

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.

Mittens.—3/4's of all made in the country to-day on our machines. Lamb Knitting Machine Co., Chicopee, Mass.

Steamboats supplied with Pumps for every service by Valley Machine Works, Easthampton, Mass.

Send for Special List of Second Hand Machinery. Pond Machine Tool Co., Worcester, Mass.

The patent right of Brill's patent Printer's Chase, illustrated in this number, is for sale. Address A. C. Pleyte, 1719 Walnut St., Milwaukee, Wis.

Wanted—First class Wood Pattern Maker, experienced in making patterns for brass castings. United Brass Co., Lorain, Ohio.

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

The leading Non-conducting Covering for Boilers, Pipes, etc., is Wm. Berkefeld's Fossil Meal Composition; 1/4 inch thickness radiates less heat than any other covering does with two inches. Sold in dry state by the pound. Fossil Meal Co., 48 Cedar St., N. Y.

Machinists.—Spring Calipers and Dividers, with patent washers, made by J. Stevens & Co., Box 28, Chicopee Falls, Mass.

Try our Corundum and Emery Wheels for rapid cutting. Vitrified Wheel Co., 38 Elm St., Westfield, Mass.

The Providence Steam Engine Co., of Providence, R. I., are the solebuilders of "The Improved Greene Engine."

Every variety of Rubber Belting, Hose, Packing, Gaskets, Springs, Tubing, Rubber Covered Rollers, Deckle Straps, Printers' Blankets, manufactured by Boston Belting Co., 225 Devonshire St., Boston, and 70 Reade St., New York.

Stephens' Pat. Bench Vises and Planer Chucks. See adv., p. 76.

For sale.—Large Air Compressor, 24" x 24" air cylinder; steam cylinder, 18" x 24"; coupled to one shaft, with cranks at right angles; also has 10' band, wheel 16" face. Good as new. Will be sold very low. Address Henry I. Snell, 135 N. 3d St., Philadelphia, Pa.

Experimental Machinery Perfected, Machinery Patterns, Light Forgings, etc. Tolhurst Machine Works, Troy, N. Y.

Bermuda Scientific Collections. Naturalist, Box 3359, N. Y.

Wanted.—A first-class man to superintend a Sash, Blind, and Door Factory; outfitted with all late and improved machinery; working about one hundred hands. Must be sober, a good manager, and estimator on job work. To the right man a good salary and permanent employment will be given. Or I will sell a half interest in the above well established business. Address, with full particulars as to age, habits, qualifications, and recommendation, R. F. Learned, Natchez, Miss.

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

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, 36 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. Ferracute 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, Easton, Pa.

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.

Guild & 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.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 73.

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

Woodwork'g Mach'y, Rollstone Mach. Co. Adv., p. 14.

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

We are sole manufacturers of the Fibrous Asbestos Removable Pipe and Boiler Coverings. We make pure asbestos goods of all kinds. The Chalmers-Spence Co., 419 East 8th street, New York.

Rubber Skate Wheels. See advertisement, page 18.

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

Emerson's Book of Saws Free. Reduced prices for 1885. 50,000 Sawyers and Lumbermen. Address Emerson, Smith & Co., Limited, Beaver Falls, Pa.

Hoisting Engines, Friction Clutch Pulleys, Cut-off Couplings. D. Frisbie & Co., Philadelphia, Pa.

Barrel, Keg, Hogshead, Stave Mach'y. See adv. p. 78.

Swift's Patent Coffee Roasters and Mills, 30 sizes. Lane Bros., makers, Box 276, Poughkeepsie, N. Y.

Munson's Improved Portable Mills, Utica, N. Y.

Machine for grooving chilled rolls for flour mills. Pratt & Whitney Co., Hartford, Conn.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, send for catalogue to Rowley & Hermance, Williamsport, Pa.

The Porter-Allen High Speed Steam Engine. Southwark Foundry & Mach. Co., 430 Washington Ave., Phil. Pa.

