ENGINEERING INVENTIONS.

A balanced piston for steam cylinders has been patented by Mr. Thomas Joyce, of Scranton, Pa. It has grooves in the lower sides of its ends, with perforations leading into the grooves, whereby the weight of the piston will be carried by the steam, and undue wear of the lower side of the piston will be prevented.

A car coupling has been patented by Mr. Michael Spelman, of Shreveport, La. This invention covers improvements on an automatic coupling heretofore patented by the same inventor, other parts being now employed instead of shouldered springs on the sides of the drawhead, to allow it to tilt downward when required.

A car coupling has been patented by Mr. William B. Little, of New York city. Combined with a drawhead having a cavity is a weight block sliding in the recess, and having a coupling pin and swinging tongue, with other novel features, to make a coupling that is cheap, durable, and automatic, and that will act whether the cars be on a straight or curved track.

A car coupling has been patented by Mr. John A. Craig, of Lauderdale, Mo. Its construction is such that when the link is raised the contact of a meeting drawhead will jar it down into coupled position, and to uncouple it is necessary to raise a lever, from either the side or top of the car, so that the moving parts of the coupling may be operated without going between the cars.

A railway ties has been patented by Messrs. Adam N. Warner and Thomas J. Deakin, of Williamsport, Pa. Cross ties are formed of metallic bed plates having a central groove open at the top, within which fit the shanks of T-shaped blocks, their upper flanged portions resting upon the upper marginal portions of the grooves, and these blocks form the bearers or sleepers for the rails.

MISCELLANEOUS INVENTIONS.

A musical cigar show box has been patented by Mr. Anthony Ward, of Brooklyn, N. Y. Combined with a show box and its cover and a music box escapement is a rod and arm and spiral spring, so arranged that the music will be started and stopped by the opening and closing of the show box cover.

A watch pouch has been patented by Mr. Michael Dooley, of North Adams, Mass. It is made with an edge opening having opposite wires or stiffenings at its margin, and with notches or bends adapted to inclose the stem of the watch, or having a clasp, being neat and inexpensive and calculated to exclude dust.

A wire stretcher has been patented by Mr. Henry Clemons, of Downing, Mo. It consists mainly of an oblong iron frame having a shaft journaled therein, and with a handle, ratchet, and pawl for rotating it, the frame being in two parts, enabling it to be folded in compact form, and so it can be used in angles or corners.

A wagon jack has been patented by Mr. William T. Easterday, of Watsonville, Cal. Combined with a standard formed of sections having teeth is a follower with looped arms, and a lever with a pin connected to the follower by a link or links, with other novel features, to make an improved construction of such device.

A zither attachment for music boxes has been patented by Mr. Alfred Sueur, of New York city. It is placed below the comb and provided with an adjusting device, the attachment consisting of a roll of paper on a strip of wood or metal, so that the roll can be brought in contact with the under sides of the teeth of the comb.

A nut lock has been patented by Mr. John Bare, of Mount Union, Pa. It consists of a carrier plate or support having a pair of bolt holes, and a pair of locking plates pivoted at one end centrally between the holes, their other ends movable in arcs between the holes, the device being adapted to take up the wear of the bolt.

A clothes rack has been patented by Mr. William H. Ertell, of New York city. Combined with back and end boards are hinged bats which can be turned down into and supported in a horizontal position, and held in place when turned up in a vertical position, being designed for use in bedrooms, and so made as to be compactly folded when not in use.

A perpetual dial calendar has been patented by Mr. Charles R. Talcott, of Valparaiso, Ind. It is composed of two tablets, one a revolving dial and the other a fixed or stationary tablet, by the combination of which the day of the week or month, and the day in any given year, may be quickly and accurately ascertained.

A leather rolling machine has been patented by Mr. Charles S. Ames, of Bishop, Ill. It has disk shaped formers on a shaft in connection with concave grooved rollers, the rollers and disks having their shafts geared for joint action, the machine being designed to roll flat leather strips to a U-form, to be used around a center filling to make round lines, etc.

A stall for handling vicious horses has been patented by Mr. Charles F. Shedd, of Fairfield, Neb. In the side walls are vertically sliding doors, the front and rear of the stalls likewise having doors, and there are leading ropes and crank shaft, with other novel features, whereby men may be able to work each side of the horse in the stall to harness or saddle him without danger, and there will be no liability of the horse getting cut in the stall.

A device for assorting animals has also been patented by the same inventor. It consists principally in a special manner of arranging the gates and compartments of an inclosure, whereby the gates may be easily operated from the outside, and stock cut out and worked into one or the other of the compartments, as may be desired.

