

SCIENTIFIC AND PRACTICAL INFORMATION.

NEW INVESTIGATIONS IN MAGNETISM.

MM. Treves and Durassier have recently investigated the question of whether, and how, in a steel magnet, the known portable force varies when the weight and section are affected by the gradual dissolution of the magnet in an acid. The result is that the force is always proportional to the section and to the weight, so that a curve representing the variation of weight and section would be parallel to one indicating the diminution of intensity. As the dissolution progresses, the metal shows serrated inequalities perpendicular to the axis of the bar; and if a horseshoe magnet be treated, the curved part is found to dissolve incomparably quicker than the straight portions.

A NEW MODEL FOR SHIPS.

The circular ironclad lately constructed in Russia, and described in the SCIENTIFIC AMERICAN of August 7, 1875, may possibly lead to a radical change in the construction of sea vessels other than those for warlike purposes. A young officer of the Russian navy, attached to Admiral Popoff's staff, has constructed a saucer-shaped sailing yacht, 20 feet in diameter, which is described as extremely fast. The little craft is cutter-rigged, with an exceedingly high mast, and has great speed under canvas, in combination with an altogether unequalled power of staying and wearing. She is perfectly round, decked somewhat after the fashion of a Bermuda boat, and, having great stability, can carry, almost without inclination, all the canvas which it is possible to spread upon her. Strange to say, she is extremely handy as well as fast. Such, at least, is the account given of her in the London Times by Mr. E. J. Reed.

OXYCHLORIDE OF SULPHUR.

Paul Behrend, of Leipsic, has recently discovered a new and convenient method of preparing the oxychloride of sulphur, also known as sulphuryl chloride, SO₂, Cl₂. This was accomplished by taking sulphuryl oxychloride (SO₂, HO, Cl), which is formed by the union of sulphuric anhydride with hydrochloric acid, and sealing it up in glass tubes which were heated for 12 or 14 hours to a temperature of 338° to 356° Fah., in a paraffin bath. On distilling the contents of the tube, pure sulphuryl chloride was obtained.

METALLIC GALLIUM.

The new element gallium has recently been obtained in a pure metallic state by M. Lecoq. Its brilliancy places it between platinum and silver. It was obtained by treating electrolytically the aqueous solution of its ammoniacal sulphate, and the very coherent deposit formed was subsequently burnished.

The Food Equivalent of Health.

General Sherman, in his chapter on the "Military Lessons of the American War," says: "To be strong, healthy, and capable of the largest measure of physical effort, the soldier needs about 3 lbs. gross of food per day, and the horse or mule about 20 lbs. An ordinary army wagon drawn by six mules may be counted on to carry 3,000 lbs. net, equal to the food of a full regiment for one day; but by driving along beef cattle, a commissary may safely count the contents of one wagon as sufficient for two days' food for a regiment of 1,000 men; and as a corps should have food on hand for twenty days ready for detachment, it should have 300 such wagons, as a provision train; and for forage, ammunition, clothing, and other necessary stores, it was found necessary to have 300 more wagons, or 600 wagons in all for a corps d'armée. Each regiment ought usually to have at least one wagon for convenience to distribute stores, and each company two pack mules, so that the regiment may always be certain of a meal on reaching camp without waiting for the larger trains." A curious calculation of a similar nature exists, made by Tempelhoff, a Prussian general, the historian of Frederick's wars: "100,000 men," he says, "consume daily 150,000 lbs. of flour, equal to 200,000 lbs. of bread. Bread and forage are seldom to be had in sufficient quantities on the spot—hence magazines are established along the line of operations. The bread wagons carry a supply for six days, the men for three more. In commissariat wagons, flour for nine additional days could be conveyed—one wagon to 100 men for nine days, thus 1,000 wagons supplied the army for that time. An operation of 18 days' duration could thus be conducted without an intervening magazine, but field ovens were required to make the flour into bread. But bread for three days requires two days to bake it; at the end of six days, therefore, a halt must be made to bake or else the ovens would fall behindhand with the supply; so that, in advancing into an enemy's country before magazines could be formed there, six days was the extent of march practicable without a halt."

A strange Explosion in Boston.

