

ENGINEERING INVENTIONS.

An improved method of hardening steel has been patented by Mr. Ludlem B. Rockwell, of Sunbury, Pa. The articles used consist of cyanide of potassium, prussiate of potash, sal ammoniac, sulphate of iron, and bluestone, applied after a special manner during the tempering operation.

A car coupling has been patented by Mr. George H. Livingston, of Antea Fort, Pa. The invention covers a transversely movable drawhead and means for shifting it, with means also for moving the drawhead vertically, and means for moving and shifting the buffers.

A feed water return trap for steam heating apparatus has been patented by Mr. Denning P. Keating, of Ward's Island, New York city. This invention provides a novel construction and arrangement of parts to form a practical automatic device for returning the water of condensation of steam radiators back to the steam boiler.

A valve gear has been patented by Mr. Joshua P. McCook, of Richmond, Va. This invention covers a special construction of automatic valve gear, whereby the admission of steam is regulated according to the load, a peculiarity being a spring arrangement for normally holding the driving wheel in position in contact with the fly wheel or crank shaft.

A car coupling has been patented by Mr. James A. Arment, of Dodge City, Kansas. The drawhead has the ordinary link socket, with a vertically swinging self-coupling hook in a recess on one side, and a catch device for the hook of the opposing drawhead, with other features, by which the cars are coupled by two hooks, one on each car, both being detached by one movement of the lever or hook.

A running gear for railway cars has been patented by Mr. Charles E. Candee, of New York city. This invention consists in improved journal boxes wherein friction rollers are employed, and in connection therewith a novel construction of axle, to reduce friction and wear to a minimum, and so the axle, rollers, and wheels can be readily and independently removed when worn out.

An automatic safety lock for locomotive furnace doors has been patented by Mr. Lewis B. White, of New York city. A casing is pivoted above the fire door, with a spring, and an arm for closing and locking the door, which casing can be locked to hold the arm raised by a bolt which is connected with a ball for automatically withdrawing the bolt when the locomotive collides with objects, or runs off the track.

A railway track clearer has been patented by Mr. Lewis Larchar, of Marble Rock, Iowa. A stock, having a pivotal and spring connection with the engine or car, is provided with a foot block carrying the clearer plates or cutters pivoted to the stock, to swing forward and backward, the block being held in normal working position by springs at its opposite faces; the block may also be made to swing laterally or held raised from the track.

A hand power mechanism has been patented by Mr. Eli Z. White, of Carrollton, Miss. It is made with a drive wheel mounted on a main shaft, which carries a loose rock lever, which in turn connects by rods with reversely set cranks of two shafts carrying drive wheels which act on the drive wheel of the main shaft, the crank shafts being mounted yieldingly, the whole making an inexpensive mechanism for driving railway hand cars or vehicles, or for operating light machinery.

AGRICULTURAL INVENTIONS.

A steam plow has been patented by Mr. Benjamin S. Benson, of Baltimore, Md. This invention combines a plow gang, a cutter bar, and a traction engine, the plow gang being arranged to neutralize the thrust of the plows and steer them, and for giving a free, independent, up and down motion to each plow in adapting itself to hollows and ridges on the surface of the ground.

MISCELLANEOUS INVENTIONS.

A clothes sprinkler has been patented by Clara O. Bilinski, of Diamond Lake, Ill. This invention covers a special construction and combination of parts to provide a simple, inexpensive device for sprinkling clothes for laundry and household purposes.

A heat insulating compound has been patented by Messrs. Carl Grunzweig and Paul Hartmann, of Ludwigshafen, Germany. It consists of asbestos, fossil meal, clay, soluble glass, disintegrated cork, and water, in certain proportions and prepared for use in a specified manner.

A ventilated barrel has been patented by Mr. Thomas L. Lee, of Memphis, Tenn. It has a middle inside hoop, and plain straight staves of uniform width sprung around it, to form the bulge, the staves being spaced and nailed to the middle hoop and the nails clinched.

A show case has been patented by Mr. Adam K. Bowman, of Greensburg, Pa. It is an upright case with glass doors, and having removable partitions and brackets, in which assorted yarns and similar goods may be conveniently stored and exposed for sale.

A music leaf turner has been patented by Mr. James P. Batchelor, of Hutchinson, Kan. This invention covers a special construction and combination of parts in a device, whereby the leaves of either book or sheet music may be turned by the performer without interfering with the rendering of the music.

A cement composition for moulding brick has been patented by Messrs. Richard B. Eason and John J. McGivney, of New York city. The composition is composed of gypsum and ashes, treated in a specially described manner, to make a cement for use as a plaster, or to be moulded into brick or other forms.