Seaming and Looping Machines, Patent Burr Wheels, Brushing Machines. Tubbs & Humphreys, Drawer 1637, Cohoes, N. Y.

Young Men! Read This! The VOLTAIC BELT Co., of Marshall, Mich., offer to send their celebrated ELECTRO-VOLTAIC BELT and other ELECTRIC APPLIANCES on trial for thirty days, to men (young or old) afflicted with nervous debility, loss of vitality and manhood, and all kindred troubles. Also for rheumatism, neuralgia, paralysis, and many other diseases. Complete restoration to health, vigor, and manhood guaranteed. No risk is incurred, as thirty days' trial is allowed. Write them at once for illustrated pamphlet free.

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

NEW BOOKS AND PUBLICATIONS.

LOCOMOTIVE ENGINE RUNNING AND MANAGEMENT. A treatise on locomotive engines. By Angus Sinclair. John Wiley & Sons, New York.

This book will be found especially valuable to engineers and mechanics who have worked their way into responsible positions, or who are doing so, through their personal energy and perseverance rather than by the aid of a regular course of study and the advantages of favorable connections. It is plainly written throughout, so that not only fremen and machinists, but those in no way connected with such business, can readily understand its statements and reasoning, yet it gives a vast amount of detail, derived from long experience of the writer as a practical engineer, and one having had charge of the motive power and repairs of a prominent branch of railway. It does not pretend to be anything more than an elementary work in mechanical engineering, but will form a valuable addition to a class of practical instruction books now finding great favor with the public.

ORIGINAL RESEARCHES IN MINERALOGY AND CHEMISTRY. By J. Lawrence Smith. Edited by J. B. Marvin. Printed at Louisville, Ky., for presentation only.

This is a memorial volume, prepared at the request of the widow of the late Professor Smith, and containing a sketch of his life written by Dr. Marvin, at the request of the American Academy of Arts and Sciences. From 1842 to 1873 Professor Smith was prominent as an original investigator in the departments of chemistry and mineralogy, having been a lecturer in the Charleston Medical College and Professor of Chemistry in the University of Virginia, and afterward succeeding Professor Silliman in that department in the University of Louisville. He was one of the earliest to point out the mineral resources of the South, and was for a number of years a mining engineer in Turkey, where he went on solicitation of the Sultan through our Secretary of State. Professor Smith died February 12, 1883, in his 65th year.

SEASONAL CLIMATIC MAPS OF THE UNITED STATES. By Charles Denison. Rand, McNally & Co., Chicago.

These maps embrace five different presentations of the climatology of the United States on a substantially mounted chart 40 by 60 inches. One side of the chart has four different views—one each for spring, summer, autumn, winter—and each showing, for those seasons, humidity, isothermal lines, direction of prevalent and wet and dry winds, altitudes, etc., while the other side shows the averages in the conditions in one large map for the whole country together. The various degrees between extreme moisture and extreme dryness are indicated by eight shadings, from deep blue to deep red. The data for these exhibits are compiled from reports of the United States Signal Office, but the way in which the information is here presented enables one to cover a very large field understandingly at a glance.

THE MAGAZINE OF AMERICAN HISTORY, edited by Mrs. Martha J. Lamb, has now entered upon its thirteenth volume. Each number of this publication always presents an admirable collection of papers, and maintains the high character of the gifted editor, who, in her history of New York city, displayed the highest qualities of an author. The magazine is as instructive as it is entertaining, its frontispiece in the February number being a portrait of the eminent Mohawk chief, George H. M. Johnson, or Onwanonsyhton, accompanied by a spirited sketch. Among other interesting articles, some of which are illustrated, are "The Early New York Post Office," "Benedict Arnold's March to Canada," "The Character of Andrew Jackson," and "Andre's Landing Place at Haverstraw." The magazine is handsomely printed and illustrated, and is sold for 25 cents a copy, \$5 a year. Office of publication, 30 Lafayette Place, New York city.

