

ENGINEERING INVENTIONS.

A boiler flue cleaner has been patented by Mr. James M. Ferguson, of New Orleans, La. The nozzle has a central aperture in its disk portion, with an inner tubular extension, around which is an annular space opening through the disk portion, and connecting with a steam chamber of the nozzle, whereby the flue cleaner is operated to remove dirt and soot and prevent the formation of scale.

A slide valve has been patented by Mr. William Mitchell, of Altoona, Pa. It has a central exhaust chamber, and the steam inlet port is formed clear through the body of the valve, the tops or outer edges of the side bars of the valve at each side of the exhaust chamber standing back of the plane of the contact faces of the chamber walls which form the valve face, so as partly to equalize the pressure at both sides of the valve and reduce its length of travel.

A revolving cylinder engine has been patented by Mr. John J. Blair, of Cincinnati, O. Combined with a fixed piston and a revolving cylinder surrounding it, with a cylindrical chamber in the piston having a sliding valve, there is a rod connected with the revolving cylinder and the sliding valve, a sleeve surrounding one end of the rod, weighted levers on the sleeve, and a plate on the ends of the rod against which the ends of the weighted levers rest.

AGRICULTURAL INVENTIONS.

A cutting apparatus for reaping and mowing machines has been patented by Mr. Elias Hazelton, of Brantford, Ont., Canada. It consists of an endless chain of knives, made by chain links, with a projecting bracket from one side adapted for the attachment of a knife, so that when the chain is run back and forth along a guide rail the edges of the oppositely moving knives cut against each other.

A seed planter has been patented by Mr. Charles C. Kierulff, of Starke, Fla. It is a light wooden box, tapering to form an edge like a spade on its lower end, with a slanting partition to guide the seed, and a vertically-sliding gate, with other novel features, the device to be operated by hand to make the holes in the ground, and mechanically drop therein cotton, corn, and similar seed.

MISCELLANEOUS INVENTIONS.

A hat and bonnet fastener has been patented by Clara Abell, of Geddes, N. Y. Combined with a hat or bonnet is an elastic band having one end secured to the hat or bonnet, and having a hair pin attached to the opposite end.

A lumber drier has been patented by Mr. Orman A. Duke, of Clanton, Ala. It is so constructed that all the hot air and gases of the furnace are utilized directly in the drying of the lumber, while the flues are so arranged that there is no danger of the lumber being fired by sparks escaping from the furnace.

A toy cap exploder has been patented by Mr. Henry M. Dixon, of New York city. Its construction is such that, in exploding a paper cap, a representation of a bird perched upon the toy will fall off as if shot, and the sparks will be prevented from flying about.

A rosin holder for violins has been patented by Mr. James W. Angus, of Macon City, Mo. It consists of a plate having lugs for holding it on the violin, with spring jaws for holding the piece of rosin, whereby the rosin will be held in such a manner as to be at all times handy and convenient.

A ring holder for displaying rings to the best advantage has been patented by Mr. Max Eising, of New York city. It is a clamp made of sheet metal, with a slotted tongue, on one end of which a bow is formed, from which a bent tongue projects through the slotted tongue, and has a curved prong on its end.

A lock has been patented by Mr. William G. Mumma, of Warrensburg, Mo. It can be made right or left handed, and the case may be so arranged that it will serve for either a mortise or rim lock, all parts being of cast iron except the springs, making a cheap lock for barns and outhouses.

A braid board has been patented by Mr. Charles E. Barnes, of Paterson, N. J. It is made of two flexible parts connected at the ends, so that the board or card of which it is made, and the braid wound thereon, may be opened out and placed upon a reel for convenience in unwinding the braid from the board.

A wheel fender for carriages has been patented by Mr. James M. Todd, of Albert Lea, Minn. It is a movable or rotatable fender for the forward wheels of vehicles, held to the carriage axle by novel means, to prevent mud and dirt taken up by the wheels from being thrown on the carriage or its occupants.

