

ENGINEERING INVENTIONS.

A car door fastener has been patented by Mr. Eugene F. Hardin, of Lincoln, Neb. It consists essentially of a catch, in connection with which is arranged a sealing attachment and a retaining block, the device being one which can be quickly applied, is cheap and durable, and will prevent any accidental opening of the door.

A car coupling has been patented by Mr. John Harding, Jr., of Wellington, Kansas. The invention consists in the peculiar construction and arrangement of a hinge plate on top of the drawbar, and a weighted drop hinged to or near the front end of the plate and bearing a coupling pin, all combined with the drawbar, the device making an automatic coupling.

A steam trap has been patented by Mr. Samuel Bonser, of Dover, N. H. The head plate has a central aperture, above which a filter is held, and there is a divided cylinder having an annular chamber and an outlet, with tubular spindle, spindle cap, cylindrical tube and connecting tube, with other novel features, making a simple device for discharging the water of condensation from steam heating or other steam apparatus.

A device for preventing the explosion of boilers has been patented by Mr. Bendix Meyer, of Gleiwitz, Prussia, Germany. It consists of a plate or cover held on a packing surrounding the outlet steam pipe, a weighted rod or stem holding the cover or plate on the packing, while a stop prevents the plate or cover seating itself on the outlet pipe after the packing is removed or thrown out by the pressure of steam from the boiler.

A gas furnace has been patented by Mr. William W. Waplington, of West Middlesex, Pa. The invention is an improvement on a former patented invention of the same inventor, and provides for using practically all the internal surfaces of the flues for regenerative purposes, with a simple and inexpensive form of gas and air valves, being adapted for both natural and artificial gas, and providing special means for utilizing the heat usually wasted in the ash pit of gas producers.

AGRICULTURAL INVENTION.

A cultivator attachment has been patented by Messrs. Edward Harris and John N. Tiger, of Waverly, Neb. Combined with graduated and adjustable bars and a suspended shoe are standards carrying adjustable curved knives, making a simple attachment for either a riding or walking cultivator, whereby listed corn, corn in rows, or any vegetable planted in rows, may be expeditiously and effectively worked.

MISCELLANEOUS INVENTIONS.

A combined pencil holder and cigar cutter has been patented by Mr. Paul E. Gonon, of New York City. It consists of a tube with an aperture for the insertion of a pointed cigar end, a cutting tube to slide over the aperture, with spring held therein, and a pencil holder held in the other end of the tube.

A toy blow gun has been patented by Mr. Edward L. Evatt, of La Grangeville, N. Y. The invention covers an improved construction of a gun to be used as a child's toy, or as a blow gun for shooting a dart at a target, by applying the mouth to the rear end of the tube.

An animal power, or tread machine, has been patented by Mr. Eli B. Studebaker, of Fredonia, Kansas. The invention covers novel features of construction and the combination of parts in a machine which may be readily adjusted to accommodate the strength of the animals working it and the desired power and speed of the machinery to be driven.

A process of refining gold and silver has been patented by Messrs. Darley C. Johnson and John P. Ryan, of Brooklyn, N. Y. It consists in placing the alloy of base and precious metals in a cupel, melting the alloy, and covering the surface with pulverized asbestos, with various other features, whereby the cost as well as the waste of refining will be decreased.

An improved bin has been patented by Mr. Holger C. E. Petersen, of New York City. It is designed to be of ornamental appearance, with a compact and substantially dust proof frame, from which the bin may be readily removed and cleaned, and wherein the weight is so distributed that the bin is easily turned upon its axis.

A combined saw jointer, saw set, and gauge has been patented by Mr. John H. Sodee, of Seattle, Washington Ter. It embraces a frame with a guide arm and stationary jaw, in combination with a sliding jaw and cam for operating it, the invention covering various novel parts and details and combinations of the same.

A door attachment has been patented by Mr. William W. Allen, of East Pepperell, Mass. Combined with a latch and an extension thereon is a branch chain connected with the outer end of the extension, a main chain fastened at both ends and held in an angular position by the branch chain, with other novel features, whereby a door can be held locked in open position.