A metal punch has been patented by Mr. Gilbert McDonald, of Augusta, Kansas. This invention relates to a former patented invention of the same inventor, and consists of the employment of a

segmental ratchet arrangement to be operated by a pawl and lever for forcing downward the cutting or punching tool.

An axle gauge has been patented by Mr. Rufus A. Simpson, of Ferrdale, Cal. This invention covers a special construction and combination of parts in a gauge for accurately measuring the set and gather of a wagon wheel, and for use in indicating accurately the exact set and gather for iron and steel axles.

A smoking pipe has been patented by Messrs. James W. Owens and Oscar McClure, of Washington, Mo. This invention relates to corn cob pipes, and covers the filling of the interstices of the corn cob with a peculiar composition, so that the pipe will not be permeable by nicotine, will not become discolored, and will have other advantages.

A brick has been patented by Mr. Arthur Sherry, of Learned Station, Miss. The bricks are made in square form with interior openings, so the bricks when laid can be bound together by a clay, mortar, or cement composition placed in the openings, the edges of the bricks being chamfered or rabbeted to protect the pointing from the weather.

A necktie and collar fastener has been patented by Mr. Frank D. Adams, of Auburn, Cal. This is a device to be used for preventing a necktie from working up out of place upon a collar, and consists of a pointed spring wire, with its body in the form of a letter S, and its ends so bent that it may be readily applied to keep collar and necktie in position.

An improved ring handle has been patented by Mr. Charles A. Cook, of New York city. Combined with a screw spindle, with a cap spun on its head, is an escutcheon plate through which the bolt is passed, the escutcheon having a raised part fitting in the open end of the cap, making a handle simple in construction and which cannot turn on its spindle.

A cheese cutter has been patented by Messrs. Monroe W. Chapel and Eugene A. Reynolds, of Grand Blanc, Mich. This invention covers a rotatable block with a standard, a peculiar spring, and a knife actuated in a novel way, making an improved device for cutting sector-shaped pieces from a head of cheese conveniently and rapidly.

A mole ditcher and tile layer has been patented by Mr. Andrew S. Hughes, of Ackley, Iowa. This invention embodies in one machine a capacity for both ditching and tile laying, for drain tile, regulating the beam so as to make a uniform level or grade of the bottom of the ditch on both ascending and descending ground, with other novel features.

A plating basket has been patented by Mr. Arthur Murphy, of Taunton, Mass. It is a vessel with projections on the upper surface of its bottom, connected by wires, which then pass through channels in the bail or handle, with a hook on the handle by means of which the vessel may be suspended in a plating solution from a suitable conductor.

A quarter boot has been patented by Mr. Thomas Golden, of New York city. This invention relates to devices attached to quarter boots of horses to prevent slipping, and covers a peculiarly shaped clip with points on its inner face and claws on its ends; in combination with the front strap of the quarter boot, to firmly engage the hoof of the horse.

A check hook for harness has been patented by Mr. Joseph Darling, of Karns City, Pa. This invention consists principally of a check hook adapted to slide through the saddle tree or back pad, and having a strap or cord attached to it for operating the hook to uncheck or check up the horse, so the driver can do it without leaving the carriage or vehicle.

A wardrobe bed has been patented by Mr. Ernst Doring, of New York city. It is constructed with an upright case and the bed frame connected by a bar having end shoulders, with other features, so that the fulcrum point will be changed automatically as the bed frame is raised and lowered, and the bed frame will be prevented from going too far in either direction.

A stationary automatic ice planing and ridging machine has been patented by Mr. Stephen L. Smith, of St. Louis, Mo. It consists in a combination of supporting bars, knives, and brooms, with the slide-way over or through which the ice cakes are moved, and means of adjusting the parts, to cut off snow, slush, etc., and to ridge the cakes to prevent their freezing together.

A spring check hook for harness has been patented by Mr. William Black, of Morris, Pa. This invention relates to that class of check rein hooks wherein a coiled spring or elastic connection for the check rein is employed, the use of the spring allowing considerable freedom to the head of the horse, while by its use there is less liability of the horse breaking the check rein.

A combined wrench and gauge for gas service pipe cocks has been patented by Mr. Alfred G. Bayles, of New York city. It has a longitudinal slot in its handle with a pin secured adjustably therein to adapt the wrench to serve as a gauge, the slotted handle having a scale of division marks so the gauge pin can be readily set to prevent the cock from being opened beyond a fixed point.

