroxide of lead or of iron is a preservative which withstands the action of great heat, as these oxides are almost fire proof. The only difficulty to solve was, how to make these coats of oxide adhere well to the metal, and he found that when the solution is made by dissolving these oxides in alkalies the desired adhesion is obtained.

The lead solution is obtained in boiling three parts of litharge in forty parts of water and four parts of caustic potash; when cold add forty parts of water, and pour it into a porous cup, in which the metal to be covered is suspended, after being carefully cleaned and made rough with pumice stone. The porous cup is placed in water acidulated with one twentieth part of nitric acid: a metallic plate is plunged into this and connected with the negative pole of a simple constant galvanic battery, of which the positive pole is connected with the metal to be covered. The water is decomposed, its oxygen unites with the protoxide of lead, which is carried to the metal, so that this is not oxidized but in the course of a few minutes covered with a beautiful dark brown coat of peroxide of lead, which adheres so strongly that it can stand the friction of a burnisher.

The iron solution is made by heating the protosulphate (green vitriol) in liquid ammonia: it is used in the same way as the lead solution. The deposit is first brown red, becomes darker when the thickness increases, and in the course of several hours forms the color which the painters call "Mars red." But those thick films have not so much adherence, and it is better to stop the operation in a few minutes, as soon as the red coating becomes visible. It must be remarked that copper cannot be coated by this solution by reason of its peculiar affinity for ammonia.

When the intention is only to color the metals with a very thin coating of peroxide of lead, the operation is simple. Saturate a solution of potash with peroxide of lead, connect the metal to be colored with the positive pole of a battery and place it in the solution, connect the negative pole with a platinum wire, and move the end of the wire about the neighborhood of the metal to be colored: when keeping the point of the wire on one place the rings of Nobili above mentioned are produced. By placing this platinum wire in a

glass tube, so that only the extreme point projected, and then the electricity was allowed only to escape from the point. Becquerel produced designs in different colors on the metal. These colors are very beautiful, and being produced by an exceedingly thin transparent film, are modified by the metal on which they are deposited. Gold, silver, copper, platinum, steel, brass, britannia ware, etc., or gilded, silvered and coppered objects, in this way receive the brightest colors, and the success depends in a great measure on the previous careful cleaning of the metal which is to receive the deposit: touching with the fingers will interfere with the results, but if the operation fails, all one has to do is to place the metal in acetic acid, which dissolves and removes this oxide of lead, and it may be recommenced. Also a copper solution has been recommended in place of the lead solution. It is prepared by dissolving four parts of blue vitriol and six parts of white sugar in eighteen parts of water, and adding so much caustic potassa as to redissolve the precipitate of oxide of copper which is at first formed.

When the battery is too strong, a yellow deposit results, which peels off. Six small cups of Smee's battery, filled with water only slightly acidulated, perform the operation in from one to two minutes.

It is found that when metals thus covered are exposed to acid or ammonia exhalations the film is changed in the course of time. To obviate this difficulty Becquerel covers the objects with a varnish overcharged with oxygen. To prepare this varnish he exposes for two hours to a moderate heat two pounds of linseed oil mixed with two drachms of litharge and half a drachm of sulphate of zinc, and filters. Apply with the brush: if too thick dilute with spirits of turpentine or benzine. V.

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, January 24th, Prof. Tillman presiding.

The Chairman presented his usual summary of scientific items, some of which may be thus briefly referred to. The French Government have made a late survey of the Brazilian coast in which there were taken 178,000 angles and 160,000 soundings. Alexander Herschell has succeeded in obtaining a spectrum of a bright meteor and the spectra of meteor tails and finds the metal sodium present in the state of vapor. A small and perfect plant has been found in Hot Creek district, Nevada, which seems to thrive only in water so hot that the hand cannot be held in it. The London Pneumatic Company can send 120 tuns of goods through 18 miles of tubes every hour by means of atmospheric pressure at a cost of one penny a tun per mile. A meteorite weighing nearly 1,600 pounds has lately been sent to Paris from Mexico. Mr. Dauge of the Academy of Science, Brussels, finds that the refraction of the emergent rays in the atmosphere exterior to the sun's photosphere may augment the apparent diameter of the sun, and the mean period of its rotation, also retard the apparent motion of a spot in proportion as it recedes from the sun's center; this may account for some recently observed phenomena. The number of cases of cattle disease in Holland in December last was more than double the number in December, 1865, and its reappearance is reported in England where the pecuniary loss to the agricultural community on this account has already reached £3,500,000. Dr. Louvel has satisfactorily demonstrated the fact before a French Commission that animal and vegetable substances can be kept unchanged for any length of time in a vacuum. Professor Wyman, after careful measurement avers that the accuracy of workmanship of the bee has been greatly exaggerated and that the typical form of the cell is rarely realized. A memoir on blood relationship in marriage by Dr. Mitchell is published by the London Anthropological Society, in which the writer shows that consanguinity in marriage injures the offspring, the effect being enfeebled constitutions, bodily defects, impairment of the senses or nervous system, and sterility.

STAVELESS BARRELS.

A cylindrical barrel of novel construction was shown, designed for holding coal oil, and built up of thin strips of white oak laid across each other and held together with glue or cement. The veneers, of any desired width, are laid on spirally around a mold till a perfect cylinder twelve or fourteen layers thick is formed. The heads are made in a similiar manner, and when completed the barrel is perfectly tight, of great strength, weighs but little, is manufactured in less time and can be put into market at one-fourth the cost of any petroleum barrel now in use.

STEAM BOILER EXPLOSIONS.

This was the subject of a valuable paper read by Mr. J. A. Miller, in which he discussed the theory of explosion and proposed a plan for their prevention. The action of the sun on the surface waters of the ocean in causing evaporation, was used as an illustration wherein steam or vapor of water rises into a kindred element free from violence. In an engine boiler, on the other hand, the heat is applied below the water and must force its way up through a dense medium, but not before the whole liquid has been charged with as much steam as it can hold, and still further to impede its progress the makers fill nearly the whole steam space with tubes. When the liquid mass is surcharged the vapor cannot be released until either the pressure is relieved or its power of expansion is increased by heat, and this immense power stored in the water is the admitted cause of boiler explosions.

A REMEDY SUGGESTED.

The speaker referred to some diagrams he had prepared showing his new system of constructing cylinder, cylindrical flue, upright, tubular, and the American steam boilers, so that the atoms of steam as formed are mechanically carried directly into the steam space, and thus separated from the water will easily rise into their own element no matter what the pressure. As the result, steam is made rapidly, and the boiler contains water free from steam and steam free from water, and even if a rupture takes place it is simply a relief of pressure rapidly or slowly, and the effect is no more disastrous than the giving way of a steam pipe distant from the present boiler.

BEET ROOT SUGAR.

By appointment, Dr. Hirsch read an able and exhaustive article on the above subject, giving the history of its introduction into France, the patronage its manufacture received from Napoleon I., and the opposition it encountered from the English sugar merchants, and detailing at some length the best mode of cultivation and the various processes of manufacturing. The discussion of the several points brought forward in these two papers was laid over for one week.

Editorial Summary.

A UNITED STATES VESSEL FOR THE COLOMBIAN NAVY.—Our readers will remember a very swift vessel named the *R. R. Cuyler*, which at the beginning of the war was engaged in the trade between New York and Savannah, but was purchased by the United States Government for $165,000, and placed in the navy. She was a terror to blockade runners on account of her speed, and during the war captured some important prizes. At the close of the war she was sold at auction in New York, and her new owners, changing her name to the *Rayo* (lightning), placed her in the New Orleans trade. She has recently been purchased by the Colombian Minister for his government, and is to be armed with six 9-inch Dahlgren's, and two sixty pounder rifled Parrotts. She is 538 feet long, 32 feet breadth of beam, and registers 1202 tunnage, and is to be manned by a complete crew of Americans.

GWYNNE'S PUMP has been sucessful in raising upwards of thirty sunken vessels in British waters. The steamship *London*, sunk in the river Tay in November last, on the 22d of December was raised to the surface in twenty minutes, and with some delay in attempting to cut away a bulkhead that held back the water in the forecastle, the ship was ready to be taken in tow and floated up the river in less than two hours after the first stroke of the pumps. The pumps used were two with twelve-inch and one with nine-inch suction pipes, placed on vessels alongside, and a four-inch and a nine-inch placed on board the *London* after she rose to the surface. The vessel had been sunk by a collision, and the hole in her hull, as well as the access of water through the hatches, were of course remedied as well as possible while under water.

NUMBER OF WORDS IN USE.—Prof. Max Müller quotes the statement of a clergyman that some of the laborers in his parish had not 300 words in their vocabulary. A well-educated person seldom uses more than about 3,000 or 4,000 words in actual conversation. Accurate thinkers and close reasoners, who select with great nicety the words that exactly fit their meaning, employ a much larger stock, and eloquent speakers may rise to a command of 10,000. Shakespeare, who displayed a greater variety of expression than probably any other writer in any language, produced all his plays with about 15,000 words. Milton's works are built up with 8,000, and the Old Testament says all that it has to say with 5,642 different words.

COMPOSITION OF COIN.—The gold coin of the United States is formed of gold, ninety parts, silver, two and a half, copper, seven and a half. The silver coin is composed of silver, ninety and copper ten parts. A new alloy which promises to be useful for small coin is just announced by M. M. de Ruolz and de Fontenay of Paris, and is called by them *Tiers-argent* or trisilver. It is composed of 33 per cent silver, 25 to 30 per cent of nickel, and 37 to 52 per cent of copper. The three metals when melted form a compound which is not homogeneous, and it is only by a secret process that a malleable metal is produced. In color the alloy resembles platinum, it takes a high polish and is not affected by exposure to the atmosphere, or by any but the most powerful reagents, and is extremely hard and tenacious.

HIGH PRESSURE.—A turbine water wheel is about to be placed in position for a slate quarry in Wales, with a fall of 1,000 feet. This is believed to be greatest hight of fall ever made use of for motive power; the nearest approach to it being in the Black Forest in Germany, where a turbine works under a fall of 800 feet. The rapid destruction of the step at the foot of the main shaft under the great pressure resting on it, has caused much difficulty in the latter case, which it is proposed to avoid in the Welsh wheel by giving (roller?) bearings to the horizontal part, so as to divide the load over a large surface.

EXPORT OF PETROLEUM.—The United States exported 67,430,451 gallons of petroleum in 1866. The total export in five years has been 168,247,487 gallons. No less than 243 vessels cleared full cargoes of petroleum from the port of Philadelphia in 1866.

THE ground stoppers of caustic alkali bottles incrustate very rapidly; grease stops it but imperfectly, and introduces fatty bodies in the lye. Paraffine is the best agent, because lye is without action on it, and lubricates the surfaces in contact.

THE question of Government administration of telegraphs, as a branch of the postal service, is now agitated in England as well as in this country. Our readers are aware that it has long been in operation in Switzerland.

THE ENGLISH COLLIERY EXPLOSIONS.—The investigations into the cause of the recent colliery explosions in England are still proceeding, and the evidence already taken shows that the mine at Barnsley had been for many months in an unhealthy condition, and that the accumulation of gas in the workings had rendered it so much like a powder magazine that the torch was only wanting to cause an explosion. It also appears that the miners had been in the habit of smoking at their work, and numbers of duplicate keys have been found on the scene of disaster, which the miners had evidently obtained and kept for the purpose of unlocking their safety lamps. Nobody has been found censurable for this state of affairs, however. The subscriptions for the benefit of the families of the miners who were killed already amounted to $250,000.

NEW WATER PROPELLER.—Mr. James Parker describes in *Engineering* for Jan. 11th, an apparatus for propelling vessels by steam without an engine. The steam is issued in extremely small jets, each shooting into the center of an open pipe a quarter of an inch in diameter, conducting into a hot water chamber, into which the jet carries with it a current of compressed air. This compressed and heated air is admitted upon the surface of the water in closed tanks, by the ordinary slide valve, and its force is employed to eject the water through propelling pipes on the plan of the *Waterwitch*, described in the SCIENTIFIC AMERICAN not long since. The steam and compressed air may also be driven into a dry hot receiver and thence used in a large-cylinder engine. The contrivance is a modification of the caloric or hot-air engine.

RECENT COURSE OF POPULATION.—Six of the states have taken an intermediate census, from which the following results are derived by the *Public Ledger*:—

	1860.	1865.		
New York	3,880,735	3,827,818	Loss, 1.5	per cent.
New Jersey	672,035	773,709	Gain, 15	"
Illinois	1,711,951	2,123,606	" 24	"
Minnesota	173,885	250,099	" 44	"
Kansas	107,206	140,179	" 31	"
Alabama	964,201	945,344	Loss, 2	"
Oregon	52,465	65,090	Gain, 24	"

It is well not to lay much stress on census reports in this country, where such things are often done with a looseness which is worse than not attempting them at all. The recent New York census was a broad farce on its face, so far as this crammed and running-over city is concerned; and the general conclusion, that the state has lost population in the last five years, we venture to believe can scarcely be sustained by common-sense testimony from a single township.

A GOOD EXAMPLE.—The directors of the North Eastern Railway (English) have made an arrangement for the instruction of the apprentices in their locomotive department, at the York School of Arts, at a reduced rate, half of which is borne by the Company. To educate their own engineers and machinists scientifically and practically from boyhood, is a shrewd liberality for corporations whose interests depend so much on the capacity and fidelity of such employees. There are many concerns in this country that might improve and economize their service materially by such means.

WHEELING ROLLING MILLS.—All the rolling mills of Wheeling have stopped work. In consequence over one thousand persons are thrown out of employment. This has been caused by the closing of navigation on the rivers, and partly by the decrease in the demand for nails. It is estimated that there are over fifty thousand kegs of nails now stored in Wheeling warerooms waiting shipment. Monday, February 4th, was fixed upon for the resumption of business.

ECONOMY IN FUEL might be greatly promoted, if consumers would imitate the practice of a good fireman with a steam boiler, in sprinkling over the surface of the fire a thin layer only of coals, as often as required. By this method the gases from the fresh coal are not roasted out in such great volume that nearly all go off unconsumed, as the case is when a large mass of fresh coal is roasted at once.

ATLANTIC TELEGRAPH.—The receipts from the working of the ocean telegraph up to the present time have averaged almost $4,100 a day, including Sundays and forty days when the land lines were down. Since the reduction in tariff since Nov. 1st, of fifty per cent, the receipts have been at the rate of $1,400,000 per year.

OIL IN AUSTRALIA.—The popular rendition of the story which accounts for the discovery of glass has been matched in Australia. Late accounts state that some miners lighting a fire at Campbell's Creek found their stone fireplace blazing up. On examination the rocks were found to contain a large percentage of coal oil.

TO RENDER NITRO-GLYCERIN INEXPLOSIVE, says the *Mountain Messenger* (Cal.), a certain admixture of wood naphtha has been found effectual. When it is wanted for use, the requisite quantity can be taken out, and a little water added, which will mix with the naphtha leaving the pure nitro-glycerin at the bottom.

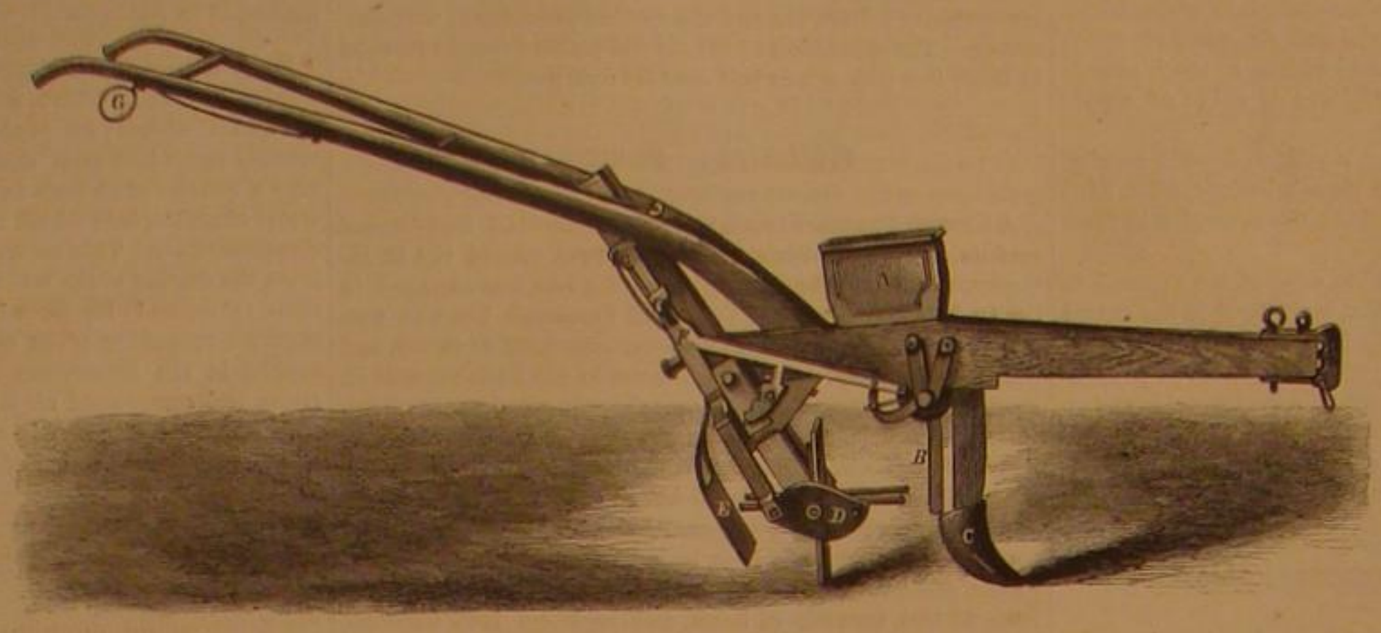
A FORCE of traction of 100 lbs. is sufficient to draw a load of 24½ tuns at the rate of 2½ miles an hour on a canal. The same force would draw, however, only 1900 lbs. at a speed of 13½ miles an hour. At the latter speed a given force could draw little if any more than on an ordinary turnpike road.

A RAILWAY carriage, moving with a friction of 6 lbs. per tun, would, if set in motion at the top of a straight plane falling 100 feet, and connecting at the bottom with a straight level line, run a little more than seven miles by its gravity alone.

Improved Corn Planter.

The engraving represents a one-horse, one-row corn planter, intended for dropping and covering corn or other seed in hills and leaving an easily distinguishable mound for each hill. The frame—beam, handle, etc.—is made in the usual form, A being a hopper for containing the corn. Under this is a roller having two cavities in its periphery, one always in contact with the interior of the hopper and the other with the delivery spout, B. The share, C, is to score or trench the soil. A suitable frame projects downward from the rear of the beam and carries a shaft having scrapers upon it and a cam, D, attached. Behind all is the coverer, E.

The corn being placed in the hopper, a portion of it falls into that recess in the roller presented to the under side of the receptacle. The revolution, or rather the half revolution of the roller, to secure the dropping of the seed, is effected by means of a forked lever, F, one arm of which is attached to an arm on the roller shaft and when receded allows a spring—not shown—to rotate the roller. The other fork of the lever engages with pins on the ends of the cam to hold the cam shaft and the scrapers steady, while the face of the cam when in operation actuates the lever.



THE FIELD CORN PLANTER.

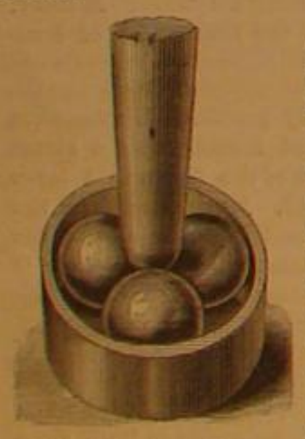
The ground being marked off one way, the machine is run across the drills and at each intersection the operator holding the handles raises the forked lever by the wire and loop, G, which allows the roller to rotate and deliver the seed and the scrapers also to perform a half revolution. The earth that has been heaped up by the scrapers is then deposited by the coverer, E, on the corn. One or the other of the scrapers is always operating on the soil except at the moment of rotation, when it leaves the heap thus accumulated for the action of the coverer.

A two-horse, double-row machine is made on the same principle, the operation of dropping in this case being performed by the foot of the driver. For newly cleared land unencumbered with stumps and for rocky soils the one-horse planter seen in the engraving appears to be well adapted.

Letters patent were secured for this implement through the Scientific American Patent Agency, Nov. 20, 1866, by J. D. Field, of Keokuk, Iowa, who desires to dispose of the entire right or to sell territory. Address Box 134.

Hamaker's Patent Step for Upright Shafts.

It is a well known fact that more trouble is caused by the wearing, friction, and heating of the steps than in any other distinctive feature of upright spindles. Vertical shafts sometimes sustain immense weights, and as the weight is confined principally to a very limited area the consequent friction upon the point is enormous. Various materials for steps are used, both of metals and woods, but the plan shown in the accompanying engraving seems to possess advantages over every style of fixed step, at least in the reduction of friction.



No letters of reference are required to assist in the explanation. The balls are of cast chilled iron, placed in a pan shaped vessel, and revolving by means of the rotation of the spindle end, which is made of such a form that its surface engages with the balls at an angle of forty-five degrees and presses them against the rim of the receiver. The difference between the diameter of the inside of the rim, against which the balls act, and the circle which their inner surfaces traverse, is such that their constant and uniform rotation is assured and their wear must be perfectly even. The device can be used equally well in an inverted position. The receiver can be secured to the lower end of the shaft and the balls supported on a point like that in the engraving. In fact, an inversion of the engraving will show this method of applying the device. For situations where dirt would be apt to accumulate with the step in an upright position this method will be found effectual, as no oil or other lubricator is necessary.

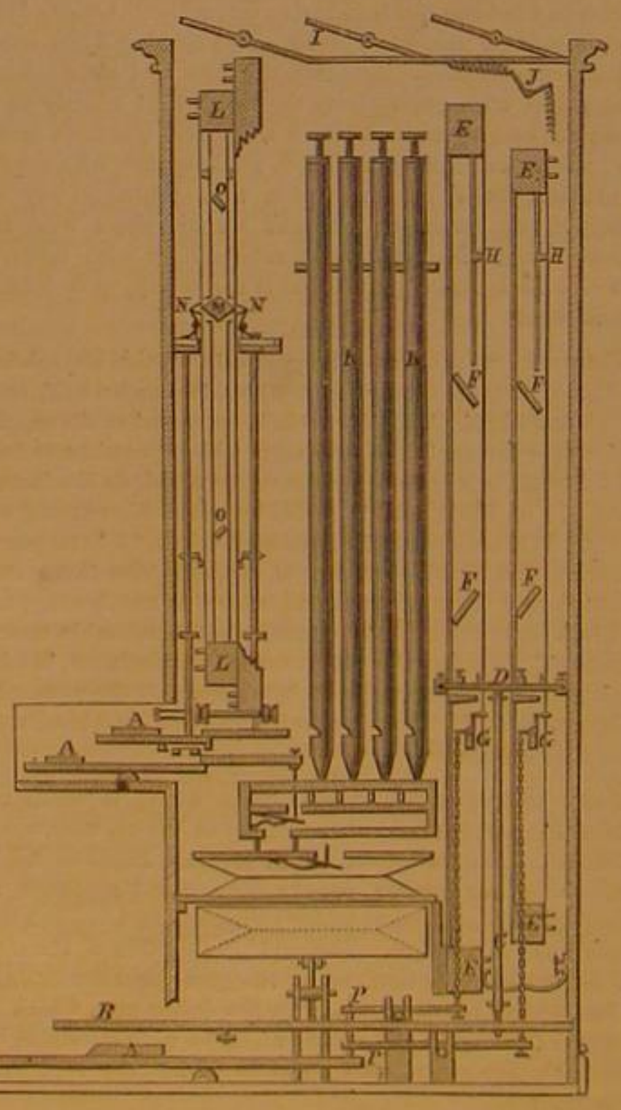
Letters Patent were granted for the device Nov. 13, 1866, to A. G. Hamaker of Eberly's Mills, Pa., from whom persons interested can obtain any other additional information.

A New Substance.

M. Nikles, Professor of Chemistry at Nancy, recently announced to the Academy of Sciences that he had succeeded in obtaining perchloride of lead, a curious substance derived from the only compound of lead and chlorine, and which now must be called protochloride. The latter is obtained directly by subjecting lead to the influence of chlorine by the application of heat, or else by treating litharge with hydrochloric acid. It crystallises in needles, is volatile, and cannot be decomposed by heat. M. Nikles has obtained the new compound by exposing the protochloride to the action of a current of chlorine in a solution of chloride of lime. The perchloride thus obtained is a yellow liquid emitting a strong smell of chlorine, and is a powerful agent for communicating that element to other substances. It will dissolve gold, and produces with aniline and the analagous compounds, those beautiful colors for which those substances are so remarkable. With morphine, it yields a color similar to that of the horizon at sunrise; and with brucine, a rich cherry red. Now, brucine and strychnine, both vegetable bases extracted from nux vomica, are very difficult to distinguish from each other, and here perchloride of lead steps in as a useful agent; for it so happens that it does not produce red with strichnine as it does with brucine, and may therefore be used to distinguish one substance from the other. It serves the same purpose with regard to morphine and the other alkaloids of opium; it will likewise detect bi-carbonate of lime in potable water by producing a yellow tint, and help to distinguish salts of lead from those of bismuth, since it precipitates the former from their solutions and not the latter. It will carbonize cane-sugar and not glucose, and blacken aniline without producing any effect either on fecula, starch, or dextrine. Like other perchlorides, it combines with ether to form a very caustic compound, which attacks both gold and platinum, beside other metals.

Davis' Improvement in Organs.