A hose coupling has been patented by Messrs. Albert F. Symes, of Salem, and Joseph Buchtel, of Portland, Oregon. It consists of a section with a radial opening, on which is fitted a ring with a lug projected through and movable circumferentially in the opening, with other novel features, whereby the coupling may be easily effected and released, and a simple construction is provided.

A means for preventing disturbances on telephone lines has been patented by Messrs. John E. Dann and John Lapp, of Honeoye Falls, N. Y. The device consists of a copper cylinder around the telephone wire, but insulated therefrom and connected with the earth, a rubber tube inclosing the copper cylinder to protect it from exposure to the atmosphere or moisture.

A churning device has been patented by Mr. John S. Dickey, of Payne, Texas. Its construction is such that a continuous rotary motion may be given to the churn body and a vertical reciprocating motion to the dasher, the churn body being adapted to serve as a drive or fly wheel, the device being simple and so made that no part is likely to get out of order or wear quickly.

A fastening for satchel frames, etc., has been patented by Mr. Louis B. Prahar, of Brooklyn, N. Y. With the case attached to one part of the frame and the catch to the other part, is a stationary stem and a sliding stem, with a spiral spring connecting them, and a sliding latch connected with the sliding stem and engaging with the catch.

A handle fastening for hand satchels has also been patented by the same inventor. Combined with the frame and its handle caps, having perforations in the opposite sides of their lower parts, are open rings with their ends bent inward and inserted in the perforations, hinging staples being attached to the frame and engaging with the open rings, the device being simply made, and yet such that the fastenings will not be liable to separate when subjected to a severe strain.

A stop watch has been patented by Mr. Eugene J. A. Dupuis, of New York city. There is a pinion on the arbor carrying the second hand, continually engaged with a wheel, loosely mounted on one of the arbors of the watch works, the loose wheel having a spring friction device, and there being other novel features, to simplify construction and provide a mechanism that can be operated rapidly and exactly.

A machine for caning chair bottoms has been patented by Mr. James S. Hodgson, of Brooklyn, N. Y. The invention consists principally of a suitable frame, combined with lifting devices for spreading the warp strands of cane, so that the weft strands may be easily and quickly passed between them, there being also a special form of shuttle for carrying the free end of the weft strand of the cane.

A drop light and chandelier has been patented by Mr. John Trigge, of Mount Vernon, N. Y. The extension of the chandelier has rack teeth engaging a cog wheel placed in a box on the chandelier, the cog wheel being connected with an automatic brake device, consisting of a disk having spring-pivoted cams and an adjustable brake band, to facilitate the adjustment of the drop light and prevent its sliding when once adjusted.

A combined clod crusher and land marker has been patented by Messrs. Abraham Bartmes, Clement V. Whallon, and David W. Frick, of Coldwater, O. The clod crusher is a rectangular frame with closed bottom, pivoted about its middle to accommodate itself to the undulations of the ground, and carrying a toothed roller to break up clods and lumps; the marker is a transverse bar, with shoes or runners, loosely attached to the crusher proper.

A windmill has been patented by Mr. John W. Currie, of Solomon City, Kansas. The mill head is a cross wrought iron coupling, its vertical arms lengthened by short tubes, the lower extension tube being stepped and journaled in the mill tower and the upper tube carrying the operating mechanism, with other novel features, designed to make a durable and inexpensive mill, which can be easily thrown into and out of gear.

A tobacco curing barn has been patented by Messrs. William B. Farrar and John J. Thornton, of Greensborough, N. C. It has an underground conduit, whose walls are composed of damp earth, for supplying damp, earthy air, the conduit having a cut-off, and the rack bars or tier poles have their strips set vertically, and there is a combined net and screen suspended horizontally beneath the racks of tobacco, with other novel features to facilitate the operation, avoid scorching the leaf, and secure uniform bright color and sweet taste.

A process of manufacturing ammonium bichromate and one for the manufacture of bichromate of potash form the subject of two patents issued to Mr. William Simon, of Baltimore, Md. The first consists in the conversion of sodium bichromate into ammonium sodium chromate and the decomposition of this salt into sodium chloride and ammonium bichromate by the addition of hydrochloric acid. In the other the potassium bichromate is manufactured by decomposing chromate of sodium by chloride of potassium and hydrochloric acid.

The stock and hay frame and stock loader recently patented by Mr. John T. Carrington, of Clay Center, Kansas, is designed to provide an improved frame or wagon box, for use for stock or hay and other like material, and the stock loader combined therewith can be used on railroad chutes.

NEW BOOKS AND PUBLICATIONS.

USEFUL THINGS TO KNOW ABOUT STEAM BOILERS. By G. B. N. Tower. New York: American Steam Boiler Insurance Co.

The primary object of this book is to teach owners and users of boilers how to use and care for them, in order to lessen the liability to accident, which it is the business of the company publishing the book to insure against. The author is an eminent engineer, holding the position of supervising inspector of the company, and the great variety of useful information which the book affords is put in terms so plain as to be easily within the comprehension of the simplest fireman or 'prentice boy.