A money envelope has been patented by Mr. Patrick Scanlan, of Ida Grove, Iowa. It is of novel construction, for the use of express companies carrying valuable packages, so that after it has been sealed it will be secure against abstraction of its contents without breaking the seals or cutting or tearing it open.

A foot rest for shoeing horses has been patented by Mr. Benjamin Lear, of Woodstock, Vt. It is for supporting and holding horses' hoofs while paring, shoeing, and clinching the nails and finishing, and can be adjusted very easily to any desired height, while the horse's leg is not twisted or strained, and the hoof cannot slip.

An adjustable seat has been patented by Mr. Manoah Miles, of Russell, Kansas. Two slotted upright end pieces have a swinging seat board hung between them, with a hinged wing and a cross rod or pivots, passed through notched curved slots in the uprights, making a seat which can be easily adjusted for a lounge, invalid chair, etc.

A gas pressure regulator has been patented by Mr. Robert F. Hatfield, of New York city. It is contained in a case holding water or other liquid, and is so made as to give notice, by the flaring of the lights, when the liquid needs replenishing, and shut off the gas before the liquid becomes so low as to break the seal of the regulator.

A split gear has been patented by Mr. James Lawlor, of Fall River, Mass. Combined with a flanged hub are two or more wheel sections bolted on the flange, the sections having side recesses for receiving the flange, the wheel being readily fastened on or removed from a shaft without requiring the removal of other wheels and pulleys.

A safety stirrup has been patented by Mr. Henry Coates, of Newark, N. J. It has a pivoted guard to prevent the foot from entering too far into the stirrup, the latter being made in one piece and the entire guard in one piece, avoiding the necessity of several castings, while there is no need of a spring to hold the guard against the stirrup.

A bobbin for sewing machines has been patented by Mr. William W. Ford, of Elmira, N. Y. It has one loose head, with a spring to engage therewith and lock it closed on the barrel, to catch and hold the end of the thread on the bobbin preparatory to filling, and for afterward releasing the thread from its lock, saving time in filling, avoiding breakage, etc.

A telegraph insulator has been patented by Mr. Benjamin N. Deblieux, of Bay St. Louis, Miss. It is composed of two longitudinal sections placed together to form a joint in the middle and retaining the wire between them, with devices for holding the sections together, to support the line wire without wrapping or cutting, and altogether obviating a tie wire.

A bit fastening for bridles has been patented by Mr. Daniel Waters, of Wilkesbarre, Pa. This invention consists of a bit ring on which is formed an annular recess, with a plate to which the bit wires are fastened, the plate being placed around the annular recess formed on the bit ring, to prevent rapid wear of the bit end.

An artist's sketch book has been patented by Mr. William T. Brundage, of Brooklyn, N. Y. Combined with an artist's box are socket pieces on one end and a palette fitting in the box having at one end hook clips fitting in the sockets, to hold the palette on the end of the box, so that the holding of the palette in the same hand with the box will be facilitated.

A comb attachment for shears has been patented by Mr. Daniel M. Young, of St. Louis, Mo. The scissors blade has screw-threaded apertures near its opposite ends, through which pass thumb screws, fastening the comb through similar apertures in the back of the latter, the comb thus attached serving as a guard and to regulate the length of cutting the hair.

A vehicle axle has been patented by Mr. James I. McCalop, of Clinton, N. C. It has a cross slot in which is placed the tongue of the journal made separate from the main body of the axle, with other novel features, providing for adjusting the wheels upon the axle when worn at the hub, and at the same time maintaining them at the same distance apart.

A combined overshoe and leggin has been patented by Messrs. Henry Rudolph and Henry Schwank, of Iteso, Col. This invention covers novel details of construction and combination of parts for a shoe and leggin suitable for wear in cold mountainous districts, for warmth as well as for protection of the feet and ankles in a rough country.