The profession of music in this country has within twenty years attained to great importance, and while much attention has been devoted to musical education, no less has been paid to the improvement and perfection of musical instruments. The piano-forte is really the favorite household instrument in all this country; but within a few years the substitution of wind organs adapted to small rooms has been considerably encouraged on account of their adaptabilty to sacred and other music of a slow movement. Long-sustained notes are impossible on the ordinary piano-forte, as after a string has been struck the vibrations which produce the sounds gradually become shorter and shorter and soon cease.



Still, the deep sounds producing the bass tones on the organ are not so sweet and agreeable to the ear as those produced by the vibration of strings; and the object of the improvement herein illustrated is to remedy this defect. Instead of pipes for the bass there are, in this instrument, vertical strings operated by bows in the manner of the ordinary bass viol. By means of the sectional engraving, we will endeavor to make the device understood by professionals.

A are keys, B, the treadle for working the bellows, and the bell crank, C, which works the bows D, across strings, which are tightened to the frames, E. F are octave stops for the strings. G are bell cranks which bring the strings in contact with the bridges, H, and the bows, D, at the same time to produce the different tones required. I, at the top of the instrument is a swell stop operated by the bell crank, J, and springs. The pipes, K, have a screw plug at the top of each for tuning them.

On the front of the instrument, L, are sections of the piano frame and M is a suspension and division bridge which divides the tone into octaves or unisons by passing the strings over or under it by means of hitch-pins or holes. N are hammers striking the strings on both sides the bridge, and O are cushions to stop the vibration of the sound boards. P are couplers to enable the performer to play upon one or more sets of strings at once.

The performer can command all the stops, pedal-bass, bows, and bellows, alone; but if help is needed the bellows can be worked by an assistant at the side on an independent treadle. The pipes used being small do not require much wind, as the bass and double bass notes are obtained from the viol strings.

These improvements are the result of over seven years' experiments, and are the subject of patents issued in 1863 and 1864 to William Davis, Professor of Music, Tamaqua, Pa. Those interested will address as above.

The Suspenders Bridge.

The *Brooklyn Daily Union* signalizes its enlargement by spreading upon one of its broad pages a monster engraving to represent a fashion of bridge by which a company just formed propose to connect New York and Brooklyn. The peculiarity of the plan consists in adopting four termini, two on each shore, making four corners of a parallelogram, connected by suspension arches thrown diagonally between the opposite instead of the adjacent corners. These diagonals of course cross each other midway like a pair of suspenders, and give the passenger from either starting point a choice of two landing places on the farther shore, thus making in a certain sense four bridges in one. Each span will be some 2,000 feet in length, and will necessitate what appears not to be contemplated, a center pier at least, at the point of intersection. Even with that modification, the sections will be of decidedly unadvisable length. It is not doubtful that bridges can be built and used of 1,000 or even 2,000 feet span; but it should always be remembered in forming plans, that every foot added to the length of span diminishes the length of life, in a bridge, on account of the increased vibration. It has been stated as the result of certain experiments, that an iron girder will break with about 400,000 changes of load with accompanying vibrations. Probably this is not to be considered a rule, for a rule is hardly possible: but it is evident that the wearing out in this way of every iron bridge is but a question of time, that the best economy is to give such bridges the rigidity of short sections as far as circumstances will permit, and that the construction of bridges of immoderate span for very heavy traffic would be highly imprudent.

The "suspenders" plan would be in some respects an advantageous arrangement for two bridges, if two were to be built; but it will cost more and not less than two parallel bridges, unless it is built on a very inadequate scale, and will not serve nearly so good a purpose as two parallel bridges with termini further apart. One bridge at a time will be on the whole the best policy.

Process to Recognize Bleached Whale Oil from Unbleached Oil.

Making experiments on the bleaching of fish oils, I was struck by the action of concentrated sulphuric acid on raw and bleached oils. This action caused me to try if I could not furnish a regular and safe test for the manufacturer, so that he could detect in a few minutes the quality of the oil to be used.

Take a watch glass, pour into it a little unbleached oil, and with a glass rod take one drop of sulphuric acid and mix it with the oil; immediately the oil colors a dark brown. The same experiment repeated with bleached oil, the mixture remains limpid, and colors very slowly; and it requires ten minutes before it is a dark brown.

The oil can only be bleached by an alkali without being deprived of its albuminous matter. To see the difference, take three watch glasses; in one pour a little raw oil; in the second some bleached oil, not deprived of albumen; and in the third some perfectly pure oil. In each one pour one drop of concentrated solution of tannin. In the first it produces an abundant precipitation, and you can see some brown particles swimming in the liquid. The result is the same with the second; and in the third it produces a white magma, which disappears in letting it settle.—*Journal of Applied Chemistry.*

The Cashmere or more properly the Angora goat, is being largely introduced in the West. There are now about one thousand in Illinois, as many more in Ohio, and several thousand in Kentucky.

THE COTTON MANUFACTURE---MULE SPINNING.

[Notwithstanding the enlargement of the paper at the commencement of this volume, we find ourselves pressed for room. For this reason our articles on the cotton manufacture have been unavoidably interrupted for two weeks, there not being room for them without doing injustice to our contributors. We hope to finish the series without further interruption.]

When the cotton has left the speeders in the form of roving it enters upon a new stage in its progress. It is to be changed from the soft, almost impalpable filament to a hard twisted, rigid yarn fit for weaving into cloth. For this purpose it must be spun, an operation which is performed either on "mules" or spinning frames. The "mule" is a machine differing from the old spinning wheel and its operator mainly in being larger and much improved. In the use of the old spinning wheel—and it has not been so long obsolete but that some of our readers are familiar with it—the spinner, grasping the "roll" at the end of the spindle, recedes gradually, drawing out between the finger and thumb the attenuating thread to a stretch as far as the hands can reach, and then reversing the motion of the wheel, winds up the spun and twisted thread on the spindle to begin anew. This is precisely the action of the "mule" whether hand or self-operating. Instead, however, of the operator managing a single thread he controls a thousand. A brief description will make this clear. The mule is a long carriage like a box, two feet high as many wide and perhaps forty, or fifty, or a hundred feet long, running on wheels which traverse iron tracks, the box carrying on its front side a row of spindles projecting above the box and inclined at an angle of about twenty degrees toward the source of supply of the roving. Inside the box are drums nearly upright but inclined on their axes to the same direction which the spindles have. These by bands of twine give motion to the spindles while the drums are driven by suitable belts attached to the machinery at the "head" of the mule, which may be either in the center of the length or at one end.

There are two of these long, box carriages, one running in while the other is running out. Behind each are frames called "creels" which contain the speeder bobbins of roving arranged in double or triple tiers and rotating vertically on their spindles by the draft on the roving itself. These rovings are fed through guides to rollers similar to those on the drawing frames and speeders described in preceding articles. The lower series are of steel fluted very finely and the upper ones of iron covered very smoothly with soft leather, sheepskin being preferred. The roving passes between these rollers and comes out at the front in a filament of cotton so fine and thin as almost to approach invisibility. This film when spun is yarn. Instead, however, as in the drawing frames and speeders, the cotton being entirely drawn to a finer film by its passage between the rollers, it is pulled or stretched out while being spun by the retrogression of the carriage which contains the spindles and traverses the transverse rails laid for its wheels. The yarn on the spindles is attached to the film of cotton as it appears from between the rolleres, and the speed of the spindles soon twists it into a hard thread, drawing it out evenly as the carriage with its spindles regularly and steadily recedes from the rollers.

It will be seen that in all respects this operation is that of the old-fashioned spinning wheel and spinner. The rollers on the mule which detain and gradually pull out the material correspond to the finger and thumb of the old-style spinner, and the forward and backward movement of the mule carriages to her lithe stepping back and forth. The winding up of the spun product is also the same.

When the mule carriage has run back from the rolls and spun the length of yarn—ten or twelve feet—the motion of the spindles stops with that of the carriage. It is then reversed sufficiently to unwind that portion of the yarn which is twisted spirally about the spindle to the top, when a wire guide called a "follower" depresses the yarn, and, as the carriage runs in, winds up the spinning in a cone-like form making what is called a "cop." It might be supposed that the yarn, while being spun as the mule recedes from the rollers, would wind around the spindles and break, but the inclination of the spindles, the elevation of the rollers above their tops, and their pointed form, prevent this. They merely twist the yarn.

The "mule" was formerly run in by a man called a mule spinner, who when the carriage had come out managed with one hand a large band wheel and with the other the "follower," running the carriage in and forming the "cop." The self-operating mule is the kind now used. In this the services of the spinner are dispensed with, only "piecers" and "roving boys" or "bobbin boys" being employed. The duty of the latter is to keep up the supply of roving in the "creels" by replacing full bobbins for empty ones. That of the "piecer" involves considerable skill and long practice. If an end breaks he stops the spindle by pressing on its side with the thumb, disengages the broken thread, and holding the end between the thumb and forefinger over the nail of the middle finger, he dexterously fillips the yarn on the roving as it comes through the rollers and the twist secures immediate union of the parts.

When the spindles are full the mules are stopped, the "cops" partially raised on the spindles, and a length of yarn is run on the space below the "cop" for a new start, and then the cops are taken off and packed carefully in boxes for the weaver. A description of the spinning frames and subsequent operations must be reserved for another article.

A LOUISVILLE skater named Ronalds has no legs. He uses three skates, sitting upon one and putting the others on his hands. A Russian in Chicago skates on stilts.

DANGERS OF KEROSENE LAMPS, AND MEANS OF SAFETY.

The safer hydrocarbon oils—such as have been tested for inflammable vapor at 100° Fah., for instance—are proved to be unsafe in all lamps with the ordinary metallic wick tube and cap, exposing a heated surface to the accumulated gas within the vacant area above the oil. The apparently unaccountable explosions that sometimes take place are explained by the simple fact that the brass work in contact with the spontaneous exhalations of the oil is usually at a temperature of 108° to 110°, when the lamp is in use. That this actually renders the gas explosive (with the proper proportion of air) appears to have been proved by the experiments of Dr. John Attfield, F.C.S., reported in *The Grocer*. A lamp had exploded at the house of a country gentleman, and the fragments, with the can of oil from which the lamp had been filled, were sent to Dr. Attfield for the purpose of elucidating the cause of the explosion. The oil yielded no inflammable vapor under 83° Fah. The brass work was fitted to a reservoir similar to that which had been broken, and after burning the lamp for five hours, the temperature of the oil being only 65°, but that of the brass work around the wick being as high as 108°, it was found that a mixture of heated gas and air had been formed within the lamp, which exploded on the application of a light.

From this experiment and these reasons, there seems no room to doubt that in general all "kerosene lamps," when burning, contain the dangerous element which has wrought such melancholy havoc, in full potency, waiting only the accidental application of flame, or the coincidence of such accident with the proper admixture of air, to burst and spread destruction around. If there is any lamp in the market which guards against this danger from the heated brass work, we are not aware of it. We have procured a number of patents for guarding the brass work from contact with the aëriform contents, and for substituting less conductive substances for metal in burners and caps, but none of them have seemed to make their way into the general lamp trade. It may be hoped that Dr. Attfield's demonstration may be the means of bringing out these valuable improvements into notice.

But there is a partial reassurance for those who will burn only highly refined and carefully tested oils, in the fact that Dr. Attfield found no explosive mixture in a lamp which had been burned for seven hours with an oil yielding no inflammable vapor below 114°. The lowest test for ordinary safety is above 110°, as the brass work may be expected to heat to that point: while it is liable of course to be heated still higher, according to the intensity of combustion, the character of the metal, and the warmth of the surrounding atmosphere; so that there is no absolute safety attainable while the heated metal is exposed to the interior of the lamp.

The importance of domestic tests for common use is brought into stronger light than ever by these developments. It is imprudent to rely implicitly on dealers in oils, whatever their standing. A dealer who made it a rule never to sell an oil which he had not himself proved for inflammable vapor at 115°, would be glad to have every purchaser re-test his oil at home. It would make his light shine, expose the difference between cheap and good oil, and serve directly and indirectly to prevent calamity.

The proper test, for all who can procure a chemist's test tube, say 6 inches long and an inch or more in diameter, and a naked thermometer, is to place a little of the oil in the tube and heat it gradually, stirring it frequently with the bulb of the thermometer, and at every degree of ascending temperature introducing a small flame into the open end of the tube, until the vapor ignites. The degree at which this takes place indicates the temperature at which this oil or its vapor, and by consequence the brass work exposed thereto, will be dangerous. It would make a good article of commerce to put up these two requisites—the test tube and naked thermometer—with directions for their use, at the lowest profitable price, and advertise them throughout the country.

A cruder experiment, which many will not like to try, but which Dr. Attfield assures us is as harmless as that of lighting raisins in brandy in the Christmas game of snap dragon, is to unscrew the cap after the lamp has burned an hour or two and quickly apply a match within the reservoir. A light-blue flash of flame and a puff-like explosion will be perceived, if the lamp is in a dangerous condition. When the lamp is open, this can do no harm: but when confined, the gas if ignited must find a vent by bursting the lamp and scattering the oil in every direction.

SPONTANEOUS COMBUSTION OF "COFFEE."

BY PROFESSOR CHARLES A. SEELY.

An ex-coffee manufacturer has given me the particulars of two interesting cases of spontaneous combustion which occurred in the course of his business; and as it seemed to me that the facts might prove useful if widely known I obtained his consent for their publication. For the information of a small number of my readers it is necessary to explain that a coffee manufacturer is one who roasts beans, peas, wheat, barley, rye, corn, chicory, etc., grinds with a few roasted coffee-berries, and divides the mixture in neat paper parcels to suit the demand of the public. Many consider this business illegitimate. I do not, unless the product is represented to be what it is not. The public will have what they call for.

My friend in various ways had observed a tendency towards spontaneous combustion of some of his roasted material, and had adopted what he supposed sufficient precaution against dangers. One day he roasted about ten bushels of barley As was then his practice, the grain was drawn from the roaster on a large cooling table covered with zinc, spread out and turned over until it was supposed to be cold. It was then, late in the day, put into barrels, and shortly the factory was locked up for the night. During the night a watchman discovered smoke issuing from the premises, made a forcible entry, and found the barley in all the barrels on fire. The barrels were promptly rolled into the street and the fire was extinguished by an abundance of water.

After this he adopted further precautions, but failed again. As soon as the roasted grain was spread out it was sprinkled with water from a watering pot, and was left a longer time on the table. A few bushels of roasted wheat were spread on the table, sprinkled with water and left on the table for the night. In the morning in place of his wheat, he found only a heap of clean ashes. There was not a kernel left unconsumed.

In explanation of these cases I would suggest that during the roasting there is generated a substance which has a peculiar affinity for oxygen and in this respect is akin to linseed oil. This substance is probably a volatile oil to which the peculiar aroma of roasted grain is due. Such a substance is known to exist in roasted coffee-berries. The aroma of coffee is soon lost by reason of its affinity for oxygen which changes it into a substance which has little or no odor. Hence also dried coffee grounds are not near so combustible as fresh roasted coffee.

Science Familiarly Illustrated.

What is Steel and How Made?

Steel is a variety of iron occupying a position between wrought iron and cast iron, having less of carbon than cast iron and more than wrought iron. Pure malleable, or wrought iron, is theoretically considered as containing no carbon, but probably few specimens exist without containing some. Cast iron has four or five per cent and steel only from one-half to one and a half per cent. As the proportion of carbon in steel increases so it becomes hard and brittle and increases in fusibility as cast iron; but with diminishing proportions of carbon it assumes more and more of the softness, malleability, and toughness of wrought iron. Steels of the former character are called "high" steels, and of the other "low" or "mild" steels. Steel is made in Germany direct from pig iron which contains four or five per cent of carbon. By furnace manipulation a portion of this carbon is driven out and the product is German steel. This is not a pure steel and is generally incapable of being hardened and tempered.

The usual method of producing steel is by cementation or conversion, bars of wrought iron being used. A furnace of suitable form contains boxes made of fire brick in which the bars of iron are packed in layers covered with charcoal powder. The bars do not touch each other but each is enveloped with the charcoal. When filled the pots are covered and cemented air-tight. Heat is then applied by a proper furnace and grates and the fire gradually increased in intensity for several days. A test bar is introduced at the beginning and is occasionally withdrawn to determine the progress of the process. When the process is completed the bars, if broken, will be found to have changed their fibrous for a crystalline structure. The surface of the bars is covered with thin blisters as though laminæ of the iron had been raised by the expansion of a gas under them, and from this it gets the name of blistered steel. For some purposes this steel is useful, but it is unfit to be worked into tools for cutting wood or metals.

The next process is the tilting. The bars are cut into convenient lengths, piled together and heated in a furnace to a weld and placed under a trip hammer which welds the pieces together and draws them out into a bar. This process improves the quality of the steel and fits it for some purposes; but there is another method of treating the blistered steel; that is to melt the steel in air-tight crucibles and cast it. The ingots are then re-heated and hammered and perhaps rolled. This process of hammering and rolling is a very important one. In fact, after the conclusion of the manufacture in the working of steel bars, to form them into tools, good forgers always expect to refine and improve the steel by judicious heating and hammering.

What makes the great difference between steel and wrought or cast iron is still a puzzle to mechanics and scientific men. The main difference appears to be in the varying proportions of carbon which each contains, and in the different chemical conditions in which it exists, yet the amount in those specimens which contain the most is so small that it is difficult to account for its so entirely changing the character of the metal. It is not yet fully settled that the iron and carbon is chemically united in the best of steel, while it is certain that it is not so united in cast iron but that the union is a merely mechanical one. There is much yet to be learned about iron and steel before we arrive at the real facts.

The Care of Belts.

The apprentice sometimes finds considerable difficulty in the management of belts on machinery. Experience will in time teach him, but in this, as in many other cases, experience is a costly teacher, and much can be learned by instruction. A belt to run well should be perfectly straight, with parallel edges, and of equal thickness throughout its length. The time is past when every mechanic manufactured his own belts from the side of leather. They can be bought so much superior, of belt manufacturers who make that their business, that they are cheaper than the home manufactured. No belt should have more than one butt joint. If it is advisable to put together pieces of old belts to form one, the joints should be scarfed and lapped. Old belts have usually absorbed so much oil that the ordinary belt cement—fish glue—will not unite their surfaces; then riveting or sewing should be resorted to. In riveting the heads should be on the wearing side and the washers on the outer surface. In sewing, the awl

should pierce the leather in a slanting direction, and the lacing put through so as to present but a small amount of its surface on the pulley side. In making a butt joint the lacing should not be crossed on the wearing side, only on the outer side. The too frequent use of the belt awl is reprehensible. In making a lap joint, however, the awl alone should be used, and the perforations should be as small as possible; but in a butt joint avoid as much as you can the use of the awl and have recourse to the punch. This cuts a clean hole, much less liable to tear than the puncture of the awl. Care must be taken in unlacing a belt by pulling the lacing out with the awl. The eye-sight has been destroyed by plunging the awl into the eye. If a belt is to be "taken up," *i. e.*, shortened, the cut should be made perfectly straight across, and for this a try-square should be used. If not cut straight and the butts be brought together and sewed the belt will be crooked, and after running awhile will become permanently curved. It is important that belts should be kept clean, especially on their under surfaces, and that no accumulations of gurry should be allowed on the pulley face. If belts are neglected in this particular they are certain to become stretched and crooked. Too much oil—the lubricating oil for machinery—rots the leather and destroys the belts. Whenever they become hard they should be moistened with good neat's foot oil.

Debate on the Extension of a Patent.

In the House of Representatives on Friday, a bill came up to authorize the Commissioner of Patents to hear the application of the heirs of Thomas W. Harvey for the re-extension of the patents of May 30, 1846, and August 18, 1846, for improvements in machinery for cutting screws and dressing screw heads, and to grant extension of such patents for seven years, from May 30, 1867, and August 18, 1867.

Mr. Bromwell (Rep.), of Ill, who reported the bill from the Committee on Patents, addressed the House in support of the bill.

The bill was opposed by Messrs. Hall, Washburn, of Mass., Allison, Stevens, and Morrill.

Mr. Hale (Rep.), of N. Y., represented that although the patentee or his heirs may not have derived much advantage from the invention, the assignees of the patents had made immense fortunes. He described it as the most enormous and gigantic monopoly that this country had ever seen.

Mr. Washburn (Rep.), of Mass., took the same ground, and showed that the public had already paid millions for the invention. He also showed that the widow and heirs of Harvey, had assigned their interest to the American Screw Company, of Providence, R. I.

Mr. Allison (Rep.), of Iowa, stated that the American Screw Company, which had the patent, had actually bought off an English screw company from bringing their productions into the American market, paying it a royalty of $40,000 a year.

Mr. Stevens (Rep.), of Pa., stated that for years past the American Screw Company had divided thirty to forty per cent semi-annually.

Mr. Morrill (Rep.), of Vt., added that the stock of the company was two or three hundred per cent over par, and that its dividends were immense.

Mr. Bromwell denied that the bill was for the benefit of the American Screw Company, asserting that it was for the widow and heirs.

Mr. Myers (Rep.), of Pa., a member of the Committee on Patents, spoke in support of the bill.

Mr. Allison moved to lay the bill on the table.

Mr. Washburn, of Mass., demanded the yeas and nays on the motion.

The motion was negatived—yeas 70, nays 75.

The morning hour expired, and the bill went over till the next day, when it was tabled by a large majority.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Stoves vs. Grates.

Messrs. Editors:—A controversy has been going on for some years between the advocates of stoves and those who prefer the *luminous* heat projected from an open fire, and one controversalist (page 42, Scientific American, current volume), rather summarily disposes of the numerous and intelligent advocates of the grate as "old fogies or musty and misinformed sanitarians whose theories are inspired by their own infirmities."

Were man a pie or a potato, the question might be dismissed at once in favor of the stove, as the more efficient instrumentality of mere heat: but that stoves and other tight heaters are more cleanly than the grate many housekeepers deny, averring that a properly arranged ash flue will carry off nearly all the dust incident to stirring, while that entering or forming in the room itself escapes over the fire instead of accumulating on that portion of the wall and ceiling which, in the case of close heaters, receives the impact of the ascending currents.

Grates are said to be more dangerous on account of fire, but an underwriter whose experience is second to none, states that no discrimination is made in the estimate of risks, and that if any were made, it would not be in favor of stoves.

The stove partisans cite the well-known statistics of actual conversion of oxygen by a pair of human lungs and by a given quantity of fuel respectively, and the large overplus supplied by the present perfected (?) plans for warming, whereupon the adherents of the grate are expected to reconsider their headaches and be convinced.

The advocates on both sides, being equally sincere and intelligent, is there not a reasonable inference that the delicate human organism is subject to some subtle influences not yet wholly accounted for? This admitted, there remains one test, more conclusive than any argument.

The public schoolroom—packed with individuals in rapid development—is the place where questions of warming and ventilation assume the most vital importance, and if, as some assert, thousands of children are yearly immolated by ignorance on this subject and a misdirected economy, there should be no delay in the initiation of impartial and exhaustive experiments. The most salutary arrangement might be found in a combination of the two systems, having discretionary use of warm-air registers or of floor-warming devices, as auxiliary to the fireplace in very cold weather and for the maintenance of an equable temperature in halls and passages. Several establishments should be selected, as nearly as possible equal in salubrity, capacity and numbers, and a careful record be kept in each of the cost of fuel *per child*, extreme and mean temperatures, hygrometrical and electrical conditions, intellectual progress, general health and spirits, sickness and mortality. For such an investigation, mere opinion could afford to wait. G. H. K.

Cincinnati, Jan. 21, 1867.

[An arrangement for obtaining the advantages of the open fire without its distressing drafts and dustiness, is to lay the firegrate flat in the hearth, on a level with the floor, letting it draw its air from a chamber or chimney beneath communicating with the cellar, and drop all its ashes and cinders into the same receptacle. We understand that this apparatus is made in Philadelphia, and we can easily credit the statement that its operation is very agreeable.—Eds.

The Mathematics of Music.

Messrs. Editors:—Frequent allusion has been made in your journal to the beautiful connection existing between the natural and physical sciences. We have had a glimpse at the link between astronomy and chemistry, in the partial analysis of the sun's substance by means of the spectrum; and at another, between astronomy and her sister sciences, in the discovery of our outermost (?) planet by Leverrier. And the mathematician would tell us that he everywhere discovers the confluence of his favorite science with every other string on the great diapason of nature.

The object of the present paper, however, is to exhibit a link of much humbler pretensions. We allude to the connection between *music* and *mathematics*.

If a string of the harp or piano be struck, it will return to rest by a series of isochronous vibrations whose rapidity will be governed by the length and tension of the string, and the sound emitted will be higher or lower as the vibrations are more or less rapid. Musicians tell us that the voice ascends *naturally* by a series of whole and half intervals. It is the mathematical relation of these intervals which we propose to consider.

If we assume any sound, as C, to be the result of a given number of vibrations in a certain time, the other notes of the staff, ascending, will be as follows:—

C—16 or 384.	G—24 or 576.
D—18 or 432.	A—27 or 648.
E—20¼ or 486.	B—30⅜ or 729.
F—21⅓ or 512.	C′—32 or 786.

The larger numbers are relatively the same as the first, only multiplied up to clear them of fractions. Is it not curious that not one of these larger numbers contains a prime factor greater than 3?

Sounds which bear simple relations to each other, as C : G : : 2 : 3, etc., give harmony, while those bearing more complex relations, as C : A : : 16 : 27, give discord.

If we extend the figures through another octave (marked ′) we will have:—

D′—36.	A′—54.

Now 54—36=18, which corresponds to D of the first octave, and this sound may be distinctly heard as a distant complement when the two notes, D and A, are sounded together on the accordeon or the higher keys of the melodeon. The same rule holds good with all the combinations.