A MANUAL OF CHEMISTRY.—ORGANIC. Watts' Revision of Fownes, revised by William A. Tilden. Philadelphia: P. Blakiston, Son & Co.

This is the latest revision of Fownes' Manual, in the department of organic chemistry. The main characteristics which distinguished the original work, orderly arrangement and clearness and conciseness of statement, are still maintained in the work as it is presented to-day, although the new matter successively added by Dr. Watts and Dr. Fisher often quite overshadows in importance that to be found in editions published before their work was added. Both volumes, physical and inorganic, and organic, are now published in uniform style, a large 12mo, of admirable typography.

PROTECTION OR FREE TRADE. By Henry George. New York: Henry George & Co.

The author of this book has risen rapidly to a considerable degree of public prominence, mainly on account of his radical ideas as to the unwisdom and injustice of the laws of all governments confirming and maintaining individual property in land. The present volume adds nothing to the intelligent discussion of protection *vs.* free trade, except as it seeks to connect the subject with these other ideas of the writer. In his view protection is a robber which may be driven off, but it is hardly worth while so long as there is a land owner left, for the latter is sure to take from labor all that it has but just sufficient to enable the continuance of work.

Received.

HOUSEHOLD REMEDIES. By Felix L. Oswald. New York: Fowler & Wells Company.

FOREORDAINED. A STORY OF HEREDITY. New York: Fowler & Wells Company.

CHEMICAL ARITHMETIC; WITH A SHORT SYSTEM OF ELEMENTARY QUALITATIVE ANALYSIS. By J. Milnor Coit. New York: D. C. Heath & Co.

Sugar Machinery for Plantations and Refineries forms the subject matter of a handsome illustrated catalogue just issued by Messrs. Robert Deeley & Co., of New York, engineers, founders, and machinists, who have for years made a specialty of this business. This firm has furnished the equipment for some of our largest sugar refineries, and has for an extended period enjoyed a large foreign trade in the furnishing of apparatus for plantations as well as for sugar factories.

Rock Drills, Air Compressors, and the machinery and appliances usually employed in connection therewith, are shown at considerable length in a recently published catalogue of the Rand Drill Company, of New York. The book has some instructive views showing the use of the drill in recent important engineering operations, with three pictures of the explosion last summer at Flood Rock, in the tunneling for which the Rand drill was used.

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.

Wanted—Propositions from builders of ice machines, to erect a 25 ton machine for W. H. Howe, Nashville, Tenn.

Little and Lively.

The times change and we change with them. Hardly larger than mustard seeds, but composed of highly concentrated vegetable extracts, Dr. Pierce's "Pleasant Purgative Pellets" have caused the old style, large drastic, cathartic pills to be abandoned by all sensible people. The little sugar-coated Pellets are a sure cure for constipation; for persons of sedentary habits they are invaluable. They are little and lively, pleasant and safe.

Veneer Machines, with latest improvements. Farrel Fdry. & Mach. Co., Ansonia, Conn. Send for circular.

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.

Wanted—A capitalist to take a half interest in or to manage a valuable patent on Automatic Freight Car Brake. A splendid chance to the right man. For further particulars, address R. B. V., Box 607, Iowa Falls, Iowa.

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.

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.

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.

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

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.

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.

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

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

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

Packer Ratchet Drills are drop forged from Norway iron and bar steel. Billings & Spencer Co., Hartford, Conn.

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

Hoisting Engines. D. Frisbie & Co., New York city.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N.Y. See illus. adv., p. 350.

Hercules Lacing and Superior Leather Belting made by Page Belting Co., Concord, N. H. See adv. page 382.

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.

Iron and Steel Wire, Wire Rope, Wire Rope Tramways. Trenton Iron Company, Trenton, N. J.

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

Cushman's Chucks can be found in stock in all large cities. Send for catalogue. Cushman Chuck Co., Hartford, 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.

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) C. E. De P. asks: 1. How many Edison lamps will the dynamo described in SUPPLEMENT, No. 161, run? A. One or two very small incandescent lamps. 2. If I were to make a machine double the size of the one described, should I use the same sizes of wire, and how much, and would it supply as many lamps as the first one? A. In a general way, use wire of double diameter and six to eight times the weight. It would require three or four times the power to run it, and would supply three or four times as many lamps. 3. How large a machine would it take to run six 16 candle lamps, and how much power would it require? In making a machine for this purpose, is there some better form of armature and commutator which I might use, and would I want to use the same sizes of wire as on the other machines? A. It would take about 1 horse power. It would not be advisable to construct so large a machine on the plan given. The drum armature (Siemens) is preferable. We cannot prescribe the exact size of wire, as it varies with the proportions of the machine.