A coat adjuster has been patented by Mr. David H. Purves, of Waddington, N. Y. It is to enable aged, infirm, or sick people to easily put on overcoats or other garments without help, and consists of a garment holder with a vertically movable clamp and lock, with a relatively stationary trip or releasing device to release the lock when the clamp and lock are moved upwardly.

A riding saddle has been patented by Mr. Peter J. Peffey, of Boise City, Idaho Ter. Combined with the tree is a front strap having bifurcated ends, the cantle jockey having reduced ends and lips, with other novel features, whereby one or two girths may be used to accurately fit the saddle, the saddle being adapted to any shape horse and the change being quickly made.

A carpet-stretching machine has been patented by Mr. Leonard Hinkle, of Kenton, Ohio. It has a toothed drawbar, with a head having an opening fitted over the bar, the lower part of the opening having a pawl-like edge to engage the lower teeth of the drawbar, with other novel features, making a stretcher which can be operated by one standing erect, and which will not injure the carpet.

A device for handling cans and bottles has been patented by Mr. David D. Brown, of Brooklyn, N. Y. It consists of a frame of novel construction with spring-held arms, lips for grasping necks of bottles, etc., and other novel features, whereby cans, bottles, and similar goods may be readily and safely removed from shelves above the operator's head and as safely replaced.

A cotton gin rib attachment has been patented by Mr. John E. Kelly, of Marshallville, Ga. It is an efficient device for repairing the worn parts of gin ribs, thus saving the expense of new ones, and has a brittle holder underneath the rib, that the saws pass through, which not only extinguishes any fire that may be generated, but cards the cotton and improves the staple.

A nut lock has been patented by Mr. William Adair, of Leesville, Ohio. By this invention the plate itself is made the locking device, the nuts and the openings in the plate being so made that the latter locks the nuts when they are turned slightly backward on their bolts, the nuts being cut away at their inner corners, and the plates having slots of corresponding form and size.

A waterproofing compound has been patented by Mr. Ferdinand Kreutzer, of New York City. It is for use on leather and fabrics, and intended to render them soft and durable without injury to the material or acting upon the dyes, and consists of raw linseed oil, zinc vitriol, and fat soap, in specified proportions, and combined and cleared after a special described manner.

A bale tie has been patented by Mr. Frederick T. Warburton, of Newport News, Va. Combined with a buckle having a transverse slot with parallel upper and lower sides are band sections having enlarged ends, the slot being wider than the combined thickness of the body of the band and one of its thick ends, but narrower than the combined thickness of both the ends.

An apparatus for wiping metal-coated wire has been patented by Mr. Charles E. Matteson, of Easton, Pa. A circular pipe is held a short distance above a casing through which the wire passes, in combination with inwardly and downwardly projecting pipes, with other novel features, for wiping wire to remove the surplus metal and give it a smooth surface after it leaves the bath.

A thill coupling has been patented by Mr. John W. Yous, of Mound City, Mo. The thill or pole iron has side lugs or trunnions arranged to enter a horizontal recess extending forward from the main vertical recess of the axle clip, the parts being held together by a spring-carrying wedge, thus dispensing with the use of bolts and the ordinary form of rubber anti-rattler.

A neck yoke has been patented by Mr. Fred F. Wheeler, of Ocheyedan, Iowa. It is so made that, should the tugs become detached, the yoke will not be slid off the pole by the forward motion of the horses, while it will revolve free horizontally or laterally upon the pole, yet action in the direction of the longitudinal axis of the pole will be limited by the forward or rearward throw of the yoke.

A process of producing designs upon celluloid has been patented by Mr. Albert Le Roy, of Paris, France. It consists in first printing the design upon any suitable material, then damping and applying upon a celluloid sheet and subjecting both to pressure between hollow steam-heated plates, thus fixing the design permanently upon the celluloid by the simultaneous influence of heat, pressure, and steam.