A singular explosion occurred in South Boston on the evening of December 22. A large gas main, running under the Federal street bridge and along Federal street, exploded, tearing up the pavement, killing and wounding a number of people, and blowing others into the water. It is supposed that gas had escaped from a defective pipe until the ground had been saturated by an explosive mixture of gas and air. How it was fired is not known. The main pipe, about five inches in diameter, passes through under Federal street bridge, and along the causeway leading from it up Dorchester avenue, the continuation in South Boston of Federal street. This causeway is composed of three feet or more of dirt and gravel, with the pavement resting on a foundation of piling, and on either side, for 17 feet or more, is the river.

Eye witnesses state that a bright flash was first seen about the middle of the causeway, followed by a sharp explosion

and paving stones, gravel, and debris flying in all directions. Almost immediately the causeway on the right hand side fell over into the river, carrying over with it several persons. The number of these is not yet ascertained, but it is feared several were buried under the debris at the bottom of the river. The pavement was completely torn up for a distance of 175 feet from the wooden portion of the bridge to Crosby's warehouse, which was seriously shattered. Had the explosion occurred five minutes later the loss of life would have been far greater, as the draw of the bridge had been up for some time, and a crowd of 300 or 400 persons, on their way from the city to their homes in South Boston, had collected on this side, and in a few minutes would have swarmed upon the causeway.

Another Subterranean Explosion.

An explosion in one of the city culverts of Philadelphia, Pa., accompanied by the rupture of a gas main and the upheaval of inlet covers and the iron tops of manholes, coming soon after the fatal occurrence of a somewhat similar nature in Boston a few days ago, has led the Public Ledger of the former city to make some inquiry into the fact. It does not appear that the explosion came from any contact of inflammable gases with fire, as there is no account of any flames having been seen by anyone. A rupture of a small gas main seems to have been an incident of the violence, and not the cause of it. The damage appears to have been occasioned by confined air, compressed within the culvert by the backing up of the tide water of the river to such a degree as to break out through the inlets and manholes with great force. This is not an unusual occurrence, and not by any means so dangerous as the ignition and explosion of inflammable gas in a culvert would be.

The Value of the Scientific American.

S. S. B. says: "I believe that, since its first year (1848, I think) I have missed but one year's numbers of your journal. In the burning of my house, four years ago, I lost some 18 years of your paper, with many other valuable books; but none was so great a loss as the file of your paper. In 1854, I lent a volume of the paper to a friend of mine, who was erecting a factory. He told me that that volume of the SCIENTIFIC AMERICAN saved him about \$800 in the construction of a grist and saw mill."

D. L. R. says: "The SCIENTIFIC AMERICAN affords me more pleasure than anything else that I can find in the literary line. It is indeed a great storehouse for deep, interesting thought. Not a bit of room is wasted. As an American I am proud of it, and wish it all prosperity from ages on to ages."

F. McC. says: "I cannot refrain from saying a word for the SCIENTIFIC AMERICAN. As it is now conducted, it cannot be beaten as a scientific periodical. I make it a rule to always take my copy to the weekly meetings of our association, and never fail in finding something to read aloud to the members, with profit to them all. You are doing a world of good in sounding the Keely motor."

Rendering Wood Fire and Water Proof.

M. P. Folacci has devised a new mode of rendering wood waterproof and incombustible, which involves the use of the following composition: Sulphate of zinc 55 lbs.; American potash 22 lbs.; alum (ammonia base) 44 lbs.; oxide of manganese 22 lbs.; sulphuric acid at 60°, 22 lbs.; river water 55 lbs. The above ingredients, with the exception of the sulphuric acid, are mixed in a boiler, where the water is added at a temperature of 113° Fah. As soon as solution is effected, the acid is gradually poured in. To prepare the wood, the timbers are placed in a suitable chamber, on gratings, and separated by spaces of about a quarter of an inch. The composition is then pumped in to fill completely the receptacle, and is maintained therein in a state of ebullition for three hours. The wood is then withdrawn, and dried in the air. According to the inventor, it becomes practically petrified, and the most intense flame only carbonizes the surface very slowly.

A Magnetic Island.

The volcanic rocks composing the foundation of the Isle St. Paul are ferruginous. Those on the north side of the crater, which result from the slips whereby all the east side of the mountain is laid bare, attract the two poles of a magnet, and contain 6 per cent of iron. Those met with around the cones of scoriae situated at the foot of the exterior slopes of the crater, on the sea shore, are true magnets with two poles, containing 14 per cent of iron. The observations made for declination and inclination indicate the local action of a south pole toward the center of the crater, a fact which should warn navigators to guard against the magnetic influence of this isle.—A. Cazin, in Comptes Rendus.