(2) J. D. asks: How is dynamite that is used in the present time made? A. By mixing infusorial earth with nitro-glycerine. A recent proportion is 1 of earth to 3 of nitro-glycerine.

(3) G. J. asks how he can find any number of points in a circle without going around the circle with compass. A. Using the radius of a circle as chord, the circumference can be divided into six parts. This gives three parts, and by halving the sides, twelve; then by taking three sides of the dodecagon at once, it gives four parts; by doubling the dodecagon it gives 24 parts, etc. But for most of the ordinary cases, the tentative method is most available.

(4) L. E. C. asks (1) why secondary wire (of induction coil described in SUPPLEMENT, No. 160) is wound in two sections, with insulated wire drum between them. A. To more perfectly insulate from each other members of the coil possessing great difference of potential. 2. If No. 28 wire would not be better for medical purposes? A. We would not advise you to depart from proportions given. They have proved very good. Almost any proportion of parts will answer for a medical coil.

(5) A. T. G. asks: 1. Is 16 pounds of ice placed in a refrigerator every other day more serviceable than 8 pounds placed in it daily? A. The sixteen pounds would be the better if the refrigerator was not to be opened; normally, there would be no difference between them.

(6) E. J.—To paint on glass, take clear resin 1 ounce; melt in an iron vessel, let cool a little, but not harden; then add oil of turpentine sufficient to keep it in a liquid state. When cold, use it with colors ground in oil.—The following is a receipt

for a liquid which will remove ink from paper: Take of chloride of lime 1 pound, thoroughly pulverized, and 4 quarts soft water. The above must be thoroughly shaken when first put together. It is required to stand 24 hours, to dissolve the chloride of lime; then strain through a cotton cloth, after which add a teaspoonful of acetic acid (No. 8 commercial) to every ounce of the chloride of lime water. The eraser is used by reversing the pen holder in the hand, dipping the end of the pen holder in the fluid, and applying it, without rubbing, to the word, figure, or blot required to be erased. When the ink has disappeared, absorb the fluid with a blotter.—See SCIENTIFIC AMERICAN SUPPLEMENT, No. 438, for information about gelatine copying pad or hektograph.

(7) G. R. L. asks how to prepare a wash suitable for coloring an external wall a dark terra cotta tint. A. A wash for external work, said to be good, is formed in the following manner: Slake a shovelful of good lime in about a quart of warm blood, fresh from the slaughter house. Place in ordinary pail, and add a sufficient quantity of skim milk and beer grounds, boiled together, to fill the pail. Well stir the mixture, which will then be ready for use without the addition of water, and will stand the weather as well as oil paint. Another reported wash of excellence is formed by mixing one gallon of lime slaked with one gallon of wood ashes, ¼ pound of powdered alum or borax, and sufficient soft water to render the mixture of the consistency of cream. Color may be added to suit; 15 pounds of whiting and half a pound of fresh slaked lime, dissolved in skim milk, makes another hard and durable wash. To produce a terra cotta color, add 1 part of Indian red, 1 part of common lamp black, 3 parts of umber, and 1 to 2 parts of yellow ocher or chrome yellow, varying the quantity of the latter until the desired tint is obtained.

(8) C. S. M. asks how to make an ink that will not appear on paper unless the paper is heated. A. Dissolve 1 fluid ounce common oil of vitriol in a pint of soft water. Stir well, and allow it to cool. Write with a clean pen. When dry, it will be invisible; held to the fire, it turns black.

(9) H. K. writes: A railroad train starting at the equator on a railroad running north, which rail wears the faster—east or west; and on which side would a train be most likely to run off the track? A. The east rail would have the greatest pressure, from the earth's motion, and if the train was running fast enough, it would be thrown off on east side.

(10) Inquirer asks: 1. How can white country flannel shirts and drawers be washed without shrinking? Have hundreds to wash every two weeks, and the shrinkage soon renders the shirts too small for use. A. Care in rubbing and in the drying, after washing in tepid water, such as comes from experience, will make the shrinkage as little as possible, but the only sure way to insure such garments keeping their size is to dry them on forms, as do all the manufacturers of knit underwear. 2. What ingredients will form a wash to clean a brick church, now almost black, after 20 years' exposure in south side Pittsburg smoke? A. You will find the necessary information for cleaning brick walls in SCIENTIFIC AMERICAN SUPPLEMENT, No. 21. 3. Can you give a poor sufferer from asthmatic and bronchial ailments a remedy? A. There is a long and very explicit article on "Bronchial Asthma" in SCIENTIFIC AMERICAN SUPPLEMENT, No. 171, by John C. Thorowgood, in which he gives several of his remedies.

