ENGINEERING INVENTIONS.

A feed water regulator has been patented by Mr. Alexander J. Aderhold, of Birmingham, Ala. It is a balance valve regulator in which the entire valve, stem and all, is inclosed within the stem and water chamber within which it acts, and which requires no stuffing box for its stem, the construction being simple and such as to avoid friction of parts and liability to stick.

A car coupling has been patented by Mr. William H. Moore, of Elsie, Mich. The coupling hook is pivoted to swing vertically, its prong being at the front end of the drawhead, a spring pressing the hook downward, and a shaft journaled transversely in the drawhead extending to the sides of the car to operate a cam by which the action of the coupling hook can be controlled.

A rotary engine has been patented by Mr. George W. Bond, of Fort Wayne, Ind. Combined with a wheel having peripheral buckets with their front edges concaved, is a segmental steam box having rotary bearings upon the edges of the buckets, the exhaust pipe taking the exhaust from the lower end of the steam box, the engine being simple in construction, and intended to utilize the steam to the greatest advantage.

A hydraulic engine has been patented by Mr. Charles R. Whittier, of Yonkers, N. Y. It is of that class in which the piston is stationary and the cylinder is caused to reciprocate by the inflow and discharge of water, the construction being such that only small counterbalancing weights are required, and the cylinder may be made comparatively short, no equalizing pipe to equalize the pressure of water in the cylinder being required.

A smoke preventing furnace has been patented by Mr. William Latham, of South Cleveland, O. It is designed to prevent the formation of smoke by securing a perfect combustion, employing therefor an injector operated by steam to carry in a blast of air to a hollow trunk in the bridge wall, where it issues in jets and mingles with the products of combustion, the invention covering a novel combination and arrangement of parts.

MECHANICAL INVENTIONS.

A convertible drill press or slotting machine has been patented by Mr. Laurence H. Pierson, of San Francisco, Cal. It has a traveling head carrying a contrivance for converting the up and down motion into a rotary one, a frame on which the head is adjustable, a standard supporting the frame and directly attachable to the work to be slotted or drilled, with feeding devices and other novel details.

AGRICULTURAL INVENTIONS.

A mowing machine has been patented by Messrs. Walter B. Cox and John McDonough, of New York city. It has a horizontally revolving cutter arranged to act in connection with relatively stationary fingers, the cutter blades being at an angle of forty-five degrees to the inclined forward edges of tangential arms, the opposite edges of the blades being beveled, so when a blade is dulled it may be reversed and its sharp edge be used.

MISCELLANEOUS INVENTIONS.

A ruling machine has been patented by Mr. Thomas W. Wharmby, of Cleveland, O. This patent relates to the laying mechanism and drop boxes of paper ruling machines, the ruled sheets passing over concave rollers as they are discharged, to prevent the corners from turning down.

A flower pin has been patented by Mr. Howard L. Kranz, of Providence, R. I. Combined with a brooch having a slot is a clasp extending through the slot, and acted on by a spring, whereby a bouquet or bunch of loose flowers may be conveniently attached to any part of the dress.

A penholder has been patented by Mr. Samuel S. Rogers, of Assotin City, Washington Ter. It is adapted to attach the holder to the hand at one angle, and for holding and guiding it, in connection with a fountain and a mechanism for regulating the supply of ink to the pen.

A shaft tug has been patented by Mr. George M. Sicklesteel, of North Branch, Mich. It is a novel device, intended to prevent the shaft or thills from dropping, even if the brace or whiffletree breaks, and also to prevent the vehicle from running on the horse in case of the breaking of the shaft or tree.

A rotary shuttle forsewing machines has been patented by Mr. Carl Junker, of Carlsruhe, Germany. It is a uniformly vertically rotating shuttle of semicircular shape held by the driver, the axes of the spool and shuttle being coincident, the invention being an improvement on a former patented invention of the same inventor.

A roller skate has been patented by Mr. Burt E. Tilden, of Youngstown, O. This invention provides an improved brake for roller skates, a brake shoe of leather, rubber, or other suitable material, with its rubbing surface outwardly convex, being so held at the rear of the skate that it can be conveniently adjusted to any desired height.

A piano wagon has been patented by Mr. John D. Lindsley, of Hiawatha, Kansas. It is provided with windlasses and ropes, skids and various attachments for holding and managing the piano, to promote the safety of the instrument during loading or while in transit, and to lessen the labor of piano moving.

A grab hook has been patented by Mr. Sylvester Byrue, of Philadelphia, Pa. Grabbing levers are pivoted on a rod, with springs acting on the levers, and arms for locking levers in place, making an improved implement for automatically grabbing persons in the water and holding them, and one which can also be used by firemen.

A horseshoe has been patented by Mr. Daniel Cruice, of New York city. It is formed with a thickened portion at the toe and thin portion at the heel, in combination with heel and frog supports, the shoe being offset at its upper surface, and with thin pockets or depressions in the lower surface which will tend to prevent the horse slipping.

A truss pad has been patented by Mr. Alonzo D. Smith, of New Woodstock, N. Y. It is a centrally apertured pad combined with a smaller pad closely fitted to the aperture, the smaller pad being arranged opposite the heruial opening, while the larger pad supports the abdominal walls around, a spring connecting the smaller and larger pads.