Useful Recipes for the Shop, the Household, and the Farm.

Round steel wire rope will bear more than double the weight required to break iron wire rope of similar diameter.

The following is the London rule for gas pipe sizes: For 200 lights, 2 inch iron tube; 120 lights, 1½ inch; 70 lights, 1¼ inch; 50 lights, 1 inch; 25 lights, ¾ inch; 12 lights, ½ inch; 6 lights, ¼ inch; and 2 lights, ⅓ inch.

Apply soapsuds to a suspected leaky joint in the gas pipe. The formation of bubbles will show any escape. This is safer than trying the joint with a lighted match. If the leak occur in the branch of a bracket or chandelier, it is repaired by soldering with plumber's fine solder; if it be a very small one, heat the place first with a spirit lamp, and fill the aperture with cement.

The drive wells which are extensively used in the South and West are made as follows: A piece of 1½ inches gas pipe is perforated with several hundred holes near the end, which is covered with a fine brass wire screen, and this in turn is protected by a covering of sheet zinc or iron also perforated. The extremity of the pipe is sharpened, or a steel point may be fixed. It is then driven into the ground, adding pieces on the top as it sinks in. As soon as the proper depth is reached, a pump is attached, and the result is an inexhaustible well, often giving an abundant supply of water in half an hour after the end of the pipe first entered the soil.

NEW BOOKS AND PUBLICATIONS.

THE ALDINE, a Fortnightly Journal devoted to the Fine Arts and Literature. Price 50 cents a number. New York city: The Aldine Company, 18 and 20 Vesey street.

This publication is of the rarest beauty in typography, engravings, and paper that we have ever seen. It was first published in 1869, and we have recently perused with great care all the numbers since issued, up to that for December, 1875; and it is with the greatest satisfaction that we attest the gradual improvement of the work, from the first number to the last issued, until now, when it has attained a higher standard of perfection than any illustrated journal on this continent. The superb engravings illustrate highly artistic subjects, some from Nature, and others from the paintings of our best American and the most celebrated foreign artists, all of which are executed by our best engravers. The Aldine is to be published twice a month in the coming year, and the publishers promise to give their readers engravings of historical events, appropriate to the Centennial year. We can add, in closing this notice, nothing that gives a more concise and truthful idea of this artistic publication than the words of our honored American poet, William Cullen Bryant. He says:

"In England and Italy we have the best printed books, and I think in England the best impressions of engravings made; but I have never seen anything comparable to the work of THE ALDINE: nothing so fine, the ink put upon the block in such just proportions, not too much, not too little, impressed on the paper with the greatest care and dexterity; no blot, no blur, no blank—the slenderest, lightest and most delicate lines impressed with the greatest certainty, so that the impression represented the original engraving on the block as it left the hands of the artist, with as much fidelity as a mirror reproduces the lineaments of the human countenance."

HYDRAULIC MANUAL. PART I, consisting of Working Tables and Explanatory Text, intended as a Guide in Hydraulic Calculations and Field Operations. By Louis D'A. Jackson, A. I. C. E. London: W. H. Allen & Co., 13 Waterloo place, S. W.

This is the third edition of probably, to the hydraulic engineer, one of the most useful of professional treatises. It embodies a collection of working tables, based on the most improved modern principles and enough text to set forth both principles and formulae in a manner both clear and concise. The work has been prepared under the auspices and with the assistance of the English civil officials in India; and the second part of the book, now added, consists entirely of hydraulic and meteorological statistics, the former principally, the latter altogether, Indian. The present edition includes, beside the above, many new tables and considerable amplification of the text, and forms, as a whole, a valuable compendium both of the works of many of the best authorities on hydraulic engineering and of several valuable and hitherto unpublished manuscripts. D. Van Nostrand has the book for sale in New York city.

THE POPULAR HEALTH ALMANAC FOR 1876. New York city: E. Steiger, Frankfort street.

This is a laudable effort on the part of Mr. E. Steiger, the well known publisher and importer of German scientific and other works, of this city, to produce a popular calendar which will replace the well known yellow covered pamphlets which now serve the double purpose of almanacs and advertisements of quack medicines.