An electric regulator for dampers has been patented by Mr. Wilson E. Facer, of Cleveland, O. Combined with a flue and its dampers, magnets and armatures are made to open and close a damper, a battery and thermostat having contact points for directing an electric current to automatically maintain any desired temperature for which the device may be set.

A sash frame, holder, and casing for carriages, cars, and other uses has been patented by Mr. Albert Ayers, of Rahway, N. J. The casing has a curved groove with a "throw over" in the bottom of its throw over sash groove, and the sash frame has spring friction holders, the improvement being designed to keep sashes from rubbing or rattling, and to hold them firmly in position.

A ribbon and lace exhibitor and measurer has been patented by Messrs. William B. Gleason and Milo J. Harrington, of Albion, Pa. It consists of a drum or roller having an eccentric hub, while there is a reciprocating and swinging arm operated from the hub, and a counting wheel operated from the arm, whereby ribbons and lace may be measured automatically as they are drawn from the holder.

A photographic printing frame has been patented by Mr. William H. Lewis, of New York city. It has one or more swiveling locking springs applied to its backboard and ears or lip pieces applied to the frame, to engage positively with the locking ends of the springs, the ears or catches being of a novel construction, and the whole calculated to allow of the progress of the printing being watched without danger of shifting the paper.

A polishing paper has been patented by Mr. Robert J. White, of West New Brighton, N. Y. Un-sized paper is coated with a solution of rotten stone, pumice, or other polishing substance by making a solution of the latter in water of about the consistency of cream, the paper being then dried, when the polishing material is mechanically held in the interstices of and on the surface of the paper in a form convenient for use.

A portable hay and cotton press has been patented by Mr. Charles L. Barnard, of Byhalia, Miss. It is supported on wheels, so that it may be run into the field where it is to be used, and the front part of the press carries a windlass mechanism for operating the platen, the middle part being the press box proper, and the rear part being large enough to afford a space for placing hay or cotton, in which the follower reciprocates in forcing the material into the press box.

A telephone exchange forms the subject of a patent issued to Mr. William S. Ford, of Denver, Col. The invention consists of an apparatus for making connections on a switch board between a line strip and a connecting strip by means of a current acting upon the latter and another current operating electrical devices acting upon the line strip, these currents being sent to the switch board from an operator's table having upon it contact points in connection with the electrical devices at the switch board.

NEW BOOKS AND PUBLICATIONS.

CHEMICAL CONVERSION TABLES FOR USE IN THE ANALYSIS OF COMMERCIAL FERTILIZERS. By F. B. Dancy and H. B. Battle. Raleigh, N. C.: The Authors, 1885.

These tables are intended to dispense with the necessity of calculating the amount of any constituent in commercial fertilizers, from the weight of the precipitate obtained.

A GUIDE TO SANITARY HOUSE INSPECTION. By Wm. Paul Gerhard, C. E., New York: John Wiley & Sons, 1885.

It has been Mr. Gerhard's purpose, in writing this little book, to instruct the householder. The main features of sanitary house inspection are unfolded for his benefit, and are presented so briefly and so well that the scholar will find the perusal of his text-book a pleasure rather than a task. So many elements enter into the make-up of a truly healthy home that every housekeeper, no matter how thoughtful he may be, will find a guide in this matter absolutely essential if the inspection is to be at all thorough. Ordinarily, the examination of a house for either purchase or lease is limited entirely to visible qualities, and the points which really determine its healthfulness and desirability are lost sight of. Mr. Gerhard's book goes into a brief analysis of these features, and points out to the would-be tenant the chief matters which he should investigate in choosing either a city or country home. It is not intended to be at all exhaustive, but the hints which it contains, and the special points insisted upon, are calculated to give us healthier homes, and, as a happy corollary, a stronger people.

A SKETCH OF THE GEOLOGY OF CORNWALL. By Brenton Symons. London: The Mining Journal, 1884.