An automatic fan has been patented by Mr. Charles E. Pierce, of New York City. An oscillating shaft bears a pinion which engages with the segmental gear of an escapement, the motor being either a spring or a weight, and the shaft operating a vibrating arm to which a fan is attached, making a convenient device for driving away flies, cooling rooms, etc.

A clamp has been patented by Mr. Frederick F. Houston, of Chicago, Ill. The clamp head has a thrust block and follower with opposing inclined faces, opposite wedge blocks being fitted between them, with means for drawing one of the wedge blocks toward the other, with a cam lever fitted to the thrust block adapted to bind the latter to a timber, the device being specially adapted for holding work while gluing or otherwise joining the parts.

A cow milker has been patented by Mr. Philip M. Hobbs, of Wymore, Neb. It consists of two hand levers somewhat in the form of a pair of scissors, one of the levers being adapted to be rocked in a vertical plane, one having a teat-receiving recess and the other a projection to fit therein, two of the milkers being used at the same time, one grasped by each hand, and two teats being operated upon by each device.

A saw gunner has been patented by Mr. Lewis J. Grant, of Lamont, Mich. It comprises a die frame with a handle and spring carrying a punch block, combined with a handle having a head with bearings on the under side of the die frame, and an arm secured to the die block and having its lower end connected to a pin secured eccentrically in the head, with other novel features, the device being very handy, and always ready for use.

A grain car door has been patented by Mr. William T. Spillane, of Casselton, Dakota Ter. The door-supporting frame is mounted upon a horizontal way, and a vertically adjustable door is carried by the frame, the parts being so arranged that the door may be raised to rest within the frame, and the frame

and door moved to one side to clear the doorway, the device being a substitute for the ordinary detachable grain doors.

A glass beveling machine has been patented by Mr. Thomas F. Gilroy, of New York City. Combined with a grinding wheel having a swinging frame is a revolving shaft mounted therein carrying the glass disk to be beveled, and a screw-threaded spindle engaging with a gear wheel nut actuated by a hand wheel for raising or lowering the frame, with other novel features, making a simple, durable, and effective machine.

A sash fastener has been patented by Mr. William R. Abrams, of Ellensburg, Washington Ter. The invention covers a novel construction and combination of parts, in connection with a dog journaled in the casing, whereby the edge of the window will be engaged at any point, and effectually prevent the upper sash from being drawn down or the lower sash from being raised, and not interfere with the operation of either sash in an opposite position.

An automatic chuck for all kinds of brass work, such as steam, water, clock, and watch works, has been patented by Mr. Patrick J. Cahill, of Leeds, Mass. It is to take the place of spring chucks, and will grip from the smallest holds up to five tons without friction, being very economical. It has a sliding chuck head operated by hand or treadle, with springs for opening and closing the jaws, and four of them have been working for the past year in the works of the Haydenville Manufacturing Co., Haydenville, Mass.

A dress guard for vehicles has been patented by Mr. Charles L. B. Martin, of Montclair, N. J. It is a folding shield, which may be placed over that portion of the wheel against which a lady's dress is liable to drag in getting in or out of a carriage, and is in the form of two circular troughs, formed of back and side pieces, preferably of leather, united by links, and with a hook which may be adjusted to bear against the rear face of one of the spokes and hold the shield in place. This shield prevents the soiling of the garments on the wheel, and when not in use may be folded and kept beneath the seat.

SCIENTIFIC AMERICAN BUILDING EDITION.

OCTOBER NUMBER.

TABLE OF CONTENTS.