A carpet stretcher has been patented by Mr. Osman C. Du Souchet, of Warsaw, Ill. A rack bar is passed through a box, and there is a clamp with its pivoted jaws on opposite sides of the end of the rack bar, with means for operating the rack bar, and other novel features, making a carpet stretcher which will be strong and durable and easy to operate.

A shirt has been patented by Mr. Jacob Lederer, of New York city. It has front and rear reenforcing pieces reaching along the edges of the yoke to the arm hole, thence around the arm hole and joined beneath it, in order to render the shirt strong where the most wear and strain comes, without making it heavy and uncomfortable.

A stamp canceler has been patented by Messrs. Edward A. Luzenberg and Edward Sachs, of San Antonio, Texas. It is made to force metal teeth through a rubber part of the canceler which has been inked, and thus perforate the stamp and ink it at the same time, but so as not to mutilate the letter or other contents of the envelope.

An artificial fly has been patented by Mr. Wakeman Holberton, of Hackensack, N. J. The wings are so attached to the body of the insect that they will collapse or close when casting the fly, thus reducing the air resistance, rendering the fly less liable to become detached, and causing the parts to expand and have a life-like motion in the water.

A turning machine has been patented by Mr. Abraham Stoner, of Stony Point, La. It is more particularly intended for forming vessels or tubs from blocks of the tupelo gum tree, the wood of which when dried is very white, light, and difficult to split by mechanical means, the machine operating automatically, and designed for making vessels of various sizes and shapes.

A street washer has been patented by Mr. Frederick Chapman, of Brooklyn, N. Y. It is a box set immediately over and in connection with the water main, closed by a removable cover, and with suitable easily operated valve fittings, whereby the apparatus will be wholly protected from becoming clogged by the entrance of dirt to the movable parts.

A mosquito canopy for bedsteads has been patented by Mr. Nicolai Petersen, of Charleston, S. C. The construction is such that the canopy is sustained by cords, the supporting arms and their joints being removed from the range of entanglement with the netting when folded, the invention being an improvement on a former patented invention of the same inventor.

A fire escape has been patented by Mr. David H. Dillman, of Fredericksburg, Pa. It consists of an endless ladder adapted for attachment to the cornice or side of a building, contiguous to a window or other place of exit, and to operate automatically when a person steps upon the ladder, so as to convey one to the ground in safety.

A thill coupling has been patented by Mr. Benjamin Ligget, of Tucson, Arizona Ter. The object of this invention is to do away with the ordinary form of bolt and nut, the bolt being held in place by the action of a spring, and the bolt being only slotted at its head, so the band will constantly press the inner face of the head against one jaw of the clips, and prevent rattling or accidental displacement.

An automatic cut-off for gas burners has been patented by Messrs. Thomas J. L. Smiley and Charles H. Stombs, of San Francisco, Cal. This invention includes a gravitating valve and thermostatic fingers or springs, and is applicable both to double and single tip burners, constituting a life-saving gas burner, which will do away with possibility of accident from the escape of gas from burners to which it is attached.

A seal press has been patented by Mr. Emory Q. Darr, of Shelbyville, Ind. It has a handle-carrying die, a spring hammer carrying a corresponding die, and an actuating mechanism of a dog engaging a trigger, the device being conveniently made in the form of a small pocket pistol, or in such form that it can be readily carried in the pocket, to be easily available by notaries and others.

An electrical cut-out has been patented by Mr. John M. Fairchild, of Portland, Ore. This device provides for the ready cutting out of an electrical current by any one from a building in case of fire, etc., but has a rotary adjustable switch bar and contacts, a separable key, and other details, whereby the locking or turning on can only be done by a specially authorized person.

A whiffletree coupling has been patented by Mr. Hiram C. Brown, of Winsted, Conn. It consists of a bolt with a curved arm formed on its head and a plate with an apertured lug for the reception of the end of the curved arm, with other details, whereby the whiffletree will be held from tilting forward when subjected to a draught, and so it will always work freely upon its bolt.

A road cart has been patented by Mr. Samuel Coles, of Valhalla, N. Y. A cross bar with convexed upper surface is secured upon the shafts, and the body is independently balanced upon the cross bar, with other features, whereby the cart will not be affected by the horse motion, and the horse can be driven with a loose girth, the girth having nothing to do with the motion of the cart.

A process of making explosive compounds has been patented by Mr. Milton F. Lindsley, of North Bergen, N. J. A mechanical mixture of wood fiber, charcoal, bituminous coal, and starch is powdered, made into grains, treated with acids, and then with carbonate of potash and saltpeter, making an explosive agent mainly of nitro-cellulose, but adapted for use in all kinds of firearms.

A device for regulating and enriching illuminating gas has been patented by Messrs. Lewis B. White, Daniel Jackson, and Martin Van Buren, of New York city. It has an annular funnel-shaped vessel for receiving hydrocarbon, in connection with a specially contrived governor, whereby the gas may be regulated automatically according to the pressure, or may be made to circulate among the heated hydrocarbons of the apartments of the gas-enriching attachment.