Received.

ANNUAL REPORT OF THE UNITED STATES SECRETARY OF THE TREASURY for the fiscal year ending June 30, 1884. Washington: Government Printing Office.

THE FIREMAN'S GUIDE. A handbook on the care of boilers. By Karl P. Dahlstrom. E. & F. N. Spon, New York and London.

LEE'S MAP OF THE INDUSTRIES OF PITTSBURG AND ALLEGHENY CITY. No. 2. Alex. G. Lee, Pittsburg, Pa.

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 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) G. F.—For ascertaining the volume of steam used in lifting water by an injector: From measurements of the suction tank and receiving tank ascertain the increase of bulk of receiving tank after a stated run of the injector in cubic feet of water, which multiplied by 62.43 pounds, the weight of one cubic foot of water, will give the amount of water derived from the steam in boiler. Multiply the weight of water thus ascertained by the tabular number of cubic feet of steam per pound of water for the pressure that you carry in the boiler, for the volume of steam used. You will find this table in most works on steam for every pound of variation in pressure. Thus for:

Table with 3 columns: Pressure (lb.), Cubic feet steam (1 lb. water), and 1 lb. steam (lb. water). Rows include 15 lb., 20 lb., 25 lb., 30 lb., 40 lb., 50 lb., 60 lb., 70 lb.

and so on. The temperature is not essential in any ordinary computation, as the volume of water discharged modifies the temperature and becomes the absolute basis of calculation.

(2) B. asks: What is considered the general analysis of ground beef bones? A. The following analysis by Heintz is given in Ure. It is of the femur of an ox:

Table with 2 columns: Substance and Weight. Rows include Animal matter, Phosphate of lime, Fluoride of calcium, Carbonate of lime, Phosphate of magnesia.

(3) J. M. C.—Roofing tile when properly laid has a life of several hundred years more or less, according with climate. Slate a little less. Slate is the cheapest. Roofing tile is made in New Jersey.

(4) G. P.—Make soft solder from tea lead by melting with equal part of block tin.

(5) H. A. P.—We presume annattoine is one of the numerous synonyms for annatto, the yellow coloring matter.

(6) J. H. D. asks for a cement or paste that will fasten cotton cloth on sheet iron, that will withstand the action of weather and rain. A. Use a cement made by melting equal parts of asphalt and gutta percha, and applying the mass hot under a press. See also waterproof cement, SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.

(7) F. W. S. asks: What can be added to ashes from bituminous coal, that will form good and inexpensive walks for yards and grounds used only for pedestrians? How made and how put down? A. Good hydraulic cement, equal parts by measure. Mix dry, then wet the whole quickly as in making mortar, and spread smoothly with shovel. Two inches thick is sufficient for ordinary paths.

(8) W. J. S. asks: What will remove those black flesh worms from the face? A. Cover the parts affected with a pomade consisting of kaolin 4 parts, glycerine 3 parts, acetic acid 2 parts, with the addition of a small quantity of some ethereal oil.

(9) B. F. S.—For removing ink see the answer given to queries Nos. 39 and 41, in our issue of November 22, 1884. Manhattan Island is 13 1/2 miles long, and 2 1/4 miles in width at certain points.

(10) J. B. asks how many steam boilers there are in the United States. A. According to the census of 1880, there were 72,304 boilers in use in manufacturing industries, and 5,403 steam vessels. Poor also gives the number of locomotives at 25,000.

(11) W. C. B.—Flexible tubes, such as rubber hose and the like, are largely used for transmitting the elements of power, such as steam, air, and water; but the motion due to such power has to be developed at the exit end of such tubes by appropriate appliances. Your half horse power from a blast is feasible, but we cannot construct your appliance.