A grader has been patented by Mr. Henry Hill, of Britt, Iowa. This invention covers a novel construction and arrangement of parts of a machine to plow up the earth and carry it the required distance to one side of the furrow, or load it into a wagon, and is designed especially for making roads by moving the earth from the ditch at each side to the center of the road.

An apparatus for charging liquids with gas has been patented by Mr. William Maynard, of New York city. Combined with a furnace for producing fumes or gases is a funnel, with pipes for conducting gas and water into it, the water gyrating along the sides of the funnel very rapidly, thus hydrating or purifying the gas, and drawing it downward into a gas receiver placed below the box.

A method for the production of rosaniline coloring matters has been patented by Mr. Emil Erlenmeyer, of Frankfort-on-the-Main, Germany. It

consists of oxidation of various combinations or mixtures of methylated amines or anilines or rosanilines with primary, secondary, or tertiary amines in such a way that the methyls of the former compounds are applied under the influence of oxidizing media, etc.

NEW BOOKS AND PUBLICATIONS.

THE MANUFACTURE OF LEATHER. By Charles Thomas Davis. Henry Carey Baird & Co., Philadelphia. 8vo, 324 pages. \$10.

This is probably the most complete work on the subject, but it is all the more important that it is an American work, for the only two volumes in the language that ever pretended to cover the whole trade have been long out of print, while in both French and German there are several treatises of considerable merit. This volume of Mr. Davis' is designed to cover a "description of all the processes for tanning, tawing, currying, finishing, and dyeing of every kind of leather, including the various raw materials and the methods for determining their values, the tools, machines, and details of the art," etc., together with a list of American patents pertaining to the business. It is illustrated by 302 engravings, and has 12 samples of dyed leather.

THE ARCHITECT'S AND BUILDER'S POCKET BOOK. By Frank Eugene Kidder. John Wiley & Sons, New York. Price \$3.50.

The 586 pages of this handsomely printed pocket book are crowded with useful information, designed to make a complete and handy reference volume for those engaged in practical work. Briefly but comprehensively treating of the mathematics of building, it then more elaborately covers questions as to the strength and stability of foundations, walls, buttresses, piers, arches, posts, ties, beams, girders, trusses, floors, roofs, etc., and gives a great amount of condensed information on carpentry, masonry, draining, painting and glazing, plumbing, plastering, roofing, heating and ventilation, and kindred topics. The author is a civil engineer as well as a distinguished architect, yet the book is not intended to cover the more intricate problems of building, naturally belonging to the civil engineer, but rather as a valuable aid and companion in the regular work which builders are ordinarily called upon for. The book is illustrated with 408 engravings, mostly from original designs.

Received.

INTEREST TABLES OF THE MUTUAL LIFE INSURANCE COMPANY, OF NEW YORK. By William H. C. Bartlett, Actuary.

NEW YORK PRODUCE EXCHANGE ANNUAL STATISTICAL REPORT, FOR 1883. By E. H. Walker.

THE CHILDREN OF THE BIBLE. By Fanny L. Armstrong, with introduction by Frances K. Willard. Fowler & Wells Co., New York.

SMOKING AND DRINKING. By James Parton. Fowler & Wells Co., New York.

NOTES ON THE OPIUM HABIT. By Asa P. Meylert. G. P. Putnam & Sons, 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.

Anti-Friction Bearings for Shafting, Cars, Wagons, etc. Price list free. John G. Avery, Spencer, Mass.

Blake's Patent Belt Studs. The strongest and best fastening for Rubber and Leather belts. Greene, Tweed & Co., N. Y.

Scientific Works by Huxley, Tynndall, Spencer, etc., very cheap. J. Fitzgerald, 20 Lafayette Place, New York.

Every one interested in Firearms and Sporting Goods should send for the Catalogue issued by Messrs. J. A. Ross & Co.; also their 1885 Calendar. See advertisement in this issue.

Correspondence solicited with any one having novelties, inventions, or patented articles of merit to introduce in Eastern market; office central; salesmen experienced. Address Chas. A. Post, 31 Astor House, N. Y.

For Sale.—SCIENTIFIC AMERICAN, vols. 1 to 40; well bound; good order. G. W. Pearsons, W. W. Office, Kansas City, Mo.

Linen Safety Hose, all sizes, for hotels, warehouses, and steamboats. Greene, Tweed & Co., New York.

For Sale.—Drill Presses. S. M. York, Cleveland, O.

For Sale.—Steel Figures, \$1 per set. S. M. York, Cleveland, O.