DECISIONS OF THE COURTS.

United States Circuit Court—Southern District of New York.

PATENT BILLIARD TABLE.—LEVI DECKER vs. WILLIAM H. GRIFFITH & CO.,—LEVI DECKER vs. CHARLES SILVERBRANDT.

[In equity.—Before Blatchford, J.—Decision rendered November 5, 1875.] The patent sued on in these cases, being a reissue granted to the plaintiff, Levi Decker, March 9, 1869, on the surrender of the original patent granted to him December 18, 1866, for an "improvement in cushions for billiard tables," has been heretofore the subject of consideration by this court in the case of Decker vs. Grote (10 Blatchf. C. C. R., 531). The invention set forth in the specification of the patent has reference to a cushion formed of India rubber.

The claim in this case is for the catgut or other cord E, partially or fully embedded, or otherwise attached at the angle α of the rubber cushion C, so as to protect said cushion against the impact of the ball, substantially as herein shown and described, and for the purposes set forth. The manufacture and use by Winant, prior to the alleged date of invention by Decker of his device, of a strip of spring steel, or equivalent material, with holes in its lower edge, through which wires were passed and fastened to the under side of the rail, said strip being placed in a crease or groove cut in the upper face of the rubber near the angle thereof, and the manufacture by Stevens, prior to 1864, of India rubber cushions for billiard tables, having a French clock spring placed in a slot in the upper face of the rubber, parallel to and near the inner face of the rubber, bringing the upper edge of the spring near the upper corner of the rubber, are substantially the same arrangements of devices used by Decker.

Bill dismissed.
William J. A. Fuller, for the plaintiff.
Edward N. Dickerson, for defendants.

Recent American and Foreign Patents.

NEW CHEMICAL AND MISCELLANEOUS INVENTIONS.

IMPROVED ELECTRIC CABLE AND CONDUCTOR.

George W. F. Hoogeveen, Haarlem, Netherlands.—This inventor proposes a series of telegraph wires, which are covered with gutta percha, and sewn within a covering of sail cloth made perfectly impervious to moisture and other disturbing agencies, by being impregnated and coated with highly insulating material. The latter is a mixture of paraffin and glycerin, provided on the outside with a coat of coal tar and sulphur, and having on the inside a coat of rubber varnish and benzine.

IMPROVED SWINGING SHIP'S BERTH.

Edward P. S. Andrews, Lisbon, Me.—This inventor, in order to prevent sea sickness, proposes berths pivoted to the cabin walls, and connected by separate and jointly-swinging governing end plates, of which one is applied to a swinging weight of corresponding size, to produce the level position of the berths. A pivoted hook lever of each berth may be attached to the corresponding end piece, to swing therewith and with the weight, or to a staple of the wall, to assume a fixed position at the wall. By this arrangement, the berths will always remain level; or any one of them may be fastened and held rigidly to the vessel, in accordance with the desire of the occupant.

IMPROVED CRACKER MACHINE.

Charles S. Fowler, Brooklyn, N. Y.—This invention has for its object to improve the construction of the class of machines that are used for cutting dough for crackers, cakes, etc., so as to enable them to be more readily adjusted and more thoroughly controlled than when made in the ordinary way. The arrangements are such as to allow the dough to shrink before reaching the cutters, so that the crackers or cakes will not be drawn out of shape by said shrinkage. The construction embodies many new and ingenious devices.

IMPROVED ENVELOPE OPENERS.

John La Blanc and Xavier St. Pierre, Ophir City, Utah Ter.—The device, which is attached to the end of a pencil, consists of a blade enclosed between guides of india rubber. The latter serves as an eraser, and, when acting as a guide for the blade, adapts itself to envelopes of different thicknesses.

IMPROVED METHOD OF CONCENTRATING TAILINGS FROM QUARTZ MILLS.