(12) E. A. P. asks for receipt for making green ink that will copy. A. The receipt for a green ink is given on page 2498 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 157. The addition of a small quantity of glycerine will cause it to copy. An aniline green soluble in water and mixed with glycerine with a little alcohol should likewise give satisfactory results.

(13) E. W. A.—Locomotive wheels and car wheels vary much in size. If you will multiply the diameter of any wheel by 3.1416, and divide the number of feet in 40 miles by this sum, you will obtain the whole number of revolutions in 1 hour; divide this quotient by 60 for the revolutions per minute.

(14) J. E. L. asks: How many pounds to the square inch is called high, and how many pounds is called low, pressure of steam, when used in buildings for heating purposes and return to boiler? A. From 10 pounds upward is generally called high pressure; from 0 pound to 10 pounds, low pressure. Much of our low pressure heating is efficient with from 1 to 3 pounds.

(15) E. R. asks (1) what to add to China ink to make it flow easily and without interruptions on tracing cloth. A. It has been found, that if genuine Indian ink be rubbed with good black ink until it will flow easily from a pen, excellent results will ensue. 2. Whether there is any possibility of restoring the transparency of tracing cloth, when it has been damaged by water drops, so that in copies made by the blue process no stains will be noticed, and what should be done to the purpose? A. Tracing cloth is coated with a varnish which varies with different makers, so that the spots can be restored by coating them with the proper varnish, whatever it may be. Frequently equal parts of Canada balsam and turpentine are used.

(16) P. B.—Encke's comet is not visible as yet to the naked eye. For other particulars see illustrated article in SCIENTIFIC AMERICAN, January 24, 1885. A planet is said to be stationary when the orbital motion of the earth and the planet so coincide that the planet appears for a short time not to move in its position among the stars. The nodes are the points where the orbits of the planets intercept the ecliptic, descending south, ascending north.

(17) P. H. McN. asks: Is there any loss of motor power in the use of the reciprocating steam engine in transferring that power from the reciprocating to the rotary motion, through the crank and its connections to the main shaft? If so, what per cent? I find that engineers differ on this subject. A. Engineers do not differ so much as to the fact as they do in the methods and necessity of overcoming the apparent loss by special contrivances. Although the actual loss may be about 37 per cent, the smoothness of motion of the crank and its ease of reversion are well worthy of its loss of power over the jerky rectilinear motion. Modern engineering practice has long since settled the theoretical dispute in favor of the crank.

(18) F. J. C. asks for a receipt for frosting silver. A. Dip the article in a solution of nitric acid and water, half and half, for a few minutes, then wash well in clean water, and dry in hot sawdust. When thoroughly dry, brush the sawdust away with a soft brush, and burnish the parts required to be bright.

(19) F. H. W. asks: 1. Is there anything better than fluoric acid with which to etch on glass? A. No. The sand blast is used to a certain extent. 2. How is the matter applied, if there is any other way than by the use of wax? A. Two slightly differing processes by means of fluoric acid are described, the first on page 2690 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 169, and the second on page 4994 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 313. 3. What is the fluid sometimes called diamond ink, used to etch glass? A. Diamond ink is a trade name given to some particular variety of etching ink. See page 233 of SCIENTIFIC AMERICAN, for October 11, 1884, for method of manufacturing the same.

(20) Merlin asks for a formula for making violet or purple (the best) ink for using with the hektograph. A. The ink you desire is prepared by dissolving one part aniline blue violet in a mixture of seven parts water and one of alcohol.

(21) W. T. G. asks the most effective stain for ash. I desire to stain a dark color, say imitation of ebony. If this wood can be effectively stained ebony, will you be good enough to give me a good recipe for such a stain, and say whether it should be put on hot or cold. A. We recommend the following: Dissolve 4 ounces shellac with 2 ounces borax in 1/2 gallon of water. Boil until a perfect solution is obtained. then add 1/2 ounce glycerine, after which add, in sufficient water, soluble aniline black, and the mixture is ready for use. See also process given under "Dyeing Wood Black," in SCIENTIFIC AMERICAN SUPPLEMENT, No. 207.