Whistles, Injectors, Damper Regulators; guaranteed. Special C. O. D. prices. A. G. Brooks, 261 N. 3d St., Phila.

Agents with \$2 capital wanted. Brown, Elliott & Spears, Silver Creek, N. Y.

Experimental Machinery Perfected, models, patterns, etc. Tolhurst Machine Works, Troy, N. Y.

Brush Electric Arc Lights and Storage Batteries. Twenty thousand Arc Lights already sold. Our largest machine gives 65 Arc Lights with 45 horse power. Our Storage Battery is the only practical one in the market. Brush Electric Co., Cleveland, O.

The Cyclone Steam Flue Cleaner on 30 days' trial to reliable parties. Crescent Mfg. Co. Cleveland, O.

For Steam and Power Pumping Machinery of Single and Duplex Pattern, embracing boiler feed, fire and low pressure pumps, independent condensing outfits, vacuum, hydraulic, artesian, and deep well pumps, air compressors, address Geo. F. Blake Mfg. Co., 44 Washington St., Boston; 97 Liberty St., N. Y. Send for catalogue.

Stationary, Marine, Portable, and Locomotive Boilers a specialty. Lake Erie Boiler Works, Buffalo, N. Y.

Wanted.—Patented articles or machinery to manufacture and introduce. Lexington Mfg. Co., Lexington, Ky.

"How to Keep Boilers Clean." Book sent free by James F. Hotchkiss, 86 John St., New York.

Mills, Engines, and Boilers for all purposes and of every description. Send for circulars. Newell Universal Mill Co., 10 Barclay Street, N. Y.

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

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Steam Boilers, Rotary Bleachers, Wrought Iron Turn Tables, Plate Iron Work. Tippet & Wood, Elston, Pa.

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

Send for Monthly Machinery List to the George Place Machinery Company, 121 Chambers and 103 Reade Streets, New York.

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.

Guil & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. Complete outfit for plating, etc. Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

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.

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

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 422.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 433.

Curtis Pressure Regulator and Steam Trap. See p. 14.

Woodwor's Mach'y, Rollstone Mach. Co. Adv., p. 14.

Drop Forgings, Billings & Spencer Co., Hartford, Conn.

Brass & Copper in sheets, wire & blanks. See ad. p. 438.

The Chester Steel Castings Co., office 407 Library St., Philadelphia, Pa., can prove by 20,000 Crank Shafts and 5,000 Gear Wheels now in use, the superiority of their Castings over all others. Circular and price list free.

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. 433.

Pays well on Small Investment.—Stereopticons, Magic Lanterns, and Views illustrating every subject for public exhibitions. Lanterns for colleges, Sunday-schools, and home amusements. 136 page illustrated catalogue free. McAllister, Manufacturing Optician, 49 Nassau St., N. Y.

Renshaw's Ratchet Drills. No. 1, \$10; No. 3, \$15. Cash with order. Pratt & Whitney Co., Hartford, Conn.

Shipman Steam Engine.—Small power practical engines burning kerosene. Shipman Engine Co., Boston. See page 23.



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 Information requests on matters of personal rather than general interest, and requests for Prompt Answers by Letter, should be accompanied with remittance of \$1 to \$5, according to the subject, as we cannot be expected to perform such service without remuneration.

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

(1) J. T. L. asks a receipt to convert a white rubber coat to a black. A. It is impossible. The black color is due to substances added to the rubber during the process of manufacture.

(2) J. H. asks: What acid or combination of acids will eat hard brass away quickly? A. Nitric acid or nitro-muriatic acid.

(3) E. F. asks if there is any way by which a violin can be improved in tone so as to be able to make it worth more, and would like to know if varnishing a violin affects its tone any. A. The tone of a violin improves with age and by continual playing. We should not advise its varnishing, as it is not likely to improve the tone.

(4) F. S. D. desires a recipe for making a mucilage for library labels. A. Try the following:
Gum Arabic.....2 parts.
Water.....5 "
Acetic acid.....1 "
Dissolve over a water bath by means of heat, and add one pint spirits of wine.

(5) F. A. W. writes: Will you give me a simple test to determine the presence of glucose in cane sugars? A. Dissolve some of the suspected sugar in water, and add Fehling's solution; if grape sugar is present, a precipitate of the red oxide of copper will form, while with cane sugar no effect is observed.

(6) C. T. asks how to ebonize white-wood. A. Dissolve 4 ounces shellac with 2 ounces borax in half a gallon water. Boil until a perfect solution is obtained, then add half an ounce of glycerine, after which add sufficient aniline black soluble in water, and it is ready for use.