1. Elegant Plate in Colors of a Residence of moderate cost, with floor plans, specifications, sheet of details, etc.
2. Plate in colors of a Country Store and Flat, with specifications, floor plans, sheet of details, etc.
3. Design of a one-story Southern Residence, with floor plan. Cost, Five Thousand Dollars.
4. Perspective and floor plans for Dwelling for a narrow lot. Cost, Thirty-five Hundred Dollars.
5. Illustration of a two-story and attic Dwelling erected at Arlington, N. J., with floor plans. Cost, Two Thousand Eight Hundred Dollars.
6. Drawing in perspective, with floor plans, of a Double House of moderate cost. A pleasing design.
7. A Twelve Hundred and Fifty Dollar two-story attic House. Perspective and floor plans.
8. Perspective drawing, with a floor plan, of a House at Flushing, N. Y. A comfortable and substantial dwelling, costing about Eight Thousand Dollars.
9. View of the new United States Court House and Post Office at San Antonio, Texas.
10. Handsome design of a new Dry Goods Store erected at Winona, Minn.
11. Illustrations of small sea-side Cottages at Lion-Sur-Mer, Department of Calvados, France.
12. Page engraving showing Main Entrance Gate, Chateau at Bougival. M. Pasquier, Architect.
13. Views of a Church at La Capelle, France. M. Charles Garnier, Architect.
14. New Church at Stratton, in Hampshire, England.
15. Design of a Sideboard in Walnut.
16. New Exhibition Building of glass and iron, at Madrid. Half page engraving.
17. Villa St. George's, at Saint Lo. Half page engraving.
18. A City Residence in Mannheim. Werle & Hartmann, Architects.
19. Miscellaneous Contents: Cost of Brick and Brickwork.—United States Mail Chutes for Interiors of Buildings, illustrated.—An Improved Saw Filing Machine, illustrated.—Improved Device for Working Window Shutters, illustrated.—Drawing and Engineering Instruments.—Tests of Portland Cement.—Painting Brick and Stone Buildings.—Frosted Glass.—Action of Frost on Cements.—Oil of Bay for Flies.—Decorative Novelties.—Colored Mortar for Brickwork.—How to Clean and Polish Top Leather Screens.—Blinds.—To Transfer Prints to Wood.—Rules for Gas Fitting.—Bichloride of Mercury as a Disinfectant.—Chinese Brick-making.—The Long Leaf Pine.—New Galvanizing Process.—Earthquake Foundations.—Care in respect to Fire.—Healthy Habitations and Defective House Construction.—The Effect of Sea Water on Concrete.—Vassar College Sewerage.—Preservation of Stone.—Improved Surface Planing Machine, illustrated.—The "Auburn" Boiler for Steam Heating and the Woodcock Patent Shaking Grate, with illustrations.—Ebonizing.—Design in Architecture.

The Scientific American Architects and Builders Edition is issued monthly. \$2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming, practically, a large and splendid MAGAZINE OF ARCHITECTURE, richly adorned with elegant plates in colors and with fine engravings, illustrating the most interesting examples of Modern Architectural Construction and allied subjects. The Fullness, Richness, Cheapness, and Convenience of this work have won for it the LARGEST CIRCULATION of any Architectural publication in the world. Sold by all newsdealers.

MUNN & CO., PUBLISHERS,
361 Broadway, New York.

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.

Magic Lanterns and Stereopticons of all kinds and prices. Views illustrating every subject for public exhibitions, Sunday schools, colleges, and home entertainment. 152 page illustrated catalogue free. McAllister, Manufacturing Optician, 49 Nassau St., New York.

No. 11 planer and matcher. All kinds of woodworking machinery. C. B. Rogers & Co., Norwich, Conn.

I want my patent, 314,351, on hobby horse, manufactured and brought in market. State best terms, and working model will be sent. Wm. Spitznass, New Athens, Ill.

Steam jacket feed water boiler and purifier. New catalogue free. Wm. Baragwanath & Son, 40 W. Division St., Chicago.

For the latest improved diamond prospecting drills, address the M. C. Bullock Mfg. Co., 133 Jackson St., Chicago, Ill.

The Railroad Gazette, handsomely illustrated, published weekly, at 73 Broadway, New York. Specimen copies free. Send for catalogue of railroad books.

The Knowles Steam Pump Works, 113 Federal 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.

Link Belting and Wheels. Link Belt M. Co., Chicago.

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

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.

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

For best leather belting and lace leather, including Hercules, see Page Belting Co.'s adv., p. 173.