We would carry the investigation much further but for encroaching on your valuable pages. J. W. Hollingsworth.

Paoli, Ind., Jan., 1867.

Consumption of Coal.

Messrs. Editors:—A correspondent of your valuable journal, Mr. Vander Weyde, page 33, current volume, refers to the consumption of 4 lbs. of coal per horse-power per hour in steam engines as a "theoretical economical amount," "never reached on a small scale," "some modern improved engines and boilers coming wonderfully close to it."

Ward, in his "Steam for the Million," pages 30 and 83, gives the consumption of coal—*Great Eastern*, said to be 4 lbs. per horse-power per hour; locomotives, 2¼ to 2½; *Wyoming's* engines, 2·73; Cornish engines, 2 lbs.

Bourne in his Catechism gives Cornish engines 1·74 to 3·1 lbs. per horse-power per hour. S. F.

Philadelphia, Jan. 23, 1867.

"The Great Peat Delusion."

Messrs. Editors:—I have read with great interest in your number of February 2d, an article by Prof. Charles A. Seely, entitled as above. After eighteen months' close study of "peat as a fuel," I am led to conclusions so directly in conflict with those (given by inference rather than actual statement) of the learned Professor, that I make bold to reply. There can be no dispute as to the truth of his premises, that the heat-producing power is what we want in fuel. The only trouble is that the statement is not complete. Had the Professor added, "and that fuel which, with this quality, is most free from deleterious admixture, and whose residue has a marketable value, will prove, all things being equal, the cheapest and best;" he would have published a proposition to which no exceptions could have been taken. Neither is the Professor altogether fair in quoting anthracite alone.

Anthracite coal is a most important fuel, but it is only one of many in use in America. New England burns up wood, charcoal; Nova Scotia, Cumberland and cannel coal, as well as anthracite. Illinois uses the soft coals of Ohio as well as her own. The coal that in Pittsburg is sold for two dollars per tun, is worth ten dollars in Boston, and eighteen dollars in Chicago.

The anthracite that fills the cupola of the iron furnace must give place, in the glass houses, to Cumberland, while gas companies find it for their interest to import cannel from England and Pictou from Nova Scotia.

In the generation of steam on locomotives and stationary engines, coal has displaced wood, because the latter fuel has become scarce and dear. The foreman of every railroad repair shop in the country will tell you that, as a result, full ten per cent has been added to the cost for repairs, by the burning of fire boxes and the bursting of flues. How great may be the additional disadvantage from the noxious smoke, and the never-ceasing shower of cinders, let the numberless hosts of suffering passengers answer.

I might pursue these comments further, but prefer to inquire, is peat a "great delusion?"

In answer to this interrogatory, I cannot do better than cite a portion of a letter now before me from Prof. S. W. Johnson, dated Sheffield Scientific School, Yale College, New Haven, Conn., Nov. 27, 1866.

Gentlemen:—I have examined the two samples of peat sent by you as coming from the Great Dismal Swamp. . . .

Calculated with the usual contents of water (twenty per cent) occurring in air-dry peat fuel, we have:—

	Surface peat	At 4 feet depth.
Water	20·00	20·00
Volatile matter	50·05	52·59
Coke (ash free)	24·97	25·44
Ash	4·98	1·97
	100·00	100·00

Both of these samples are of excellent quality. The sample taken from a depth of four feet, especially, is remarkably free from ash, which adapts it for gas making, metallurgical purposes, etc. For iron smelting and working, this peat, properly condensed, would answer admirably.

From a letter of Prof. B. Silliman, of Yale College, dated Jan. 1, 1867, I quote:—

It is evident that this peat (speaking of four samples from the same locality which he had analyzed) has an excellent composition. . . . The water contained in peat may, indeed, be removed wholly by artificial drying; but in practice, a peat containing less than fifteen per cent of water, is found to absorb moisture, and thus regain its original weight. Your plan of compression (by the use of Leavitt's condensing mill), is therefore highly advantageous, not only in removing from it water, and in preventing absorption of water from air, but also in giving compactness and ease of transportation to the manufactured article. In conclusion. . . . . I do not doubt that, by the use of the approved modes of preparation which you are employing, you will be able to place in the market an exceedingly useful and merchantable fuel.

I might go on at length, quoting not only the opinions of scientific men, but also the results of actual practice in some of the largest manufacturing establishments in America. Perhaps however I shall have consumed all your space when I state, that the comparative merits of peat and mineral coal as steam generaters have been so thoroughly tested, as to induce one of the largest railroad corporations of this State, to enter into a contract with the New York Central Peat Company, of which Gen. Henry A. Barnum is President, for one hundred thousand tuns of peat fuel. And as a final proof of its practical value, that at least five of the leading railroads of America are only waiting to be guaranteed an adequate supply before altering the fire boxes of their locomotives, to adapt them to this "delusion." Benj. S. Pardee.

31 Pine street, New York City, Jan. 31, 1867.

An Invention Wanted.

A naval engineer, writing from Pensacola, Fla., says:—"Can any of your contributors propose a method of making a substantial large sized brick, or block, of any compound material, to cement sand and which shall at the same time be cheaper than the present red brick, and as durable and more convenient for building purposes?

"I shall feel quite interested in a reply to this, as in this section brick are scarce and high in price, the material being found in but few places and the clay of an inferior quality, while sand is in abundance."

Another Novelty.—Cigar tubes are now selling in London, which, after being used for a short time, develope a picture previously invisible. Chemical analyses show that these are photographs prepared in the ordinary way, and then made invisible by the aid of bi-chloride of mercury, the same process, in fact, by which the "magic photographs" are prepared. Magic photographs may be made visible by the application of hyposulphite of soda, and in the cigar tubes the heat and ammonia from the tobacco have the same effect. It is probable, therefore, that these tubes were originated by some genius who accidentally discovered the effect of tobacco juice on invisible photographs.

To Mend Broken Glass.—A much better proces for mending broken glass, china and earthen ware with shell-lac than heating them, is to dissolve it in alcohol to about the consistency of glue or molasses and with a thin splinter of wood or pencil brush touch the edges of the broken ware. In a short time it sets without any heating, which is often an inconvenient process. It will stand every contingency but a heat equal to boiling water. L.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

SASH STOP AND LOCK.—Wm. H. Truesdale, Elgin, Ill.—This invention consists in a pivoted dog or catch which operates upon the edge of the wooden sash in such manner as to hold the same by friction at any given hight, its end being bevelled in such manner as to have the effect of crowding the sash up against the weather strip in the one side and up close against the jamb at the opposite side of the window whereby a tight joint all around is ensured, for keeping out the cold and rain.

ROTARY STEAM ENGINE.—J. B. Willet and Livingston Brien, Nashville, Tennessee.—The object of this invention is to obtain a constant action of the steam upon the driving shaft of a steam engine.

OIL.—E. K. Wood, and R. W. Henry, Dewitt, Iowa.—This invention relates to an improved oil as a substitute to be used for linseed oil in the mixing of paints.

BUTTON FASTENING, ETC.—G. A. Lingard, N. Y.—This invention relates to a novel attachment to studs, etc., by means of which they can be securely fastened to the clothing.

ATTACHMENT OF HANDLES TO BRUSHES AND OTHER IMPLEMENTS.—Miss Anna Eddowes, Frankfort, Pa.—This invention consists in securing the handle to the head of the brush, in such manner that while a firm and secure fastening is obtained, the handle can be readily detached and attached at pleasure.

SEED PLANTER.—J. Shattuck, Waterloo, N. Y.—This invention relates to a new and improved machine for planting seed either in hills or drills, and it consists in a novel construction and arrangement of parts, whereby seed may be planted at the required depth in the soil, covered, and the earth pressed upon it, all the parts being operated automatically or under the draft movement of the machine.

CULTIVATING AND SEEDING MACHINE.—W. K. Garrison, Abingdon, Ill.—This invention relates to a new and improved cultivator and seeding machine, and it consists in a novel construction and arrangement of a movable or adjustable frame with a lever and main frame or draft pole, whereby the device is placed under the complete control of the operator when used either as a cultivator or seeding machine.

TIPPING ATTACHMENT FOR POTS AND KETTLES.—Charles Coester Jr. and W. L. Deevey, Bridgeport, Conn.—This invention relates to a new and simple attachment to be applied to pots and kettles which are not provided with handles, and is designed to assist in tipping the same.

WASHBOARD.—William A. Jordan, New Orleans, La.—This invention consists in attaching springs to the underside of the washboard, which springs allow the board to yield to the pressure brought to bear upon it in the rubbing of the clothes thus relieving the clothes from wear.

HORSE HAY FORK.—E. B. Woodruff, Morristown, N. J.—This invention relates to a new and improved horse hay fork for elevating and depositing hay in barns, and it consists in a new and improved means, whereby the loaded fork is firmly secured in position, while being elevated and rendered capable of being readily tripped so that it may discharge its load when required.

MEANS FOR PREVENTING ACCIDENTS ON RAILROADS.—Milton Wallwork, Shelbyville, Tenn.—The object of this invention is to obtain a simple and efficient means for preventing accidents on railroads, such as the collision of trains, the running of the same off from drawbridges, etc., etc.

MACHINE FOR CUTTING CANVAS, CARDBOARD, ETC.—H. H. Pember, New York City.—This invention consists of two feed or pressure rollers between which the canvas, etc., to be cut is drawn in combination with a knife blade so arranged that it can be adjusted in position according to the width of strip desired.

MANUFACTURE OF NOZZLES OR SPOUTS OF COFFEE POTS, PITCHERS, ETC.—W. H. Miller, Brandenburg, Ky.—This invention consists in a novel manner of forming the spouts or nozzles to coffee pots whereby it can be done with great quickness, convenience, and efficiency.

HORSE RAKE.—Emandes Krous, West Liberty, Ohio.—This invention consists in constructing a horse rake in such a manner that all of the teeth will conform to all the sinuosities of the ground by attaching them to independent bars that are constructed in such a manner that each one can be raised or lowered without interfering with the others.

DEVICE TO PREVENT HORSES FROM CRIBBING.—Robt. Jennings and Jas. A. Marshall, Bordentown, N. Y.—This invention has for its object a very effective and simple device for preventing horses from indulging in the habit or disease of what is termed cribbing. It consists of two pieces of steel spring of suitable length both made in the form of an arc of a circle one within the other. The outer spring has a shorter or smaller diameter than the inner one. In the outside spring is secured several sharp points that project to near the inside spring. The inside spring is provided with a slot or mortice through which these points project when the inner spring is pressed down.

WATER WHEEL.—A. P. Johnson, Edwards, N. Y.—This invention relates to a new and improved water wheel of that class in which screw or spiral buckets are employed, and it consists of two wheels placed on a horizontal shaft and fitted in the ends of a case which has a draft tube communicating with it. The buckets of the wheels are formed with a gaining twist or spiral, that is to say, the pitch of the buckets gradually decreases from their outer to their inner ends, and the wheel case is provided with a tube containing a valve which is automatically opened when the gates are closed to admit of the discharge of the water from the case and draft tube. The invention also consists in a novel construction of the outer ends of the buckets the same being made to serve as cutters to cut drift wood and admit of the same passing through the wheel without stopping or choking it up. The invention further consists in the novel construction and application of gates to the wheel case whereby the gates may be operated, opened and closed with the greatest facility.

EGG AND CREAM BEATER.—F. Oakley, London, England.—This invention relates to a device by which eggs and cream can be beaten with the greatest despatch and ease, and which is easily cleaned and not liable to get out of order.

VALVE MOVEMENT.—C. C. P. Peabody, Calais, Maine.—This invention consists in an arrangement which enables one to operate the valve of a steam engine, and to change the engine from a forward to a back motion, or to reverse the motion with one eccentric.

SILK CLEANER.—Jules Jeannotat, Paterson, N. J.—This invention is to produce a single device for freeing silk from knots, clearing it of extra growth and all foreign substances that may have adhered to it; and it consists in the employment or use of two plates pivoted in a suitable shaped frame or stand, in such manner that their proximity to each other, or nearness of their edges, may be regulated in a single moment to accommodate different sizes of silk.

CORN AND COTTON CULTIVATOR.—A. H. Allison, Charlottesville, Ind.—This invention relates to improvement in the construction of machines for the cultivation of Indian corn, cotton, or other plants, set in rows in the field, and consists in the arrangement of the plows in connection with the frame by which they work one side of the rows of corn or cotton at a time, and are completely under the control of the driver, who is seated in the carriage frame, the parts being all simple, strong and compact.

GATE.—George McKnight, Hebron, N. Y.—This invention has for its object to furnish an improved gate, simple in construction, readily operated, and which, when lowered or opened, shuts down entirely out of the way.

BED BOTTOM.—E. M. Payne, Waverly, N. Y.—This invention has for its object to improve the construction of the improved bed bottom patented August 14, 1865, and numbered 57,181.

CHURN.—Robert T. Stanley, Charlton, Iowa.—This invention has for its object to furnish a churn by the use of which the churning may be quickly and thoroughly performed, developing and gathering all the butter that may be in the milk.

ROTARY BELLOWS.—Hiram Phinney, Kingston, N. Y.—This invention has for its object to furnish an improved rotary bellows, simple in construction, and not liable to get out of order.

MILK RACK AND TABLE.—John McCoun, Lockport, N. Y.—This invention consists in a combined revolving milk rack and table, so constructed that the air may have a free circulation all around the milk pans, cooling the milk more quickly, and producing more cream and better butter than when the milk is kept in the ordinary manner.

ORDNANCE PARTLY OF BRASS AND PARTLY OF STEEL.—William Webb.—The patentee takes a tube of steel or iron, having an internal diameter somewhat less than that which it is intended the finished gun shall have, and casts upon it either a coating or a series of rings of brass; or he fixes the rings by shrinking them upon it, or attaching them in any other convenient way. The result is a brass gun, lined with steel or iron.

SHEET IRON.—George Haseltine.—The object of this invention is the improvement of sheet iron, which is effected by covering it, during the process of manufacture, with a hard, compact, and smooth surface of steel, so as to render the sheets stronger, more durable, and less liable to oxidation. To the bottom and top of a "pile" is added a bar or plate of steel of the length and width of the pile. The latter is then heated to the proper degree for welding, and passed between rollers, so as to become a bar of the desired width and thickness. This bar is cut into suitable lengths, which, after having been heated, are passed between rollers a number of times sufficient to form them into plates. Then the scale produced by the heating and rolling is removed by means of a chemical bath. A series of these having been piled together, and brought to a dull red heat, are passed between rollers to give them exactly the required thickness, and a smooth and polished surface on both sides.

GAS FOR LIGHTING AND HEATING PURPOSES.—George Russell and William Carbines.—This invention consists in the production of inflammable gas from cocoa-nut shells, fir cones, beech nuts, acorns, and Brazil nut shells with or without the nuts, by subjecting them in retorts to such a temperature as will cause their decomposition. An ammoniacal liquor containing hydrocarbons, etc., is obtained after the illuminating gas; and the residuum is a charcoal suitable for many purposes.

PREVENTION OF BOILER EXPLOSIONS.—Edwin Bray and John Greaves.—This object is to be effected by affixing over the furnace a small chamber made of brass or some other suitable material, and fitted with, by preference, a conical valve, connected with one extremity of a lever of the first order, and a float within the boiler with the other extremity. When the water becomes too low, this float falls, the conical valve rises, and allows steam to pass from the boiler to the furnace, so as to extinguish the fire.

UTILIZING SCRAPS OF TINNED IRON.—Alfred Vincent Newton.—This is effected by compressing them in a mold, so that they may occupy a small space; placing them in crucibles along with carbonaceous substances sufficient in quantity to impart two and a half per cent. carbon to the tinned iron; subjecting the mass for a sufficient time to a proper temperature; and then casting the metal into ingots, which may be used in the same way as ordinary steel.

PREVENTING CORROSION OF SHIPS.—William Piggott.—This is effected by establishing a galvanic action between the iron of the ship and zinc, or some other metal electropositive to the iron. The electropositive metal may be either in contact or electric connection with the iron, but must be always in such a position as that it will be exposed to the action of sea water. To prevent fouling, the ship is to be placed in one electrical condition, and the sea in another, by means of any convenient form of galvanic battery.

MANUFACTURE OF IRON.—Arthur Thomas Becks.—The object of this invention is to secure to manufactured iron a smooth and clean surface, by alloying the iron with a small quantity of tin either before or after it has been converted into wrought iron. The proportions from one to ten parts by weight tin, and two hundred parts iron. The tin is, by preference, obtained from tin plate scraps. If the bloom, bar, or sheet cracks or breaks readily, either at a red heat or cold, the proportion of tin must be reduced.

ENVELOPE MACHINE.—George H. Reay, New York City.—This invention consists in the arrangement of a movable slide or arms, fitted into guide grooves, in the bed of an envelope machine, and provided with lips or studs which serve to hold the pile of blanks in position, in such a manner that by means of said sliding arms the pile of blanks can be pushed in under the pickers or gummers, or removed from under said pickers without stopping the machine or interrupting its regular motion.

WASHING MACHINE.—C. M. Mack, Brooklyn, Pa.—This invention relates to an improvement in washing machines, and consists in the arrangement of a horizontal rack frame, fitted to move up and down vertically within a box, and the contraction and expansion of springs on which the frame rests.

APPARATUS FOR EVAPORATING AND DISTILLING LIQUIDS.—Pierre T. Badoux, New York City.—This invention relates to an apparatus which is particularly intended to accelerate the evaporation or distillation of liquids or fluids of any description.

BRISTLE BOOT FOR HORSES.—John J. Davy, Newark, N. J.—This invention consists in a strap provided with radiating bristles, made from hair or other suitable material, in such a manner that a boot for horses is obtained, which is easily applied and removed, and which is not liable to wear out.

SCRUBBING MACHINE.—Andrew Irion, Femme Osage, Mo.—This invention relates to a machine which is composed of a small tank, supported by suitable wheels, and provided with a discharge spout and stopper, so that the flow of the liquid from the tank can be regulated. One of the wheels is provided with an internal gear, which meshes into a pinion mounted on the end of a crank shaft, from the crank or cranks of which suitable connection rods extend to a scrubbing brush, in such a manner that while the tank is drawn or pushed along on its wheels, a quick reciprocating motion is imparted to said scrubbing brush, and the operation of scrubbing is effected with ease and with comparatively little exertion.

TREATING LINSEED OR OTHER OIL OR FAT.—Daniel E. Breinig, New York City.—This invention consists in treating linseed or other oil or fat with metallic gum and turpentine or naphtha, in such a manner that its properties are improved, and that the same can be used with great advantage for manufacturers' and painters' purposes.

STRAP FOR ACCORDEONS.—C. T. Zimmerman, Philadelphia, Pa.—The second part of this invention relates to a strap for accordeons, which forms a double loop, one to pass round the wrist and one to admit the thumb of the hand which grasps the accordeon, in such a manner that the strap is not liable to slip on the hand, and the player is enabled to operate the accordeon without danger of losing hold of the same.

MACHINE FOR STAMPING AND EMBOSSING.—George H. Reay, New York City.—This invention relates to a machine which is intended particularly for embossing and stamping the blanks of envelopes or other articles of paper, but which can also be used for stamping articles of any other description.

BLASTING POWDER.—W. Fehleisen and Ernst Fehleinsen, Cilli, Austria.—This invention relates to an explosive compound intended particularly for blasting purposes, and composed of saw dust or other particles of wood or other cellulose material, in a finely reduced condition, to which is added salipeter or nitrate of potassa, charcoal or carbon and prussiate of potassa, or ferro cyanite of potassium.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

Parties requiring paper-collar machines will address W. H. Tolhurst, corner of Union and Fulton streets, Troy, N. Y.

Wood pump and pipe manufacturers send list of prices to T. Ibbotson, 61 Ann street, New York City.

P. R. Coleman, Goshen, N. Y., wants a machine to cut cheese box bands.

Jno. Riggin, 43 Chestnut street, St. Louis, desires to obtain a mangle.

Who are the most extensive brush manufacturers in the Union? A. Eddowes, 4,339 Franklin street, Frankford, Philadelphia, Pa.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

W. T., of C. W.—Glass, china or earthenware can be drilled with a steel drill hardened without drawing, run at high speed and the point kept wet with turpentine mixed with gum camphor.

J. L. F., of Mass.—There are no known mechanical means by which a velocity higher than 90,000 revolutions per minute can be obtained. Cotton spindles usually make from 6,000 to 7,000 turns per minute. No higher velocity, we are aware of, has ever been used for manufacturing purposes. There is a limit even to our application of known mechanical laws.

G. M. C., of N. J.—1,500 feet per minute is a high velocity for a belt. Higher speeds are necessary in some cases, but as a general rule a velocity of from 1,000 to 1,200 feet per minute is high enough for real economy.

J. C., of Minn.—You say you cannot keep the joints of your iron pipe tight. Judging from your letter a portion of the pipe is exposed to all the rigors of your severe winters out of doors, while another portion is in your shop. If this is so, one portion of the pipe may be subjected to a temperature of 10 degrees below while the other is under the influences of 70 above F. There is good reason in this case for your pipe joints leaking. An iron rod one inch square raised from 32 degrees to 212 expands with a force of 35,847 pounds, or it exerts a force of 119·15 pounds for every degree F.

G. W. C., of R. I.—There is no need of a straight edge in cutting lace leather into lacets except to cut the first, or rather to trim the side. After straightening the edge take the knife in your hand, the straightened edge of the leather toward you, and use your thumb—the thumb of the right or knife-holding hand—as a guide. Holding your thumb rigid and guiding your knife by it you can cut up a side of lace leather quicker and more perfectly than by the use of a straight edge.

S. M., of N. Y.—A ready test as to the upward pressure of the atmosphere is within the reach of any one. Nearly fill a tumbler or goblet with water, not wetting the rim, and press over the top a piece of paper, closing the paper down all around the rim with the fingers. Then, holding the paper in place, invert the glass and not a particle of water will escape until the paper is saturated.

T. N. C., of N. Y.—The ordinary helix machine and the magneto-electric machine for medical purposes give to and fro currents rapidly neutralizing each other, and thus are not suitable for producing magnetic effects. But by a variation in their construction so as to give a single current in one direction they may be used in place of the battery for the telegraph and electro-plating.

G. S. P., of N. Y.—The theory that the bursting of boilers may be explained by the production of explosive gases, has been proposed a great many times. But it has no foundation in fact. Water may be decomposed by heated iron and hydrogen generated, but hydrogen of itself is no more combustible than water. There is no conceivable way that oxygen can be furnished in boilers as ordinarily constructed and operated. The theory requires the simultaneous production of both.

T. D. I. of ——.—Lubricating oils are tested by applying them to journals where the amount of reduction of friction can be measured. The axis is revolved by means of a constant weight, and the reduction of friction is determined for the cases of different weights pressing down the axis. Careful experiments show that petroleum oils, answer pretty well for light weights pressing on the axis, but for the heaviest work they are not to be recommended. Sperm oil is found to be preferable to all other oils for lubrication so far as intrinsic merit goes. But on account of cheapness other oils will always be in demand.

W. B. Y., of N. Y.—Gunpowder has been used, especially in the Arctic regions, for breaking up ice. The kind of apparatus (torpedo) and the plan of proceeding should vary to suit the thickness of ice and other circumstances. Gunpowder should be used more than it is for that purpose. A few years since a steam vessel was expressly prepared to serve as an ice breaker. It operated by running its bow up on the ice and thus breaking it down.

A. D. C., of Mass.—We cannot tell you why ice is slippery. Can you tell us why sugar is sweet? There is such a thing as delving too deep in the field of science. When we reach hard pan we ought to be content. We cannot go beyond the ultimate properties of matter. They are indisputable facts, which we cannot explain.

I. L., of Ind., communicates an interesting case of spontaneous combustion. In mixing black paint (linseed oil and lampblack) an excess of lampblack was accidentally poured in from a paper package. The excess was scraped off from the surface of the paint, some of the oil adhering to it. The oiled lampblack was placed in the package and laid on the shelf. In the course of an hour the package was discovered to be on fire and blazing.

C. E. R., of N. Y.—The paste to which you allude we believe is gum tragacanth in water. There is no mucilage made with water which can dry instantly. There are plenty of solvents which evaporate more rapidly than water (alcohol, ether, benzole, chloroform, etc.) but it is doubtful if any of them would be available for common use. . . . . "Cocoanut milk pricked into the skin is said to remove India ink." So also it is said that woman's milk has the same property. The statements need confirmation.

J. P. B., of Me.—There is no water solution which can be raised to the temperature of 450° in the open air. Oil tallow or fusible metal are generally used for "baths" of temperatures above 250°. The heat should be varied to suit the nature of the different articles to be preserved.

C. W. D., of N. Y.—Water in cooling contracts till it reaches the temperature of 39°. On further cooling it expands till it becomes solid ice at 32°. Ice is therefore not formed in water till the whole mass has reached 39°, and the formation of the ice is confined to the surface. After a film of ice is formed, it increases in thickness by growth of ice on its under side, where it is in contact with the upper surface of the water. Your notion seems to be that by reason of the porosity of ice the water filters up through, freezes on the top of the ice, and that the ice grows upward instead of downward. You are wrong, and you have lost your wager.

A. M., of N. J.—"What is the smallest quantity of ground room that can be allowed chickens in confinement, fed on animal food, and the different proportions of grain, making the estimate by the 100 That depends, as the Frenchman would say. A. M. does not furnish all the data that we should require in order to venture replies which would be satisfactory to us. We beg to refer him to the wise men of the Farmers' Club, who will give him figures exact to the fraction of an inch.