(7) J. H. writes: I wish to paper some rooms in my house. The roaches are inclined to eat the paste; will you tell me how I can keep them from doing so? A. Use an ounce of poke root boiled in a pint of water, and mix the extract with the paste.

(8) P. & Co. ask for a receipt for suitable ink used with a stylographic pen, and that will copy; it requires to be very limpid and fluid. A. The inks used with the stylographic pen are generally aniline

Inks, and consist of nigrosine, soluble, dissolved in sufficient water; a little sugar or glycerine can be added to make it a copying compound, but we doubt if good copying ink can be used with such a pen long.

(9) E. H. B. asks a good and cheap way to prepare a soft pine floor to be used for a skating rink; want something to fill cracks with, that will stay. A. We know of nothing better than the wood itself. The floor plank should be dry and well driven together. No cement that we know of will make a solid filling suitable for roller skating. We advise the use of maple for the floor; white pine is too soft.

(10) H. S. asks how to use the tin foil which comes round tobacco, for soft soldering? A. Add 50 per cent of tin. 2. How is Vienna lime used to polish steel? A. Wet the Vienna lime to a paste. Apply to buff, and finish dry.

(11) M. D. L. M. desires a receipt for clearing and purifying sorghum molasses that is old and glutinous with dregs settled at the bottom. A. First blow the molasses up with steam, then neutralize with lime, and inject sulphurous oxide, which will bleach the mixture, and finally run through the bag filters and boil down.

(12) W. H. A. asks: Is there a process for reworking or improving stale or inferior butter? A. Butter that is rancid may be restored, or in all cases greatly improved, by melting it in a water bath with some freshly burned and coarsely powdered animal charcoal (which has been thoroughly freed from dust by sifting), and straining it through clean flannel. A better and less troublesome method is to well wash the butter first with some good new milk, and next with cold spring water. Butyric acid, on the presence of which rancidity depends, is freely soluble in fresh milk.

(13) C. H. K.—We are not acquainted with the compound mentioned, but presume that it is similar to the menthol cures recently placed on the market. These are prepared as follows: Neuralgia cures are usually composed of menthol or a mixture of menthol, thyme, and eucalyptol to about equal parts of paraffine or spermaceti. When applied a burning sensation similar to that of menthol is first produced, generally followed by relief.

(14) H. D. J. asks (1) a formula for making a paint or cement, acid proof, for lining wood bath vats for plating. A. The following is from one of our back numbers: Melt together 1 part pitch, 1 part resin, and 1 part plaster of Paris (perfectly dry). A good asphalt varnish, if allowed to dry properly and completely, will also stand. 2. What is henequin, mentioned in SCIENTIFIC AMERICAN of December 6? A. Its botanical name is Agave sisalana, or, as it is more commonly called, Sisal or grass hemp.

(15) J. H. R.—Dust on belts is sometimes a source of trouble, but we can give no better advice than to try and keep a belt as nearly as possible in the condition in which a good manufacturer would furnish it, by occasional treatment with a little castor oil. Most of the slipping of belts comes from their being overloaded, or not properly laced up after the "stretch" has been taken out of the leather.

(16) M. S. asks (1) if there are any means by which I can construct a sand blast for the manufacture of small glass signs, and if so, how shall I go to work to make it? Can I mould small glass letters in a plaster Paris mould? A. You will find the sand blast described in SCIENTIFIC AMERICAN of January 29, 1881. Articles in glass are generally cast in metallic moulds, or else in wooden forms, and we do not think that plaster would be suitable. 2. I saw in a back number of the SCIENTIFIC AMERICAN a formula for an etching ink for glass. Where can I get it prepared? A. A description of the etching ink is given on page 211 of SCIENTIFIC AMERICAN, for April 5, 1884. It can be prepared by any competent pharmacist.

(17) E. N. N. writes: On page 299, in answer to No. 27, you say that a bar placed square is as 673 to 568 to a bar of same size placed diagonally. I am very desirous to know whether this is the case. Take, for instance, a buggy axle 1 inch, and place it square; will it require more strain in usage to bend that, than though placed diagonally? I see some of the express companies' wagons have the axles diagonally, and was about to have some spring wagons so made, when I chanced to see the answer above referred to. A. The answer is correct. The diagonal arrangement of axle is derived from the idea that the principal strain is neither horizontal nor vertical, but compounded of both, as you will see by analyzing the direction of the thrust when a wheel strikes an obstruction. You will find it as nearly as possible in the direction of the lines of the square when placed in the diagonal position.