Curtis Pressure Regulator and Steam Trap. See p. 157.

Iron, Steel, and Copper Drop Forgings of every description. Billings & Spencer Co., Hartford, Conn.

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

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

60,000 Emerson's 1887 Book of superior saws, with Supplement, sent free to all Sawyers and Lumbermen. Address Emerson, Smith & Co., Limited, Beaver Falls, Pa., U. S. A.

Safety Elevators, steam and belt power; quick and smooth. D. Frisbie & Co., 112 Liberty St., New York.

"How to Keep Boilers Clean." Send your address for free 88 page book. Jas. C. Hotchkiss, 120 Liberty St., N. Y.

The Holly Manufacturing Co., of Lockport, N. Y., will send their pamphlet, describing water works machinery, and containing reports of tests, on application.

Durrell's imp. nut tapper. Taps 1/2 to 2 in. New imp. bolt cutter. Howard Bros., Iron Works, Fredonia, N. Y.

Patent Rights for Sale. Apparatus for building Concrete Buildings and Walls. County rights, \$50. State rights, \$500. See descriptive notice in SCI. AMERICAN, May 22, 1886. Send for circulars. Ransome, 402 Montgomery St., San Francisco, Cal.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

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

NEW BOOKS AND PUBLICATIONS.

SCIENTIFIC HORSESHOEING. By William Russell. Cincinnati: Robert Clarke & Co. Pp. xxv., 211.

This book intelligently considers, anatomically and practically, the question of the proper shoeing of horses, and affords a great deal of information which it would be well for all owners of horses to be possessed of. The author has for many years had a high reputation as a successful horseshoer, and in this book points out many of the errors existing where horseshoeing is done by those ignorant of their business or careless in its performance, and the great evils which result therefrom. The book has numerous illustrations explanatory of the structure and functions of the horse's foot, and showing the effects of good and bad shoeing.

WILSON'S QUARTER CENTURY IN PHOTOGRAPHY. By Edward L. Wilson. New York. 1887. Edward L. Wilson. Pp. 528.

In this work we have an admirable body of photographic information. From notes published at various times by some three hundred leading authorities, amateur and professional, a running series of foot notes is composed. Above these, and serving as the basis for their imparted character of commentary, comes the text, rather less in extent than the notes. The whole forms an exceedingly attractive *alla-parada* of notes and observations. Illustrations of all sorts of devices and assistances in photography are given in liberal profusion. The text is a consecutive and valuable treatise by itself. The notes are made up of selections from the Philadelphia Photographer. The author and editor of the work speaks of it as an anniversary publication for himself, he, twenty-five years ago, having entered a photographic establishment as employe. This volume commemorates his devotion of a quarter of a century to his art. From what has been said of the scheme of the book, it is evident that a review is impos-

sible. To get at the full scope, the book itself should be consulted, and we recommend it to all photographers upon its merits.

POOR'S MANUAL OF RAILROADS, 1887. Twentieth annual number. New York: H. V. & H. W. Poor. Pp. xliii., 1053. \$6.

To any one interested to understand the details of the railroad business of the United States, the financial position of the different companies and the various properties, this book is simply invaluable. During the twenty years since the first edition was published, each successive volume has represented a larger and larger mass of more carefully compiled statistics, much being from the sworn statements of railway officials, giving the work a high standing as an authoritative record in a field in which it has no competitors.

POOR'S DIRECTORY OF RAILWAY OFFICIALS. New York: H. V. & H. W. Poor. Pp. xliii., 372. \$2.

This is properly a supplement to the Manual, bringing within convenient compass the names of all officials desirable to know, for business purposes, to the number of some 30,000, including the names of officers of street and lumber railways as well as steam railways, express and sleeping car companies, and manufacturers of railway supplies.

The Curio is the title of a new illustrated magazine, commenced by R. W. Wright, of No. 6 Astor Place, New York. It is in quarto form, handsomely printed, and intended to satisfy the tastes and set forth the possessions of collectors of the rare and curious in the departments of genealogy and biography, heraldry and book plates, coins and autographs, rare books and works of art, old furniture and plate, and other colonial relics.