Undoubtedly the most striking feature of Cornwall is its ancient mining industries, which have been in almost continuous operation since the days of adventurous Phoenicians. A Cornishman has become almost synonymous with a miner, so wide is the reputation of the country for its mining. Although so old a country, and so well explored, its geology is in some respects still quite obscure. A wide diversity of opinion exists among those naturalists who have given it careful study. In describing the geological features, therefore, Mr. Symons has put forward his own views tentatively, and avoided so far as possible adding to the causes of controversy. He gives an excellent account of the different formations and a full description of the chief mining districts into which the country is divided, with the principal minerals which are made the object of search. Considerable attention is given to veins and their formation, since in few mining countries are the vein systems so complicated as in Cornwall, and probably in none have the theories offered in explanation been more absurd. The book is illustrated with a number of steel plates and a good geological map of the country.

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

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"How to Keep Boilers Clean." Send your address for free 88 page book. Jas. C. Hotchkiss, 86 John St., N. Y.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 46.

Timber Gaining Machine. All kinds Wood Working Machinery. C. B. Rogers & Co., Norwich, Conn.

Bradley's improved Cushioned Helve Hammer. New design. Sizes, 25 to 500 lb. Bradley & Co., Syracuse, N. Y.

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Crescent Steel Tube Scrapers are made on scientific principles. Crescent Mfg. Co., Cleveland, Ohio.

Curtis Pressure Regulator and Steam Trap. See p. 350.

The Improved Hydraulic Jacks, Punches, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Hoisting Engines. D. Frisbie & Co., Philadelphia, Pa.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest, cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each. Minerals sent for examination should be distinctly marked or labeled.

(1) J. A. W. writes: I want an instrument to give the per cent of sugar there is in the crude juice of the sorghum cane. A. The determinations of the specific gravity by the hydrometer are approximately correct; if these are unsatisfactory, you must use a polariscope. We should very much doubt the practicability of the other machine you mention.

(2) C. G. asks what to get to dissolve platinum. A. Platinum is soluble in aqua regia, a mixture of hydrochloric and nitric acids. It is not soluble in any single acid.

(3) F. B. P.—For how to remove marble stains, see SUPPLEMENT, No. 129. For black enamel to apply on bicycles with a brush: Dissolve in about 2 pounds of tar oil, ½ pound of asphaltum and a like quantity of pounded resin: mix hot in an iron kettle, care being taken to prevent any contact with the flame. When cold, the varnish is ready for use.

(4) F. M. Z. asks for a formula that will make tallow soap foam well. A. See "The Method of Making Soap," in SCIENTIFIC AMERICAN SUPPLEMENT, No. 494. Numerous receipts are there given for tallow soaps that "foam well."

(5) C. A. asks: 1. How do the so-called fire eaters perform their feats, or what chemicals do they use to keep the fire from burning them? A. Dilute sulphuric acid, strong alum, and hard soap are the principal substances used. 2. What article which, when mixed with coal oil, will keep it from exploding? A. The explosive properties of coal oil cannot be removed except by so transforming it that it can no longer be used for burning purposes.

(6) F. J. E. desires information as to the value and process of manufacture of dissolved bone, a fertilizer used on wheat fields. A. Messrs. H. J. Baker and Bro., of 215 Pearl Street, New York, are the manufacturers of the fertilizer known as dissolved bone. It is excellent for wheat lands. As manufactured by a New York firm, it contains about 17 per cent of phosphoric acid, and is made by treating the bone with sulphuric acid in the proportion of 0.64 per cent of concentrated acid to each pound of bone.

(7) A. D. S.—Kerosene can be mixed with lard oil in small quantities with good effect for lamps. The kerosene should be 150° test. The quantity used must be determined by a trial as to the smoke-producing results. The browning of a gun barrel will not prevent rusting unless the barrel is oiled or varnished. Inside of barrel should also be oiled. No useful alloys of silver and steel can be made that will not rust.