Francis E. Mills, Virginia City, Nev.—This invention consists in first causing the mingled sands, sulphurets, quicksilver, and water to flow through a wide and shallow sluice with small transverse slits, called riffles, cut through its bottom. Each riffle opens into a tank filled with standing water. In passing over these water riffles, the coarser and heavier sulphurets and globular quicksilver sink through the water spaces into the tank and are saved, while most of the sand and some of the exceedingly fine and light sulphurets and minute particles of floured quicksilver are carried on through the sluice by the current, which then flows into another sluice of reverse form. Here the sands gradually arrange themselves into different horizontal strata, according to the coarseness of the grains, the fine sulphurets, minute particles of quicksilver, etc., finding their way to the bottom of the sluice among the moving grains of the coarsest sand. Near the bottom of this deep narrow sluice, at the lower end, is inserted a very thin sheet of metal, which divides the running current horizontally, cutting off the lowest stratum of coarse sand, containing the fine sulphurets, etc., from the main body of the flowing sands above it without disturbing the current, so as to discharge the former into a separate vessel. The very fine sulphurets, etc., are separated by passing them through a fine screen.

IMPROVED MUSIC RACK FOR UPRIGHT PIANOFORTES.

Stephan Brambach, New York city.—This is a swinging desk or stand, arranged at the front of an upright pianoforte case, provided with a hinged base strip and extension legs for supporting jointly the music book and holding desk in inclined position.

IMPROVED PAPER BOX

David K. Osbourn, Baltimore, Md.—This is a neatly shaped box, formed of a single piece of paper and provided with a rear extension, which serves as a cover and as a means of suspension. It also has suitable stiffening pieces within.

IMPROVED SLEEVE ADJUSTER.

Alfred Perigo, New York city.—In order to hold the cuffs of a shirt away from the hands, while the latter are engaged, this inventor proposes a button-holed tab on the sleeve and a button on the shoulder of the garment. The cuff can thus be fastened up without first removing the coat.

IMPROVED DUMPING DEVICE FOR FILLING GRAVES.

John W. Varnice, Crawfordville, Ind.—This is a device for receiving the soil thrown up in digging graves and dumping it all at once into the grave to fill the same. It consists of a box provided with suitable doors, which stands beside the grave and is filled with earth as the same is excavated. When it is desired to replace the soil the box is tilted, when arms strike against latches which hold the doors, open the latter, and thus allow the earth to be discharged.

IMPROVED SIGN AND ORDER SLATE

Joseph S. Gold, Washington C. H., Ohio.—This invention is designed for the convenience of professional men, but may be used by all who may find it a convenience; and it consists of a sign having on its back side a sliding slate, which slate is raised by means of a cord, and is covered, when down, by a self-acting lid.

IMPROVED TOBACCO DRYER.

Henry R. Farmer, Ringgold, Va.—This inventor proposes a heating apparatus for buildings, in which tobacco is stored in order to cure the tobacco by artificial heat radiated directly from pipes made to conduct the warmth about the lower part of the room from a furnace outside provided with regulating valves or gates. A valve or register, located directly over the hot air pipes, so tempers the heat at the entrance into the barn that the building is protected from burning.

IMPROVED WIRE FENCE STAPLE.

Homer S. Smythe, Aurora, Ill.—This invention relates to certain improvements in staples for wire fences, and it consists in a staple having a short prong and a long prong, the latter of which terminate at one end in a chisel point, and at the other in a beveled head, and is provided with barbed notches to hold it more securely in place.

IMPROVED CARTRIDGE BELT.

Major David Taylor, Paymaster U. S. A., Leavenworth, Kan.—This invention consists in arranging button holes on a soldier's cartridge belt between sections thereof, making slots near the ends, using clips of the same length as the cartridge or as the width of the belt, and in making the clip with a point and so constructed as to hold the cartridge with muzzle downwards. The first improvement allows a pistol holder or other attachment to be readily applied or detached, the second allows the buckles and clips to be fastened by reversing the end of the holding strap, the third gives a more stable and efficient support to the cartridge, and the fourth allows the clip to extend above and below the cartridge to give the former a greater bearing on the latter.

IMPROVED CARTRIDGE.

George Smith, Brooklyne, N. Y.—This is a strong paper or straw-board tube or shell, in which the charge is confined by a metallic wad at each end. The wad at the outermost end retains the charge without necessitating the folding-in of the outer end of the shell, and, by the explosion, its edges are expanded to such extent that it forces the shell out of the gun. The wad at the inner end is forced out of the shell and left in the gun, to be dropped out after firing.

IMPROVED RAILWAY TELEGRAPH.