(11) Y. F. writes: If a steamer makes 8 miles per hour carrying 90 pounds of steam, with 150 pounds will she not increase her speed to 12 miles? A. If the boat has good lines for speed, possibly adding 60 per cent to the steam pressure, with capacity of supply for the 50 per cent increase in speed of engine, will give the boat a speed of 10 miles per hour. The slip of a wheel, paddle, or screw increases with the increase of speed. 2. What is the hottest steam used for driving an engine, and will steam, when too hot, become valueless? A. Steam has been used for power up to 500 and more pounds pressure. It becomes only valueless by burning packing and oil. The pressure may be carried up to a thousand pounds.

(12) A. S. asks: 1. Is there any means by which to give very small wooden globules a permanent black or brown color, simply putting them in the solution? A. Wash with a concentrated aqueous solution of extract of logwood several times; then with a solution of acetate of iron of 14° B., which is repeated until a deep black is produced. 2. Where and for what price a square foot could I buy thin sheet lead to protect a table against acids? A. It is worth about ten cents per pound, and can be procured from a dealer in chemical apparatus.

(13) J. T. asks why the free silver on a silver print is removed when immersed in a soda bath (hyposulphite of soda), while that which is exposed to light is not. A. Sensitized paper is covered with albumen impregnated with chloride, and sometimes other haloid salts of silver. By exposure to the light these silver salts are reduced. Exposed under a negative, parts of the surface are protected from the action of light. When such a print, after exposure under a negative, is immersed in hyposulphite of soda, the silver chloride, etc., that light has not reduced is dissolved; the rest, by reduction, has been rendered insoluble in hyposulphite, and remains on the paper, constituting the print, which is ready for toning. There is no free silver in the print. The "hypo." removes the silver salts that have been unacted on by light. 2. Why do objects appear right side up to the senses, when they appear inverted on the retina of the eye? A. Presumably by experience and habit. Perception of distance is due to parallax, or distance apart of the eyes. 3. For solders and soldering see SUPPLEMENT, No. 20.

(14) E. E. B. asks (1) how to make a solution for silver plating, to be applied with a sponge or flannel to brass or copper. A. You can make solution for silver plating on brass, etc., by dissolving 1 ounce of nitrate of silver in 1 quart of rain or distilled water, and a few crystals of hyposulphite of soda are added which form a brown precipitate soluble in a slight excess of hyposulphite. Articles may be silvered by dipping a sponge in the solution and rubbing it over the surface of the article to be coated. 2. How to divide a circle into 360 parts. A. This is generally accomplished by means of a protractor, costing from 25 cents upward, which can be procured from any dealer in mathematical or drawing instruments.

(15) A. F.—The red coloring matter in thermometers is simply an aniline red dissolved in alcohol.

(16) W. J. S. asks the composition and mode of manufacture of the so-called "grease paints" used by actors in making up. A. The principle is to make a dry powder somewhat darker than the desired tint, and then thoroughly mix this powder with some bland oil (as almond oil) or some fat (as perfumed benzoated lard) or some perfumed paraffinoid (as petrolatum), in the proportion necessary to produce the required color and consistency.

(17) H. G.—Water will filter through a brick partition. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 451, on Filtering Cisterns.

(18) W. E. D. asks the process of casting bass relief tiles in bronze. A. The mould is made in sand from a pattern in the same manner as for ordiuary brass work. For special description of bronze casting see SCIENTIFIC AMERICAN SUPPLEMENT, No. 101, and for finishing bronze work see SCIENTIFIC AMERICAN SUPPLEMENT, No. 39.

(19) C. G. A.—The high polish on steel is produced by using Vienna lime on the buff.

(20) J. W. C.—Riveted joints should always be calked. Tubes should be expanded to stop leaks. Iron borings sifted and made into a putty with Prince's metallic paint, white lead, and boiled linseed oil make a good joint for flanges. Joints that leak water will also leak steam, however small.

(21) W. M. asks how to stain brass black; can it be done with fire or acids? It should be a dull black if possible. A. The best means for producing a black surface on brass or silver is said to be platinum bichloride, made by dissolving platinum in nitrohydrochloric acid to saturation. Dip the polished work or rub the solution on with a small pad of cotton. After blacking, the object is washed and lacquered.

(22) W. H. B. asks how the roughness is made, like file cuts, as on the triggers of guns at the part where your thumb raises the trigger. A. The parts are indented with a dull cold chisel in the manner of file cutting. The sharp edges are smoothed off in finishing.

(23) E. A. Y. asks what is the cement used for putting on stained glass substitute. A. Nothing but the best fish glue is used.