(22) J. E. J. desires a formula for mixing water colors, so as to form cakes that won't crack in drying. A. Water colors mixed with gelatine, and afterward fixed by washing with a solution of alum or with curd of milk, washed and pressed, then dried on fine net, and, when required for use, mixed with water and the coloring matter.

(23) Q. C. A. asks: 1. Is there any known chemical or substance that will remove the stain or scar produced by the burn of sulphuric acid (on the flesh)? It was done about two months ago, and left a dark red stain and scar. A. We know of nothing that will remove the scar, except time. The skin is burnt, and it will take time for a new cuticle to grow. 2. Please give me a receipt for gold ink. I can make it, but have trouble in keeping the bronze held in solution; it settles. A. For gold ink, take 24 leaves gold; 1/2 ounce bronze gold; 30 grains best honey; 4 drachms gum arabic; 30 drops spirits of wine; 4 ounces rain water. Rub the gold with the honey and gum, and having mixed it with the water, add the spirit.

(24) V. C. H.—To definitely express an opinion concerning the proper means of preventing boiler scale is almost impossible without an exact knowledge of the composition of the water u ed, etc. On page 4553 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 286, you will find an article on the "Complete Prevention of Boiler Incrustations." In SUPPLEMENT, No. 137, tannates of soda are recommended. In general all woods rich in tannin are used. Filtering through iron may be advantageous for drinking purposes, but we do not see that it will affect the lime salts contained in the water.

(25) A. P. C. asks how to remove painted letters from a brick building. A. To properly answer your question, the conditions must be more thoroughly explained. To remove paint from stone, use three pounds of common washing soda dissolved in a gallon of boiling water. This, if applied hot, will so soften the paint that in a short time, it can be readily removed with a stiff scrubbing brush.

(26) J. De L. T. writes: Given two vessels for milk setting, of same diameter, A being four inches deep, B being forty inches deep, is it a fact that cream will rise quicker in B than in A? Or, in other words, is it a fact that cream in B will not take ten times (or about) more time to rise than in A? A. The cream in B will rise quicker on account of its containing a greater amount of milk, but not quicker in proportion to whole amount. It is more a matter of practical experiment than any demonstration of a scientific principle.

(27) A Reader asks (1) if there is any solvent for vulcanized rubber. A. Chloroform, carbon bisulphide, and naphtha are among the solvents for rubber. 2. How are old rubbers made over into new ones? A. Old rubbers are chopped fine, cut with naphtha, and then worked over with a certain proportion of new or original rubber. 3. Is solid rubber type vulcanized in metal or plaster moulds? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 251, for information concerning rubber type.

(28) B. & Co. write: We wish to place tin foil on japan tin with a mullage or cement so that it will dry and cleave to the japan so firmly that water or weather will not remove it. A. Try the following: Make a dilute solution of white gelatine or isinglass; the proper proportions are one to twenty; add a little potassium bichromate, and apply it by means of a pencil or sponge. It does not adhere at once, but will do so in a short while.

(29) W. S. N.—The imitation grapes are made of thin blown glass subsequently coated with a varnish of the coloring material. They can only be made by an experienced glass blower.

(30) W. G. writes: In describing on page 20 how to make balloons and soap bubbles of collodion, you do not say how such a solution should be made; will you state how a collodion solution must be made, to answer the above named purposes? A. Collodion is prepared by mixing 21 fluid ounces of stronger ether with 6 fluid ounces stronger alcohol in a suitable bottle, add the quantity of gun cotton, and shake until dissolved. It can be purchased directly from any dealers in photographic supplies.