J. H. P., of N. J.—There is no advantage in turning the face of pulleys crowning so long as you will keep your shafts in line and your belts straight. But this is not always possible, and as the tendency of belts as of a liquid on a revolving shaft, is by centrifugal force to traverse the part furthest from the center, so even if the two shafts are out of line slightly the belt will retain its proper position if the center of the pulley face is the highest. Sometimes it is necessary, even when shafts are leveled and lined as exactly as possible, to raise the center of a pulley to keep the belt on the pulley. This is done, generally, by putting on the pulley, around the center of the periphery, a strip of leather secured by copper rivets or by screws tapped into the rim.

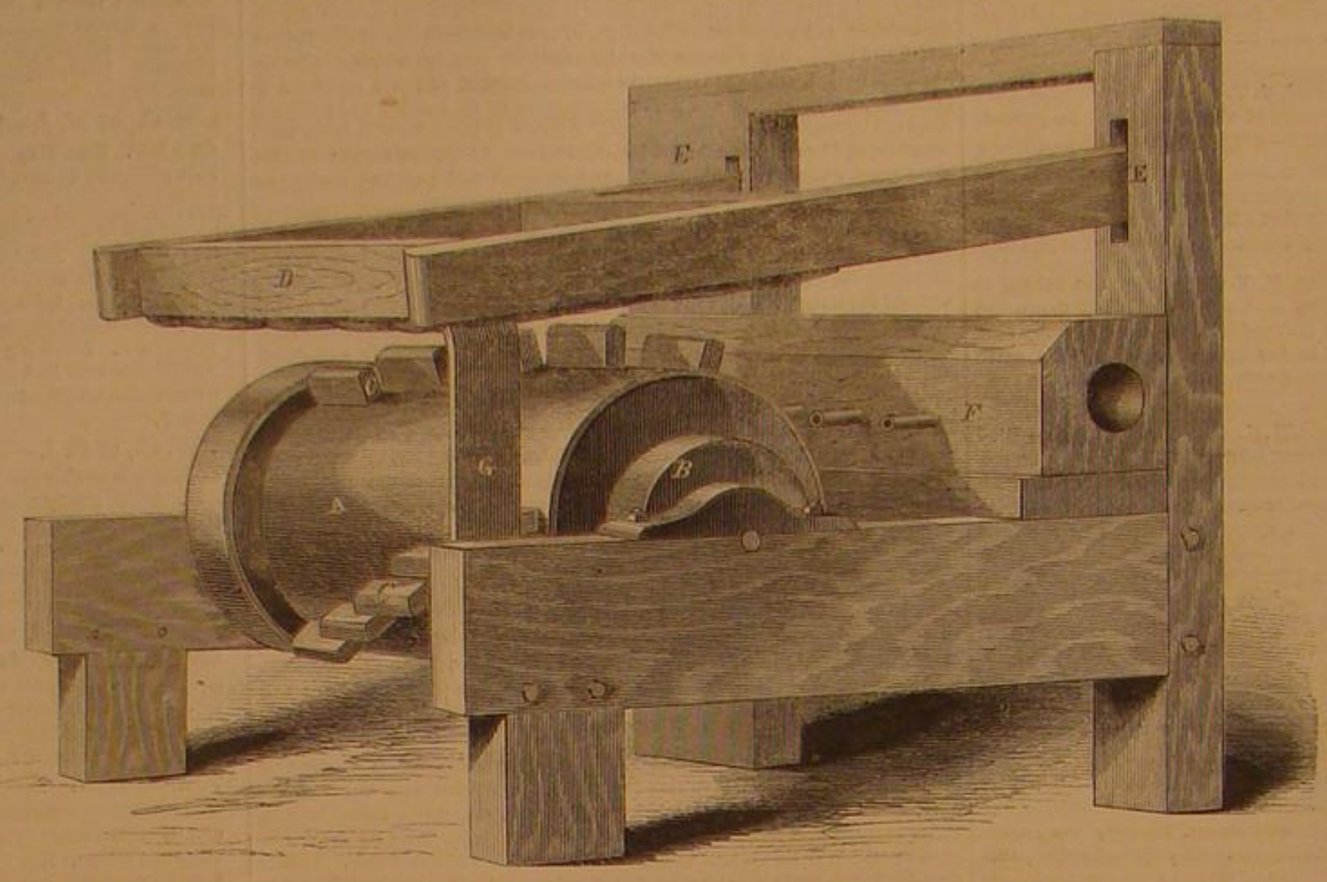
Improved Machine for Scouring Leather.

The scouring of leather has been from time immemorial effected wholly by hand. We believe, however, there are now in use devices for assisting in the more efficient contact of the stone with the hide, and the machine which is shown in the engraving is a further effort in the same direction.

It consists of a frame of suitable strength having mounted on it a drum, A, twelve inches or more in diameter, having a driving pulley, B, at one end and bearing on its surface the scouring stones, C, which are imbedded in the cylinder, the ends projecting at a uniform hight, arranged in spiral rows, and so placed in relation to each other that when the drum revolves every portion of the surface of the side of leather exposed to their action is subjected to the operation of their surfaces. On a frame, D, pivoted to the uprights, E, is an apron of leather or other suitable material, confined between the two cross bars and seen projecting below the frame, is secured. F is a reservoir of water, fed from a head and provided with pipes arranged in a row just above the center of the drum, by which streams of water may be ejected upon the leather while in process of scouring.

The operation is thus:—A side of leather is thrown by the attendant over the frame, D, the drum revolving toward him, when the stones catch the end and have a tendency to pull the side through and throw it at his feet; but he guides and controls its progress as his judgment dictates, allowing it to move as he pleases. During the operation water is to be thrown from the pipes upon it. A spring catch, G, holds the frame, D, up from the drum when no leather is passing through and the weight of the frame is not desirable.

The patent for this device is dated Dec. 4, 1866, and was obtained through the Scientific American Patent Agency for Franklin Davis, of Lawrence, Kansas, whom those interested will address for additional particulars.



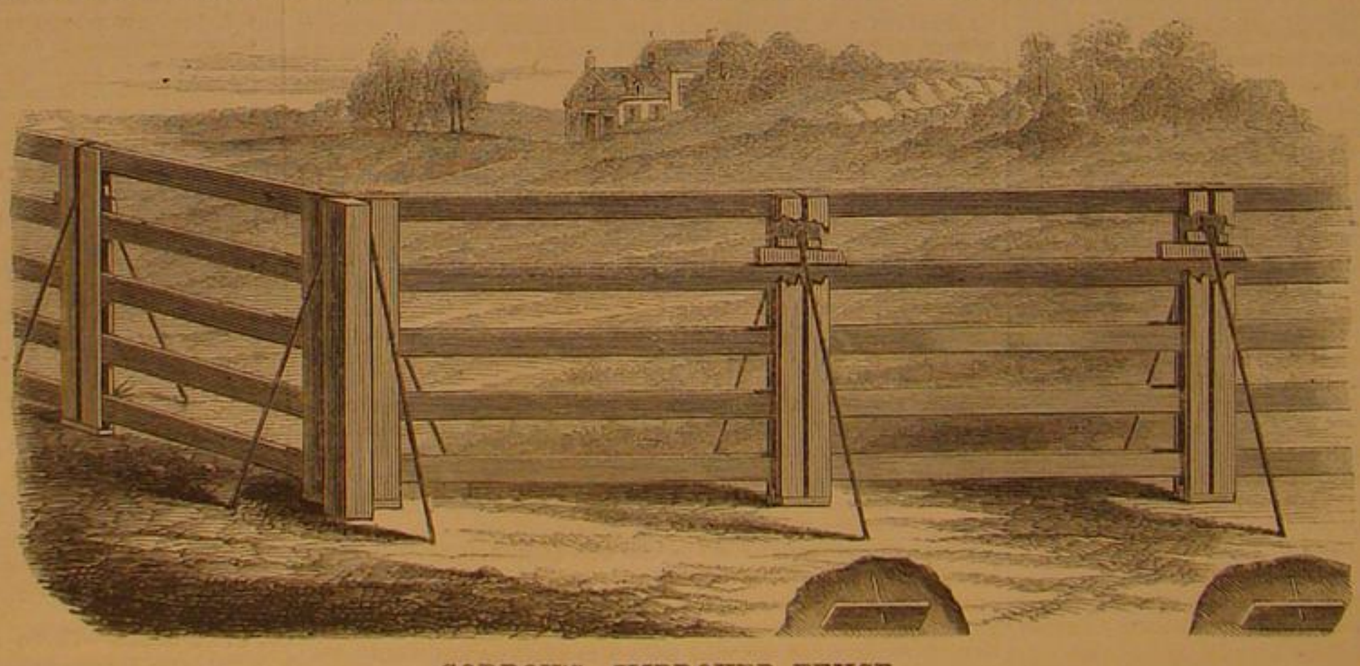
DAVIS' MACHINE FOR SCOURING LEATHER.

Improved Fence.

Farm and other fences require frequent repairs from the rotting of the posts while the superstructure has not begun to decay, and from the throw of the frost. One great item of farm labor in the spring is the fence repairing from this latter cause. The engraving gives a view of a simple fence which does not appear to be liable to these objections. There are no posts seated in the ground. The fence is built in panels or lengths under cover, during the inclement season of the year, when out door work is either impossible or inconvenient, and it can be put up rapidly without great labor.

The panels are placed end to end on a foot, which is merely a piece of board or plank, having a projecting rib rising between the upright cleats to keep the fence intact against side pressure and preserve the ends of the upright from decay by moisture. The fence is secured by guys of galvanized wire which are attached at the ends to anchors of wood, or tile, or any suitable material. These anchors are set into the ground to a sufficient depth to insure permanency. The wire takes a single turn around a block inserted between the uprights over one of the horizontal bars, and the whole affair made "taut" by a wedge-like key driven between the block and slat.

The inventor claims that the cost of this fence is much less than that of ordinary fences, and that it has a decided advantage over others in that it can be built anywhere and transported to the place of erection. It was patented by E. C. Gordon through the Scientific American Patent Agency, Dec., 1866. Further information may be obtained by addressing A. M. Towl, Sevastopol, Ind.



GORDON'S IMPROVED FENCE.

AMERICAN CHILLED WHEELS IN ENGLAND.

The English still distrust the chilled cast-iron railway wheel as brittle and dangerous, and cleave to their expensive and comparatively short-lived wrought wheels. Mr. W. W. Evans, who has been for thirty years engaged in railway construction in the United States and North America, is now in England, engaged in the mission of introducing the American Chilled Wheels. Of course this is no American interest; the object being simply to induce the English to adopt for their own benefit (and to that of the manufacturer) the American way of making wheels. Mr. Evans presents to the British public, in *Engineering*, a dense array of facts and statistics on this subject, mostly well known to intelligent Americans, but some of which are worth repeating even here. The chilled wheel is used almost exclusively in the western hemisphere—in the United States, Canadas, and South America. They are also in high favor in Russia and Austria. Their peculiarly striking superiority for mountainous countries, where curves are sharp and grades are steep, renders Mr. Evans sanguine of introducing them on the mountain roads of India. Specimen sets are offered to all the English railways, free of charge until approved, and thorough public tests by breaking up wheels with sledge hammers, are employed to break up the thorough British prejudice against the article. It is a doubtful trial of endurance between two very hard substances. Three hundred and twenty swinging blows with 28-pound sledges were struck on a chilled wheel, at one of these trials, before the stout smiths could break out a piece; as many more were struck before the wheel was broken up; and the hub was not broken up but given up, as a nut too hard to crack. It was then placed under a steam hammer of great power and destroyed.

The life of the chilled wheel on the Erie railway is quoted as about 140,000 miles, and there were wheels of this kind in the International Exhibition of 1862 that had run on Canadian railways 160,000 miles. The life of the English wrought wheel, as compared with the cast, is practically but little over 30,000 miles, because after that amount of work its face is worn so uneven that it must be turned true in a lathe, at a cost about equal to that of recasting the iron wheel. The wrought wheel will stand two turnings, and sometimes three, making its total existence, with all the expense of turning; from 60,000 to 90,000 miles at the utmost.

The great English objection, the danger of breaking from frost and rough road, is turned against the wrought wheel by the facts of English railway accidents, and by the testimony of the manager of the Moscow railway, who says that they have tried every class of wheels, and found none to withstand the roughness of their road and the severity of their climate, but the chilled cast wheel, an article made by themselves of Swedish iron and very inferior to ours. They had tried twenty of the German steel wheels, last winter, and broke one fourth of them.

Care for the Feet.

Many are careless in the keeping of the feet. If they wash them once a week they think they are doing well. They do not consider that the largest pores of the system are located in the bottom of the foot, and that the most offensive matter is discharged through the pores. They wear stockings from the beginning to the end of the week without change, which become completely saturated with offensive matter. Ill health is generated by such treatment of the feet. The pores are not only repellants, but absorbents, and this fetid matter, to a greater or less extent, is taken back into the system. The feet should be washed every day with pure water only, as well as the arm pits, from which an offensive odor is also emitted, unless daily ablution is practiced. Stockings should not be worn more than a day or two at a time. They may be worn for one day, and then aired and sunned and worn another day if necessary.

Improved Insulator.

An Englishman named Hooper is reported to have perfected the application of caoutchouc for insulation of telegraphic wires, so as to supersede gutta percha by an altogether superior article. Tests for inductive resistance on a knot of the Ceylon cable core, manufactured by Mr. Hooper, showed that the time of falling from a tension of full charge to that of half charge was 300 minutes. The Atlantic cable falls in 60 or 70 minutes. The inductive resistance was to that of gutta percha as 1·36 to 1, implying that if a cable coated with gutta percha were just able to pay its expenses, when coated with caoutchouc it would yield 36 per cent of them toward a dividend. Its permanency of insulation at high temperatures is the most remarkable quality of this coating. At 212° Fah. its insulation is more tenacious than that of gutta-percha at 100°. It is manufactured at a temperature of 280°. It is also nearly impermeable to moisture even under pressure—the change in weight by absorption in three years being found to be only one per cent in thin sheets. The material is first formed into massive cylinders, then shaved from the periphery by keen cutting machines into very thin long sheets, next slit into tapes, and these are served around the conductor to the thickness desired, when the mass is welded by heating. The secret of the improvement, however, is said to be in the perfect elimination of oxygen—imperfectly effected by vulcanization—which was the element that caused the gradual softening and permeability hitherto experienced in the article. It was a process of slow oxidation or decay, which has been entirely obviated. The removal of oxygen leaves the caoutchouc of its proper color, pure white.

MENDING IRON CASTINGS.

Generally when a casting breaks and cannot readily be repaired to be of its original strength by strapping with wrought iron, it is condemned. But there are cases where the the condemnation of a casting would involve the loss of a large amount of work expended upon it, especially when the casting is a heavy one and one costing much to prepare it for its work. It may not be generally known that such fractures are capable of repair by the same process that originally created the complete casting. If a mold of sand is made about the ends of the broken portions and melted iron is poured into the mold, a union may be formed if the molten iron is allowed to impinge upon the separated surfaces and then run off until they become fused, when the outward flow of iron is stopped and it allowed to fill the vacant space. The time allowed for fusing the ends of the fracture can be ascertained by feeling with an iron rod. When the iron of the original casting "gives" readily it is time to stop the outflow gate. Beds of marine engines have thus been repaired to be as good as new.

Core Making for Foundery Men.

A correspondent from Springfield, Ohio, says that cores for iron castings can be made better with sorghum skimmings and sand than by the usual rye flour, molasses, and sand. He gives this as the recipe: One quart sorghum skimmings, sixteen quarts water and sharp sand enough to make the mixture of the proper consistency. He says: "I can make more cores with one barrel of skimmings and better than most molders can with four barrels of flour."

Southern Inventors were usually lucky with their improvements until the war came on, which brought ruin and prostration upon everything. Isaac Krebs, of Virginia, patented a safety whiffletree in 1855, upon which up to the breaking out of the war he had realized sixty-five thousand dollars, the whole of which was swept away by the war save the value of some far off acres in Texas.

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PSEUDO-SCIENTIFIC SPECULATION.

WE have received from Dr. L. Bradley a reply to our strictures upon the erratic speculation which sometimes intrudes (as we think) upon the legitimate discussions of scientific institutes. We regret that we have not room for a defence so long as the doctor sends us, but we are glad to be enabled to say that he repudiates the doctrine of atheism, and "venerates the Supreme Being and the Holy Writings as highly as we can." The heart is often wiser than the head, and if our friend can believe in God with the one and in the Eternity of Matter with the other, we can congratulate him that his sentiments are no worse or his logic no better.

But the assumption that the eternity of matter is among the accepted principles of science, or that any such thing is susceptible of proof, is one which very few scientific men will concede. There is no controversy between science and theology on this point. Be the properties and the destiny of matter what they may, no one pretends that it is impossible for them to have had a beginning and to have been constituted by the Almighty Creator "when as yet there were none of them." Let it be granted that there is no necessary direct contradiction between the eternity of matter and the statement of divine revelation that "In the beginning God created [formed] the heavens and the earth:" an essential contradiction nevertheless remains between two distinct and heterogeneous infinites, God and matter—whether matter be attempted to be conceived as an eternal emanation from or a co-eternal substance with the Deity. The escape from this contradiction is directly into Pantheism, or the identity of Nature and God: the only logical result of the doctrine of eternity or infinity of matter; involving the absurdity of a self-caused, i. e. uncaused, universe, and depriving the soul of a God to worship, love and trust, as effectually as the blankest denial of Him by name.

The common sing-song about proscribed science, Galileo, and all that, is nothing to the purpose. Nobody denies that science has helped us in many ways, and may help us still, to a better understanding of revelation. But it is quite another thing for mere speculation, under the borrowed name of science, to contradict, as genuine science never has done or can, the fundamental truths that make man a moral and responsible being, and even to exclude all valid ground for his being at all.

If any one chooses to amuse himself with speculating upon the eternal activity of the Deity, and to surmise that all our sensible experience, the causes of which we call matter or properties of matter, amounts to nothing but a manifestation, relatively to our faculties, of a Divine force which has never rested from eternity and never will rest; there is nothing that we know of in science, revelation or the moral interests of the rational universe, to forbid such speculation, as speculation. But the difference between speculation of this sort and that which makes matter a true substance necessarily subsisting eternally by virtue of its own properties, is just the difference between theism and atheism. It is admitted that the dreamer of the one dream may possibly be as little an atheist at heart as the dreamer of the other: still, there is more real atheism in us than we are apt to suspect.

THE NEEDLE GUN AND THE REBELLION.

The needle gun narrowly escaped getting its first great celebrity in America. In 1861, as soon as it was determined that war was inevitable, the politicians and speculators had a grand scramble for contracts. The bepestered and bewildered war department dispensed its benefits almost regardless of consequences. Among the happy contractors whose day of fortune seemed to have come, was one who secured a contract for furnishing 10,000 needle guns at $30 each. A manufacturer was easily found who would deliver the guns at $12·50 each, and a capitalist who would furnish the money for the manufacture for half the profits. But the contractor considered such arrangements were like throwing away his contract, and that one or two hundred thousand dollars was a small reward for his patriotism. He therefore waited for something better to turn up. What did turn up was a Congressional committee for the examination of contracts. Thus the needle gun scheme and hundreds more were nipped in the bud.

A few needle guns were, however, manufactured and imported and used in the war; a few companies were supplied with them. The admirers of the needle gun tell a very good story about them. After one of the battles in which they were used, the rebel prisoners wanted to know "what kind of gun it was which the Yanks loaded up on Sunday and fired the rest of the week." But the story is so good that it may reasonably be doubted. At all events the proprietors of other breech-loaders tell the same story in favor of their favorites.

AEROLITES.

IN a contemplation of the heavenly bodies, revolving at such inconceivably remote distances from our own planet, any investigation relative to their internal structure, other than pure speculation, seems improbable. But by the aid of science this inter-planetary chasm can be spanned, and with the telescope and spectroscope the means are at our command for penetrating their orbits and acquainting ourselves with the constituents of these remote worlds. In those strange visitors which from a time prior perhaps to the age of man, through the centuries up to the present day, have fallen upon our earth, there is furnished for us tangible evidence from which we can at leisure directly investigate the characteristic formation of the distant spheres. This assertion assumes the truth of the supposition that these bodies have actually fallen upon our earth from some other planet, a view which when first proposed was received with incredulity and ridicule, but is now generally accepted by scientific men. The lunar theory considers the bodies as masses thrown out by the volcanoes of the moon with such a force that they are carried beyond her attraction and into the atmosphere of the earth.

The fact of the falling of these bodies is undeniable and has been attested on innumerable occasions by reliable witnesses. Chemical analyses prove a oneness of origin from the similarity of composition in specimens collected from all portions of the globe, and while embodying no elements not found on the earth, the combinations differ from anything belonging to the earth. In falling, meteorites have been observed shining with an intense splendor, and rushing through the air in an oblique direction with an immense velocity. When near the earth an explosion usually occurs, and the scattered fragments bury themselves deep in the ground. Showers of aërolites are on record, but fortunately for mankind the fall in great numbers is rare, and even the descent of single masses are only chronicled with the proverbial frequency of "angels' visits."

The interior of Central America and Mexico it is believed holds untold numbers of meteorites which have been stored up there for countless ages, and compared with which the specimens placed in the cabinets of the curious dwindle to the merest insignificance. The Caaba or sacred black stone in the Mohammedan temple at Mecca it is supposed is an aërolite, but a determination of this point by analysis under the existing circumstances would be attended with some hazard to the experimenter.

The announcement was made a few weeks since that the largest mass of meteoric iron ever discovered had been lately found by Professor Shepard, in Missouri, and was consigned by him to Amherst College. This statement was erroneous, this honor of owning the heaviest meteoric stone in any collection being due to Yale College.

The history of this (the Gibbs meteorite) is somewhat singular. In Dr. Bruce's Journal in 1810, the account of the varied fortunes through which this specimen has passed, is detailed at some length. It appears that two years previous to this date, the Indians of southern Louisiana, now Texas, stated that a great stone had been seen by one of their number to fall from heaven, and they volunteered to guide the curious to the place. Under the impression that this was an immense lump of platinum, two rival companies started for the spot. The mass was found as represented, and not far off they were told were two larger specimens which had been separated by the explosion. After a long series of adventures they reached New Orleans with their prize. Some time after the meteorite, as it was now proved to be, was purchased by Colonel Gibbs, brought to New York and deposited by him in trust in the Museum of the Lyceum of New York. During a removal of this cabinet the mass of meteoric iron barely escaped an ignominious consignment to oblivion by being buried by the carmen who found it too heavy for easy manipulation. The widow of Colonel Gibbs rescued it from its premature grave and generously presented it to Yale College. Before being placed on exhibition one end was sawn off and polished, and an inscription embodying the name of the donor and the weight, 1635 pounds, was engraved upon it. The mass measures three feet four and one half inches in length, by two feet four inches thick and stands sixteen inches high. In superficial area the large aërolite deposited in the Smithsonian collection exceeds it, but the weight of the latter does not equal that of the Gibbs meteorite.

AN IMPORTANT PATENT LAW QUESTION.

It appears by a decision of Judge LOTT—Supreme Court, Kings County, special term, Jan. 17—that a manufacturer taking license from a patentee is subject to the rule *caveat emptor*, and cannot recover license fees or royalty paid by him, on the ground of invalidity of patent, unless intentional fraud on the part of the patentee or his agent can be shown. Cyrenus Wheeler, Jr., C. Aultman & Co., John P. Adrian, E. Ball and others, who had invented and improved various mowing and reaping machines, and obtained patents therefor which they claim cover all that constitutes a practical mowing and reaping machine at the present day, have formed an association for mutual benefit and protection, of which Mr. Wm. Allen acts as the agent. On Mr. Allen's demand, Mr. Frederick Nishwitz had consented to take out a license from the associates and to pay them $500 for machines he had previously made and sold. Subsequently he discovered what he believed to be sufficient to warrant the belief that these patents were invalid, and brought suit to recover the money he had paid, and to establish his right to manufacture in future without license from these parties. A great deal of testimony was adduced on the part of plaintiff to establish the want of novelty in the inventions in question.

Judge Lott dismissed the complaint, on the ground, substantially, that the defendants were not only justified in assuming the validity of their patents and in enforcing the rights therein conferred on them, but that the plaintiff, being allowed equal opportunity with themselves to judge of the reality of the rights for which he agreed to pay the consideration in question, had by his agreement virtually waived or conceded the question of validity, and could not reopen it. It would seem, if Judge Lott is correct, that a manufacturer of articles patented by others, must take the whole responsibility of deciding on the validity of patents, so far as he is concerned, whether to disregard or to pay under them, and will suffer alone and without remedy all the penalties of legal fallibility, either way, whether he concede too much to the patentee or too little. In general, if a man takes payment for that which is not his, however innocently supposing it to be so, he is required to refund. It seems to us that there is enough to be said on both sides to render this a nice and important question. A stay of proceedings for thirty days was granted to the plaintiff, but we do not learn whether an appeal is to be taken.

OUR WATER STREETS---FERRYING, BRIDGING AND SUB-TUBING.

We have already referred to the system of ferrying business over the great water avenues of a metropolis like this, as entirely out of date, inadequate in its nature, and incapable of being improved to meet the exigencies of trade or weather and secure a safe, regular and expeditious transit at all times. The incipient struggles of the Brooklyn community for a radical reform in their mode of communication with the city, we leave to the daily chroniclers of passing events, and confine our attention to the mechanical and economical problems involved.