(8) Student asks how he may obtain transfers or offsets from printed matter upon white paper—plate, litho, and type. A. The following process is given for the purpose of transferring engravings to paper: Place the engraving a few seconds over the vapor of iodine. Dip a slip of white paper in a weak solution of starch, and when dry in a weak solution of oil of vitriol. When again dry, lay a slip upon the engraving, and place both for a few minutes under a press. The engraving will be reproduced in all its delicacy and finish. Lithographs and printed matter cannot so be transferred with equal success.

(9) J. H. I. asks what size return tubular boiler it will take to run two engines, cylinders 2x3, revolutions 250, boiler pressure 100 pounds; and what horse power; cylinders or crank at right angles; and what size boat they would drive at about six or seven miles per hour? A. Your engines are 3 horse power, and will require a boiler of 40 square feet heating surface. With a 15 inch screw in an 18 foot boat you accomplish six to seven miles per hour.

(10) A. P. asks: What is the difference between coal oil and insurance oil? Also, what is black oil? A. By coal oil, we infer you mean the ordinary burning fluid, or kerosene. This is one of the distillates of crude petroleum, which is probably the "black oil" referred to by you. The "insurance oil" is a high grade of kerosene, having a greater density than the common article and a higher flashing point; in other words, an oil with a lesser tendency to explode than the common article.

(11) E. O. M. asks how to cut a pinion of 21 teeth on planer centers that are only divided with the numbers 16, 20, 36. A. By using the 20 index, and slotting the index catch so as to retrograde the index by one-twentieth for each tooth cut. The side of the index catch may be divided so that the length of one index notch represents 20 divisions arranged like a vernier; add one more division for the 21st tooth. Then, by drawing back the catch one division for each index division, the 20 index will produce 21 teeth. Make a trial, marking to see if the arrangement is working correctly before cutting the pinion.

(12) A. M. D.—There is no practical way of destroying the odors of melted tallow or soap boiling except by fire. You may put a close hood over the kettles, and carry the odors in a large pipe of tin or sheet iron to the boiler furnace or to the furnace that heats the kettles. Close all air inlets to the fire except from over the kettles. The only machinery for this purpose in use in this city is a sealed kettle boiled by steam, with a vent pipe extending under a fire, either under the boiler or separated. Such apparatus is used for rendering offal and dead animals for their fat.

(13) W. O. asks: 1. What is the difference between cast iron and malleable cast iron? A. Cast iron is iron that is melted and cast in moulds and used without further treatment. Malleable cast iron is iron that has been cast in moulds, and afterward annealed in annealing ovens for a considerable time to render it malleable. 2. What is meant by volts and ohms, used as terms in electricity? A. A volt is the unit of electromotive force. An ordinary or Daniell or gravity battery produces a current of about one volt. A machine which produces a current equivalent to that of one of Daniell battery will produce about one volt. The ohm is the unit of resistance. It is about equal to 350 feet of No. 9 telegraph wire. 3. What is the power of a chrome battery (bichromate of potash battery) aside of the Grenet? If they will run a 6 candle power incandescent light, how many? A. The bichromate of potash battery produces a current of about 2 volts. To run a 6 candle power of incandescent light will require about 4 to 5 cells of bichromate of potash battery. 4. I noticed, early one foggy morning, in looking at an arc light (Brush), that it had a full purple-pink cast. In looking at the same light on a clear morning through a frosted window (that was from the cold), it made the colors of a rainbow on the window. Is this spectacle natural with the light? A. The purple color of the arc lamp observed by you was probably due to the temporary elongation of the arc, the light produced by the long arc always having a violet tinge. It is not uncommon to see the colors of the spectrum in frost crystals. 5. Have you a book for sale called "Catechism of the Locomotive"? If so, what is the price? A. Yes. The price is \$2.50.

(14) D. McP. writes: There is one man maintains that it does not take any more power on the pump to test a boiler that holds 5,000 gallons of water than one that only contains 50 gallons. I say, the more water, the more power on the pump (both boilers being perfectly tight). Will you be so kind as to decide the argument? A. It takes no more pressure on the pump

piston to test a large boiler, than it does to test a small one, but in testing the large boiler more water will be required to bring it up to the necessary pressure, and consequently more power will be consumed in testing the larger boiler.