(31) P. R. writes: What is the greatest steam pressure a boiler 4 feet long, 15 inches diameter, 22 one-inch flues will stand? The shell one-eighth inch steel, heads three-sixteenths inch steel, with a strength of 65,000 pounds. What is the horse power of such a boiler, a plain cylinder, with fire under it, to go to one end and return through the flues? What is the power of an oscillating engine 2 1/2 inches by 4 1/2 inches stroke, running at 300 revolutions a minute at the pressure the boiler will safely stand? A. Your boiler should bear a working pressure of 50 pounds per square inch, and rates a little less than 2 horse power. Your engines rate 1 1/2 horse power at speed of 300 with 30 pounds mean pressure.

(32) F. H. R. writes: Photographers usually save the clippings of the sensitive albumen paper, filter papers, etc., which are subsequently reduced to ashes and sent to the assayer to be reduced to the metallic state, to be afterward converted into nitrate of silver again. Can you suggest any plan by which the ashes can be converted into nitrate of silver without first being brought to the metallic state? A. It is best to prepare the nitrate from metallic silver. You can, however, reduce the silver yourself by fusing it with a little borax in a sand crucible in an ordinary coal fire. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 307.

(33) W. D. F. and H. B. S. ask: Is it a fact that the upper part of a wheel of a vehicle driven over the ground revolves faster than the lower part? If so, please explain the cause? A. The top does not revolve around the axle any faster than the bottom. The top moves along the road twice as fast as the axle. The bottom stands still in relation to the road, but moves backward in relation to the vehicle. The misapplication of a word gives rise to much disputation. A wheel revolves on its own center, and every portion of its periphery has the same relation to its center in regard to speed.

(34) E. K. G. asks: What is the process of preparing and sensitizing paper for solar camera printing? A. The following method of preparing paper for solar printing is given by Libois: Take thin Saxe paper, and float it for a minute on the following salting solution:

- Chloride of ammonia..... 4 drms.
Citric acid..... 4 "
Rain water..... 25 oz.

The citric acid is first dissolved in two and a half ounces of water and completely neutralized by bicarbonate of soda, five drachms of which are required to neutralize three drachms of the acid. The solution of citrate of soda thus formed is added to the solution of chloride of ammonium. The solution must have a slight acid reaction, which is attained by the addition of a few drops of a solution of citric acid. A small quantity of boiled arrowroot is also mixed with this bath, which is said to improve the final tones. The paper is next hung up to dry, after which it is sensitized by floating on the following bath for half a minute:

- Nitrate of silver..... 1 oz.
Water..... 18 "

The bath is acidified with a few drops of a solution of citric acid. The first few drops produce a slight precipitate of citrate of silver, which is at once dissolved by the succeeding drops. When this is effected, the bath is sufficiently acid. It is important that the paper be thoroughly dried before it is pinned on the focusing screen in the camera. For exposure and directions regarding development, see Notes and Queries, No. 6, page 90, of SCIENTIFIC AMERICAN, vol. lii.

(35) J. C. W. asks whether brass will do for an engine cylinder 4x5. How thick should the casting be? What sized ports and bridges should be used? What kind of material for packing rings: if brass will do? A. Ordinary yellow brass is not fit for a cylinder. If you make a composition of 1 pound copper to 3 ounces tin, you have a good metal. Make the cylinder 1/2 inch thick except where needed thicker around steam ports. Ports 1/8 x 2 1/2. Exhaust 3/8 x 2 1/2. Bridge 3/8 wide.

Make the packing rings of above composition. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 34, for proportions of engines.

(36) E. B. asks for a receipt for a gold paint such as is used on steam heating racks put on with a brush. A. Steam heating racks are generally coated with bronze powder, but you can use a golden varnish such as the following: Pulverize 1 drachm of saffron and 1/2 drachm of dragon's blood, and put them into 1 pint spirits of wine. Add two ounces of gum shellac and 2 drachms of Socotrine aloes. Dissolve the whole by gentle heat. Yellow painted work varnished with this mixture will appear almost equal to gold.