A spirit level for boring bits forms the subject of two patents which have been issued to Mr. Wm. E. Gwyer, of New York city. Its construction is such that when the bit is vertical an air bubble will be exactly in the center of the spirit bottle, and the least variation of the bit from a vertical position will cause the air bubble to move away from the center, so the operator can always know when he is boring a vertical hole; another device of suspension hooks, stem, and balancing weights enables the operator to bore holes exactly horizontal.

NEW BOOKS AND PUBLICATIONS.

GEOLOGICAL SURVEY OF NEW JERSEY. ANNUAL REPORT OF THE STATE GEOLOGIST FOR 1885. Trenton: State Printer.

Under the direction of Professor George H. Cook, the Geological Survey of New Jersey has become one of the most creditable of the many undertaken by the different State governments. While New Jersey offers but a limited field for geological study as compared with some of the other States, the topographical work of the survey is scarcely inferior to even the magnificent maps prepared by the national corps under either the Coast or Geological Surveys. Eleven years have now been spent upon the the topography of the State, and it is calculated that about two more years will be required to complete the work. But perhaps the best feature of the Survey is its practical value to the people of the State. This is, after all, the highest purpose of such a work. A particular effort has been made to include in these investigations the questions which have a direct bearing on industrial matters, and, as a result, to furnish information which will be personally useful to the citizens who have contributed toward its maintenance.

THE MICROSCOPICAL BULLETIN. James W. Queen & Co., Philadelphia.

This little bimonthly publication contains matter which is of interest to microscopists, and the price (25 cents a year) is so small that every one interested in microscopical subjects can afford to have it.

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.

How to Meet Customers.

Inventors and manufacturers should exhibit at the Minneapolis Industrial Exposition. Opens August 23, closes October 2. Finest building in the country; 7½ acres floor space. Power and space free. Building in center of city; 160,000 people; 400,000 within radius twenty miles. Entire Northwest tributary. Address, for full particulars, William M. Regan, Minneapolis, Minnesota.

$3,000 will buy the right to patent Morgan's U. S. patent Horse Hay Fork Returner in Canada. Big bonanza. Address John H. Morgan, Jr, Aurora, Ill.

Send to the *Railroad Gazette*, 73 Broadway, New York, for a catalogue of Locomotive, Track, and other railroad books.

Emery Wheels of unusually superior quality for wet grinding. The Tanite Co., Stroudsburg, Monroe Co., Pa.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Pumps for liquids, air, and gases. New catalogue now ready.

Wanted—To correspond with a practical door, sash, and blind maker; one who would be fully competent to take full charge of a factory and could give correct estimate of machinery needed, cost of manufacture, probable demand and margin. One that could take an interest would be preferred. Address Mr. H. H. Durkee, 48 Broad St., New York.

Wanted—Patented articles of merit to manufacture on royalty. Electric Mfg. Co., 311 River St., Troy, N. Y.

Curtis Pressure Regulator and Steam Trap. See p. 142.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. $100 "*Little Wonder.*" A perfect Electro Plating Machine. Sole manufacturers of the new Dip Lacquer Kristaline. Complete outfit for plating, etc. Hanson, Van Winkle & Co., Newark, N. J., and 92 and 94 Liberty St., New York.

Grimshaw.—Steam Engine Catechism.—A series of thoroughly Practical Questions and Answers arranged so as to give to a Young Engineer just the information required to fit him for properly running an engine. By Robert Grimshaw. 18mo, cloth, $1.00. For sale by Munn & Co., 361 Broadway, N. Y

Send for catalogue of Scientific Books for sale by Munn & Co., 361 Broadway, N. Y. Free on application.

The Knowles Steam Pump Works, 44 Washington St., Boston, and 93 Liberty St., New York, have just issued a new catalogue, in which are many new and improved forms of Pumping Machinery of the single and duplex, steam and power type. This catalogue will be mailed free of charge on application.

"*Imitation is the Sincerest Flattery.*"

If the above quotation is true, then Dr. R. V. Pierce ought to feel highly flattered on account of the many imitators of his popular remedy, the "Pleasant Purgative Pellets," for they have scores of imitators, but never an equal, for the cure of sick and bilious headache, constipation, impure blood, kidney pains, internal fever, and all bowel complaints. With a bottle of the sugared granules in the house, you can dispense with the family doctor and his often nauseous medicines.

Haswell's Engineer's Pocket-Book. By Charles H. Haswell, Civil, Marine, and Mechanical Engineer. Giving Tables, Rules, and Formulas pertaining to Mechanics, Mathematics, and Physics, Architecture, Masonry, Steam Vessels, Mills, Limes, Mortars, Cements, etc. 900 pages, leather, pocket-book form, $4.00. For sale by Munn & Co., 361 Broadway, New York.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, $40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN patent agency, 361 Broadway, New York.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Iron Planer, Lathe, Drill, and other machine tools of modern design. New Haven Mfg. Co., New Haven, Conn.

Catarrh, Catarrhal Deafness, and Hay Fever permanently cured by a new treatment, in from one to three simple applications, made at home. Send stamp for descriptive pamphlet to

Dixon & Son, 303 West King St.,
Toronto, Canada.

Nystrom's Mechanics.—A pocket book of mechanics and engineering, containing a memorandum of facts and connection of practice and theory, by J. W. Nystrom, C.E., 18th edition, revised and greatly enlarged, *plates*, 12mo, roan tuck. Price, $3.50. For sale by Munn & Co., 361 Broadway, New York city.