The Machinery of Small Boats for Ships of War, etc., a paper read before the Institution of British Naval Architects, by A. Spyer, presented on application by Fred. M. Wheeler, 95 Liberty Street, N. Y.

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) A. F. M. desires a recipe for making a good thin shellac varnish. A. Break the gum into small pieces and macerate in a stoppered bottle with ether. After swelling up sufficiently, the excess of ether is poured off, when the shellac will dissolve quite readily in alcohol.

(2) H. S. W. desires a receipt for the cure of warts, one that will remove them permanently. Also please give me the cause of warts. A. Their cause is uncertain; they are said to be caused by uncleanliness. Their removal is easiest effected by means of caustics, such as silver nitrate, nitric acid, or salomatic vinegar.

(3) A. F. S. asks (1) a good receipt for making hektograph ink, both purple, blue, and black. A. Take 1 part aniline of desired color, dissolve in about 7 parts water and add 1 part glycerine. 2. The cause of the glass plates cracking in the Wimshurst electric machine? A. The trouble may be in the clamping—the flanges may not fit, or may not be properly packed. For electrical supplies, address any of the makers of or dealers in such goods advertising in our columns.

(4) G. F. D. writes: I have been troubled of late with what is generally termed sour stomach, and have been taking a third of a teaspoon of saleratus or thereabout, to overcome the acidity. Is that a proper corrective? A. You had better take a cup of clear warm water an hour before meals, and occasionally a bottle of citrate of magnesia to clear the stomach, with good habits and plenty of exercise. See most interesting lectures on dyspepsia, its treatment and cure, in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 323, 129, 215.

(5) H. G. asks a recipe for a good paint or stain for patterns for castings. A. Shellac varnish alone or with lampblack or vermilion is in ordinary use for varnishing patterns. Methylic or wood alcohol is the best solvent of shellac for making the varnish. Shellac varnish may also be purchased through the paint trade.

(6) J. McD. asks: 1. Is there really a fourth state of matter, known as radiant matter? A. The question is yet undecided. It is safest to conclude that there is probably no fourth state of matter. 2. Does all ice maintain a fixed temperature or degree of cold? In other words, would ice frozen at or near north pole and brought to North Carolina be of same

temperature as ice formed in North Carolina? A. Ice can be of all degrees of temperature below 32° Fah. The fixed point of temperature is its melting point. This is always 32° Fah.

(7) P. H., Jr., asks: 1. Will a siphon draw water through 2,400 feet of 1 1/4 inch pipe with a rise of 20 feet and a fall of 80 feet? A. Yes; but it requires care in filling or charging, to free every part from air, and an air chamber at the apex to prevent a break in the flow by accumulation of air which is liberated by the partial vacuum. Lower end should be immersed or turned up to prevent air drawing into the end, if the slope is steep. 2. A receipt for roof paint for corrugated iron roofing. A. Use pulverized oxides of iron, as yellow and red iron ochers, or brown hematite iron ores finely ground, and simply mixed with linseed oil and a drier.

(8) F. H. S. asks: What is the best battery for running a small electric turntable for show windows? How is the battery made? I have a plunge battery of ten cells carbon and zinc plates in electro-poin fluid. Would this be suitable to run the above or a small electric lamp, or would it soon run out? A. For the above purposes a Bunsen battery is perhaps the best. For description of this and other forms, see our SUPPLEMENT, Nos. 157, 158, and 159. The plunge battery, however, is very serviceable.

(9) G. A. M.—Rule for surface of oblate spheroid: Square their diameters, and multiply square root of half their sum by 3.1416 and this product by the transverse diameter, or

sqrt(d^2 + d'^2) x 3.1416 x d'

For prolate spheroid: As above by inserting conjugate diameter in place of transverse. The other formulae asked for involve conditions in mathematical astronomy too complicated for this column.