Plans and estimates have long since shown that a bridge can be thrown across from Brooklyn Hights say to Franklin Square, at mast-head height above the mid-channel of the East River, and made at the same time one of the most profitable pieces of road and one of the most lucrative business streets in the world. One hundred thousand persons would regularly cross that single bridge twice daily, if it were in position to-day; cheerfully paying, if need be, $4,000 a day for the privilege. The income from railway and other vehicles would be at least half as much more. Both revenues would be doubled in no long period by the stimulus afforded to traffic in this direction by such facilities. Here is ten per cent., at the start, on $22,000,000: enough to build all the bridges that could be desired from Wall street to Hell Gate; and as no expense is added by the multiplication of passengers, the profits would soon become equally great at half the present rates.

The cost of the approaches would also pay large dividends. The rental of stores and warehouses on the land portions of this highway, in both cities, would be enormous. It is even estimated that this part of the enterprise will pay enough profit to leave the bridge free, as it ought to be. Considering the improved value of the street, new or old, which will run continuous with the bridge from its terminus to Broadway, with that of the property on both the land portions of the bridge, at least five hundred lots, with their improvements present and prospective, will be at once transferred from a comparatively poor to the most valuable position, and their actual productiveness doubled or often quadrupled; directly interesting not less than $20,000,000 of present and added capital on the new route in the construction and results of the work; not to speak of the interests of Brooklyn property in general, which, thus relieved of the chronic incubus of ferry perils and delays, and brought both practically and geographically nearer to business than New York itself is, would immediately rise to the level of New York values.

With regard to plans for the construction of a bridge, little needs here be said, for nothing new is needed. All the requisite data, and a choice of numerous proved and successful plans, are at the disposal of those who may have to decide upon the *modus operandi*. It is conceded that the bridge or bridges must be at mast-head hight above high water, so as to offer no obstruction to shipping, and hence that the Brooklyn approach must commence on the Hights, or at least Prospect street, and the New York approach at the elevated ground of Franklin or Chatham Square. The water width, or length of bridge proper, would be from 1200 to 1350 feet, according to the location adopted. Two or three spans or arches will be necessary, requiring one or two immense piers in the channel,

which will still more excite the already impetuous current of the tides in the East River. This consideration furnishes one of the strongest arguments adduced for giving preference to the sub-aqueous mode of transit. Three leading principles of structure are proposed: first, suspension; second, solid stone masonry; third, a masonry of iron cases filled with concrete, laid like blocks of stone, and anchored together by through bolts and bars. The latter method seems to meet with favor. The plans set forth propose to build from as far up as the corner of Henry and Rutgers streets, New York, to Sands and Fulton streets, Brooklyn, and to build three arches, the central one at 140 feet above high water. The location is ill judged. A landing at Franklin Square will accommodate business between New York and Brooklyn, for the present and future, better than one farther north. No matter in what direction or how far business may extend, those who go farther up town can go there after leaving the bridge, just as easily as on the bridge. The plan of a tubular bridge, like the Victoria at Montreal, or that over the Menai Strait, is also talked of by some, but is manifestly ill adapted for the immense and continuous volume of traffic that must be accommodated; besides being the form worst exposed, at that dizzy height, to lateral strain from the winds.

The costliness of a high bridge over the North River, and the objections to so multiplying bridges as to afford the fullest accommodation desirable to the several widely separated points on both shores, are difficulties to be obviated by the system of sub-aqueous tubular railways, surveys for which, as we have already stated, are now in progress under strong auspices of capital. Some of the expedients proposed by English and American engineers for locating tubular tunnels under water, may here be mentioned. The first in prominence, at present, is the plan adopted for sub-tubing the Thames in London. The tube of the Waterloo and Whitehall Pneumatic Railway, is to be built in four sections or spans of 221 feet each, supported not merely along the length of the tube in a dredged channel, but also upon piers going down to the clay. The tubes, now in course of construction by Messrs. Samuda, at the Isle of Dogs, are of ⅝ inch iron, with three rings of enveloping brickwork bound by hoops of angle iron, and are to receive, after being laid, an internal lining of brickwork bringing their diameter to 12 ft. 9 in. The length of the tubes, including shore ends, will be five eighths of a mile. The ends of each section are closed by bulkheads, and when finished, all will be floated down to Hungerford, and by a moderate admission of water will be eased down into exact position in the trench and on the foundations prepared for them. The ends will be brought into connection as lowered, by means, we presume, of guiding rods on the one, entering corresponding holes on the other, and a close joint will be effected "by means of an ingenious water-tight lock or stuffing box devised by Mr. Rammell." From which language of our English authority on that point (*Engineering*) we understand that the ends are to interlock, with suitable packing, in some way that will result in a water-tight joint for purposes of construction. It is evident that a packed joint could be forced home with any required power by the simple exhaustion of air from the shoreward section. The bulkheads can then be removed, and the joint secured and packed permanently, by means of inside flanges, ready bored with matched bolt holes. Indeed, supposing the nearer flange to be inside the bulkhead and the holes in the opposite flange to be threaded, the bolts might be inserted through without removing the bulkhead, if thought necessary or more prudent. Then, cutting away the bulkhead, the annular space between the flanges could be packed impenetrably, at leisure, or if needful in haste.

This is very likely the simplest and least expensive mode of joining the tubes at moderate depths. Others, however, have been suggested, and we shall mention last a suggestion of much promise for sub-tubing the Straits of Dover. Such things have been proposed and discussed since as long ago as 1809. Half a century is not an excessive period to elapse between the first suggestion of a great improvement and the first serious attempt to realize it. One of the best plans offered in the past, was to build a wooden coffer dam for a section of the work, by one of the variety of methods in use, commencing at the shore, and having either excavated and lined with masonry a tunnel in the river bed, or laid a tube of wrought or cast iron or wood and fully embedded it in loose rock and earth; then cross the dam with a bulkhead or new end near the termination of the finished work, and thence—removing the portion now done with—extend the dam forward to enclose a new section of the work to be done. This being substantially a well tried system, and affording clear space and leisure for the most thorough foundations, superstructure and leveling, will commend itself to careful consideration; especially if the danger of forming a bar in the harbor should compel the constructor to sink his work wholly beneath the bed of the river.

If a tube were constructed semi-cylindrical, or rather semi-elliptical in its transverse section, the flat side forming the bottom, and the vertical sides extended one or two feet beyond the bottom, so as to be forced down like a spade through the mud, it might not be difficult to join each section on its predecessor by over-lapping. The bottoms, of course, could only meet, end to end; but the water would be excluded from access to that seam, by the dam formed by the sides forced down into the river bed. Then an iron coffer, hollowed at its lower end to enclose and fit the exposed surface of the tube, might be forced down upon it and into the bed at the sides, and tightened sufficiently to give access to the joint for perfecting it. Or again, a flexible jacket being placed over the joint, the tube might be exhausted of water, the external pressure closing the joint sufficiently for purposes of construction. Yet again, it might not be particularly difficult to close and fasten the joint sufficiently by workmen in submarine armor; all the preparations being carefully made before sinking the sections.

The contrivance we have promised to refer to, recently patented by an English engineer, if as practicable as it seems, will do away most of the difficulty of submarine tubing at all depths and to all distances. His plan is that of an exterior section of tubing, enclosing and sliding over the real tube like the exterior joint of a telescope—or rather like the cap on the end of a telescope, being closed at the exposed or forward end—fitted and packed water-tight, and thus forming a sliding coffer within which the extension of the tube can be built onward indefinitely; the sliding coffer being pushed forward as the work proceeds. Commencing with a joint of tube open on the shore and capped with the sliding coffer on the water end, the shaped iron plates can be carried in, adjusted and riveted on, with due reference to the preservation of a water-tight joint with the coffer. A variety of simple expedients will occur to any mind, whereby leakage may be prevented or promptly stopped, without necessarily binding the sliding coffer so much that it could not sustain, if strongly constructed, a hydraulic pressure sufficient to force it forward with the progress of the work.

Finally, we have a most radical change—nay, revolution, and that in the arrangements of Nature herself—from the old conservative organ of business, the New York *Journal of Commerce*. When such an organ deliberately and persistently advocates a measure like that of closing up the East River from the Navy Yard to Governor's Island as a great dock, gridironed with stone piers and warehouses stretching across from either shore with mere drawbridged passages between their ends, and opened for the ingress and egress of shipping only at the pauses of the tides; does it become journals devoted to science and progress to start back in protest against the monster innovation? Certainly, in commercial circles, where the chief opposing interests exist, the proposition meets with considerable favor. It is full of advantages and benefits; yet there are two objections which will be fatal to its success. The destruction of the great water way between the east and west shores of Manhattan, and between the inland routes and the manufacturing business on the East River, will hardly be submitted to, even if the Harlem River should be opened through, ten miles northward, for a *succedaneum*. In the second place, the probable formation of bars in the harbor and the exposure of portions of the city to inundation by the concurrence of certain gales with high tides, are dangers which no legislature is likely to permit, for the sake of any convenience or advantage to be expected. We mention this, therefore, rather to complete our survey of the subject than as a practical matter.

THE BROTHERHOOD OF LOCOMOTIVE ENGINEERS.

This is the title of an association in some few respects agreeing with those known as trades unions, but mainly quite different. While like trades unions its object is the improvements of its members, unlike them it does not seek to improve their position in regard to the amount of pay, nor attempt to dictate terms to employers. It has a nobler object and one that commends itself alike to employers and employed. It is intended to elevate the status of engineers as such, and their characters as men. No locomotive engineer who is addicted to the excessive use of stimulants, or to any other habit which interferes with the proper discharge of his responsible duties is elligible for membership. If a member grossly neglects his duties or violates the rules governing the road he runs upon, he is liable to expulsion, and several instances have occurred where this penalty has been enforced when the management of the road has not noticed the fault. The association properly regards the engineer as the most responsible man on a train, and not, as is generally considered, the conductor. There is no doubt that to the engineer the passengers are indebted for safety especially under difficulties. While the conductor should be a man of sound judgment and ready contrivance, the engineer is the official who controls the imprisoned power which may either carry the train with its living or merchantable freight to a safe issue or hurl all to remediless ruin.

The brotherhood of locomotive engineers inquires carefully into the qualifications of its members, demanding that they be capable of taking care of their machines, ascertaining and remedying defects, providing against accidents, as well as of running the locomotive. It was instituted in 1863 and its ramifications extend now nearly all over the country. Its strict management has given it a great influence among the managers of roads, so much so that it is not uncommon for an applicant for a position to be required to show his certificate from his subordinate division before his application is considered.

From an examination of the constitution and by-laws of the "Grand International Division" we are inclined to the belief that it is as valuable to railway companies and the traveling public generally as it is beneficial to the members themselves. We shall be glad to chronicle its future success or to give place to useful suggestions from its members.

Something New on Ice.

The inauguration of skating as a fashionable amusement and healthy exercise has changed the former comparatively small skate trade to huge proportions. The innumerable patterns and novel means of fastening which have been noticed in these columns, show that no small amount of ingenuity has been expended by inventors to effect the completeness of the skate. An improvement in a new line, introducing an entirely novel feature, has been lately patented by Mr. O. W. Taft, of this city. The peculiarity of this invention consists in constructing a recessed chamber beneath the foot plate or "tread" of the skate, which is lined with cork or other non-conductor of heat, and is designed to hold a piece of heated soapstone. By this means the feet are kept warm and dry, and the pleasure, health and comfort of the skater will be greatly increased. This principle is alike applicable to wood and metal skates of nearly every pattern, and interferes in no way with their use in the ordinary manner without the heating device: thus while it detracts nothing, it seems to add the great desideratum lacking in the completeness of a skate. We are sure it will be *warmly* welcomed by the lovers of the national winter sport. Address for further information Mr. O. W. Taft, No. 35 William street, New York.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING JAN. 29, 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $300 on application.

☞ 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.

61,501.—Improvement in the Eye of Wire Heddles for Looms.—John Ashworth, North Andover, Mass.

I claim a wire heddle eye for loom harnesses, made by interlocking loops of two wires, substantially as set forth.

61,502.—Boots and Shoes.—Charles W. Bailey, Boston, Mass.

I claim the heel latch, C, made as described and represented.

I also claim the arrangement of the latch, its spring, the cap and catch plates, their catch holes and catches, with each other and a heel and sole as specified.

61,503.—Shingle Machine.—Henry D. Barnes, New Haven, Conn.

I claim the combination of the cutter, D, and the adjustable guide, H, and the spring, I, constructed and arranged to operate substantially in the manner described.

61,504.—Bedstead Fastening.—Warren S. Bartle, Newark, N. Y.

I claim the combination of the appended wrench, d, and the nut, c, with the hook, a, all as described and set forth in the foregoing as specified.

61,505.—Sash Fastener.—Burroughs Beach, West Meriden, Conn.

First, I claim the combination of the lever, E, and the cam, D, constructed respectively with arms, I and F, and so as to operate substantially in the manner described.

Second, I claim the combination of the lever, E, and cam, D, when constructed with the lip, f, and the notches, c, so as to operate to lock the cam, substantially in the manner described.

61,506.—Mode of Exhausting Air from Fruit Cans by Steam.—Darius Beardsley, Ithaca, N. Y.

First, I claim the herein described method of exhausting air from fruit cans or jars by the condensing of steam.

Second, I claim the double convex chamber extending into the steam chamber, E," for the purposes specified.

61,507.—Wagon Seat.—Jacob Beck, Williamsville, Ill.

I claim the wagon seat, A, provided with suspension rubber springs, a, in combination with a wagon box provided with two or more rods, c, substantially as and for the purposes specified.

61,508.—Plow.—Theophilus F. Bertrand and Peter Sames, Rockford, Ill.

First, We claim a vibrating coulter, when limited in its vibrations, substantially in the manner and for the purpose set forth.

Second, Adjusting the coulter vertically, substantially in the manner and for the purpose described.

61,509.—Milking Cows.—L. T. Blake, New Haven, Conn.

I claim the combination of one or more sets of rolls, c or d, rotated in the manner described, with their respective pressure plates, G or H, substantially as and for the purpose specified.

61,510.—Window-sash Supporter.—Alonzo T. Boon, Galesburg, Ill.

I claim the curved lever, C, as constructed and arranged to operate on the pivot, d, in combination with the right-angled box, a, for the control of the roller therein and its combination with the notches, f, to serve as a fastener, substantially in the manner as herein described.

61,511.—Nutmeg Grater.—William Bradley, Lynn, Mass.

I claim the combination and arrangement of the box, A, and its rotary tube, B, with the spout and rasping plate as specified, such box and tube being made with openings through their sides and with a stopping lip, b, and the plate, D, being applied to the space, C, substantially as described.

61,512.—Cultivator.—Martin Breneman, East Donegal Township, Pa., assignor to himself and Samuel Ely, Elizabethtown, Pa.

I claim the special arrangement and construction of the frame, A A' B C D, in combination with the reversible handles, F, and holes, 10 12 13 14 and 15, adapted for the reception and application of the axle and wheels, L M, scrapers, O P, all constructed and operating in the manner and for the purpose specified.

61,513.—Saw.—Ira S. Brown and Chas. N. Brown, assignors to themselves and J. Mason Gross, Providence, R. I.

We claim a saw tooth, B, so constructed as to interlock with the tooth on either side thereof, and mutually sustain and be sustained by such adjacent teeth, substantially in the manner herein set forth.

Second, We also claim the arrangement of the locking device, F f G, or equivalent mechanism, by which several or all of the teeth may be fastened by one operation, substantially as above described.

61,514.—Bee Feeding Apparatus.—Ebenezer Buel, Silver Creek, N. Y.

First, I claim the drawers, D D, for containing material for the bees to feed upon, in combination with the box, A.

Second, I claim the float, W, of perforated paper, prepared by saturation with beeswax, and buoyed with cork or other light substance.

Third, I also claim the introduction of a current of pure water into the apparatus or within access of the bees without their passing out of the hive into the open air, either under a float or through a spout with ribbed or corrugated bottom.

Fourth, I also claim the valve, V, either arranged as described, or in a fixed position.

Fifth, I also claim the apparatus for conveying water in a continued current within access of the bees in the feeding apparatus.

Sixth, I also claim the coating of my bee-feeding apparatus with beeswax, thus rendering it the better adapted to the habits and tastes of the bee.

Seventh, I also claim, in combination with the box, A, the drawers, D," the float, W," of perforated paper, the valve, V," the provision for introducing a current of pure water to pass through the apparatus, the apparatus for conveying the water, and the coating of beeswax on all the inner surfaces of the apparatus, when constructed and used for the purposes set forth.

61,515.—Churn.—William C. Chamberlain, Dubuque, Iowa.

I claim, First, The construction of the dasher of a churn of cross arms, F F', having secured to them the pieces, g g, and hinged to them the blades, h h, the latter being attached by their free ends to the arms by means of slots

ted stays, j j, and pins, l l, substantially in the manner herein described and for the purpose specified.

Second, The socketed angle, a a', constructed and applied to the churn box, substantially as described.

Third, The curved and grooved strips, J J, applied to the cover, G, so as to operate as set forth.

61,516.—SUGAR CANE MILL.—Orlando Clark (assignor to himself and Isaac Utter), Rockford, Ill. Antedated January 18, 1867.

I claim the arrangement in a cane mill, substantially as described, of the frame, the rollers, the feeding tube, the pan, and the scraper, for the purpose set forth.

61,517.—BALING COTTON.—Charles Colahan, Alton, Ill., assignor to himself and John Fertig.

I claim, First, The weight, C, and follower, E, in combination with the spring, g, block, e, and notches, b, substantially as and for the purpose set forth.

Second, The arrangement of the casing or frame, A, doors, B, pulley, B', rope, D, and weight, C, in combination with the notches, b, follower, E, provided with blocks, e, and spring, g, separating conjointly, substantially as and for the purpose set forth.

61,518.—SPINDLE BOLSTERS OF SPINNING FRAMES.—Jesse D. Cottrell, Milford, Mass.

I claim the combination of the separate helical bushing with the bolster, such bushing to be used therein, substantially in the manner and for the purpose described.

I also claim the bolster as made with a chamber, a, and a screw cap, C, or its equivalent, as specified, to receive and hold a helical bushing, to be arranged within the bolster and used as and for the purposes explained.

I also claim the bolster as made with the helical bushing-receiving chamber, and with a passage or notch in the lower part thereof, to lead out of the said chamber and into the oil cup when the bolster is arranged upon such a cup, as specified.

61,519.—WADDING WASTE MACHINE.—George Cox, Reading, Pa., assignor to F. Willcox and G. L. Jenkins.

First, I claim the combination of the picker cylinder, B, inclosed passage, W, feed rollers, F G, endless apron, C, and drawer, X, or their equivalents, respectively in the manner and for the purpose substantially as shown and described.

Second, The parts last mentioned in combination with the gearing for giving motion to the feed, substantially as shown and described.

61,520.—PROCESS OF FINISHING FELTED AND OTHER GOODS AND FABRICS.—Thomas Crossley, Bridgeport, Conn.

I claim a woven or felted cloth of wool, fur, silk, cotton, or other material, either dyed colored or printed, and subsequently corrugated as described, as a new article of manufacture.

61,521.—SELF ADJUSTING TRESTLE.—Henry Davis, Abingdon, Illinois.

I claim the construction and arrangement of a trestle in the manner and for the purpose herein described.

61,522.—SAFETY BRIDLE.—Daniel M. Donehoo, Beaver, Pa.

I claim the strap, G, connecting the bit ring, F, and safety rein, I, through the check strap ring, D, in combination with the gag or riding rein, K, all arranged to operate substantially as and for the purpose specified.

61,523.—WAGON.—James Dowd, Boston, Mass.

I claim the improved jigger, as made with the neck or arm, B, combined and arranged with its platform, A, the sweep frames, their supporting springs and front axle, the whole being substantially as described.

I also claim the application of the driver's seat, or the same, and the foot rest, to the arm or neck, B, extending from the platform, A, and over the front wheel sweep frames, and axle, as set forth.

61,524.—PORTABLE FENCE.—John S. Edgar, Janesville, Wis.

First, I claim the feet, B B, when constructed and used substantially as and for the purpose set forth.

Second, The combination of the feet, B B, sections, A A', and bars, C, substantially as and for the purpose set forth.

61,525.—JOINT FOR TINNED IRON VESSELS.—Horace Everett, Philadelphia, Pa.

I claim the within-described joint for tinned plate vessels, that is to say, the flange, b, and channel, x, on the plate, B, and the flange, a, on the plate, A, projecting partly across and into the said channel, and there soldered, as set forth.

61,526.—GATE.—Franklin Ewer, Honeoye Falls, N. Y.

I claim, First, The combination of a swinging gate, A, with a sliding section or panel, B, substantially as described and for the purpose specified.

Second, The combination with a swinging gate, A, and sliding section or panel, B, of the connecting arm, D, operating substantially as and for the purpose set forth.

Third, The combination of the double-acting catch, n n, with the swinging gate, A, and sliding section or panel, B, operating in the manner and for the purpose substantially as described.

61,527.—COTTON-BALE TIE.—Henry Fassman, New Orleans, La.

I claim a hoop lock constructed in the shape of a hook, and of a flat form with legs, a b, of different lengths, and a short curve or neck, c, and with or without a shoulder, d, substantially as and for the purpose set forth.

61,528.—GOVERNOR CUT-OFF FOR STEAM ENGINES.—Jacob Felber, St. Louis, Mo.

I claim, First, The cam, C', when constructed substantially as herein set forth, so as to produce a variable cut off.

Second, I claim the construction and arrangement of the balanced cut-off valve, E3, as described.

Third, The adjusting nut, E, in combination with the valve rod, E', for the purpose of regulating the opening of the ports, e', as herein set forth.

Fourth, The combination and arrangement of the cam, C', the lever, D, and the valve, E3, substantially as herein set forth.

61,529.—REFRIGERATOR.—J. R. Fergusson, Brooklyn, N. Y.

I claim the refrigerator box, with its openings, S' and t, doors, C C and J, constructed as set forth, receptacles, M M S S and R R, interior walls, P P, channel, D, and ice box, E, all arranged and used in the manner substantially as herein specified.

61,530.—WINDMILL.—F. G. Fowler, Springfield, Ill.

I claim, First, The eccentrics, c, in combination with the sails, s, hung on pivots placed on their vertical central line, and revolving in the manner and for the purpose substantially as described.

Second, The vane, V, in combination with the eccentric, c, and sails, S, arranged in the manner and for the purpose substantially as shown.

61,531.—PATTERN CHART.—Charles Freetsha, Paterson, N. J.

I claim a pattern chart composed of a series of movable blocks, the different sides of which are colored in different colors, substantially as and for the purpose herein described.

Second, The combination of the covering rods, c, with the polygonal pattern blocks, substantially as and for the purpose herein set forth.

61,532.—COMPOSITION FOR OILING WOOL.—John Gomersall, Mansfield, Mass., assignor to E. Winslow, West Roxbury, Mass.

I claim the within-described composition for dressing wool or shoddy, consisting of the ingredients mixed in the proportions, substantially as set forth.

61,533.—BUTTON-HOLE SEWING MACHINE.—E. A. Goodes and E. L. Miller, Philadelphia, Pa., assignees by mesne assignments to the American Button-hole, Cording, Braiding, and Embroiding Machine Company.

I claim the arrangement and combination herein described of the inclined vibrating needle arm, E, its eye-pointed needle, n, and the vibrating loop holder or carrier, b, for the purpose specified.

61,534.—SEEDING MACHINE.—Henry P. Gregg, Roscoe, Ohio.

I claim the valve box, B, valve, C, valve seat and measuring cup, D.

61,535.—SHUTTLE FOR NARROW WARE LOOMS.—John G. Hamilton, Clinton, Mass., assignor to George Crompton, Worcester, Mass.

I claim, in connection with a device for creating tension upon the bobbin, the arrangement of the pirn to swing, and the application of the spring to keep the pirn in normal position with respect to the shuttle, substantially as described.

61,536.—PIPE FOR WELLS.—Augustus Harrington, Warsaw, N. Y.

I claim the tube, A, having a series of four or more perforations, a, said perforations being lined with wire screens, x, in combination with the ribs, b, and spear, B, when arranged in the manner substantially as and for the purpose specified.

61,537.—NUT.—William Harris and Clinton Browning, Rush Run, Ohio.

I claim the nut, A, in combination with the stop, D, provided with a spring point, f, constructed and arranged to operate substantially as and for the purpose set forth.

61,538.—FRAME, ETC., FOR HOT-AIR REGISTERS.—C. R. Harvey, New York City.

I claim, as a new article of manufacture, a compound register frame, consisting of an exterior metallic supporting frame, provided with an exterior flange, as described, and an interior frame composed of an incombustible lead conducting material, substantially such as is described, applied to and supported by the exterior frame, substantially as set forth.

61,539.—CARPENTER'S SQUARE.—Owen T. Hayes, Hastings, Minn.

I claim a square provided with a graduated scale of angles, and one or more curved slots at the intersection of its limbs for the attachment of an adjustable plate, B, applied and operating substantially as and for the purpose specified.

61,540.—APPARATUS FOR INSTRUCTION IN TELEGRAPHING.—Edward A. Hill, Chicago, Ill.

First, I claim the combination of the two batteries, C C, with a series of wires, x y z, and their terminal points, a b c, and the movable arms, D D, connected with a wire, q, or its equivalent, arranged and operating substantially as herein specified and shown.

Second, I claim the employment of a series of escape wires, r s t u, and their terminal arms, M N O P, in combination with a plate or plates, L, connected with a ground wire, Q, arranged and operating substantially as herein shown and described.

Third, I claim the arrangement of the two terminal batteries, C C, with the circuit through the same, so as to be placed at the center of the line upon each side of the instructor's desk, substantially as and for the purposes shown and set forth.

61,541.—ROTARY LARD PRESS.—B. Hubbe, New York City.

First, I claim the lining, E, made of cloth or other suitable fabric of sufficiently fine texture for the purpose, in combination with the cylinder, A, constructed and operating in the manner set forth.