Baylus Cade, Scott Depot, W. Va.—The object of this invention is to reduce the risks incident to life and property upon railway lines resulting from an ignorance on the part of the train men of the condition of the road and the position of other trains thereupon. The invention has in view the placing and keeping of all of the trains upon the route in a single telegraphic circuit which is continuous from one end of the line to the other, and is never broken, whereby each moving train is in itself a station which is in communication with all the other trains as well as the terminal and intermediate fixed stations, by means of which arrangement one train may telegraph to the train preceding or following it, or to any one of the fixed stations, and the messages sent from one point to another are reproduced in the usual way upon all of the intermediate trains and stations.

IMPROVED TAILOR'S MEASURE.

Friedrich H. Ullrich, New York city.—This is an improved tailor's measure, by which the different dimensions of the body can be taken quickly, conveniently, and accurately, to enable the tailor to produce a good fit, and furnish a basis for an improved system and apparatus for drafting the patterns. It consists of a graduated belt, with suitable back clasp and sliding hip clasps, to which a detachable measure is hung for taking the different measures required.

IMPROVED TEMPORARY BINDER.

Charles D. Lindsey, Cincinnati, O.—In this device, a notched spring plate is employed to secure or hold one or more fasteners in place upon a suitable block. The paper fasteners are so clamped as to be supported firmly in an erect position.

IMPROVED SAUSAGE STUFFER.

Hugh P. Rankin, Allegheny, Pa.—This invention relates to certain improvements in sausage stuffers, and it consists in a barrel or cylinder pivoted upon trunnions on a framework, and provided with an adjustable nozzle. In said barrel moves a piston, which is rigidly attached to a screw-threaded rod, which said rod is actuated longitudinally in the barrel by means of a bevel gear which operates through a revolving sleeve and an adjustable screw-threaded segment. The latter, by engaging the threads of the piston rod, converts the rotary motion of the sleeve into a longitudinal rectilinear motion of the piston, and a stud upon the framework engages a longitudinal groove of the piston rod to keep the latter from turning.

IMPROVEMENT IN WEATHER VANES.

William H. Pickering, Boston, Mass.—In looking at a weather vane standing "end on," it is difficult to tell whether it is pointing toward or from the observer. To show this, the present inventor suggests attaching to the vane pivot two arms inclined downward, one of which carries a ball, and the other a piece of glass set in a frame. It is then easy to tell, by the position of the ball to the right or left of the vane, in which direction the latter is pointing.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED TYPE WRITING MACHINE.

Philander Deming, of Albany, N. Y.—This invention consists, first, in printing each word with an initial letter different from the others composing it, such initial standing in lieu of a space to distinguish the beginnings of words; and secondly, in the manner of grouping the different sets of letters to admit of the most rapid manipulation of the keys.

IMPROVED RAIL JOINT.

Hermann Weber, New York city.—In this device an auxiliary fish plate is placed upon the bolts, which are provided with wedge-shaped notches on their upper and lower sides, and when moved longitudinally the edges of said plate enter the notches in the bolts, and thus lock the said bolts in place. The plate is made narrower than the regular fish plates, and in its upper edge is formed a number of teeth to receive a pawl, which holds it from working back when it has been driven into place.

IMPROVED WATER WHEEL.

Isaac Mallery, Dryden, N. Y.—This is a turbine wheel having the chutes divided horizontally. The case and the chutes are so arranged that the mouths of the latter open at the top of the case instead of the sides. A horizontal gate is arranged on the top plate, which may be adjusted at any time to close tight without too much friction.

IMPROVED SMOKE STACK.

Darerrick Allard, St. Albans, Vt.—The invention consists mainly in the arrangement of a beveled ring, in connection with the vertically adjustable tube, whereby the blast is prevented passing into the space between said tube and the casing of the stack, and also whereby cinders or sparks are deflected into the main ascending current, when they fall into said space.

IMPROVED WATER WHEEL.

James J. Bourgeois, St. Cloud, Minn.—This invention relates to certain improvements in water wheels; and it consists principally in the peculiar construction of the gate or cut-off. Two horizontally moving slides are provided with rack bars with pinions between the same, so that the slides move in unison in opposite directions, to open or close above the center of the wheel.

IMPROVED ORE CONCENTRATOR.