(10) J. W. D. L.—The expenditures of the German government last year, including cost of army and navy and ordinary expenses of the empire, were \$174,153,877. The general cost of the United States government was \$242,483,138. Any such comparison, however, would be greatly misleading without counting the expenses of the several States, which in Germany have to support their army contingents, which is not the case here. Prussia, for instance, has a total expenditure of \$324,868,000, Bavaria \$60,000,000, Baden \$41,000,000, etc. Our State governments are expensive, but paying for a large special army contingent each does not figure in such expense.

(11) P. L. asks: What is the proper composition of the metal in a safety plug for a boiler, and at what temperature does it melt? A. We have no record of the composition used by various parties advertising the sale of fusible plugs. The following alloys, with their corresponding melting points, together with the temperature of steam at various pressures, may be found useful:

Table with columns: Tin, Lead, Bismuth, Steam pressure by gauge, Temp. Rows show various alloy compositions and their corresponding steam pressures and temperatures.

So much depends, however, on the way in which an alloy is made, the purity of its original metals, and the changing conditions to which a fusible plug is subjected, that it is very doubtful whether they should ever be depended upon in critical places.

(12) Jones asks how to use glucose in making pop corn balls. A. We know of nothing better for making pop corn balls than molasses boiled until stringy and then rolling the corn in it. Glucose is decidedly inferior.

(13) G. S. asks the best way to mix the whitewash for outside work. A. Take a clean, water-tight barrel and put into it 1/2 bushel lime. Slake it by pouring boiling water over it and in sufficient quantity to cover it 5 inches deep, stirring it briskly till thoroughly slaked. When slaking has been effected, dissolve in water and add 2 pounds sulphate of zinc and one of common salt.

(14) W. L. F.—There are several receipts for making the black color on brass: 1. 5 drachms nitrate of iron, 1 pint water. 2. 5 drachms perchloride of iron, 1 pint of water. 3. A solution of chloride of platinum in water.

(15) R. K. B.—The curvature of the earth in such a straight line a mile in length would be 2.04 inches from the surface at either end. If the line were two miles long, either end would be 8.004 inches from the surface. The measures are found by determining the tangent of the circle of the earth's radius.

(16) J. E. N.—The cultivation of the tree that yields annatto would not prove profitable, as the demand for the product is too limited. It is used chiefly for coloring butter and cheese. Messrs. W. H. Schieffelin & Co., 170 William Street, New York, and all other large drug houses import it in quantities such as to suit the demands of their trade.—The address of our Consul-General in Brazil is H. C. Armstrong, Rio de Janeiro.

(17) J. S. asks if there is any simple and reliable method of testing a 12 horse power boiler at 100 pounds water pressure. The said boiler is situated in a part of India where no government test is procurable, and it cannot be sent to any boiler works. What apparatus is necessary for the purpose? A. We know of no safe way of testing the boiler except by improvising a pump, no matter how small. A common plumber's force pump is sufficient. Fill the boiler full of water by any convenient means, through the safety valve or otherwise. Use the pressure gauge attached to the boiler, if you think it is correct. Also set the safety valve weight at 100 pounds by its mark. Then pump water in by any means at hand. It takes but very

little water to run the gauge up to 100 pounds after the boiler has been filled. If you have a steam pump attached to the boiler, a lever may be arranged to work the pump a few strokes for the required pressure. The engine in the absence of all pumping appliances may be made to put pressure upon the boiler by pulling it backward and pouring water into the exhaust, but this should be managed cautiously. With proper precautions the following method may be used. Fill the boiler with water, leaving absolutely no air space. It must be solid water. Then by slowly firing, the pressure can be run up to any desired amount. The instant the pressure is reached, or an instant before, draw the fire. This should only be done by an experienced engineer.

(18) A. M. H. asks directions for making paint to paint pipes and radiators for steam heating. A. A little clear japan varnish mixed with ordinary colors makes a very good cheap paint for radiators. The regular japan varnishes in colors are used for fine work. This requires to be baked in an oven at 250°, and makes a permanent color. Sometimes ordinary colors in oil are used. When dry, varnish with copal.