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

Hercules Lacing and Superior Leather Belting made by Page Belting Co., Concord, N. H. See adv. page 238.

Cutting-off Saw and Gaining Machine, and Wood Working Machinery. C. B. Rogers & Co., Norwich, Conn.

Supplement Catalogue.—Persons in pursuit of information of any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Billings' Patent Adjustable Four and Six Inch Pocket Wrenches. Billings & Spencer Co., Hartford, Coun.

New Portable & Stationary Centering Chucks for rapid centering. Price list free. Cushman Chuck Co., Hartford, Conn.

The Crescent Boiler Compound has no equal. Crescent Mfg. Co., Cleveland, O.

Wm. Frech, Sensitive Drill Presses, Turret and Speed Lathes combined, Power Punching Presses, 68 W. Monroe Street, Chicago.

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

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

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv., p. 158.

Astronomical Telescopes, from 6" to largest size. Observatory Domes, all sizes. Warner & Swasey, Cleveland, O.

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.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(1) W. T. S. asks: How many feet board measure, allowing ¼ of an inch for the kerf of the saw, in a stick of timber 48 feet long, 10 inches by 10 inches square? A. If you sell the stick of timber at board measure, no allowance should be made for resawing, and it should tally 400 feet board measure. If allowance is agreed to for resawing, the stick will cut seven 1 inch boards and one 1¼ inch board or plank, and should then tally for the whole stick 330 feet board measure.

(2) W. S. L.—It will take 6 horse power for machines you mention. We could not in Notes give large examples and details.

(3) G. J. S.—Sheet copper is somewhat variable in its tensile strength; hard rolled copper 36,000 pounds, soft copper 24,000 pounds, is the utmost strength per square inch. Thus a $\frac{1}{32}$ inch sheet will tear asunder at from 750 to 1,100 pounds per inch width. Allow ¼ of this as a safe load. To make sure, say 200 pounds, which divide by the pressure you wish to carry. Gas pipe will stand 500 to 1,000 pounds pressure.

(4) S. F. L.—Your 1 horse power engine will run a light 18 foot boat with a good form of 3 blade propeller, 16 inches in diameter. Would not recommend a paddle wheel for so small a boat. We advise you to inspect the numerous small steam yachts in your vicinity.

(5) W. F. R. asks: 1. What material is the best to paint a tin roof? A. Prince's metallic paint and boiled linseed oil. 2. How can I make human manure into a fertilizer? A. By mixing with dry soil. 3. What is the best plan to build a private icehouse—above or below ground? Give me the best plan for both. A. Below ground, all but roof. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 59, 55, 99. 4. I have two large skylight glasses that are cracked across. What can I use to stop them from leaking? A. Putty a strip over the cracks, or put in a new light. 5. What is the best soldering fluid to use on an old tin roof, that has been painted with tar? A. Tinner's acid, zinc dissolved in hydrochloric acid, and add a

little sal ammoniac. Scrape the tin where you intend soldering. If at all possible, use rosin, as it makes a better job than acid. 6. How can I make whitewash that will not rub off? A. Put a little white glue in the whitewash. 7. What is the name of the best brand of tin that is made? A. There are over three hundred brands in the tin trade; generally, the more letters, as X, XX, XXX, etc., the thicker the tin.

(6) In answer to P. D. P., March 27 (in regard to boiler feed pipe and heater pipes becoming partly filled with hard lime scale), E. A. T. writes: I would say, cut a piece of pipe one or one and a half inches larger diameter than your blow-off or feed, and slip it over it or them wherever they are exposed to great heat, and you will never have any more trouble with their filling up. I learned this from my SCIENTIFIC AMERICAN ten years ago or more, and it has been worth a great deal to me in that time.

(7) F. T. R.—Nitric acid dissolved in twenty to thirty parts of water is used to etch zinc with. An excellent liquid to be used in writing on zinc is ¼ ounce platinum chloride dissolved in 1 pint soft water. It is very expensive. This solution must be kept in glass, and the writing executed with a quill pen.

(8) A. H. asks: Of what shall we compose composition for making job printing press inking rollers? A. To 8 pounds transparent glue add enough water to cover it; let it stand with occasional stirring 7 or 8 hours. After 24 hours, all the water should be absorbed. Heat it in a water bath, as glue is always heated as soon as melted, and when both rise, remove from fire, and add 7 pounds molasses that has been made quite hot. Heat with frequent stirring for half an hour. The moulds should be clean and greased. Pour into moulds after it has cooled a little, and allow to stand 8 or 10 hours in winter, longer in summer. Some use far more molasses, three to four times above quantity, and less water. In this case, after soaking 1 to 1½ hours, the glue is left on a board over night, and then melted with addition of no more water, and three or four times its weight of molasses added. Two hours' cooking is recommended in this case.

(9) W. A. M. asks: If horseshoe magnets are made of fine quality of 18 gauge sheet steel, small in size, polished and nickel plated, would it be necessary to harden the steel to have them retain their magnetism? Would they be more powerful if hardened? A. They will retain more magnetism if hardened, and therefore will be more powerful.