Second, The annular grate, D, lining E, and rings, l l, in combination with the bottom, F, and shaft, B, constructed and operating substantially as and for the purpose described.

61,542.—STEAM GENERATOR.—E. B. Jucket, Roxbury, Mass.

I claim the combination and arrangement of the series of tubes, E, the preplace, A, the annular chamber, G, the water vessel or drum, F, the pipes, D, the drum, B, and the discharge pipe, C, the whole being applied together substantially in the manner and so as to operate as hereinbefore set forth.

61,543.—SEED DRILL.—John F. Keller, Greencastle, Pa.

First, I claim enlarging and diminishing both the length and width of the feed holes of seed planters in order to prevent clogging and secure uniformity of discharge, whether slow or fast, substantially as set forth.

Second, I claim the arrangement and combination of two pieces, M and M', of the feed slide, substantially in the manner and for the purpose described.

Third, I claim the sharp-edged plates, R (Fig. 5), in combination with the sharp edges of the slides, M M', substantially as set forth.

Fourth, I claim the use of the half bolt, Fig. 7, for locking the strip, M to the lever, O, substantially as set forth.

61,544.—SEED PLANTER.—John F. Keller, Greencastle, Pa.

First, I claim the combination of the gear wheel, L, with the pinion, M, and gear wheel, N, substantially as set forth.

Second, I claim the peculiar axle, O, with the bed plate, O', for fastening the axle to the frame, substantially as described.

Third, I claim protecting the gear wheels of wheat drills or seed planters against sticks, weeds, and other obstructions by means of a box or its equivalent, substantially as described.

61,545.—SEED PLANTER.—John F. Keller, Greencastle, Pa.

First, In the arrangement of a flexible boot or shovel plow with a lever and spring, I claim placing the fulcrum of the lever between the boot and the spring, substantially in the manner and for the purposes set forth.

Second, I claim the vibrating seat, I, for supporting the spring, in combination with the lever, substantially as set forth.

Third, I also claim the use of the washer, W, or its equivalent, in combination with the cap, S, and spring, L, substantially as described.

Fourth, I claim the above-described arrangement of the thumb screw, T, and guide pin, P, for compressing the spring, and thus increasing the tension of the same, substantially as specified.

61,546.—METHOD OF INCREASING TRACTION IN LOCOMOTIVES.—C. W. Theodore Krausch, Philadelphia, Pa.

First, I claim the means, substantially as herein described, of increasing adhesion of driving wheels of locomotive engines upon their rails, consisting in transferring a portion of the weight of a car or engine tender to the locomotive frame by the act of starting the locomotive, substantially as described.

Second, The employment of steam or other power, in conjunction with a coupling lever, S, or its equivalent, for the purpose of enabling the engineer to increase or diminish the weight upon the engine frame at pleasure, substantially as described.

61,547.—BUTTON.—Frederick Loos, Germantown, Pa.

I claim the combination of the screw, c, concave-convex disk, b, and serrated shank, B a, the said serrated shank and disk being of unequal diameter, all substantially as described for the purpose set forth.

61,548.—RAILROAD BUMPING POST.—Samuel Love, Indianapolis, Ind.

I claim the arrangement of the ground sills, 4 4, in relation to the bumping post, its timbers and braces, 1 2 3, in such a manner so that the ground sills shall extend under the railroad track, receiving thereupon the weight of the car in the manner and for the purpose herein set forth.

61,549.—IMITATION OF OPEN CARVING IN WOOD.—William H. May (assignor to the Ornamental Wood Manufacturing Company), Bridgeport, Conn.

I claim, as a new manufacture, imitations of open carvings in wood made by first subjecting the wood to a pressure of dies, and subsequently cutting the wood away at the back as set forth.

61,550.—BRONZING MACHINE.—George S. Mayes, Buffalo, N. Y. Antedated January 14, 1867.

First, I claim the vertical rotary shaft, A, and brushes, C and D, as described when used in combination with the feeding mechanism of a machine for bronzing printed sheets of paper or other equivalent material.

Second, In combination therewith of one or more lights of glass, or other transparent substance for the purposes specified.

Third, The grooved roller, O, as and for the purposes described.

Fourth, In combination with the endless apron, Y, of the thumb screws, c4, the boxes, c5, plate, c6, set screws, F6, and c7, as and for the purposes described.

Fifth, The adjustable feed-wheels, A' in combination with the bands or belts as described.

61,551.—SEED SOWER.—Clark, McIntosh, Utica, N. Y.

I claim the seed sower constructed and operating substantially as described.

61,552.—CLOTH GATHERING ATTACHMENT FOR SEWING MACHINES.—Charles H. Miller, Dayton, Ohio.

First, I claim the combination of the two tension guides, b c, constructed and arranged and operating conjointly as shown and set forth for gathering one piece of cloth upon another, as they are sewed by a sewing machine, substantially as described.

Second, I claim the combination of the two tension guides, b c, with the slotted base plate, A, box, B, and set screw, D, the whole being arranged and used in the manner and for the purpose specified.

61,553.—CAR COUPLING.—Joseph Miller, Cuba, N. Y.

First, I claim draw heads, A, with interlocking hooks, m m, and flanges, n, substantially as described.

Second, The oscillating or turning hooked drawheads, A, which are adapted for having connected to them the common coupling links, substantially as described.

Third, Interlocking or hooked, turning and sliding draw bars, constructed and operating substantially on the principle herein set forth.

Fourth, The adjustable stirrup, C, in combination with the sliding wedges F, and adjusting rod, e, substantially as and for the purposes described.

Fifth, The lever or rod, connected to the lever arm, h', which latter is secured to a collar, h, through which the draw bars have an end wise movement substantially as described.

Sixth, The combination of a spring, j, with the devices which are employed for oscillating or turning the draw head and its bar, said spring being so applied as to act upon the draw heads to keep the hooks thereof together substantially as explained.

Seventh, The combination of the turning and sliding draw bars, with spring, b b, substantially as and for the purposes described.

61,554.—COMBINED PULLEY AND CABLE.—Robert Heneage, Geo. Milsom and Henry Spendelow, Buffalo, N. Y.

We claim the combination of the wire cable, H, with the grooved pulley, D, and intervening packing, i, constructed and operating substantially as described.

61,555.—VENTILATING APPARATUS FOR RAILROAD CARS.—Joseph H. Moore, Chicago, Ill.

First, I claim the fans, c, when located inside of the case, A, and rotating the perforated cylinder, B, by the same current of air that passes into the car in combination with such cylinder, constructed of netting or open work, substantially as specified.

Second, The combination of the cylinder, B, rotated by the fans, C, located inside of the case, with a water bath substantially as described.

Third, The doors, E, constructed and attached so as to operate as doors and wind gathers, substantially as specified.

Fourth, The combination and arrangement of the perforated or gage cylinder, B, with the fans, c, doors, E or F, and both with the case, A, substantially as and for the purposes specified.

61,556.—KNIFE CLEANER.—Nathan P. Mulloy, Waltham, Mass. Antedated January 19, 1867.

I claim my improved knife polisher, as made with the fork cleaner, or, in other words, the piece of leather, I, and its supporter, h, arranged and combined with the knife-polishing bed and its plunger, applied and to operate together substantially as set forth.

I also claim the combination of the trough, K, with the knife polishing bed and plunger, applied together in manner, and so as to operate as explained.

I also claim the combination and arrangement of the leather-receiving slots, l l, with the trough, k, the bed, A, combined with the plunger as set forth.

I also claim the arrangement and combination of the apron, q, with the plunger bed and trough arranged and combined substantially as set forth.

I also claim the arrangement and combination of the guide, n, with the bed, A, and the plunger, H, when arranged and combined as and for the purpose set forth.

61,557.—COMPOSITION FOR POLISHING STOVES.—John Murphy, Brandon, Vt.

I claim the combination of the ingredients above named, as well in the proportions specified, as also in any and all other proportions, and in greater or less quantities.

I also claim the right of substituting and using any other compound made substantially of the same materials hereinbefore specified, though known by any other name.

61,558.—WASHING MACHINE.—Theron Outwater, Olcott, N. Y.

I claim the arrangement of the convex spring wash boards, B, attached to removable frames, C, and of the swinging bars, D, or equivalent, for retaining and holding open the boards; where the said parts are combined with the clothes frame, G, and gate, H, constructed as described and for the purpose set forth.

61,559.—ROLLER FOR WRINGING MACHINE.—H. D. Palmer, Cleveland, Ohio.

First, I claim the rubber or other nonabsorbent cloth, supported coverings, B b c, whether they are made or vulcanized directly upon the shaft as described, or separately, and afterward applied to the shaft, substantially as described.

Second, Securing a cover, B, upon a slotted or sectional shaft, A, by means of a divisional cloth or canvass connection, c, terminal of which underlap upon the shaft as shown, substantially as described.

61,560.—STUFFING HIDES AND SKINS.—William Panton, Quincy, Mass.

I claim the hide-stuffing machine, as composed of the cylinder, A, and the steam case or box, B, made and arranged substantially in manner and so as to operate as and for the purpose stated.

61,561.—VERMIN TRAPS.—Phineas Pardee, New Haven, Conn.

I claim a case provided with opening or openings, B, beneath a plate, C, and having the entrance protected by elastic wires, or their equivalents, placed around the said opening, parallel to the entrance, and bearing upon the bottom or side of the case as and for the purpose specified.

61,562.—SELF SKIMING SORGHUM EVAPORATOR.—L. D. Perry, Laura, Ohio.

I claim the pan, A, as constructed with the divisions, 1 2 3 4, gate, B, skimming openings, D, and trough E, when arranged combined and operating as herein described and for the purposes set forth.

61,563.—MODE OF SECURING CAPS TO METAL CANS.—Daniel W. Pepper (assignor to H. Everett), Philadelphia, Pa.

I claim the can, A, with its opening, A, and flange, c, and the cap, B, with its flange, l, when the two are fitted and secured together as described.

61,564.—STEAM GENERATOR.—George W. Perry, Providence, R. I., assignor to A. Perry & Company, Boston, Mass.

I claim the improved boiler or generator as composed of a series of vessels constructed, arranged and connected in manner as hereinbefore explained, and as represented in the accompanying drawings.

I also claim each section or vessel, A, made with the convexities of the corrugations of its opposite sides to project in opposite directions with respect to each other, and with the ends and top and bottom of such vessel closed, in manner as above set forth, and as exhibited in the said drawings.

61,565.—FAGGOT FOR RAILROAD RAILS.—Samuel L. Potter, Wyandotte, Mich.

I claim a pile or faggot for railroad bars, constituted of iron and steel bars, arranged substantially as herein represented and described.

61,566.—GANG PLOW AND CULTIVATOR.—George W. Price, Bloomington, Ill.

First, I claim the combination of the vibrating beams, G G, and the braces, I I, connecting them with the draft pole, the outside plows, R K, connected by the sheaths, b b, and the rods, d d, with the beams, G G, and the inside plows, L L, connected by the swivel couplings, g g, to the standards, s s, and the rods, e e, to the braces, I I, arranged and operating substantially as and for the purposes herein described.

Second, Forming the shovels or shares, K K L L, in such a manner that if a line were drawn in its oblique section, as shown in figure 3 of the drawings, the same would stand at an angle of about 22° from the standards, b b e e, to which the shovels or shares are attached, and said plows having such a level that the point of the cutting edge when throwing inwardly, shall be upon the inside of a line continued in the direction of the length of the standards, b b e e, and said point when throwing outwardly shall be upon the outside of said line for the purpose of preventing any lateral pressure, substantially as herein set forth.

61,567.—ATMOSPHERIC CHURN.—William D. Prindle and Charles M. Yerk, Tiffin, Ohio.

First, We claim, in combination with a movable bellows, C, which is applied on the cover, B, of the churn box, we claim the pipes, b b', perforated diaphragm, F, and water chamber, G, arranged substantially as described.

Second, The construction of the air pipe, b' with a perforated foot, c, a perforated and flanged diaphragm, F, and a water receptacle, G, upon it, to be used substantially as and for the purposes described.

61,568.—STEAM ENGINE VALVE.—Thomas Rodda, St. Louis, Mo

I claim the construction of the valve with its cross piece, B' with reference to the openings and construction of the pipe, A, arranged as herein set forth.

61,569.—IRONING TABLE.—M. D. Safford, Boston, Mass.

First, I claim the combination and arrangement of the carriage, m, the legs, B B, the brace, C, and the grooved cleats, H H, or their mechanical equivalent, made substantially as described, and for the purpose set forth.

Second, The combination of the bracket D, and thumb screw, E, with the table, A, sliding legs, B B, and the brace, C, when the whole is constructed substantially as described, and for the purpose set forth.

61,570.—QUILTING FRAME.—M. Schmirk and P. McCollum, Fayette, Mo.

We claim the frame, A, the legs, B and C, the connecting piece, D, in combination with the rollers, a3, the ratchet wheels, a2, and their pawls, a5, the holes, a4 a9 a10, the hooks, a6, a7, the eyelets, a8 and b1, the pin, c1, and its corresponding holes, the hook, d, and the slit, c2.

61,571.—OIL EJECTORS.—Henry Searle, Rochester, N. Y.

First, I claim the arrangement of two or more ejectors, for raising oil or other fluids from wells and other deep places, with each other, and with pipes and cocks, or valves, substantially in the manner and for the purpose described.

Second, the arrangement of two or more cocks or equivalent valves, E F G, and E, in combination with the pipes, A and B, for the purpose of changing the action of a column of compressed air or other fluid alternately from one ejector to another, substantially in the manner and for the purpose described.

Third, The combination of the pipes, A B C D, and cocks or valves, E F G H, with independent ejectors, a and b, for the purpose of making the chamber of each ejector act alternately as a compressed air chamber, and as an exhausted receiver.

61,572.—FIRE TEST TORCH.—Geo. E. Shaw, Pittsburgh, Pa. Antedated Jan. 17, 1867.

First, I claim the torch or lamp, G, pivoted suspended or hinged to the clamp, D, or to a piece of a fire tester for carbon oil, so that it can be made to occupy either the vertical position or the horizontal position represented in figure 2 of my drawings, or any other positions between the same, in the manner substantially as set forth.

Second, The combination of the clamp, D, screw, C, pivoted piece, E, and screw, H, with the lamp, Q, tube, T, and screw, R, to make an adjustable fire test torch, substantially as and for the purpose specified.

Third, The screw, R, in combination with the tube, T, piece, E, and clamp, B, for regulating accurately by the position of the fire band in relation to the oil undergoing the test.

61,573.—PLANING MACHINE.—Henry F. Shaw, West Roxbury, Mass.

I claim the combination of a cutter shaft, having cutters at each end, with a device for turning it end for end, and thus by crossing the band giving the shaft a reverse motion substantially as described, and for the purpose set forth.

61,574.—POTATO DIGGER.—Albert Snyder, Jackson, Mich.

First, I claim the double pronged fork, C, when constructed substantially as and for the purpose set forth.

Second, The combination of the fork, C, rods, 5 6, projecting screw, K, gearing, o o d g, when constructed and used substantially as set forth.

61,575.—WRENCH.—Philip Sommer, Newark, N. J. Antedated Jan 17, 1867.

I claim the combination of the jaws, C D staff, B, and roller, e, constructed arranged and operating in the manner substantially as shown and described and for the purpose set forth.

61,576.—HAY KNIFF.—Philo O. Soper, San Francisco, Cal.

I claim, First, The point, A, in combination with the blade, B, to act as a self feeder.

Second, The construction of the blade, B.

Third, The bearing of the shank, C, for the uses and purposes as set forth.

61,577.—APPARATUS FOR DESULPHURIZING ORES.—J. N. Stanly, Brooklyn, N. Y.

First, I claim an oven, B, revolving arms, F F, and upright shaft, K, operated by means of gears, G G, and horizontal shaft, H, or their equivalents, substantially as described.

Second, I claim the conveying the ores or other material while being operated upon, from the central part of oven, B, to the circumference and there discharging them or from the circumference to the center as may be desired by means of conveyors, A A, connected to arms, F F, as shown on fig. 5, substantially as described.

Third, I claim the use of fire clay, plumbago or graphite enameled iron or other metals, or any other refractory material for the construction of conveyors, A A, and for the protection of the upright shaft, K, and arms, F F, that are exposed to the action of heat and gases, substantially as described.

Fourth, I claim the construction of flues, C C, underneath the oven, B, so as to give a uniform heat, also flues, D D, leading from underneath the floor and over the arch of oven, B, in its passage to the drying floor or chimney substantially as described.

Fifth, I claim a stationary floor of the oven, B, substantially as described.

Sixth, I claim the supplying the necessary oxygen for the proper treatment of ores or other material for which the oven may be adapted through the supply pipe, V, box, M, shaft, K, and arm, F F, and openings W W, through said arms, F F, and conveyors, A A, thereby preventing the arms, F F, from becoming too much heated when in action, substantially as described.

Seventh, I claim the outlet, W, for conducting gases or other volatile substances and pipe, O, with its connections to condenser, N, and the steam or air jet, Q, for the purpose of exhausting the gases, etc., from oven, B, also chambers when used in connection with their furnace which may be required for the treatment of such ores as cinnabar zinc, lead, etc., or the manufacture of sulphuric or other acids, and for conducting the same through water thence to the furnaces, T T, through pipes, P P, where both the gases and steam or air are to be used to assist combustion, when not otherwise disposed of thereby economizing fuel, substantially as and for the purposes described.

Eighth, I claim the hollow shaft, K, and arms, A A, for the purposes named in the foregoing specifications or their equivalents, substantially and for the purposes described.

61,578.—SASH FASTENER.—Joshua Stevens, Chicopee Falls, Mass. Antedated Jan. 19, 1867.

I claim the cam, b, finger or pawl, c, and plate, a, whether operated by lever or a crank all combined and arranged, substantially as described.

61,579.—Railroad Rails.—John B. Tarr, Chicago, Ill.

I claim constructing solid railroad rail sections with tenons formed on one or both ends which are adapted to fit into the ends of rail sections having sockets them said tenons constituting part of the metal of their rails, substantia ly as described.

61,580.—Metallic Pavement.—John B. Tarr, Chicago, Ill.

I claim the metallic slabs, A, constructed with interlocking projections and depressions, substantially as described.

61,581.—Universal Joint.—S. N. Taylor, Horicon Wis.

First, I claim the shell, B, provided with internal radially projecting flanges, c, having their outer ends, rounded off as shown.

Second, The shell, B, in combination with the head, A, when said parts are shown as described.

61,582.—Crucible Tongs.—Fredrick Villard, Mount Eaton, Ohio.

I claim the arrangement of the bars, A, and hinged circular segments, B and C, combined together to form one or more crucible tongs, substantially described and set forth.

61,583.—Narrow Ware Looms.—Sam. Walker, Boston, Mass.

First, I claim operating the shuttles of narrow looms by means of a path cam wheel, H, in combination with the system of levers connecting rod and the cords or straps, n n', substantially as described.

Second, I claim reciprocating the guide bar and guides by means of devices such as desired or their equivalents, substantially as and for the purpose set forth.

Third, I claim the combination of the roll, r', with the levers, l and m, the sliding weight, W, and tension cord, t, arranged and operating as and for the purpose set forth.

61,584.—Mail Bag Catcher for Railroad Cars.—L. F. Ward, Elyria, Ohio.

First, I claim the combination and arrangement of mail bag catcher when attached to a railroad car in the manner and for the purpose herein set forth.

Second, The combination of the arms, B and C, with the stem, A, helical spring, S, and handle, D, in the manner and for the purpose set forth.

Third, The arrangement of the mail bag supporter consisting of the crane stem, E, braces, X and x' spring, F and e', and f', in the manner and for the purpose herein set forth.

61,585.—Ventilator for Windows, etc.—William L. Washburn, Brooklyn, N. Y.

I claim the combination with a stationary or adjustable frame, A, of two or more sets or pairs of swinging or flap valves and flanged shelves, substantially as and for the purpose hereinabove specified.

61,586.—Manufacture of Peat Fuel.—Joshua Webster, Malden, Mass.

I claim the arrangement in connection with a hopper or other crude peat receptacle, of a series of scrapers operating in connection with a stationary incline or bed, substantially as set forth.

Also and in combination with such scrapers and incline, the series of presser rolls, operating substantially as set forth.

61,587.—Combined Lantern, Foot Warmer and Water Heater.—George A. Wells, Oskaloosa, Iowa.

I claim the arrangement of the device forming a foot warmer, lantern and water heater, constructed and operating as described.

61,588.—Coverlet.—Henry Wellstein, Philadelphia, Pa.

I claim a coverlet woven substantially as herein specified, as a new article of manufacture.

61,589.—Oscillating Steam Rubber.—Lorenzo D. Wheeler, Fitchburg, Mass. Antedated, Jan. 21, 1867.

First, I claim the combination and arrangement of the clamp, F, and tube, D, with bed piece, A, slide frame, J, and slide, K, substantially as and for the purposes set forth.

Second, The combination with clamp, F, constructed as shown and described of table, D, and spring, I, substantially as and for the purposes set forth.

Third, The combination with frame, J, of slide, K, and springs, Q, as and for the purposes stated.

61,590.—Clothes Hook.—Henry M. Whitmarsh, Abington, Mass., and Silas S. Putman, Dorchester Mass.

We claim the pivoted hook, C, with its slot, e, so arranged that it may be closed up and thus occupy less space, substantially as described.

61,591.—Spoons.—Franklin W. Willard, New York City. Antedated Jan. 12, 1867.

I claim a tubular handle to the spoon for the use and purposes, substantially set forth in specification.

61,592.—Blower.—James M. Williams, Connersville, Ind.

I claim the construction of the three vaned pans, B B, used in combination with the semi-cylindrical case, A, having openings at the ends for the admission of air; and the deflecting board, d, arranged so as to leave a slot for the admission of air between it and case, A, operating in the manner and for the purpose specified.

61,593.—Gas Regulator.—Alonzo H. Wood, Boston, Mass.

I claim an automatic gas regulator attachment having the functions, and possessing the characteristics, substantially as set forth.

61,594.—Gate Latch.—Lum Woodruff, Ann Arbor, Mich.

I claim the pin, A, the rest, B, the slotted latch C, and the vertical looped rod, F, when arranged substantially in the manner and for the purposes above specified.

61,595.—Bed Bottom.—A. S. Babbit, Keeseville, N. Y.

I claim the casting A, with its ears, a a, and shoulders, x x, when constructed substantially as described and used for the purposes set forth.

61,596.—Apparatus for Generating Carbonic Acid Gas.—Steuben T. Bacon, Boston, Mass. Antedated January 17, 1867.

I claim the arrangement herein described of the apparatus for facilitating the generation of carbonic acid gas from saccharine or farinaceous matter.

61,597.—Shears.—A. B. Ball and A. G. Graves, Albany, N. Y.

We claim adjusting the knives, blades, C C, upon the jaws, B B, of the shares, substantially in the manner and for the purpose herein specified.

61,598.—Weft Bobbins.—William E. Bass, Lawrence, Mass.

I claim the improved weft bobbin as made with the series of swells, a a', a'', arranged on its body as set forth.

I also claim the arrangement of the taper of the portion, b, with the series of swells, a a' a'', of the body of the bobbin as set forth.

61,599.—Grinding Mill.—John H. Bear, York, Pa.

First, I claim the runner stone, G, constructed with a surface for grinding which is a segment of a sphere in any direction in which it may be intersected, in combination with the concave, E, which also is of a shape to conform to said runner stone. The said runner stone and concave being arranged and operated, substantially in the manner and for the purpose described.

Second, The arrangement of the platform, D, concave stone, E, clamp screws, c' c', and adjusting screws, C C, in combination with the vertically revolving runner stone, G, substantially in the manner and for the purpose described.

Third, The deflector, n, applied substantially in the manner and for the purpose described.

Fourth, Arranging the hopper so that its lower end rests upon the stone, E and connecting its upper end to the frame, A, by hooks or fastenings which will allow it to descend or rise with the stone, E, substantially in the manner and for the purpose described.

Fifth, The combination of the metal guards, n', and clamp screws, c' c' with the runner stone and concave, substantially in the manner and for the purpose described.

61,600.—Pendant for Watches.—John S. Birch, N. Y.

First, I claim the combination of the hollow stem, D, swivel, C, ring, B and spring top or pusher, E, substantially as and for the purposes set forth.

Second, The continuous revolving ring, B, fig. 2, in combination with the swivel, C, as and for the purpose specified.

Third, The secondary swivel bow, G, in combination with the guard bow and handle of a watch to afford an additional attachment for the guard as explained.

61,601.—Carriage Clip.—Walter Bound, Hackensack, N. J. Antedated January, 19, 1867.

First, I claim the hinged end piece, E, in combination with the bolt, D, and frame, B C, substantially as herein set forth for the purpose specified.

Second, The spring, F, provided with the lip c, and applied in relation with the hinged end p ece, E, bolt, D, and frame, B C, substantially as herein set forth for the purpose specified.

61,602.—Coal Stove.—Nathaniel A. Boyton, New York City.

First, I claim the annular heating drum, A, provided with air pipes, B, and a central air space, D, substantially as described.

Second, I also claim the arrangement of the air flues, B, intermediate of the several fire flues, J, in combination with a heating drum having the form of a complete or if an incomplete annulus, substantially as described.

Th rd, I also claim the arrangement of the air and fire flues with reference to each other and in the manner above shown, so that at adjacent points their circles shall coincide for the purpose of preventing the lodgement of soot and ashes at their places, substantially as described.

61,603.—Jack.—A. M. Breneman, Lancaster, Pa.

I claim the manner of hinging the last, A, upon the end of the standard, B, in combination with the rest, C D, operated in the manner and for the purpose specified.