(19) B. F. B.—Hard solder is generally made of brass of a lower grade than the work to be brazed. For brazing the ordinary commercial brass, use the same kind of brass, melting in a crucible and adding 20 per cent of zinc. For brazing iron, use copper or ordinary brass. Flux with borax.

(20) P. A. asks: Which is the best—a piston or a rotary fire engine? A. Both are manufactured and in use. The piston engine and pump are preferred by the New York fire department.

(21) J. H. L.—Fulminate of gold explodes by slight increase in heat caused by compression, but is exceedingly uncertain and dangerous. Fulminate of platinum is next safer and explodes at a temperature of 400° Fah. Both the above are very violent, and explode with the slightest blow. Pure fulminate of mercury is very quickly and easily exploded. It is mixed with potassium nitrate or chlorate to moderate its violence, when used for charging gun caps.

(22) J. M. C. writes: In "Haswell," issue of 1884, on page 480, he says, the evaporative power of one pound of anthracite coal is 7.05 to 9.05 pounds of fresh water. Through how many degrees is this water supposed to be raised? A. The note referred to in "Haswell" is only an average or generalization of evaporative effect from mean temperature or 60°. The ultimate evaporative effect of the best coal, less the ash, is 14.9 pounds from water at temperature of 212° without pressure. When tests are made under pressure, the evaporative effect is reduced to and from 212° temperature without pressure. Thus the best forms of boilers doing low duty may run up to 12 pounds per pound of coal, and even higher than this is claimed with regenerative furnaces. The quality of coal varies greatly, as well as the condition of boilers. You will also find in "Haswell" interesting tables of the effective value of different kinds of coal. A large percentage of boilers in use are evaporating 5 pounds and under per pound of coal. Incrustation, dirty flues or tubes and overwork are the main features of small boiler duty.

(23) R. B. says: I am going to build a small steam engine 3 inches bore and 5 inches stroke, what is the rule in plain figures to get at the power? A. For small engines of uncertain cut off multiply the area of the cylinder by four-fifths the steam pressure and this product by the travel of the piston in feet per minute. Divide last product by 33,000 for the horse power. 2. What size boiler shall I need to get one-half horse power from this engine? A. Your boiler should contain for a half horse power 8 square feet of surface exposed to the fire. 3. What size boiler should I need to run it at its fullest capacity? A. Your engine is equal to 4 horse power at 200 revolutions per minute and 100 pounds steam pressure. For this you will need a 5 horse power boiler or one containing 70 square feet of fire surface. 4. What is the rule to get at the power of inclosed water wheels or turbine? A. Turbines give from 75 to 80 per cent of the value of the water flow. The value of the water flow is the volume falling 1 foot per minute multiplied by the weight of a cubic foot. For the horse power, divide the above product by 33,000.

(24) M. asks the best method of gluing emery on wheels and belts. A. Use the best emery and good tough glue made thick. Brush the glue on rather thick and follow the brush at once with the emery from the hand or a small piece of wire cloth soldered to the edge of a small shovel, so as to distribute the emery readily. Use the flat hand to press the emery close. A small flat piece of wood may also be used to advantage.

(25) A. L. G. asks: 1. What is the best for polishing bright iron work, such as cylinder heads and guides? A. Polish bright iron work with rottenstone and oil, if it is running machinery. Work not liable to have its running parts injured by emery, may be polished with emery cloth or flour emery and oil, as it is a quick way. You may polish the cylinder head with emery, but not the slides of an engine. Tripoli and oil makes a high finish after the emery. 2. What is best for polishing Russia iron? A. Russia iron should only be wiped clean with oil. The black surface will come off if polished with abrading material.

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

A. D. G.—The material sent is sand containing iron ore, and is of value only if in sufficient quantity and purity to smelt economically, which is very seldom the case.

TO INVENTORS.

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

September 27, 1887,

AND EACH BEARING THAT DATE.

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

Table listing various inventions and their patent numbers, including items like Adding machine, Adjustable wrench, Alarm clock, and many others.