(18) F. M. B. writes: I wish a receipt for making hard water soap, which will equal or surpass any used in this country, where alkali water prevails. Tallow is the grease I wish to use. A. It will be found exceedingly difficult to prepare a soap, such as you desire from tallow; coconut oil is generally used. The following, however, is a reliable recipe, being the formula for Dawson's Patent Composite Soap: Strong potash lye, 75 pounds; tallow, 75 pounds; coconut oil, 25 pounds. Boil until the compound is saponified in the usual manner, and perhaps may prove satisfactory.

(19) R. W. asks: What will remove coal tar from the surface of hot water heater pipes, in a greenhouse? The fumes from the tar destroy the plants. What treatment would you recommend under the circumstances? A. There is no safer way to remove the coal tar than to scrape it off the pipes with steel scrapers. You may wash it off with benzine or naphtha, but you will have to let the heat down, as the evaporation of the benzine or naphtha will give more trouble than the coal tar. The coal tar ought to dry in a short time, and thus relieve you of the trouble.

(20) S. E. F. asks for a receipt for waxing soap wrappers after they are printed. A. Ordinary waxed paper is prepared by placing cartridge or other paper on a hot iron, and rubbing it with beeswax or by brushing in a solution of wax in turpentine. On a large scale, it is prepared by opening a quire of paper flat upon a table, and rapidly ironing it with a very hot iron

against which is held a piece of wax, which melting runs down upon the paper and is absorbed by it. Any excess on the topmost layer readily penetrates to the lower ones.

(21) H. J. writes: 1. I have made dynamo one-half larger and similar to that in SUPPLEMENT No. 161, fields wound with No. 12, armature with No. 16. It does not work satisfactorily; will only heat about one inch of No. 36 iron wire to a bright red. Is built according to plan in every particular, except the space between poles of field magnets is only 1/2 inch instead of 1 1/2 inches; as in plan. Is this the defect? It is about the only one I can find; have wound armature with Nos. 12 and 20 with no better success; speed 1,495 revolutions per minute, runs noiseless with open circuit, but rumbles when closed on short circuit; slot in commutator 1/2 inch out of square. Insulation good between magnet cores and wire, as tested by telephone and battery. Can you help me discover the difficulty? A. Your difficulty probably arises from having the poles of your field magnets too near together. 2. About how many 10 candle power lamps (incandescence) ought it to run? A. It might run two such lamps, provided the speed of the armature was sufficiently high. 3. What kind of steel is used for permanent magnets, and how tempered, especially telephone magnets? A. Chrome steel is considered the best. The magnets are hardened only at the ends, and drawn to a light straw color. 4. Can I make a louder speaking receiver than Bell's form, something to be heard across an ordinary room? A. We know of no telephone receiver that can be heard at any great distance, excepting Edison's Electro Mechanical Telephone; if you succeed in making a telephone that can be heard distinctly across the room, you will have produced something far in advance of anything we have at present.

(22) H. A. F. asks: 1. What is the microphone used for? A. Many of the telephone transmitters now in use are simply microphones. 2. On what principle is it constructed? A. A microphone consists mainly of two pieces of carbon or other semi-conductor placed loosely in contact with each other and vibrated by a diaphragm to which one of them is attached. See SUPPLEMENT, Nos. 163, 400, 347. 3. Is it of any great value as a scientific discovery? A. Yes. 4. Do you think there is much room for improvement on the telephone? Would you think it worth while to try? A. Certainly telephones better than those now in use are required, and any marked improvement would be sure to pay.

(23) E. M. H. asks for the method of finishing picture mouldings. Of what is the first or (as I suppose) plaster of Paris coat composed and how applied, and of what is the composition of the gilt and dark finish? A. The composition for mouldings is prepared as follows: Mix 14 pounds of glue, 7 pounds resin, 1/2 pound pitch, 2 1/2 pints linseed oil, 5 pints of water, more or less according to the quantity required. Boil the whole together, well stirring until dissolved, add as much whiting as will render it of a hard consistency, then press it into a mould, which has been previously oiled with sweet oil. No more should be mixed than can be used before it becomes sensibly hard. Gold size is then put on, several coats being considered necessary, then the gold leaf itself, which is burnished in course of time, and finally covered with finishing size.

(24) H. L. K. asks a receipt for making photo dry plates, emulsion process. A. You will find this information given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 205. 2. Also a book or manual on fancy dyeing, consisting of, namely, silks, satin, etc., giving receipts for manufacturing the dyes, and their substance. A. There are many books on this subject. One of the best is: The American Practical Dyer's Companion, by F. G. Bird, price \$10.00; the Dyer and Color Maker's Companion, 12mo, \$1.25, is a much smaller book.