61,604.—Door and Gate Latch.—Webb Broomhall, Circleville, Ohio.

I claim a rod with its middle piston journalled and the end bent to form a catch with or without a secondary device to act upon the handle, substantially as described.

61,605.—Farm Gate.—E. and A. Buckman, East Greenbush, N. Y.

First, I claim the arrangement of the posts, B, and swivelled suspending collar, b, in relation with each other and with the gate, A, whereby the gate may be opened in either direction, substantially as herein set forth.

Second, The guide rail, c, secured at the top of the gate, beveled upward and inward on its underside from both edges and operating in relation with the tapering friction rollers, b, suspended in swivels, A', substantially as herein set forth for the purpose specified.

Third, The inclined planes, f, arranged with reference to the vertical braces, d, and supporting posts, B, of a double acting gate, substantially as herein set forth for the purpose specified.

61,606.—Carbureting Illuminating Gas.—W. H. Burridge, Cleveland, Ohio.

I claim the combination of an auxiliary gas from the organic volatile hydro-carbons with the common illuminating gas, as and for the purpose specified.

61,607.—Pipe Coupling.—William Craig, Newark, N. J.

I claim the combination of the sliding or entering butt, C, with its stud, g, elastic ring, D, and the adjacent butt-holding sleeve, A, formed with grooves, b, made to terminate in cavities or continuations, c, that verge outwardly toward the end or face of the sleeve from which said grooves started at their open extremities or mouths, all for operation together substantially as and for the purpose or purposes herein set forth.

61,608.—Take-up Mechanism for Knitting Machines.—Thomas Crane, Fort Atkinson, Wis.

First, I claim, in knitting machines, an apparatus that lifts the yarn between a stationary eye or its equivalent and the yarn carrier, or between two stationary eyes, substantially as described, so that the slack is taken up as the yarn carrier approaches the centre of the machine, and is given out as it moves from the centre.

Second, I also claim the means substantially as herein described of lifting the yarn, that is to say, a rod pivoted at one end to the yarn carrier or to the machine, while its upper part is free to slide through a stationary guide placed near the middle of the stroke of the carrier, substantially as described.

61,609.—Washing Machine.—Edmund D. Crosby, Scott, N. Y.

I claim the combination of the beaters, m m, when pivoted upon the central bar and connected to the pitman cranks by the jointed arms, c c, all as described and for the purpose set forth.

61,610.—Bed Lounge.—Richard H Cutter, Cleveland, Ohio.

I claim the combination with the folding seat, A, the mattrass, M, and the folding head, C, when constructed and operating in the manner and for the purpose herein specified.

61,611.—Window Frame.—G. K. Dearborn, South Boston, Mass.

I claim the movable parts D D', of the stop bead when combined and arranged substantially as set forth.

Second, The arrangement and construction of the parting bead, E E', made substantially as and for the purpose set forth.

61,612.—Piano Forte.—J. J. and David Decker, New York City.

First, We claim the iron plate constructed with a vertical flange, C, at its rear end, arranged in relation with the wrest plank, as and for the purpose herein specified.

Second, Interposing between the bridge, G, and portion, B, of the plate, an inclined support or shelf, H, to obtain the attachment of the strings to all or the more forward portion of the turning pins close to or at uniform distances from their wooden bearing, essentially as specified.

61,613.—Stove Pipe Damper.—Daniel De Garms, Rochester, N. Y.

I claim the arrangement in stove pipe dampers of the plates A and B, journals, j k, rib or rim, m, and recesses, c, pivot bolt, f, and openings, a b, in the manner and for the purposes set forth.

61,614.—Piston Packing.—George Dryden (assignor to himself and E. A. Prescott) Worcester, Mass.

First, I claim a packing ring consisting of the segments, b, with the spring, e, and tongues, a, constructed and arranged to operate as shown and described.

Second, In combination with the rings constructed as set forth, I claim the annular recess, k, and the slide, h, arranged to operate as described.

61,615.—Grate Bar.—Addison C. Fletcher, New York City.

First, I claim the arrangement of the connecting webs, a, of the steps in a step-formed grate bar in inclined or sloping positions, substantially as and for the purpose herein described.

Second, The facing slabs, b b, of refractory material in combination with the connecting webs of the steps of a step-formed grate bar, substantially as and for the purpose herein specified.

61,616.—Car Coupling.—Gilbert B. French, Dunbarton, N. H.

I claim as my invention or improvement, the arrangement of the spring jaws, the spring abutment and the wedged standard together and with the bunter bar and its pin passage, as set forth.

61,617.—Straw Cutter.—Warren Gale, Chicopee Falls, Mass.

I claim a revolving pressure cylinder whose pressure surfaces are faced with or made of strips of copper, or some alloy thereof possessing equivalent properties, in combination with and geared to a revolving cutter cylinder or shaft, substantially as and for the purpose herein set forth.

I also claim a spiral or oblique flanged pressure cylinder, faced with copper, in combination with a revolving knife cylinder, substantially as described.

61,618.—Tuck Marker for Sewing Machines.—H. C. Goodrich, Chicago, Ill.

I claim the tuck marker consisting of the plate, A, formed as shown, with an open space around the cloth presser to permit the cloth to lie flat on the machine, the under side presenting a plain surface, so that it may be attached to any ordinary sewing machine, and provided with the point, I, and the spring arm, B, having the notch, F, arranged to engage with the point, I, said arm being arranged to be operated by the needle bar of the machine, as herein shown and described.

61,619.—Meat Safe.—Frederick S. Gwyer (assignor to himself and Levi H. Mace) New York City.

I claim the separable meat safe with detachable parts fitted with fastenings substantially as herein specified, and adapted to be packed and transported in a small compass and with protection to the delicate portions of its structure, as herein set forth.

61,620.—Nut Fastener.—William Harris and Clinton Browning, Bush Run, Ohio.

We claim as an article of manufacture a spring metal friction yoke, constructed substantially in the manner and for the purpose herein set forth.

61,621.—Broom Head.—J. M. Hotaling, Waterport, N. Y.

I claim the combination and arrangement of the clamp, B, envelope, C, link, E, and keys, l, with the handle, D, and broom, A, as herein set forth, the whole operating in the manner and for the purpose specified.

61,622.—Cultivator.—Jacob Kessler, York County, Pa.

I claim the arrangement of the teeth, G G, as constructed with the bars, E E, rods, D and a, and the frame of the machine, as and for the purpose specified.

61,623.—Fire Place Heater.—William C. Lesster, New York City.

I claim the combination with the fire-pot, B, made up of rings mounted upon and fitting one within the other as described, of the loose flange or cap, D, constructed to enter a groove in the top ring, and resting on or lapping over the partition plate, d, of the heater, essentially as and for the purposes herein set forth.

61,624.—Device for Uncorking Bottles.—Armaud Manuel, Reims, France.

First, I claim the method of removing or breaking the wire or other clasp or tie which holds the cork in the bottle, by means of a detaching lever or equivalent device attached to and secured upon the said clasp or tie, substantially as set forth.

Second, The combination with one or more clasps or ties applied to the cork as described, of a detaching lever or similar device, under the arrangement and for operation substantially as shown and specified.

61,625.—Fishing-line Sinker.—John R. Martin, Boothbay, Maine, assignor to Samuel K. Hilton, Portland, Maine.

First, I claim the connection of a plate of copper or other hard metallic substance with a body of lead or other soft metallic substance, and the arrangement of a chamber therein inclosing weights of lead or other heavy substance, either or all of which may be removed or replaced at pleasure.

Second, The fixing firmly in the upper part of the body of a staple of copper or other metallic substance with disconnected parts (affording sufficient space for the admission of a swivel or line), and a nut or burr working upon both parts of the staple at the same time, or one part alone, so that the sinker may be detached from the line and replaced at pleasure.

61,626.—Pipe Coupling.—John Matthews, Jr., New York City.

First, I claim the method of forming a swivel or screw connection of a metallic pipe or pipes, by passing the end of the pipe through the swivel and flanging it on the face of the collar, b, substantially as and for the purposes specified.

Second, The nut, C, pipe, A, and swivel, B, having a flange or collar, b, and handle, S, permanently secured to the swivel, all arranged and combined essentially as shown and described.

61,627.—Bottling Machine.—John Matthews, Jr., New York City.

First, I claim the combination in bottling machines of perforated detachable cups or wells of different depths or sizes, essentially as and for the purpose or purposes herein set forth.

Second, The bottle screen or guard made to form a guide to the mouth or neck of the bottle, by constructing it of a conical form or shape with guiding surfaces free from horizontal interruptions or breaks, substantially as specified.

61,628.—Buckle Fastening.—Robert Meyer, Buffalo, N. Y. Antedated Jan. 19, 1867.

I claim, in combination with the case, D, the pins, H H I J, or the equivalent thereof, and the plates, R and N, as herein substantially described, the case, G, the pins, F G, and plate, M, for fastening the end of the strap in place, as described.

61,629.—Boring Tool.—James Miller, New York City.

I claim, First, The combination with adjustable slides, D, on a cutter head, B, of cutters, S S', on opposite sides of their center of rotation, and with their two cutting edges or faces, o, lying in a plane or thereabouts intersecting said center, and their outer sides, s, of a sweep not exceeding, or thereabouts, the sweep of the smallest circle they are designed to travel in, constructed and arranged substantially as specified.

Second, The combination of the adjustable cutters, S S', arranged substantially as described, with the self-adjusting center or center pin, C, and cutter head, B, essentially as herein set forth.

61,630.—Knitting Machine Needle.—Job Miller, Warren, R. I., and Jason A. Bidwell, East Boston, Mass.

We claim, First, a spring-stitch castor, hung or fastened to the shank or bar of a hooked needle in rear of the cam that lifts it.

Second, A cam arranged between the shank of the needle and the shank of the stitch caster, to raise the stitch caster at the proper time to cast the stitch, and then let it drop, so that the yarn may be fed to the hook of the needle.

Third, A stitch caster made to spring in one direction after being worked by a sliding cam, H, in the opposite direction.

61,631.—Medicine.—William Jesse Miller, Louisville, Pa.

I claim the above described composition of matter for the purposes set forth.

61,632.—Annular Petroleum Burner for Hot-air, Steam and Hydrocarbon Fluids.—George L. Moody, New York City.

I claim the burning of petroleum or a hydrocarbon fluid by injecting it into a fire box or furnace in an annular form, so that all the components are consumed, leaving no residuum and making no smoke, substantially in the manner above set forth.

Second, The adjustible orifice through which the oil is discharged, made substantially in the manner and for the purpose above described.

Third, The mechanical combination and arrangement of the different concentric pipes for the discharge of heated air, superheated steam and oil, or a hydrocarbon fluid, with the adjustable orifice, as a whole, and its application in the manner and for the purposes herein mentioned.

61,633.—Hat and Coat Holder.—Eugene J. Post, Vienna, N. J.

I claim the arrangement and combination of the hat holder and pre erver with the coat hook and brackets, whether stationary or adjustable, substantially as and for the purposes herein set forth.

61,634.—Lamp Burner.—Thomas Rowatt, Jr., London, Eng.

I claim the two domes, f and l, constructed with their openings, o, increasing in width toward the base, and the opening in the outer dome broader than the opening in the inner dome in combination with their respective air passages, m, and passages, h and g, the passages to the one dome being independent of the passages to the other dome, all constructed so as to operate substantially as set forth.

61,635.—Toilet Glass.—Joseph H. Ryan, Boston, Mass.

I claim a hand toilet glass the handle of which is so attached that it may be secured in position to serve as a rest for the glass when placed upon a table, substantially as described.

61,636.—Cover and Lifting Device for Kettles.—Alexander Selkirk (assignor to himself and John Gibson), Albany, N. Y.

I claim, First, The pierced lug, E, leg, e', and T lug, E'', and the hook, h, or their equivalents, in combination with the bail, c, for the purpose set forth substantially as described.

Second, The cover, B, constructed with a notched edge in whole or in part or made in open work, in combination with the lips, o o'1, or their equivalents, for the purpose set forth and described.

61,637.—Safety Guard for Railroad Cars.—William Siebert) assignor to himself and John Price), New York City.

I claim the arrangement of the stationary guards, F F, in combination with the axles, C, carrying bars, D, truss plate, g, and truss rod, d2, substantially as and for the purpose set forth.

61,638.—Cooling and Packing Meat.—Danl. E. Somes, Washington, D. C.

First, I claim cooling air and liquids, substantially as herein described.

Second, Cooling meat, substantially as herein described.

Third, Facilitating the salting of meat, substantially as herein described.

61,639.—Chimney Collar.—John Stokely, Hiram, Ohio.

First, I claim the chimney collar constructed of the sections, A C and D, substantially as set forth.

Second, The lap, B, for the purpose of covering the loose edge of the chimney collar, substantially as set forth.

61,640.—Valve Gear for Steam Engines.—Frederic Stratner, Wilmington, Del.

I claim the described arrangement of the slotted segment, G, rock shaft, J, adjustable block, I, pitman, E, and valve rod, A', whereby the motion of the valve may be accelerated, retarded, or suspended, as set forth.

61,641.—Elastic Mold.—Thomas Taylor, Washington, D. C.

I claim the use and application of vulcanized rubber, for the purpose herein set forth.

61,642.—Apparatus for Stacking Hay.—Charles H. Tryon, Greenwood, Ill.

I claim an improved apparatus for stacking hay and for other purposes, constructed of a central upright formed of one or more separate adjustable sections, A A', as shown in the accompanying drawings in combination with a crowning pivot plate and pin, d, revolving swivel head, G, and suitable supporting ropes or chains, a, all arranged and operating substantially in the manner and for the purpose herein described.

61,643.—Fog Signal.—Isaac Van Trump, Wilmington Del. Antedated Jan. 19, 1867.

I claim an air pipe or tube hung upon centers or a rock shaft, in combination with a whistle or whistles substantially as specified so that water or other liquid contained in said tube or pipe shall cause air to pass through the whistle or whistles when the apparatus is moved, as set forth.

61,644.—Mowing Machine.—Andrew Wemple, Chicago, Ill.

First, I claim the hollow rock shaft or bar, D, provided with arms, H, for the purposes set forth, by means of which the position of the finger bar sickle relatively to the machine will not be changed when the fingers of the finger bar are rocked up or down, substantially as specified.

Second, The attachment of the finger bar to the machine or bed, B, by a single swivel joint on one side so that the pitman can be placed in the rear of the joint or connection and attached to the head of the sickle bar in the center of the circle or arc described by the finger bar in rocking, substantially as specified and shown.

Third, The location of the joint, m, connecting the pitman with the head of the sickle or cutter bar on a level with and between the pivots, l l, of the shoe so as to bring it into the center of the rocking movement so near a line drawn from one pivot, l, to the other that it will cross such line in the cutting movements so that whether the finger bar is rocked or its end elevated or depressed the sickle and pitman will work freely, substantially as shown and specified.

Fourth, The lever, N, when so arranged and connected by the hinge, j, that it will hold the machine in an elevated position without a catch or other appliance in combination with the rod, l, and draft pole, substantially as and for the purposes specified.

61,645.—Churn.—Moses Whisler New Market, Ohio.

I claim the single faced wheel, E, in combination with the pinions, m and n, the top, B, and rings, l, the whole constructed, arranged and operating substantially as and for the purpose herein set forth.

61,646.—Horse Rake.—M. Woodman, Farmington, Me., and L. Atwood, Norwich, Conn.

We claim the combination of the elevating shafts, B, the cross shaft, B', the balls, D, and the stirrup, F, all constructed arranged and operating substantially as and for the purpose described.

61,647.—Washing Machine.—L. C. Wright, Lockport, N. Y.

I claim the combination and arrangement of the stationary, revolving roller, B, with the reciprocating rubber, C, operating in the manner and for the purpose herein set forth.

61,648.—Cement Felt for Covering Steam Boilers, Pipes, etc.—Wladyslaw T. Kosinski, New York City.

I claim and desire to secure by letters patent the new article of manufacture consisting of a plastic cement compounded of the materials or ingredients and in the manner substantially as described, and suitable for covering steam pipes, boilers, hot and cold water pipes, refrigerators, etc.

61,649.—Cultivator.—A. H. Allison, Charlottesville, Ind.

I claim the plow beams, D D, suspended to the curved guide rods, f f, and connected with the stirrups or levers, g g, for obtaining lateral movement in combination therewith and with the vertically sliding crossheads, F F, the levers, H H, and the springs, m m, constructed, arranged and operating substantially as and for the purposes therein described.

Second, The arrangement of the rotary perforated clod guards, n n, combined with the plows, b b, and beams, E D, constructed and operating as herein set forth.

61,650.—Rotary Steam Pump.—H. O. Ames, New Orleans, La.

I claim the steam wheel, A, and screw or propeller blade, M, combined together and arranged and operating substantially in the manner and for the purpose described.

61,651.—Distilling and Evaporating Liquids.—P. T. Baboux (assignor to Thos. Gannon), New York City.

I claim the arrangement of the air valve, y, pipe, z, vessel, G, pipe, n', boiler, A, condenser, C, reservoir, D, and diving bells, F F', constructed and operating substantially as and for the purpose set forth.

61,652.—Fastening for Railway-car Doors.—Henry D. Bird, Petersburg, Va.

I claim the improved mode of securing railroad-car door and making them self-fastening, by means of a hinged bar, substantially in the manner herein described.

61,653.—Preparing Linseed or Other Oils for Painting.—David E. Breinig, New York City.

I claim the within-described process of treating linseed or other oils or fats

with metalline gum and spirits of turpentine, naphtha, or other suitable liquid, substantially as and for the purposes set forth.

61,654.—TIPPING ATTACHMENT FOR POTS AND KETTLES.—Chas. Coester, Jr., and W. L. Dewey, Bridgeport, Conn.

We claim a tipping attachment for pots and kettles, constructed substantially as herein shown and described.

61,655.—BRISTLE BOOT FOR HORSES.—John J. Davy, Newark, N. J.

I claim a bristle boot for horses composed of a strap, A, with radiating bristles, C, as a new article of manufacture.

61,656.—APPARATUS FOR CARBURETTING AIR.—Bernard Douglas and Wm. H. Walton, New York City.

First, We claim the removable pans, H and I, in combination with the cylinder, A, constructed and operating substantially as described.

Second, We also claim the use of warm air for the purpose described, without the direct application of fire or steam to the apparatus, substantially as specified.

Third, We also claim the alternate arrangement of the generating pans, H and I, in the manner described, for the purpose specified.

Fourth, We also claim the apparatus so constructed that when the connecting parts of the pipes which open into the atmosphere are secured thereto, there will be no exposure to fire and evaporation be prevented, as specified.

61,657.—REVOLVING FIRE-ARMS.—R. W. Drew, Lowell, Mass.

First, I claim the tubular sliding ejector constructed and operating in the manner described.

Second, The arrangement of the hinged guard with devices for fastening the same in place, when constructed and attached to the stock or frame in relation to the perforated cylinder, all in the manner described.

61,658.—ATTACHMENT FOR HANDLES TO BRUSHES, BROOMS, ETC.—Anna Eddowes, Frankford, Pa.

I claim the handle, B, with its lower portion contracted and passing entirely through the head, A, its enlarged portion fitting in the socket tube, C, having eight angular slots, G, receiving and retaining the pin, F, secured to the handle, in the manner described, for the purpose specified.

61,659.—BLASTING POWDER.—Wilhelm Fehleisen and Ernst Fehleisen, Cilli City, Austria.

We claim a blasting compound made as set forth.

61,660.—MARKING SKIRT WIRE IN LENGTHS FOR HOOPS.—John Fraser, Williamsburgh, N. Y. Antedated Jan. 21, 1867.

I claim the method herein described of marking off skirt wire by means of a die-carrying band which, together with the skirt wire to be marked off, is exposed to the action of a suitable printing roller, substantially as herein set forth.

61,661.—CULTIVATOR.—W. K. Garrison, Abington, Ill.

I claim the frame, D, in combination with the lever, F, arranged and applied to the machine substantially in the manner as and for the purpose herein set forth,.

61,662.—LIQUIDS FOR CARBURETTING GAS AND AIR.—L. E. Holden, Cleveland, Ohio.

First, I claim the combination of benzine or any other of the light hydrocarbons with colzea, rope seed, olive or other equivalent vegetable oils, for the purpose of carburetting air or gas when used for heating or illuminating purposes, substantially as specified.

Second, The combination of benzine or any of the light hydrocarbons with lard oil or its equivalent animal oil, for the purpose of carburetting air or gas when used for heating or illuminating purposes, substantially as specified.

Third, The combination of one of the light hydrocarbons with one or more animal or vegetable oils, for carbureting air or gas, substantially as specified.

Fourth, The application of the fluid made by combining one of the hydrocarbons of light gravity with one or more animal or vegetable oils to carburetting air or gas when used for heating and illuminating purposes.

61,663.—CARPET STRETCHER.—Henry Hungerford, New York City.

First, I claim a carpet stretcher so constructed and arranged that its fixed points or points of resistance against which the straining lever acts can be placed each side of or away from and beyond the line of direction of strain or tension of such straining lever, for the purposes set forth.

Second, The combination and arrangement of the hinged guard with devices for fastening the same in place, when constructed and attached to the stock or frame in relation to the perforated cylinder, all in the manner described.

61,664.—SCRUBBING MACHINE.—Andrew Irion, Femme, Osage, Mo.

I claim the tank, A, mounted on wheels, E, in combination with the shaft, g, and brush, I, constructed and operating substantially as and for the purpose set forth.

61,665.—APPARATUS FOR CLEANING SILK THREADS.—Jules Jeannotat, Paterson, N. J.

First, I claim the plates, B B, secured to and adjustable in the stand, A, in the manner and for the purposes described.

Second, The combination of the plates, B B, stand, A, and set screws, a, substantially as herein shown and described.

Third, The combination with the silk cleaner herein described of the guide or fender, C, substantially as and for the purpose specified.

61,666.—DEVICE FOR PREVENTING HORSES FROM CRIBBING. Robert Jennings and J. A. Marshall, Bordentown, N. J.

First, We claim the spring, A, provided with the points, a a a, to prevent horses cribbing, substantially as herein described and for the purposes set forth.

Second, We claim the inside shielding spring, B, in combination with the spring, A substantially as shown and described and for the purposes set forth.

61,667.—WATER WHEEL.—A. P. Johnson, Edwards, N. Y.

I claim the tube, K, provided with the valve, J, operated automatically from the gate rod, I, substantially as shown and described.

61,668.—WASH BOARD.—Wm. A. Jordan, New Orleans, La.

I claim the springs, B, secured at their centers to the rear of the wash board and having their ends secured to the connecting rods, C, substantially as and for the purpose specified.

61,669.—PAPER COLLAR.—A. Kaufmann, New York City.

I claim as a new article of manufacture a paper collar, cuff, or similar article of wearing apparel, embossed and perforated, that portion which imitates the cambric lace portion of a textile article being tinted throughout its face, except where it is embossed, snbstantially as described and for the purpose set forth.

61,670.—HORSE RAKE.—Amandes Krause, West Liberty, Ohio.

First, I claim the bent lever, G, with its hooked end, and the lever, H, in combination with the rake bars, D, operating substantially as described, for the purpose specified.

Second, I claim the independent bars, D, and teeth, E, in combination with the rock shaft, F, the lever, H, and frame, A, for the purposes and substantially as described.

61,671.—STUD FASTENING.—Geo. A. Lingard, New York City.

I claim the combination with a button stud, etc., having a center screw spindle, a, of a plate or disk, B, and frame, D, when combined and arranged together substantially as and for the purpose described.

61,672.—CLOTHES-LINE REEL.—Ira E. Loughborough, Pittsford, N. Y.

I claim as a new article of manufacture the crank reel for clothes lines in combination with the ratchet, r, pawl, a, brackets, B, and casing, C, substantially as and for the purposes set forth.

61,673.—WASHING MACHINE.—C. M. Mack, Brooklyn, Pa.

I claim the rack frame, c, placed on the springs, d d, in the box, A, in combination with the follower, g, operated by the lower frame, i i, arranged and operating substantially as and for the purposes herein described.

61,674.—CULTIVATOR.—Isaac B. Mahon, Dunkirk, Ohio.

First, I claim the sliding frame, G, fitted on the rod, F, at the rear of the axle, A, in combination with the plow beams, I I, connected at their front ends by universal joints, d d, to arms, e, secured to the lower ends of the bar J, and provided with curved standards, H, which work in guides, e, attached to frame, G, substantially as and for the purpose specified.

Second, The plow beams, N N, connected by pivot bolts to the lower ends of the bar, J, and provided with curved standards, r, which work in guides, s, formed at one end of the bolts, a, which secure the arms, B, to the axle, A.

Third, The shaft, O, provided with the segments, P, to which the plow beams, I I N N, are connected by chains, Q, and also provided with a segment, P', to which a hand lever, R, is connected by a chain, S, all arranged for the purpose of raising and lowering the plows, substantially as set forth.

Fourth, The whiffletree bars, V V, having their lower ends pivoted to the lower ends of the bar, J, and their upper ends connected with the doubletree, U, substantially as and for the purpose specified.

Fifth, The securing of the plows, M, to the beams, I I, by means of the sockets, t, at the rear sides of the plows, the loose sockets, a, and the screw bolts, v, which pass through the oblong slots, w, in the beams, I I, substantially as and for the purpose set forth.

61,675.—MILK RACK AND TABLE COMBINED.—John McCoun, Lockport, N. Y.

I claim a combined revolving milk rack and table, substantially as herein shown and described.

61,676.—GATE.—G. McKnight, Hebron, N. Y.

First, I claim the combination of the gate, C, when constructed as herein described, with the ground frame or planking, A, substantially as and for the purpose set forth.