James V. Pomeroy, Col. Ter.—This inventor now improves on the ore concentrator patented to him under date of May 11, 1875, so that the operation of the same is more effective, and the same can be worked with or without the concentrating pans. The supporting table is constructed with a step-shaped bottom, that forms a series of levels for the concentrating pans, the steps and head walls producing a wave action of the water in each level or pan. The center of gravity of the table may be changed, and a heavier or lighter shock be imparted to the same, according to the quality of the material. A level of greater length is arranged at the head of the table, and on the same is placed an endless belt, on which the pulp is fed through a hopper that is hinged at the head of the table, and seated watertight on the belt.

IMPROVED STEAM PLOW.

B. S. Benson, Baltimore, Md.—This invention contemplates the manufacture of a steam plow which shall work with revolving blades that cut the soil with fingers, separate the soil from the growth with pickers, and carry the pulverized earth to the rear. It is also provided with a sifter in the rear and a box to receive the grass, weeds, and roots; also rear caster wheel journaled in a pulley ring to govern the direction of travel; also an attachment to this wheel, consisting of a detachably clamped frame, so that it may be adjusted to suit the changing line of gravity on lands of different inclination; also with a device for holding up the plows in traveling from field to field, or to graduate the depth at which they shall work.

IMPROVED FURNACE FOR STEAM BOILERS

Charles E. Robinson, Brooklyn, N. Y.—This invention relates to improvements in furnaces for burning gases of petroleum or other liquid hydrocarbons. The attempts heretofore made to utilize petroleum as fuel for this purpose, more especially in locomotive boilers, have failed of the desired success chiefly because the combustion of gas or gases derived from said fuel has been attempted at too low a temperature; and secondly, for want of sufficiently free admission of air to the furnace chamber. The difficulties are overcome in this invention by dividing the furnace chamber into two parts, by means of a perforated diaphragm, the same thus forming the top of the chamber in which the combustion is begun, and the bottom of the chamber in which it is perfected. The bottom of the primary combustion chamber is formed by a series of inclined perforated plates, which are joined at their upper and lower edges, and by which the air is admitted in the requisite quantity and in a highly heated condition.

NEW WOODWORKING AND HOUSE AND CARRIAGE BUILDING INVENTIONS.

IMPROVED SURFACE PLANER.

Wm. C. Margedant, Hamilton, Ohio.—This invention relates to certain improvements in that class of surface-planing machines which plane both above and below the cutter head; and it consists partly in making the cutter head and its upper adjustable table together adjustable above a lower stationary table. It consists more especially, however, in the construction of the cutter head, which is made with three straight cutting knives, arranged in such a manner as to produce a shear cut. To produce this result, one end of

the cutter head shaft is made larger than the other, and the end of the knives upon the small end of the shaft are correspondingly advanced to compensate for the first inclination, thus producing, by the double angle, a shear cut with a straight knife.

IMPROVED EXTENSION TABLE.

Ansel D. Jones and Samuel L. Jones, Kirksville, Ky.—These inventors propose to connect the legs of the table to a lazy tongs frame for extension purposes. They consider that the frame can be constructed cheaper than can the usual tongued and grooved sliding sections, while its adjustment is easier.

IMPROVED HINGE.

Frederich Toedt, New York city.—This is an improved butt hinge for doors of all kinds, by which the same are raised when being opened, and closed by their own weight, dispensing thereby with the threshold. The hinge has a wing plate with a spindle and fixed inclined washer, on which the correspondingly inclined sleeve end of the other wing plate slides, raising thereby the door. The advantage of the hinge is that it allows the laying of carpets from one room to another on an even surface.

IMPROVED SOFA BEDSTEAD.

John B. M. Fifield, Philadelphia, Pa.—This bed sofa is so constructed that it does not require to be moved away from the wall when it is to be arranged as a bed; it may be changed from one arrangement to the other with one movement, and it is so constructed that, when arranged as a bed, the cushions may be covered with ticking, and thus kept clean. The back is made in two parts, and so arranged that the lower part may be swung forward to enable the upper part to be turned down into line with the seat to form a part of the bed bottom. A piece of ticking is attached to the rear of the seat and to the back, so that, when the latter is turned down, the cloth becomes extended over the entire bottom.

IMPROVED BEDSTEAD AND MATTRESS.