(37) F. L. asks: 1. What is the receipt for the fluid in a barometer, which seems to be made of a test tube filled with water and gum camphor? A. A simple weather glass is thus made: Take a glass tube about ten inches in length and one inch in diameter, and fill it nearly to the top with the following liquid: Two parts camphor, one part nitrate of potash, and one part sal ammoniac, dissolved in strong spirit of wine, then add water until the camphor is partially precipitated. The extremity of the tube can be left open or hermetically closed, but is fixed in a vertical position against the wall or a board. This kind of a weather glass is very uncertain in its operation, but it is claimed that if the weather is to be fine the substances will remain entirely at the bottom of the tube, and the liquid will be clear, but that before rain crystals will form. 2. Is the wire on an electromagnet wound in the same direction on both coils? A. Yes.

(38) J. P. asks the formula to find the diameter of the following: In the curve of a railway I stretched a line 80 feet in length, and the distance from the line to the curve was 9 inches. Required the diameter of the circle. A. When the chord and versed sine are given, to compute the diameter, divide the square of the chord of half the arc by the versed sine. For the chord of half the arc, take the square root of the sum of the squares of half the chord of the arc and the versed sine. Half chord = 40 feet, or 480 inches; 480^2 + 9^2 = 230,481, which is the square of the chord of half the arc. Then 230,481 = 25,009 inches

9 versed sine = 12' to 1 foot
-2,134' 1" = diameter of the circle.
Another and convenient rule: Divide the square of 1/2 the chord by 1/2 the versed sine, and add to the quotient 1/2 the versed sine; the sum equals the radius. As in your question: 20^2 = 1,066'666 + 375 = 1,067'0416 = radius. 2,134'0832 = diameter.

(39) H. C. W. writes: I have a telescope with a 2 1/2 inch object glass, but I mistrust the effective aperture is much diminished by the internal structure of the instrument. Is there any way I can test whether it gives as large a field as it ought? A. Look inside of the tube with the eye piece taken out, and find if the diaphragm interferes with the sight of the edge of the object glass. If the whole surface of the object glass cannot be seen, the diaphragms have been put in to cover defects in the definition of the glass.

(40) S. T. C. asks: How are small iron castings made a bright copper color? A. Make a solution in water of the ordinary blue vitriol of commerce, and use it as a bath. Its strength may differ according to the time the articles are immersed.

(41) F. P. W. asks: How is the dead white surface produced on the dials of aneroid barometers? A cyanide solution would dissolve the black letters and figures, which are made of shellac, and the surface is not like that produced by "cold silvering." A. The shellac letters are not made until after the matte surfacing is done, and they are not affected by the cyanide solution. The dead surface is produced on metal by the electrical battery bath or by a "silver powder" of precipitated silver, cyanide of potassium, whiting, and ammonia, rubbed on by a chamois skin pad. If the material is paper or wood, the surface is made by painting with silicate of soda and dry zinc paint. These articles can be procured mixed in proper proportions at a druggist's or paint shop.

(42) C. N. V.—The following is used for the transferring of engravings on wood. Take a saturated alcoholic solution of potash, pour the solution on the engraving, and immediately remove all the superfluous liquid by means of blotting paper. Lay the engraving while damp upon the wood or other material to which it is to be transferred, and place it in a press (a copper plate press is the best). The transfer will be obtained immediately. The engraving must be immersed in clear cold water after removal from the potash bath and before putting it into the press. Good wood engraving commands excellent prices. In regard to selecting a profession, we cannot advise you. Competent men will succeed in any profession.

(43) J. C. T. asks: What is the greatest pressure ever used in the largest ordnance or produced with the largest charges used by artillerymen in the world? A. About 40,000 pounds to the square inch.

(44) R. B.—The finish on copper goods is made with a burnisher to harden the surface, when a rouge polish gives it a luster. The copper is toned previous to burnishing, by boiling in a sulphuric acid and water pickle, about 1 part acid to 6 of water.

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