(24) H. T. writes: I have a double convex crown object glass, 3 inches diameter, 36 inches focus. What kind, and what focus, should the eye glass be, so the object will be seen erect, and in a natural position? A. For your eye glass use a concave lens of 3 inches or 4 inches negative focus. The 3 inch will give you a magnifying power of 12; the 4 inch a power of 9, making objects erect.

(25) G. M. W. desires (1) a receipt for preventing rust on the spokes of a bicycle. A. Boiled linseed oil will keep polished metals from rusting if it is allowed to dry on them. 2. How to brighten the nickel plating? A. Use a little rouge powder on a chamois skin.

(26) F. G. V.—Flowers may be preserved for many months by dipping them carefully, as soon as gathered, in perfectly limpid gum water; after allowing them to drain for two or three minutes, arrange them in a vase. The gum forms a complete coating on the stems and petals, and preserves their shape and color long after they have become dry.

(27) G. I. asks: 1. What is ammonia used for in a nickel solution (double sulphate)? A. The double sulphate of nickel and ammonium has been found to be the best salt from which nickel can be deposited. The ammonia which it contains is held in chemical combination. 2. How to make oroide plating solution? A. This variety of gold is a mixture of several metals, and we know of no means by which it can be used as a solution to plate with. 3. How to make hydrous carbonate of copper? A. By adding sodium carbonate in excess to a solution of copper sulphate. The resulting precipitate on being warmed assumes a green tint. 4. Is there any difference between hydrated and hydrous carbonate of copper? A. No. 5. A receipt for black color on bronze or brass? See answer to query 21.

(28) G. R. S. desires a recipe for a safe effectual depilatory. A. The safest depilatory is a strong solution of sulphide of barium made into a paste with powdered starch. It should be applied immediately after it is mixed, and allowed to remain there five or ten minutes.

(29) J. B. H. asks the number of miles of railroad in the world. A. 294,071. 2. An easy way of preserving flowers so they will retain their colors. A. See answer to query 26.

(30) P. J. O'C.—Small cupolas have been made and used for iron castings, using 300 to 500 pounds to a melting. They require experience in their management, and are not economical. It is also more difficult to make the castings of even grade in small cupolas.

(31) B. P. asks how to make porcelain glass or opal glass. A. Hot cast porcelain as manufactured in Pittsburg consists of:

Silica	67·19 per cent.
Cryolite	23·84 "
Zinc oxide	8·97 "

It is a milk white glass obtained by melting the above constituents together.

(32) E. M. B. asks: What pressure per square inch will compressed air give, say of three atmospheres, and what is the ratio of increase? A. The atmospheric pressure is 14·7 pounds. Each additional atmosphere adds the original pressure, thus 3 atmospheres is 44·1 pounds per square inch.

(33) F. W. D. writes: I have frequently observed in the West Indies, a little after sunset, large bands of light emanating from the spot where the sun had just set, widening in approaching the zenth, thence narrowing to a focus on the eastern horizon, where they sometimes seemed to terminate in a mock sun. A. This phenomenon is common in more or less intensity in all parts of the world. It is caused by clouds of various forms at or below the horizon intercepting the sunlight. The bands of light shining through broken clouds illuminate the air in streamers, sometimes reaching entirely across the sky, forming what appears to be diverging and converging rays in opposite horizons. These rays are really straight, and owe their apparent curved forms to the laws of perspective.

(34) S. S. asks whether or not a boiler will evaporate more pounds of water per pound of fuel used when water is kept high than when kept low in boiler. A. A boiler with high water will lose more water by vesicular admixture with the steam, or, in other words, will work wet steam. Low water makes dry steam unless the boiler is overworked. Dry steam makes its best work per pound of coal, and is accomplished at the low water line. This should always be a safe line.

(35) M. P. P. asks a recipe for blackening the interior of telescope tubes—something thin, smooth, and dead black. A. Use lamp black or ivory black, rubbed up with 95 per cent alcohol. Then add a few drops of shellac varnish, just enough to make the lamp black adhere without gloss. Spread quickly with a flat camel's hair brush, or in small tubes with a feather or swab.

(36) C. S. L.—Oil paintings that are freshly painted can be removed from the canvas by the application of a solvent, such as equal parts of alcohol and spirits of turpentine. If the paint is old and hard, the canvas can only be utilized by covering the painting with several coats of white lead and Naples yellow.

(37) F. C. C. asks about replating a revolver and erasing an engraved name therefrom. A. You can cut out the engraved space with a small chisel like a shallow mortise, and fit a piece of iron or brass in the space and tin it in. Then finish off the surface and replate the whole. If you undertake to fill up the space with tin or solder, it will not take the plating evenly, and will show the spot after plating.

(38) G. F. K. writes: I am making a tool, part of which must be magnetic; what steel is best, also what temper is best, to magnetize same? A. Ordinary tool steel. Double shear steel is better. Harden at a cherry red, and draw to a straw color for magnets. Magnetize by contact with a strong magnet or electro magnet.