(10) H. C. B. desires a recipe for making a peacock green stain which will penetrate into wood. A. A green stain is produced by a solution of verdigris in nitric acid; then, by dipping into a hot solution of pearl ash, the color may be changed into blue. By varying the strengths of the solutions used, the exact shade desired by you can be obtained.

(11) C. H. T. asks how to make bay rum from the bay oil. A. Take 10 fluid drachms oil of bay, 1 fluid drachm oil of pimento, 2 fluid ounces acetic ether, 3 gallons alcohol, and 2½ gallons water. Mix, and after two weeks' repose, filter.

(12) C. A. K. asks the process for tempering steel springs in the shape of rings 11 inches in circumference. A. Such a spring should be heated in a muffle or oven, lying upon a plate of iron. When at a cherry red heat, it should be dropped in the water edgewise so as to keep its shape. This may be done by dexterously and quickly turning the plate over, so that the spring may drop edgewise. A wire frame is sometimes used, and the spring heated in a charcoal fire and handled by a wire loop, from the frame.

(13) J. S. asks: What will precipitate copper and gold in a cyanide solution? A. They can be thrown down as sulphides by means of hydrogen sulphide, and then brought into solution again by boiling with potassium chlorate and hydrochloric acid. Then the gold can be separated out by adding iron sulphate.

(14) H. W. B. asks: How can I bronze a plaster cast? A. Go over the figure with isinglass size, until it holds wet, or without any part of its surface becoming dry; then with a brush go over the whole, taking care to remove while it is yet soft any of the size that may lodge on the delicate parts of the figure. When it is dry, take a little thin oil gold size, and with as much as just damps the brush go over the figure with it, allowing no more to remain than causes it to shine. Set it aside in a dry place free from smoke, and in forty-eight hours the figure is prepared to receive the bronze. After having touched over the whole figure with the bronze powder, let it stand another day, and then with a soft dry brush rub off all the loose powder, particularly from the points or from the more prominent parts of the figure.

(15) W. S. desires a recipe for making a cheap varnish for varnishing furniture. A. The following is a fine, lustrous polish for furniture: Half pint linseed oil, half pint old ale, the white of an egg, one ounce spirits of wine, one ounce spirits of salts. Shake well before using. A little to be applied to face of soft linen pad and lightly rubbed for a minute or two over the article to be restored, which should be first rubbed off with an old silk handkerchief. It will keep any length of time if well corked.

(16) R. W. W. desires a receipt to make a good water stain to imitate walnut, not to cost too much. A. Take of burnt umber 2 parts, rose pink 1 part, glue 1 part, water sufficient; heat all together and dissolve completely. Apply to the work first with a sponge, then go over it with a brush, and varnish over with shellac.

(17) G. W. H. asks the composition of a fuzee, or large scented match, which when ignited perfumes the air around? A. Dissolve ¾ ounce niter in ½ pint rose water; mix this with ½ pound willow charcoal, and dry it thoroughly in a warm place. When the nitrated charcoal is perfectly dry, pour upon it a mixture of ½ drachm each of the attar of thyme, caraway, rose lavender, cloves, and santal; then stir in 6 ounces benzoic acid. Mix thoroughly through a sieve, then beat in a mortar with sufficient mucilage to bind together. Make into pastils, and dry.

(18) H. M. B. desires a formula of plastic compounds that soften easily by gentle heat, and are easily worked into shape and position by gentle pressure, and will then set rapidly. A. The following mixture, used for making photo. gelatine plates, may be applicable: 70 parts of bitumen are melted at a moderate heat, and to the melted bitumen there are added the following, each being melted previously: 425 of spermaceti, 200 of stearine, and 170 of white wax. All these being incorporated, 70 parts of finely ground black lead are stirred in. This preparation is poured over plates at a temperature of about 40° Centigrade.

(19) J. S. W. asks as to the use of a spray of water for reducing the temperature of a room. A. It may be done by a spray fountain or a spray jet thrown against a muslin curtain. Any means to produce a large evaporating surface supplied with water (cold if possible) will accomplish your purpose.

(20) J. N. W. asks the formula for map engravers' wax. A. You can use a preparation made of 4 ounces of linseed oil, half ounce of gum benzoin, and half an ounce of white wax; boil to two-thirds.

(21) P. R.—To temper a machinist's tap take a piece of iron pipe or old boiler flue, and plug one end by welding. With equal parts of clean white sand and pulverized charcoal, pack your tap in the center of the pipe. Heat evenly in a large fire to a full cherry red; keep it in the fire until assured that the tap is heated through. Then draw the tap from the sand bath, and dip perpendicularly in clear water at a temperature of 70°. Do not let the water splash up on the tap, as it chills the teeth above the water, which prevents their hardening. It should require about 2 seconds to immerse if the thread is 6 inches long. A little experience is worth a page of advice. Quality of steel is of vital importance in hardening.