John J. Bowen, Richmond, Va.—This invention relates to an improved construction of bedstead and mattress, each constructed so as to be specially adapted to the other, whereby the cost of the mattress may be considerably reduced. It consists in a bedstead having a raised head support in combination with a mattress shortened by the width of a bolster, and provided with a bolster attached to its upper head end, which rests upon the head support of the bedstead, by means of which all of the comforts of an ordinary bed are available, and the cost of the mattress lessened by dispensing with a transverse section equal to the width of the bolster.

NEW AGRICULTURAL INVENTIONS.

IMPROVED MILK COOLER.

Bruce C. Bort, Chateaugay, N. Y.—This invention relates to improvements in the milk coolers for which letters patent have been granted to B. C. Bort and T. Bryant, under date of June 18, 1872, and November 5, 1872. The invention consists of a water cooler or vat which has a hollow longitudinal partition, with entrance and exit apertures, and lateral perforated partitions, in connection with a detachable pan seated thereon. The milk pan is thus acted upon by the cold water at every part of its bottom, so that an effectual cooling of the milk is produced, while the detaching of the milk pan admits the thorough cleaning of the cooler.

IMPROVED COMBINED DRILL AND FERTILIZER.

Aladan S. Wishart, Lumberton, N. C.—The object of this invention is to provide a combined drill and fertilizer, or a drill which is convertible at will into a broadcast fertilizer. It consists in a shaft carrying feed wheels or stirrers, located parallel with the axle, and actuated through gear wheels by the driving wheels. An adjustable hopper is arranged upon the frame, so that, when it is disposed longitudinally, a single one of the feed wheels revolves in an adjustable orifice at the bottom to constitute a drill for planting cotton and other seed; and when the said hopper is arranged transversely, or parallel with the shaft, all the said feed wheels revolve in the said hopper and act as stirrers to sow broadcast the guano or other fertilizer.

IMPROVED DITCHING MACHINE.

John E. Landrum, Hebron, Ohio.—As the machine advances, the earth is excavated by an inclined shovel—upon which the loose soil passes—entering an upwardly inclined shoot. In the latter is an endless chain, driven by the wheels of the ditcher, through the medium of suitable gearing, and carrying hoes at intervals along its length. These hoes raise the earth to the top of the machine and deliver it to the discharge spout.

IMPROVED GRAIN BINDER.

John J. Atwater, Medford, Minn.—This is a remarkably ingenious machine, including eleven entirely novel devices. There is an apparatus for collecting the grain, forming it into a gavel, and dropping upon a table, along which twine, leading from a ball of the same, is extended. This done, the cord is carried over the gavel, and both ends brought under a clamp. A portion of the twine enters a slot in a needle, which is suitably manipulated to make a knot. Lastly, the cord is cut clear of the ball, and the gavel thrown out.

NEW HOUSEHOLD ARTICLES.

IMPROVED POTATO MASHER.

Robert Crane, Jr., Columbia, Pa.—This implement consists of a handle, and a wheel-shaped device fastened thereto. The latter is formed of a ring and radial blades, the latter being set spirally or inclined to the plane of the wheel, so as to mash as well as cut when pressed down through the potatoes.

IMPROVED WEATHER STRIP.

Jesse Chandler, Barry, Ill.—This invention consists in retaining a hinged weather strip upon the threshold of a door by an adjustable stop plate, having an inclined cam part at the door casing for retaining the strip securely on the sill.

IMPROVED LAMP PENDANT.

William M. Underhill, Oconto, Wis.—This is a lever attached to a link suspended from the ceiling, having a long arm which terminates in a hook, and a short weighted arm. Directly under the point of suspension of the lever there is a bend in the long arm, to which the lamp is attached, so that the lever remains horizontal while the lamp hangs vertical. When it is desired to lower the lamp, the same is simply slid out to the hook end of the lever, which descends by the weight of the fixture.

NEW TEXTILE MACHINERY.

IMPROVED SPINNING WHEEL.

John J. Kendall, Greensborough, N. C.—The bench consists of a crooked plank set edgewise on the legs, and having a curved standard at the front end. This arrangement allows the wheel standard to be bolted on the sides so as to be held securely, and at the same time be shifted to different positions readily. The general arrangement is such that the whole standard can be shifted up or down to accommodate the height of the wheel, or the head can be turned around its bolt to swing the spindle toward the wheel in suitable position to one standing or sitting at work.