(39) A. M. asks: What kind of sizing and varnish is used to obtain the best gloss on maps, cards, etc.? A. The following is an excellent receipt for map varnish: Canada balsam and clear white resin, of each 6 ounces, oil of turpentine 1 quart; dissolve. Apply with a brush.

(40) R. L. desires a formula for making a prepared glue that will repair all kinds of articles and always be ready for use. A. Dissolve 8 ounces best glue with ½ pint of water, and add slowly 2½ ounces strong aqua fortis (nitric acid), 36° Baume, stirring all the while. Keep well corked.

(41) J. A. M. asks how to make corks airtight besides covering them with tin caps. A. Dip the top of the corked bottle in melted paraffine or melted beeswax before putting on the cap.

(42) E. C. F. asks (1) if peroxide of hydrogen is the best blondine. A. The best we know of. 2. Is it perfectly harmless? A. It is a poison. 3. Is it used diluted; if so, to what extent can it be diluted? A. It is diluted. A ten per cent solution might be used. 4. How many applications does it require, and will the color vary from dark to very light in proportion, and how lasting the shade? A. It should be applied in rather small quantity and in successive applications until the right color is reached. The shade is permanent, but, of course, as the hair grows the original color will show at the roots, and extend upward with the growth of the hair.

(43) W. C. H. asks: 1. How can I finish and polish buffalo horns nicely? Is it best to use varnish? A. With sand paper of increasing fineness, and finish with ground pumice stone and water. 2. Can hydrogen gas be safely and economically used in an oxy-calcium stereopticon fitted for burning house gas? A. It can be, but with increased liability to snap back. 3. What candle power does a No. 2 kerosene burner give when trimmed so as to give its best light and using 150° fire test oil? A. 6 to 8 candles. 4. In a bichromate plunge battery, does the E. M. F., or the quantity of current, decrease as the battery runs down? A. The E. M. F. runs down quite rapidly. 5. Will a sufficient number of such cells maintain an electric light for a reasonable length of time, say 2 to 3 hours, without change of solution or cleaning plates? A. They will.

(44) E. F. F. asks he how can make chloride of gold, such as photographers use, out of a gold dollar. A. Boil in hydrochloric acid, dropping in from time to time nitric acid. When completely dissolved, evaporate down until the acid gives off but little odor, and dilute after cooling.

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

B. F. P.—The mineral is selenite (hydrous sulphate of lime), when ground, it is used as a fertilizer. When burned and ground, it is the so-called plaster of Paris. It is worth in New York about $2.85 per long ton.—G. W.—No. 1 contains pyrite and magnetite. No value. No. 2. Pyrite; no value.—M. M. K.—The specimen is limestone and not likely to contain anything of value.—C. H. La P.—The mineral is pyrite (sulphide of iron). It has no value.—S. K B.—The specimens are not gold, but simply mica, and of no value.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

June 1, 1886,

AND EACH BEARING THAT DATE.