(22) W. M. R. asks: 1. When water gets low in a steam boiler, and water is pumped in and it explodes the boiler, what is the cause of the boiler exploding? A. Excessive generation of steam by the overheated iron forming the shell and tubes of the boiler. 2. Does water buhble up and down in a boiler like a tea kettle when there is pressure on the water by steam? A. Yes; when boilers are said to foam, their action much resembles a kettle that is boiling over. 3. How many degrees Fahrenheit does iron have to be over 212° Fah., when you put water on it, that it will not generate steam? A. The so-called spheroidal condition of water on a hot iron depends for its exhibition on temperature of both water and iron. Very cold water may become spheroidal on polished iron at 215°. The phenomena becomes more effective at higher temperatures, and is worthy of study as exhibited in working large masses of iron with a wet hammer.

(23) M. E. R.—There are a variety of well pumps to be had through the hardware trade. We know of nothing better than oak for a chain pump box. Your tile drain should not be tolerated near a well. If the drain is necessary in its present position, it should be made of cast iron pipe with lead joints well tamped. There is no simple test for contamination in wells. Poisonous water often looks bright and clear.

(24) W. C. W. asks how the polished ironwork on a printing press can be restored to its former brightness after it has become rusty and black from oil. A. Scrape off the hard oil and clean with kerosene; then polish with fine emery paper. Parts that are rough from rust must be rubbed down with medium emery paper or cloth, then polished with fine emery paper.

(25) G. H. B. asks in what form to put zinc in order to secure the greatest movement of a rod (on the thumb wheel of a lamp) by the expansion of said zinc, to regulate an incubator lamp? A. Make a combination lever of sheet zinc and sheet iron, say of strips 1 inch wide No. 16, fastening each end together by riveting or soldering, and holding them together throughout their length by riveting or winding with twine. Fasten one end to the side or top of the incubator. The variations in temperature will swing the other end to operate a lever upon the rod. Strip should be from 18 inches to 2 feet long.

(26) J. E. E. asks: By what process is "graying" done—with acids—upon polished iron or steel, which is frequently preferred to "bluing"? A. By dipping or sprinkling with dilute nitric acid after heating until blue. 2. How to make a smelter for brazing iron or steel that will fuse at a lower degree than brass. A. By mixing a little more zinc or tin with the brass. Silver is better for steel solder.

(27) G. A. C. asks: 1. What is a good paint for steam pipes when exposed to a very high temperature? A. Finely pulverized plumbago and linseed oil is as durable as any. 2. What is used to mix gilt, gold, copper, etc., for painting steam heating apparatus? A. For ordinary bronzing, the metallic bronze powder is rubbed upon the paint when nearly dry, then varnished with thin mastic.

(28) L. B. asks (1) a process to soften cast iron boxes, to chamber them to receive babbitt. A. Only by long annealing in a charcoal fire and covering over the fire with hot ashes, leaving the boxes to cool gradually. 2. A recipe for cementing cast iron. A. See SCIENTIFIC AMERICAN, February 6, 1886, Cement for Cast Iron.

(29) E. S. asks: 1. Will a leather belt transmit as much power on rubber-covered pulleys as a rubber one? If not, about what is the difference? A. No; 50 per cent in favor of rubber belt on rubber pulley, when both are new. 2. What oil is best for a small lathe and like machinery? I have trouble with the oil gumming. A. Best cold pressed lard oil, with one-tenth kerosene.

(30) F. W. S. writes: The precession of the equinoxes, 20 minutes 20 seconds per year, will amount to one day in about 70 years. In that length of time from 1885 will they fall upon the 20th of the month instead of the 21st, as at present? A. 20 minutes 23 seconds is the true precession in time. This year the equinox occurred on the 20th at about 4:35 P. M. of the astronomical day, which is also 4:35 P. M. of the civil day. The equinox will enter the 19th day, civil time, in 49 years.

(31) J. H. B. asks: What size engine and boiler will run a boat 22 feet long, 5 feet beam, and 3 feet deep, at speed of 9 miles or more an hour? A. 3×4 cylinder; vertical boiler, 26 inches diameter, 45 inches high; 20 inch wheel, 36 inches pitch.

(32) C. M. asks: 1. What can be used to render new patches in an old brick wall similar in appearance to the old? A. We know of no means of accomplishing such result. 2. I have seen something like a charcoal stick, which when burning at one end would cut glass. What is its composition and how is it made? A. Take sticks of soft wood (willow or poplar) of about the thickness of a finger, which must be thoroughly dry, immerse for about a week in a concentrated solution of lead acetate and then dry. See also "Simple Method of Cutting Glass," in SCIENTIFIC AMERICAN for October 31, 1885, page 275.

(33) G. J. E. asks: How can I dilute crude carbolic acid with water? I have not been able to mix it thoroughly. A. Carbolic acid is soluble in 15 parts of water, therefore you cannot expect to make a very satisfactory solution except by using large quantities of water. Heat will facilitate the solution somewhat, but alcohol, ether, and acetic acid are the best solvents.

(34) J. B. W.—Pure water will not affect flues or boiler. If you are using a surface condenser, you are probably pumping oil into the boiler, which may contain acid that will act on the boiler. There is no acid from the brass tubes.

(35) D. & S. — Broken anthracite measures 45 cubic feet to a gross ton, or 50 pounds to the cubic foot, but the specific gravity of anthracite varies from 1·350 to 1·640, or from 84 to 102 pounds per solid cubic foot, so that there will be a variation of from 2 to 3 pounds to the cubic foot as above stated for various kinds of coal.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined with the results stated.