Second, The combination and arrangement of the levers, F, connecting rods, H, upright frame, E, and inclines, I, with each other, with the gate, C, and with the ground frame or planking, A, substantially as herein described and for the purpose set forth.

61,677.—ROLLER FOR WRINGER.—Charles V. Mead, Hamilton, N. J.

I claim the roller consisting of the two sections, a b, with material, c, between and completely surrounding them, and incased by the elastic covering, when constructed as herein shown and described.

61,678.—DIES FOR BENDING NOZZLES OF COFFEE POTS.—W. H. Miller, Brandenburg, Ky.

I claim the combination of the die, A, and follower, G, secured to a holder or lever, C, hinged to the die, A, and spring catch, E, or its equivalent, when arranged together and operating substantially in the manner described.

61,679.—EGG AND CREAM BEATER.—F. Oakley, London, England, assignor to himself and John Wills, Newark, N. J.

First, I claim the combination of the case, A, having the spout, d, and the disk, c, with the triangular beaters, B, of unequal length, as and for the purpose specified.

Second, The case, A, having the tube, b, bearing the shaft, g, to which the beater disk, c, is secured, and supporting the shaft independent of any other bearing, in the manner as and for the purpose specified.

61,680.—CLOTHES WRINGER.—Alby H. Page, South Boston, Mass., assignor to William B. Rhoads, N. A. Rhoads, and George J. Colby, said Colby having assigned his interest to David Lyman.

I claim, First, The combination with the standards of a wringing machine of a clamping device under an arrangement such as described, so that said machine may be adjusted to tubs of various diameters.

Second, In combination with the standards of wringing machines and clamping devices, as described, I claim the use of screws, or their equivalents, for the purpose of firmly securing the wringer after its adjustment to the tub, substantially as set forth.

Third, I claim the application of a clamping device to a wringer, with a swivel joint to adapt itself to tubs of various forms.

61,681.—FOLDING AND COT BEDSTEAD.—E. M. Payne, Waverley, N. Y.

I claim the combination and arrangement of the castors, J, and the folding legs, I, whereby the device is adapted for use as a bed bottom, trundle bed or cot, substantially as herein shown and described.

61,682.—STEAM ENGINE VALVE GEAR.—C. C. P. Peabody, Calais, Me.

I claim the construction of the link, D, and its combination with a steam engine valve movement.

I also claim the rock bar, E, the connecting rods, a a' and d, and the lever, H, arranged substantially as described, in combination with the link, D, and the eccentric, B, as and for the purposes herein set forth.

61,683.—MACHINE FOR CUTTING CANVAS, ETC.—H. H. Pember, New York City.

I claim the combination of the feed rollers, D, table or platform, O, having guide bars, Q, and cutter or knife blade, L, susceptible of adjustment, when all arranged and combined together substantially as and for the purpose described.

61,684.—ROTARY BELLOWS.—Hiram Phinney, Kingston, N. Y.

I claim an improved rotary bellows or pump formed by the combination and arrangement of the semi-cylindrical valves, C, chambered cylinder, B, cranks, H, connecting rods, I, and shafts, J and L, with each other, substantially as herein shown and described.

61,685.—CAB.—John Pol, New York City.

I claim the arrangement in covered cabs of a driver's seat behind the body of the cab, resting on a spring, c, formed as herein shown, and supported on a rear extension of the frame of a vehicle, and also a supplementary seat next the dash board, and also an opening in the back of the cover to permit communication between the driver and passengers, when the several parts are arranged in the manner herein shown.

61,686.—MACHINERY FOR STAMPING AND OTHER PURPOSES.—George H. Reay, New York City.

I claim the method herein described of producing the blow required for stamping or embossing, consisting of a fly wheel, or other equivalent device, which, after having received an impulse, produces the desired action of the punch, substantially as set forth.

61,687.—ENVELOPE MACHINE.—George H. Reay, New York City.

I claim, First, The arrangement of a slide or sliding arms, in suitable guide grooves, in the bed of an envelope machine, in combination with the pickers or gummers, constructed and operating substantially as and for the purpose set forth.

Second, Providing the bed with a ridge or depression to operate in combination with the pickers or gummers, substantially as and for the purpose described.

61,688.—STAVE JOINTER.—James F. Sayer, Macomb, N. Y.

I claim the arrangement of the swinging-plane, C, double-acting knife, B, and bed, A, operating substantially in the manner and for the purposes specified.

61,689.—SEED PLANTER.—J. Shattuck, Waterloo, N. Y.

I claim, First, The rising and falling or adjustable frame, D, placed within the frame, A, and having the hollow standard, V, attached, all arranged to operate substantially as and for the purpose set forth.

Second, The reciprocating slide rod, S, operated by the cams, T, and the wheel, C, and the spring, U, and provided with the rack, g, in combination with the toothed segment, R, and the seed-dropping cylinder, Q, all arranged substantially as and for the purpose specified.

Third, The intermittingly rotating toothed cylinder, M, operated from the wheel, C, through the medium of the gearing, as shown, in combination with the hollow standard, V, attached to the adjustable frame, D, substantially as and for the purpose set forth.

Fourth, The sliding rod, Y, provided with the roller, Z, spring, m, and arm, l, and placed within the hollow standard, V, and operated from the sliding rod, S, as shown, in combination with the valves, X X, placed within the standard, substantially as and for the purpose specified.

61,690.—BARREL AND CASK.—Samuel Shea, Corry, Pa.

I claim, First, Securing the head and bottom, D and E, in the barrel by means of the flange, x, and groove, as herein described and for the purposes set forth.

Second, Securing the staves of the barrel or tank together by means of the dowell, a, feathered on both ends, in the manner as specified.

61,691.—CHURN.—Robert Stanley, Chariton, Iowa.

I claim an improved churn formed by the combination of the vertical tapering flanges or ribs, C, the triangular blades, H, horizontal arms, G, and vertical shaft, D, of the dasher, and the horizontal hand wheels, K N, and band, M, with each other and with the body, A, of the churn, substantially as herein shown and described.

61,692.—SASH FASTENER.—William H. Truesdell, Elgin, Ill.

I claim the combination of the slotted box, C, dog, D, and lever, E, when constructed and arranged as set forth.

61,693.—METHOD OF PREVENTING ACCIDENTS ON RAILROADS.—M. Wallwork, Shelbyville, Tenn., assignor to himself and James Nutt.

I claim the adjustable inclined plane, C, in combination with the plunger or rod, H, on the locomotive and connected or arranged with the throttle and whistle valves thereof to operate in the manner substantially as and for the purpose set forth.

61,694.—EXPRESS CALL SIGNS.—Joseph B. Wiesmann, Cincinnati, Ohio.

I claim the frame, A, hinged sign boards, B C C, and spring catch, b, constructed and arranged as above described and for the purpose set forth.

61,695.—ROTARY STEAM ENGINE.—James R. Willett and Livingston Brien, Nashville, Tenn.

We claim the construction and arrangement of the bucket, C, and the recess, E, with the packing pieces, h and j, spring, g, and piston, B, as herein described and set forth.

61,696.—COMPOUND OIL FOR MIXING PAINTS.—E. K. Wood and R. W. Henry, DeWitt, Iowa.

We claim the oil made of the ingredients mixed together in or about the proportions and in the manner substantially as described for the purpose specified.

61,697.—HORSE HAY FORK.—E. B. Woodruff, Morristown, N. Y.

I claim the cam lever, D, pivoted to bar, A, in combination with the catch C, and the pivoted forks, B, provided with the cross bar, d, constructed and operating substantially as described for the purpose specified.

61,698.—STRAP FOR ACCORDEON.—C. F. Zimmermann, Philadelphia, Pa.

I claim a strap for accordeons and other similar instruments forming a double loop like the figure 8, substantially as and for the purpose described.

Also the combination of the hinge joint, a, with the strap, substantially as and for the purpose set forth.

RE-ISSUES.

2,466.—BOOT TREE.—Charles T. Eames, Milford, Mass.. Patented May 27, 1856; reissued March 25th, 1862.

First, I claim the combination of the rod, D, constructed substantially as described, directly with the front, B, for the purpose specified.

Second, The arrangement together of the rod, D, the lever, H, and its spring, and the front, B, substantially as described.

Third, A boot tree constructed in two parts, A and B, when such parts are combined by means of a rod, cam and incline, substantially as and for the purpose specified.

Fourth, The use in a boot tree of a single cam and incline, when the cam is attached to the lower end of stretching rod, and traverses upon the inclined plane located in the back at or near its lower end, and operating substantially as described.

2,467.—SEEDING MACHINE.—W. P. Penn, Belleville, Ill. Patented Dec. 27, 1859.

First, I claim so combining a grain hopper and a grass seed hopper in a seeding machine that the grass seed hopper, being in front of the grain hopper, shall distribute its seed in advance of the grain and amidst of the rolling earth, as it is lifted by the teeth of the drill, substantially as and for the purpose specified.

Second, So combining a deflector with a grass and grain seed hopper, combined as specified, that said deflector shall deliver the grass seed in advance of the grain, and upon the upturning earth, substantially as and for the purpose specified.

2,468.—MODE OF PREPARING CHEWING TOBACCO.—C. W. Sweet and John F. Greene, New York City, assignees of Henry D. Smith. Patented March 14, 1865.

We claim enveloping the fine-cut tobacco in tobacco leaves or the equivalent thereof, and subjecting it when enveloped to pressure, substantially as described, and for the purpose set forth.

2,469.—HARVESTER RAKE.—Adam R. Reese, Phillipsburg, N. J, assignees by mesne assignments of A. R. Reese, W. Gould and N. Lake. Patented Nov. 5, 1861.

First, I claim the combination of an endless chain with a pulley on the main shaft, having projections which enter into the links of the chain, and the corresponding pulley geared to the revolving rake and reel shaft, substantially as described.

Second, Supporting the revolving rake and reel upon a detachable frame, so that the entire raking and reeling apparatus can be bodily removed without disarrangement of parts, for the purpose of converting the machine from a reaper to a mower.

Third, The combination with a harvester of the removable revolving rake and reel frame with the raker's seat or support, so as to give the machine a capacity to be converted from an automatic to a hand raker.

2,470.—APPARATUS FOR DISTILLING PETROLEUM AND OTHER LIQUIDS.—C. H. Hall, Binghampton, N. Y. Patented June 36, 1866.

First, I claim, in the continuous distillation of petroleum or other liquids, the use of a retort, B, in combination with furnace, D, and arch, C, substantially as shown and described, and for the purpose set forth.

Second, Passing the liquid to be distilled through the retort in the form of a thin stratum, substantially as and for the purpose described.

Third, The device herein described for generating steam, consisting of the water jacket, G, and water supply pipe, Y, and steam tube, I, in combination with condensing tube, F, substantially as shown and described, or any other means whereby steam is generated by passing the vapors of oil or other liquids being distilled through a vessel containing water, or vice versa.

Fourth, The method herein described of separating the condensable vapors from the non-condensable gases, or any other method whereby the condensable vapors are made to collect in the lower part of a receiver, while the non-condensable gases are made to pass off by the suction of a current of steam, substantially as herein set forth, and for the purpose specified.

Fifth, The water jacket, G', connected with supply pipe, H, and water tank, R, in combination with tubular condenser, E, operating as described, or in any other manner to accomplish the purpose specified.

Sixth, The receiver, L, in combination with tubular condensor, F, steam pipe, K, and discharge pipe, O, operating substantially as and for the purpose shown and described.

Seventh, The annular chamber, E, composed by an inner and outer vessel, in combination with the condenser, F, constructed and operating substantially as and for the purpose specified.

Eighth, The method herein described of freeing the retort, B, from residuum, or any other equivalent means whereby a retort or still is freed of its residuum, by the force of a jet of steam, operating substantially as shown and described.

Ninth, The within-described process of cleaning the residuum by treating it with steam and water, substantially in the manner described and for the purpose set forth.

2,471.—SAWING MACHINE.—Sparrow M. Nickerson, Chicago, Ill., assignee of Calvin J. Holman. Patented Dec. 8, 1863.

First, I claim supporting the saw upon the rollers, a p, within the saw, one of which is adjustable, so as to adapt the rollers to the wearing out of the saw, substantially as herein described.

Second, I claim so arranging the saw, A, upon interior supporting rollers and their shafts in such a manner that the saw, A, revolved by a band passing around it as before mentioned, will communicate power, through the medium of the interior rollers and shafts, to other parts of the machine or other machines, substantially as herein specified and shown.

EXTENSION NOTICES.

Alfred J. Watts, of Brooklyn, N. Y., petitions for the extension of a paten granted to him the 26th day of April, 1853, for an improvement in processes for preparing gold, for seven years from the expiration of said patent, which takes place on the 26th day of April, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 8th day of April next.

James S. Taylor, of Danbury, Conn., having petitioned for the extension of a patent granted to him the 3d day of May, 1853, for an improvement in machines for shrinking hat bodies, for seven years from the expiration of said patent, which takes place on the 3d day of May, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 15th day of April next.

John Mee, of Lowell, Mass., having petitioned for the extension of a patent granted to him the 10th day of May, 1853, for an improvement in knitting looms, for seven years from the expiration of said patent, which takes place on the 10th day of May, 1867, it is ordered that the said petition be heard at the Patent Office on Monday, the 22d day of April next.

John Mee, of Lowell, Mass., having petitioned for the extension of a patent granted to him the 10th day of May, 1853, for an improvement in warp net fabrics, for seven years from the expiration of said patent, which takes place on the 10th day of May, 1867, it is ordered that the said petition be heard at the patent Office on Monday, the 22d day of April next.

Rollin White, formerly of Springfield, Mass., but now of Lowell, Mass., petitions for the extension of a patent granted to him on the 3d day of April, 1855, and reissued to him, in three divisions, on the 27th day of October, 1863, for an improvement in repeating fire-arms, for seven years from the expiration of said patent, which takes place on the third day of April, 1869, it is ordered that the said petition be heard at the Patent Office on Monday, the 27th day of May next.

THE MARKETS.

Throughout the country, in most branches of industry, comes the same report of the torpidness of trade at a period of the year when it should be the most active. This stational inertness must be largely due to the high prices of commodities brought about by the waste of war, excessive internal taxation, a badly constructed tariff, and a debased currency. A wonderful unanimity of public sentiment seems to exist on the subject of taxes, and the general opinion seems prevalent that business prosperity must be unknown until some material reduction takes places. From present appearances the spring trade will be considerably below that of last year in most departments of business.

COTTON.—The exports from this port, for last month, were 48,525 bales, showing a falling off of 3,267 bales from the shipments of January, 1866. The demand at this date has become very light owing to lower quotations from Liverpool.

From the annual cotton report of Europe, published in the *Shipping List*, it appears that while Great Britain has not yet reached the consuming powers of 1860—when enormous purchases were made by speculators anticipating a cessation of supplies—the Continental countries have required during the year much larger supplies than before the wars. In France a uniformly good trade has been done, the mills being kept fully at work with fair profits. The cotton industry of Germany has been on the whole in a satisfactory state; the same statement applies equally well to Belgium. Spain has largely increased her manufactories, and the manufacturing demand in Russia has been and is now very brisk.

DRY GOODS.—The imports for the month of January amount in value to twelve million dollars, less than nine millions of which were thrown upon the market owing to the dullness of trade during the month. This season last year was the center of a very large import trade, exceeding fifteen millions, and fourteen and half millions were marketed. There seems to exist no probability that the imports of the current year will equal last year's total.

WOOL TRADE.—The passage of the Tariff Bill by the Senate has caused greater firmness on the part of holders, who, in most cases, demand higher prices for foreign.

A statement made to the Senate Committee on Agriculture, by J. B. Dodge, statistician of the Agricultural Department, declares the annual consumption of unscoured wool in the United States to be little more than one-third of the estimate made in the recent special revenue report. It makes the total wool supply of the four years of war, ending June 30, 1865, about 800,000,000 lbs., of which three-eighths were produced in this country, 279,000,000 lbs. imported, and an equivalent of 220,000,000 lbs. introduced as manufactured woolens. It makes the annual consumption of the loyal States, during the war, 7 lbs. per capita, instead of 4½ lbs. prior to the war, showing an increase of 55 per cent from the waste of war and the scarcity of cotton.

METALS.—In copper we note: New sheating and yellow metal steady at 40 and 30 cents, net cash, respectively; Ingot remains dull, and prices still recede. Owing to local impedients the trade of the port in pig iron is reduced to a very small compass; the demand, however, at this season, is usually small. The market for pig tin remains very quiet but firm; business in all descriptions is light. Consequent upon the passage of the Tariff Bill through the Senate, there is more disposition for the purchase of pig lead, but holders are not so willing to sell, and the market is at a stand. Zinc is very dull, and quotations are merely nominal

Foreign Patents.

Americas Inventors should bear in mind that, as a general rule, an invention which is valuable to the patentee n this country is worth equally as much in England and some other foreign countries. In England the law does not protect the right of a foreign inventor as against the first introducer of an invention from abroad. For twenty years past the great majority of patents taken out by Americans in foreign countries have been obtained through Munn & Co's agency. Patents are secured with the utmost dispatch in Great Britain, France, Prussia, Belgium, Russia, Austria, Italy, The Netherlands, Spain, Sweden, Australia, and other foreign countries. Models are not required, but the utmost care and experience are necessary in the preparation of applications. Patentees who intend to take out Foreign Patents should send to us for a Pamphlet of full advice. Address

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Reissued patents expire at the same time that the original patent would have done. For this reason, applications for reissue will be acted upon immediately after they are completed.

A patentee may, at his option, have in his reissue a separate patent for each distinct part of the invention comprehended in his original application, by paying the required fee in each case, and complying with the other requirements of the law, as in original applications.

Each division of a reissue constitutes the subject of a separate specification descriptive of the part or parts of the invention claimed in such division; and the drawing may represent only such part or parts.

One or more divisions of a reissue may be granted, though other divisions shall have been postponed or rejected.

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The documents required for a Reissue are a Statement, Petition, Oath, Specification, Drawings. The official fee is $30. Our charge, in simple cases, is $30 for preparing and attending to the case. Total ordinary expense, $60. Reissues may be applied for by the owners of the patent.

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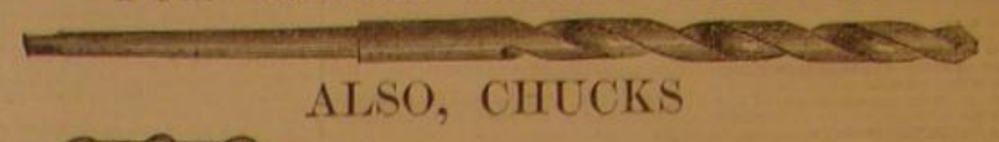
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2/8	60	1/8	14	1 to 5	20c	$2.15
3/32	65	5/32	16	6 to 10	19	2.05
7/64	70	3/16	18	11 to 15	18	1.95
5/32	75	7/32	20	16 to 20	17	1.85
1/4	80	1/4	25	21 to 25	16	1.75
11/32	85	9/32	30	26 to 30	15	1.60
9/16	90	5/16	35	31 to 35	14	1.45
13/32	$1.00	11/32	40	36 to 40	13	1.30
7/8	1.10	3/8	50	41 to 45	12	1.20
31/32	1.20	13/32	55	46 to 50	11	1.10
1 1/16	1.30	7/16	60	51 to 60	10	1.10
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1 5/32	1.75	17/32	75			
1 3/16	1.90	9/16	80			
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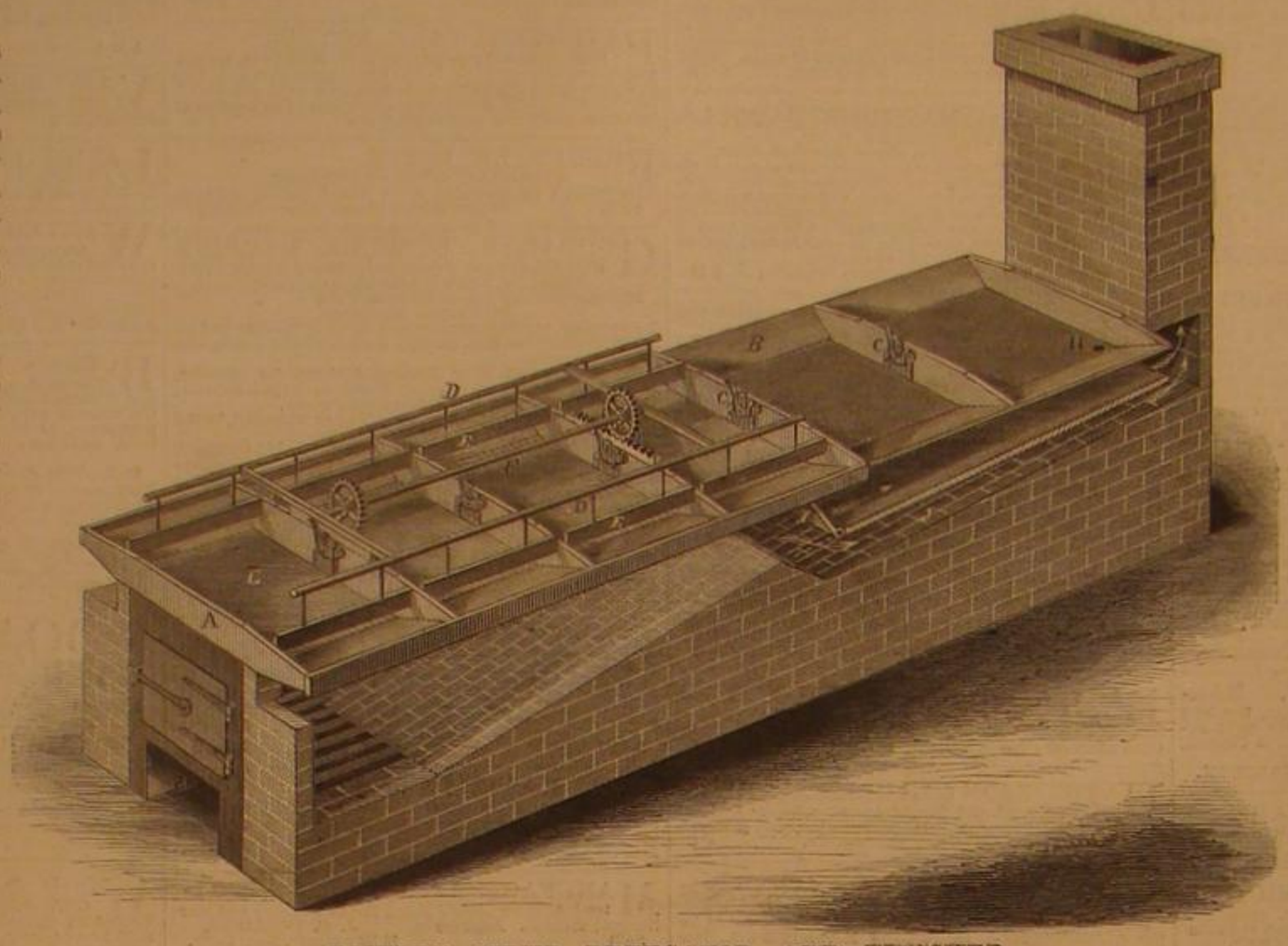
The cultivation and manufacture of the Chinese cane or sorghum into sirup and sugars has within a few years attained considerable importance in western sections of the country. Inventors have been busy in improving the apparatus by which the crude juice is manufactured into sirup and granulated into sugar. The device represented in the engraving, it is said, can, by the aid of one operator, make from 80 to 100 gallons of honey-like sirup in 12 hours, which contains less vegetable matter preventive of granulation than that made in the ordinary manner.

The defecator proper, A, is a part of the finisher, B, but separated from it by a partition. The defecator, also, as well as the finisher, is subdivided by transverse partitions as seen in in the engraving. These partitions may be either connected or kept separate by simple gates, C, which are vertical slides worked by a handle lever. The arrangements for removing the scum from the heated juice are a peculiarity in this machine. Long side arms, D, with cleats, E, attached, are secured to cross bars resting at their centers on a shaft, F, carrying either gear wheels or toothed segments which mesh into racks fixed on two of the transverse partitions.

The defecating and finishing pans with their attachments rests on a furnace, part of one side of which is removed to show the internal arrangement. The operation is as follows: A constant stream of the juice is introduced into the front compartment, G, over the grate, and by the gates, C, is passed along through the other compartments, until it reaches the last finishing pan and is discharged at H by means of a pipe. The sides of the defecator are inclined at an obtuse angle and as the syrup boils the scum rises and tends toward the sides. When a quantity has gathered the operator slides the skimmer to the edge of the floating mass, and depressing or raising the arm which he grasps, he pushes the scum up the inclined edge of the pan to remove it one side, and pulls it toward him to remove it from the other. The scum falls into side channels and is carried off by gutters or any suitable conduit.

When the syrup is sufficiently cleansed and boiled it is passed from the defecator to the finishing pan by the gates, C, and when to be drawn off at H, the damper, I, is raised, as seen in the engraving, which directs the flame and gases from the furnace to the lower passage, J, by which the finished syrup is kept from burning.



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Improvements in Iron Manufacture.

The manufacture of pig iron in the North of England (says *Engineering*) has been further cheapened, the past year, by the erection of still larger and higher furnaces: the highest being 102 feet, with a capacity of 26,000 cubic feet. The gas is now wholly taken off and burned under the boilers and stoves, so that there is absolutely no flame from the tops of the furnaces. The temperature of the blast has been increased to 1100 degrees and upwards. So far, there is no known means of driving out all phosphorus from iron. Any means which would do so would add more than one hundred millions of wealth to this nation (England) by enabling ordinary irons to be converted into excellent steel by the Bessemer process.

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