(25) S. A. D. desires a colorless lacquer for yellow cedar and a good ebony stain. A. For a colorless lacquer: Dissolve 2 ounces gum sandarac and 1/2 ounce gum mastic in one pint alcohol. When dissolved add 5 drops glycerine. For the black: Take four ounces shellac, 2 ounces borax, and boil in half gallon water until dissolved, then add 1/2 ounce glycerine, and finally sufficient aniline black; soluble in water. This stain gives very satisfactory results if properly used.

(26) M. W. asks for receipt for darkening new mahogany to imitate old mahogany. A. To darken mahogany: Put 2 ounces of dragon's blood, bruised, into a quart of oil of turpentine; let the bottle stand in a warm place, shake frequently, and when dissolved, steep the work in the mixture.

(27) R. asks about how much kaolin is used in America, and how much is exported. How much does it bring per ton, and where can it be sold? What per cent of iron is required in ochre for paint? A. No exact information as to how much kaolin is used or the quantity exported is obtainable. Its value depends upon its quality, which varies widely. The iron ochers contain from 30 per cent of iron oxide upward. Their value depends largely upon their condition, whether soft and free from grit, etc.

(28) W. G. McC. asks how to make luminous ink with phosphorus, and how to use it—the very best process. Is there any way to make it the consistency of beeswax, so one could mark on paper, the mark showing only in the dark, and use it with safety in handling? A. Phosphorus itself can be used to mark on paper and then can be distinctly seen at night, but it is a dangerous substance to handle. We believe there have been no successful attempts at making either luminous ink or paint in this country, though the latter is made in England and handled by a large New York house.

(29) H. S. writes: October 25, 1884, in answer to query No. 22, you gave directions for making a reversed blue print, also black lines on white ground. I tried them both, and inclose samples of each, a flat failure. What is the trouble? A. If properly followed, the process will give good results. The samples sent show too long an exposure, and have apparently been prepared by the blue process itself.

(30) J. M. asks for some process by which lamp chimneys can be hardened. A. Glassware of all kinds is annealed by gradual heating and subsequent

slow cooling. The operation at the works sometimes takes quite a long while. For practical purposes an easy method consists in simply putting the chimneys into cold water, and slowly heating until the water boils and then allowing the water to cool again. This operation repeated several times will bring about the desired result.

(31) C. C. H. asks: What will remove claret wine stains from linen table cloths and napkins, also from body Brussels carpet? A. Apply a little table salt to the spot stained, and also moisten it with sherry. After washing, no trace of the stain will be left. The acid contained in the claret decomposes the salt, setting free chlorine (bleaching gas), which removes the vegetable coloring matter of the wine. See also table giving directions for removal of various stains in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.

(32) H. D. J. writes: Can water and sweet oil or castor oil be thoroughly amalgamated without showing their separate parts and qualities? What is the smallest amount of water that will thoroughly dissolve 1 ounce potassa permanganate crystallized? This solution being made, how can it be mixed with oil without showing the resistance of the water to combine itself with wax? A. Neither castor oil nor olive oil is soluble in water. Sometimes a small proportion of water can be mixed with the oils, but not satisfactorily. One part of potassium permanganate is soluble in 16 parts of water at 15° C. The oils would decompose the potassium permanganate, and therefore we do not see how a satisfactory mixture can be prepared.

(33) P. W. J. writes: I want to make a telescope. 1. What is the best lens—a double or plano-convex eye glass? A. For full information on the construction of a telescope, see article on this subject in SUPPLEMENT, No. 252. Use an achromatic object glass, which consists of a double convex crown glass lens and a plano or concavo convex flint glass lens. 2. What is the meaning of 1 inch diameter, 2 inches focus lens? A. The diameter of the lens would indicate its breadth, and the focus of the lens as generally understood is the principal focus, or the point at which the image is produced. 3. What size object glass will the above require, and what will be its power? Also what length tube will it require? A. It is probable that a 2 1/2 inch object glass will meet your wants.

(34) E. C. asks how to make extract of lemon and extract vanilla such as is used in cooking. A. Extract of lemon is prepared by exposing four ounces of the exterior rind of lemons in the air until partially dry; then bruise in a Wedgwood mortar; add to it two quarts deodorized alcohol of 95°, and agitate until the color is extracted; then add six ounces recent oil of lemon. If it does not become clear immediately, let it stand for a day or two, agitating occasionally. Then filter. For the vanilla, cut one ounce vanilla into small pieces and triturate with two ounces sugar to a coarse powder; put it into a percolator, pour on it diluted alcohol until one pint has run through, then mix with one pint sirup.