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

Acid, manufacture of sulphuric, U. Cummings.... 342,785
Addressing machine, J. A. Truesdell.... 343,091
Air compressor, hydraulic, E. M. Hugentobler.... 342,798
Animal assorting device, C. F. Shedd.... 342,977
Axle cutter, R. D. McGee.... 343,058
Axle lubricator, car, F. G. Brownell.... 343,004
Baby jumper, swing, and reclining chair, combined, Abbey & French.... 342,855
Baby walker, A. Halstenbach.... 343,026
Bag or portmanteau, O. Seefels.... 343,078
Bearing, ball, W. H. Wright.... 342,891
Beer, apparatus for the preservation of, Hazlet & Bennett.... 343,125
Bell ringer, E. G. Nutting.... 343,059
Belting, coupling for round, D. C. Smith.... 342,850
Berth, automatic ship's, J. B. Secor.... 343,072
Bicycle, D. H. Rice.... 342,878
Bicycle saddle, J. Payne.... 342,925
Binder, temporary, W. D. Ready.... 343,066
Blacking box, C. H. Jackson.... 343,083
Blast heating oven, air, E. Peckham.... 343,061
Blotter, revolving, J. A. Cook.... 342,781
Board. See Ironing board.
Boiler furnace, E. J. C. Kelly.... 343,128
Book holder, L. M. Snyder.... 343,085
Boot, felt, D. F. Messer.... 343,135
Boot or shoe, F. Moor.... 342,806
Boot or shoe heel, J. H. Peters.... 343,062
Boot or shoe sole, L. E. Moore.... 343,051
Boot, quarter, J. H. Fenton.... 342,790
Boots, shoes, and stockings, process of and apparatus for making felt, O. E. Wallace.... 342,943
Bottle, medicine, B. G. Olson.... 342,837
Bottle wrapper, C. G. Biedinger.... 342,818
Bows or neckties, combined spring fastener and shield for, W. Dewart.... 342,862
Box. See Blacking box. Fare box. Musical cigar show box. Stuffing box.
Box nailing machine, F. W. Edwards.... 342,788
Box strap, R. G. Valentine.... 342,942
Bracket. See Lamp bracket.
Brake. See Railway brake. Vehicle brake.
Brick kiln, O. O. Phillips.... 342,926
Brooder, W. F. Price.... 343,064
Buckle, M. Vandercook.... 342,984
Buckle, M. E. Zeller.... 343,097
Buckle for saddles, S. T. Butler.... 343,005
Buckle, trace, J. Fischer.... 343,118
Burnishing machine, H. Crary.... 342,783
Butter, apparatus for testing, L. Fagersten.... 342,865
Calculator, G. F. Hawley.... 342,796
Calendar, perpetual dial, C. R. Talcott.... 342,981
Camera plate holder, L. Koss.... 342,914
Can. See Powder can.
Car coupling, J. A. Craig.... 343,109
Car coupling, T. Diemer.... 342,825
Car coupling, S. Haltom.... 342,793
Car coupling, L. A. Houghtaling.... 342,797
Car coupling, W. B. Little.... 342,967
Car coupling, M. Spelman.... 343,086
Car coupling links, machine for bending and welding, J. D. Bowman.... 342,858
Car starter, Hansen & Fischer.... 342,959
Car starter, S. Rockafellow.... 342,846
Car starter and brake, J. W. & G. R. Strickle.... 343,144
Carbureting air or gas, apparatus for, C. B. Dudley.... 342,863
Card feeding mechanism, etc., endless metallic apron for, W. C. Bramwell.... 342,948
Card receiver, outside, A. Moore.... 343,050
Carding horse hair, machine for, L. Zaller.... 342,945
Carrier. See Cash and parcel carrier.
Cart, hand, J. R. Fitzhugh.... 342,905
Case. See Map case.
Cash and parcel carrier, D. W. Miller.... 342,921
Caster, furniture, S. H. Raymond.... 342,930
Caster holder for furniture, C. E. Ongley.... 342,970
Cement, manufacture of, U. Cummings.... 342,784
Chair. See Children's chair.
Chair and table, convertible, C. E. Schleier.... 342,847
Chair bottoms, manchine for caning, J. S. Hodgson.... 342,963
Chairs, adjustable head rest for, J. Hogan.... 342,880
Chickens of the gapes, device for curing, R. B. Walker.... 343,145
Child's chair, F. A. Parker.... 342,841
Chopper. See Cotton chopper.
Clevis, L. Doell.... 343,016
Churn dasher, J. R. Palmer.... 342,839
Churning device, J. S. Dickey.... 343,015
Cigar lighter, J. M. King.... 342,918
Clamp. See Dam clamp.
Clasp, C. C. Shelby.... 342,987
Clevis, G. F. Walter.... 342,887
Clod crusher and land marker, combined, A. Bartmes *et al.*.... 342,995
Clod crusher and pulverizer, C. C. Marchand.... 343,046
Clothes rack, W. H. Ertell.... 342,954
Coal breaker, G. R. Root.... 342,811
Cock, automatic cylinder, Maines & Nugent.... 342,801
Coffee roaster, E. E. Mueller.... 342,834
Collar pad attaching device, horse, E. P. Robbins. 342,931
Combination lock, H. C. Griffin.... 342,958
Compression roll for slashers, etc, expanding, G. P. Whitman.... 342,889
Condensing and cooling apparatus, H. Hocking.... 342,871
Cooling and refrigerating apparatus, E. Kauffeld.. 343,035
Core material, W. N. Gartside.... 342,906
Corn husker, D. T. Phillips.... 342,807
Cotton chopper, W. H. Richardson.... 343,140
Coupling. See Car coupling. Hose coupling.
Crusher. See Clod crusher. Rock crusher.
Cultivator and corn planter, combined, J. R. Gilliland.... 342,791
Cutter. See Axle cutter. Feed cutter. Finger nail cutter. Knee cutter. Rope cutter. Thrashing machine band cutter.
Desk, T. Little.... 343,041
Desk and bureau or other piece of furniture, combined writing, H. Stolte.... 342,883
Digger. See Post hole digger. Potato digger.
Door, combined storm and screen, A. Lloyd.... 342,832
Drawing roll and saddle therefor, top, E. J. Carroll *et al.*.... 342,779
Drop light and chandelier, J. Trigge.... 342,982
Electric cable, multiple, J. J. C. & M. Smith.... 343,082
Electric cables, making, J. J. C. & M. Smith.... 343,081