O. H. J.—The specimen is a micaceous schist, partially decomposed, and of no value.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

May 4, 1886,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Air compressor, G. E. Dow 341,099
Axle box, car, A. O. Dayton 341,096
Axle lubricator. A. D. Howe 341,009
Axle lubricator, car, Morison & Bertrand 341,386
Baby walker, H. Pudder 341,167
Basket, grape. A. Schmoker 341,090
Bathtubs, shower attahhment for, W. Strong 341,183
Bed bottom, spring, A. Keenholts 341,246
Bedstead, metallic, Barth & Ramsey 341,311
Beer weighing apparatus. J. Ohlweiler 341,270
Beer weighing apparatus, Ohlweiler & Struppe 341,369
Bell cord coupling, G. W. Wood 341,301
Bench hook, A. J. Tyler 341,436
Bicycle, J. H. Healey 341,237
Bicycle, C. A. Prescott 341,389
Binding strip for papers, etc., I. W. Heysinger 341,005
Blind slat adjuster, P. A. Lewis 341,338
Blower, J. H. Blakely 341,218
Board. See Game board. Ironing board. Wagon spring board. Washboard.
Boat, H. Darcy 341,225
Boiler. See Steam boiler.
Boiler furnace, steam, H. B. Meech 341,034
Boiler furnace, steam, R. Wheelan 341,196
Boilers, fire arch for, R. Patrick 341,048
Bolt and nut, F. H. Howes 341,146
Bolt nutting machine, W. Shannon 341,174
Book or holder, account, A. D. Wilt 341,367
Boot or shoe, laced, G. W. Hayden 341,004
Boring machine, J. Davis 341,226
Box. See Axle box.
Brace. See Vehicle spring brace.
Bracket. See Shade roller bracket. Shingling bracket.
Brake. See Car brake. Vehicle brake.
Broom winding machines, chuck for, A. J. Sands. 341,278
Brush and broom head, A. G. Morey 341,040
Brushes, machine for making flat paint and whitewash, S. A. Verbryck 341,189
Buckle, belt. S. Bretzfield 341,127
Bung bush moulding machine, A. G. Anderson 341,369
Burner. See Gas burner. Lamp burner.
Bustle, Miner & McLaughlin 341,427
Bustle, D. Wertz 341,062
Button, J. H. Huff 341,418
Button atraching needle, E. Kempshall 341,148
Button fastener setting machine, F. H. Richards, 341,053, 341,054
Calipers or dividers, E. Weissenborn 341,060
Capsule machine. O. C. Mellick 341,267
Car brake, F. L. Volz 341,079
Car coupler, W. L. Wait 341,190
Car coupling, J. Arnold 341,396
Car coupling, W. H. Hughes 341,010
Car coupling, M. J. Lorraine 341,026, 341,027
Car coupling, W. H. Moore 341,153
Car coupling, A. W. Van Dorston 341,292
Car wheel, F. M. Davis 340,986
Carburetor, C. H. Wolford 341,299
Carpet stretcher, O. C. Du Souchet 341,411
Carriage body, G. N. Beman *et al* 341,215
Carriage tops, support for, T. Zanger 341,090
Carriages, shade holder clamp for children's, G. W. Pearce 341,272
Carriages, shifting seat for, C. C. Adelsperger 340,970
Cart, road, M. L. Bergman 341,216
Cart, road, C. H. Schlaack 341,281
Caster, T. Goetz 341,139
Casting car wheels. chill for, L. R. Faught 341,326
Casting metal tubes, core for, A. Humbert 341,419
Centrifugal reel, W. R. Dunlap 341,134
Cereals and mode of production, prepared. Solter & Robbins, Jr 341,355
Chair, H. H. Paine 341,047
Chenille fringe, making, L. D. Valetton 341,078
Chimneys, construction of, J. G. Vaughan 341,362
Cigar, E. Ehlin 341,323
Clamp. See Hose clamp.
Clasp. See Shoe clasp.
Clasp, F. E. Randall 341,276
Cleaner. See Lamp chimney cleaner.
Clipper, hair, W. G. Hildebrand 341,006
Clocks, electric synchronizing mechanism for, J. S. Ross 341,111
Closet. See Water closet.
Clothes line reel, J. M. Robbins 341,349
Clothes support, W. F. Krull 341,022
Clutch, friction, J. W. Blodgett 340,974
Coal digging apparatus, J. W. Hewitt 341,240
Cock and coupling for barrels, etc., combined, C. C. Linindoll 341,339
Coffin, J. Maxwell 341,260
Coke crusher, C. M. Keller 341,015
Collar folding machine, G. E. Norris 341,044
Combination wrench, A. W. Wright 341,117
Commode, A. L. Ellison 341,135
Compass attachment for pencils, E. Weissenborn. 341,061
Compass, mariner's, E. Bisson 341,125
Cooler. See Water cooler.
Coops, feed trough for poultry, J. O. Beazley 341,211
Copying press, Samuels & Breidenstein 341,056
Cord or band. Cadbury & Rollason 341,219
Cotton press, G. W. Soule 341,070
Coupling. See Car coupling. Bell cord coupling. Yoke coupling.
Crib, folding convertible, C. F. Heinss 341,238