(35) E. M. C. asks: Is there any way of softening the putty on old sash so as to get the glass out without breaking? A. Take 1 pound of American pearl ash, 3 pounds of quick stone lime; slake the lime in water, then add the pearl ash, and make the whole of the consistency of paint. Apply it to both sides of the glass, and let it remain for twelve hours, when the putty will be so softened that the glass may be taken out of the frame with the greatest facility.

(36) G. W. B.—I notice in your paper of December 13, that G. W. B. asks what will prevent shellac from turning dark after being mixed for some time. Tell him to keep his shellac in a glass or earthen vessel, and see that his brush is neither tin nor iron bound, and he will have no difficulty; it is contact with iron that turns the shellac dark.—E. W. L.

(37) R. N. writes: I have been requested to refer a disputed question to you. It is this: A tubular boiler 60 inches diameter by 14 feet long, set in brick, 60 3/4 inch tubes, stack 30 inches diameter, 48 feet high, ample grate surface, fuel common pine (not fat pine). Evaporates 3,607 pounds water in one hour. Temperature of water feed by injector 76°; injector run by steam from boiler. What horse power is the boiler? A. Your boiler is 60 horse power.

(38) S. L. asks if it is possible to construct a working model of a compound condensing screw engine (two cylinders, say 3/4x1 1/2 for small, 1 1/2x1 1/2 large), and says: "I am told that it will not work unless I can raise steam to 90 pounds, and there is difficulty in the expansion also." A. Your engine is entirely too small to gain any advantage from the compound form.

(39) A. V. R.—We are of the opinion that of two stoves exactly alike, the one with thin clear mica around the upper part will radiate more heat through the mica than would be radiated if the panels were filled with iron. Iron gives out the most heat by convection, or the circulation of air over the surface. It is also a stronger radiant than mica, but the mica has the advantage of being transparent to the direct radiation of a red hot fire.

(40) A. C. G. asks if there is anything that I can add to a solution of nitric acid that will stop its action on metals, the article added not to exceed one-quarter the weight of the acid, and to thoroughly mix with it. A. You can neutralize the effect of the acid by adding any of the alkalis; the carbonate of soda or commercial soda ash will probably be the least expensive. Dilution with water is likewise an excellent plan. Heat the solution until the nitric acid is driven off and then add water, will perhaps be found suitable.

(41) F. J. R.—For your safety valve multiply the area of the valve by the pressure that you wish to carry, divide this sum by the weight of the ball in pounds. The quotient will be the number of times that the distance of the ball should be from the fulcrum, in parts of the distance of the center of the pin from the fulcrum. To get the area, square the diameter and multiply by 0.7854. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 13, "How to Set a Slide Valve." We do not know what you mean by 6, 8, and 10, unless to make a square. Any other numbers will answer that have the

same proportion. Practice has found these the most convenient.

(42) L. R. writes: The arm below the elbow of a statue, solid as being of stucco, is broken. I tried to stick a loose small piece with plaster of Paris, but failed; it gets dry before I manage to adjust it. Would you suggest a remedy? A. We think you were right in using plaster of Paris. Mix finely powdered plaster of Paris into a cream with water, and apply it at once; will probably prove successful. Yellow resin 2 parts melted and stirred in with an equal amount of plaster of Paris is sometimes used. In the latter case the cement is to be applied hot, and the surfaces to be united must previously be heated.

(43) S. W. F. writes: What is the remedy to remove warts and moles from the face and not be injurious to the skin? A. Croton oil under the form of pomade or ointment, and tartar emetic under the form of plaster or paste, have been successfully employed for the removal of moles. For warts see SCIENTIFIC AMERICAN of October 3, 1883.

(44) D. S. C. asks what the difference is between whiting and Paris white, or sometimes it is called cliffstone, or what is the difference between it and common chalk, and why is it called Paris white? A. Whiting and Paris white are practically the same article in different degrees of fineness, both being simply chalk, ground, elutriated, balled, and dried. Cliffstone is a better and harder variety of chalk, and is the one generally used for the preparation of Paris white. The Paris white is considered the better article; it is more carefully washed and more slowly dried than the ordinary whiting.

INDEX OF INVENTIONS

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December 30, 1884,

AND EACH BEARING THAT DATE.

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