(15) J. R.—You are making your magneto electrical machine too small to be of much service. It would not be much more expensive to make it much larger, and the labor of winding the armature would be less. Probably, with so small a machine, 6 sections, each wound with four layers of No. 32 wire, will secure the best results.

(16) C. A. B. writes: In making an electric machine, I used common green glass bottles for supports for the conductor, and the machine worked all right. I tried to better the appearance, and used flint glass rods for supports, and the machine would not work at all, under the same atmospheric conditions. I made two Leyden jars out of green glass and succeeded, and tried several out of good white glass and failed. A. The white glass contains a certain amount of lead, which renders it to some extent a conductor of electricity. The green glass which you used contained no lead and was therefore a better insulator.

(17) R. L. D. asks: 1. What size of wire and cores, and how many layers, will make the strongest electro magnet, using one cell of gravity battery in a circuit not to exceed 40 feet (besides spoils)? A. Make the cores of your magnets 2 inches long and 1/2 of an inch in diameter; wind them with ten or twelve layers of No. 24 wire. 2. Why would not vulcanite plates answer in the place of glass ones in a Wimshurst electric machine? A. Vulcanite will undoubtedly answer, but on account of the oxidation of its surface it is not so durable and reliable as glass. 3. Take a copper tube which weighs one ounce per foot and a copper wire of exactly the same weight per foot—which will have the greatest resistance to the electric current? A. There will be no difference. 4. Which would melt first under a heavy shock of lightning? A. There might be a very slight difference in favor of the tube, on account of its surface being extended, so as to radiate more heat than the wire, but we think the difference will be inappreciable.

(18) G. A. C. writes: 1. The SCIENTIFIC AMERICAN SUPPLEMENT contains a description of an electric machine which, say, for instance, were it four times as large, would be sufficient for an arc light. Now, how can I calculate what size machine and wire to put on it if it would operate two lamps, and also how to calculate the wire for using about 30 incandescent lights at different times? A. We believe there is no rule which will enable you to calculate all of the dimensions of a dynamo electric machine so as to enable you to construct a machine to develop a given current; it is largely a matter of experiment. Much depends upon the quality of the iron used in the field magnet and in the armature, in the quality of the copper used for the conductor, and in the relative position of the various parts. 2. Why the United States incandescent machine is self-regulating? A. We believe the automatic regulation is effected by compound winding. For information on the construction of dynamos, consult Thompson's "Dynamo Electric Machines," Gordon's "Electric Illumination," and Dredge's "Electric Illumination." As you fail to give your P. O. address, we are unable to send the SUPPLEMENT desired.

(19) U. O. C.—Follow the instructions for making an induction coil given in SUPPLEMENT, No. 160, omitting the condenser, and making the iron core removable, to vary the strength of the secondary current. A short piece of iron should be left in one end of the core to operate the interrupter; or, if desirable, you may make the interrupter entirely separate from the coil, winding it with coarse wire and placing it in the battery circuit.

(20) J. C. T. asks: What kind of an instrument is used for registering the degrees of heat in a forge or furnace, and where could I obtain a good description of a simple one? A. The instrument for measuring high temperatures is called a pyrometer. You will find different forms of pyrometers described in SUPPLEMENT, Nos. 198, 33, 228, 358, 172, and 256.

(21) L. O. W. asks: 1. What must be the diameter of a lens to reflect a picture 4 inches square to a size of 8 feet at a distance of 12 feet from the screen? A. A lens of 6 inches focus and 2 inches diameter. 2. Are there two lenses used in a polyopticon, or only one? A. Two lenses are used in a polyopticon, arranged on the same principle as the magic lantern, the light being placed on the side of the lens tube, so as to illuminate the picture.

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