Crusher. See Coke crusher.
Culinary vessel, steam, N. & J. Forshaw 340,995
Cultivating and seeding machine, R. A. Preston 341,108
Cultivator, W. D. Lloyd 341,106
Cultivator, A. B. Reeves 341,109
Currency, paper, I. M. Phelps 341,429
Cutlery, table, J. D. Frary 341,415
Cutter. See Feed cutter. Tube cutter.
Cutter head, H. C. Knowlton 341,149
Damper regulator and alarm, thermo-electric, A. M. Butz 341,092
Damper, stovepipe, C. W. Lasher 341,023
Derailing switch, J. A. Bonnell 341,400
Desk. cabinet, D. H. Fletcher 341,100
Die, R. Butterworth 340,976
Dish, covered, E. A. Parker 341,271
Disinfectant, A. P. Bouton 341,091
Disinfecting closets, urinals, etc., apparatus for, B. Haigh 341,234
Door, E. F. Keller 341,016
Door hanger, T. Hooker 341,007
Door mat, H. T. Windt 341,116
Draught equalizer, T. K. Frankenberry 340,996
Draught mechanism for vehicles, C. S. Chamberlain 341,094
Draught regulator, E. Wood 341,300
Dredging apparatus, A. W. Robinson 341,277
Drier. See Malt drier.
Drill. See Seed drill.
Drill press or slotting machine, convertible, L. H. Pierson 341,165
Dust pan, H. V. Shaw 341,175
Dyeing hat bodies. H. F. Dietz 341,409
Electric cut-out, A. Lungen 341,384
Electric light system, W. M. Schlesinger 341,059
Electric machine, steam dynamo, L. G. Woolley 341,308
Electric machine, unipolar dynamo, S. Z. de Ferranti 341,097
Electric wires, safety device for, E. B. Temple 341,289
Electrical connection, G. D. Burton 341,128
Electrical push button, S. Vanstone 341,293
Engine. See Hydraulic engine. Pumping engine. Rotary engine.
Ensilage cutting machine, J. M. Bailey *et al* 341,309
Envelope, F. R. White 341,297
Exercising machine, S. N. Goodman 341,231
Explosive compounds, making, M. F. Lindsley 341,155
Faucet, Dummer & Malmstrom 341,410
Faucet for oil cans, G. W. Banker 341,210
Feed cutter, J. Dick, Jr 341,320
Feed cutter, J. C. Wilson 341,199
Feed water regulator, A. J. Aderhold 341,203
Fence, Coats & Reiber 341,224
Fence. J. Dickason 340,988, 340,989
Fence. C. W. Meyer 341,037
Fence. I. B. Stillman 341,359
Fence. S. Yarlot 341,118
Fence, A. Yarlot 341,119
Fence, A. J. & G. B. M. Yarlot 341,120
Fences, machine for building, W. H. McGrew 341,031
Fibers from leaves and plants, machine for obtaining, G. Sanford 341,171
File for bills, music sheets, etc., A. Lake 341,252
File, paper, W. T. Wood 341,393
Filling and corking machine, T. Cockcroft 341,406
Filter, water. T. C. Smith 341,066
Fining composition, M. Herzog 341,239
Firearm, breech-loading, C. J. Ehbets 341,227
Fire escape. D. H. Dillmann 341,321
Fire extinguishing device, C. J. Hexamer 341,143
Fish hooks and other purposes, gauge or snood for. H. H. Mansfield 341,257
Flower pin, H. L. Kranz 341,105
Flower stand, adjustable, Walker & Smith 341,191
Fly, artificial. W. Holberton 341,331
Folding and creasing machine, Tickle & Leonardt 341,361
Foot rest. adjustable, S. G. Scarritt 341,351
Fracture apparatus, A. S. Alce 340,971
Fruit jar, J. McMillen 341,341
Fuel apparatus, vapor, A. I. Ambler 341,308
Fuel economizers. lid or cover for, E. Green 341,233
Furnace. See Boiler furnace. Ore roasting furnace. Smoke and gas consuming furnace. Smoke preventing furnace.
Furnace, J. A. Langdon 341,258
Furnace, H. B. Meech 341,033
Furnaces, desiccating the air supply for, C. Cochrane 341,316
Gauge pin. E. L. Megill 341,086
Game apparatus, L. Nance 341,344
Game board, B. R. Codwise 340,980
Garment supporter, J. H. Pilkington 341,348
Gas, apparatus for producing illuminating. E. J. Jerzmanowski 341,012
Gas burner, Hosford & Bass, Jr 341,381
Gas, device for regulating and enriching illuminating, L. B. White *et al* 341,197
Gas furnace for boilers, W. R. Jones 341,014
Gas furnaces, working regenerative, F. Siemens 341,295
Gas mains, pipe joint for, T. McSweeney 341,266
Gas, manufacturing. R. H. Smith 341,354
Gas pipe joints, sealing natural, J. Schinneller 341,280
Gas works, scrubber for, A. O. Granger 340,998
Gate. See Railway gate.
Gate, I. M. Fry 340,997
Generator. See Smoke generator. Steam generator.
Glass jars, former head for, G. W. Coddington 341,317
Glass melting oven, H. J. Jacobsen 341,108
Glassware and process of making the same, ornamental pressed, J. Haley 341,141