

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Wanted immediately.—First-class experienced Salesman to sell State rights for a valuable patent. Give terms and particulars. Address F. F. F., Lowell, Mass.

Superintendent wanted for factory near New York. Must understand machine shop, wood shop, foundry, blacksmithing, etc., according to modern customs and be a man of proved ability. Address, stating experience, expectations, etc., "Wood and Iron," care of William Young, 21 Park Row, New York.

Contracts taken to manuf. small goods in sheet or cast brass, steel, or iron. Estimates given on receipt of model. H. C. Goodrich, 66 to 72 Ogden Place, Chicago.

Wanted.—Second-hand Engine, four to six horse power; Baxter preferred. John J. Rosa, Milford, Del.

For Sale Cheap: 4½ in. Equatorial Telescope, Prisms, Eyepieces, Spectroscope, Micrometer. Dr. T. A. Hoard, Utica, N. Y.

Foreman Blacksmith, Drops, Punches. See adv., p. 269.

Brush Electric Arc Lights and Storage Batteries. Twenty thousand Arc Lights already sold. Our largest machine gives 65 Arc Lights with 35 horse power. Our Storage Battery is the only practical one in the market. Brush Electric Co., Cleveland, O.

How Consumption may be Prevented and often Cured without Medicine. A Hygienic Lecture mailed for 10 cents. Dr. W. H. Benson, Staunton, Va.

Am. Twist Drill Co., Meredith, N. H., make Pat. Chuck Jaws, Emery Wheels, Grinders, automatic Knife Grinders, American Fruit Drier. Free Pamphlet. See ad., p. 350.

Curtis Pressure Regulator and Steam Trap. See p. 349.

Brass & Copper in sheets, wire & blanks. See ad., p. 350.

The Chester Steel Castings Co., office 407 Library St., Philadelphia, Pa., can prove by 20,000 Crank Shafts and 15,000 Gear Wheels, now in use, the superiority of their Castings over all others. Circular and price list free.

Diamond Saws. J. Dickinson, 64 Nassau St., N. Y.

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

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

Gear Wheels for Models (list free); Experimental Work, etc. D. Gilbert & Son, 212 Chester St., Phila., Pa.

Hand and Power Bolt Cutters, Screw Plates, Taps in great variety. The Pratt & Whitney Co., Hartford, Ct.

20,000 Duc Spherical Elevator Buckets, sizes 3½ to 17 inches, constantly on hand. Telegraphic orders filled. T. F. Rowland, sole manufacturer, Brooklyn, N. Y.

First Class Engine Lathes, 20 inch swing, 8 foot bed, now ready. F. C. & A. E. Rowland, New Haven, Conn.

Straight Line Engine Co., Syracuse, N. Y. See p. 349.

Lightning Screw Plates, Labor-saving Tools, p. 248.

Engines, 10 to 50 horse power, complete, with governor, \$250 to \$550. Satisfaction guaranteed. More than eight hundred in use. For circular address Heald & Morris (Drawer 127), Baldwinsville, N. Y.

Metal Patterns, Punches and Dies to order. Geo. Van Sands, Middletown, Conn.

Drop Forgings.—Billings & Spencer Co. See adv., p. 316.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 333.

The Sweetland Chuck. See illus. adv., p. 334.

Knives for Woodworking Machinery, Bookbinders, and Paper Mills. Taylor, Stiles & Co., Riegelsville, N. J.

Best Squaring Shears, Tinners', and Cannery Tools at Niagara Stamping and Tool Company, Buffalo, N. Y.

Lewis' Combination Force Pump makes three machines made of brass throughout. See Adv. page 317.

Saw Mills, Hauck & Comstock, Mechanicsburg, Pa.

Catalogues free.—Scientific Books, 100 pages; Electrical Books, 14 pages. E. & F. N. Spon, 44 Murray St., N. Y.

See New American File Co.'s Advertisement, p. 302.

Woodwork'g Mach'y. Rollstone Mach. Co. Adv., p. 300.

Steam Pumps. See adv. Smith, Vaile & Co., p. 300.

Stenographers, type-writers, clerks, and copyists may be obtained free of charge at the Young Women's Christian Association, 7 East 15th Street, New York.

Lathes 14 in. swing, with and without back gears and screw. J. Birkenhead, Mansfield, Mass.

Five foot planers, with modern improvements. Geo. S. Lincoln & Co., Phoenix Iron Works, Hartford, Conn.

The Best.—The Duerber Watch Case.

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, 261 Broadway, New York.

Farley's Directories of the Metal Workers, Hardware Trade, and Mines of the United States. Price \$3.00 each. Farley, Paul & Baker, 530 Market Street, Phila.

Improved Skinner Portable Engines. Erie, Pa.

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

Permanent Exposition.—Inventors' Institute, Cooper Union, N. Y. City. Every facility for exhibition of machinery, merchandise, and inventions. The expense is small—the advantages great. Send for particulars.

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.

Lists 29, 30 & 31, describing 4,000 new and 2d-hand Machines, ready for distribution. State just what machines wanted. Forsyth & Co., Manchester, N. H., & N. Y. City.

"Abbe" Bolt Forging Machines and "Palmer" Power Hammers a specialty. Forsyth & Co., Manchester, N. H.

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

25' Lathes of the best design. G. A. Ohl & Co., East Newark, N. J.

"How to Keep Boilers Clean." Book sent free by James F. Hotchkiss, 84 John St., New York.

Wanted.—Patented articles or machinery to make and introduce. Gaynor & Fitzgerald, New Haven, Conn. Recent Advances in Electricity. 170 pp., 8vo., \$2. Latest and best book out. School of Electricity, N. Y.

Water purified for all purposes, from household supplies to those of largest cities, by the improved filters manufactured by the Newark Filtering Co., 177 Commerce St., Newark, N. J.

Latest Improved Diamond Drills. Send for circular to M. C. Bullock Mfg. Co., 80 to 88 Market St., Chicago, Ill. For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Ice Making Machines and Machines for Cooling Breweries, etc. Pictet Artificial Ice Co. (Limited), 142 Greenwich Street. P. O. Box 5033, New York City.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J. Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works. Drinker St., Philadelphia, Pa.

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

Supplement Catalogue.—Persons in pursuit of information on 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.

NEW BOOKS AND PUBLICATIONS.

Die Massenverhältnisse des Menschlichen Herzens. (THE PROPORTIONS OF THE CONSTITUENTS OF THE HUMAN HEART.) By Wilhelm Müller, Director of the Pathological Institute of the University of Jena. Hamburg and Leipzig: Leopold Voss, 1883. 220 pages.

The author examined 1481 hearts during the five years from 1877 to 1881, and tabulated the results obtained, with the greatest care. He gives tables of the length, the absolute weight, and the proportionate weight of each heart, the age of the person from whom the heart was taken, and the main cause of death. The work is of especial interest to medical students.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) E. A. B.—The impurities commonly found in rock salt are generally of an earthy, sandy, or ferruginous-ocherous nature. These it is impossible to separate from the dry salt by known mechanical means, but if the substance is liquefied the separation becomes a comparatively easy matter. As commonly practiced the operation of refining is as follows: The native salt is shoveled into a series of large cisterns or wooden vats arranged so that water entering the first will gradually overflow into the next and so on to the last (five vats are the usual number). Water (pure) is allowed to enter slowly into the first reservoir at or near its bottom and percolate upward through the broken salt rock. An overflow tube near the top of the vessel carries off the resulting salt solution to the next cistern or vat. If these cisterns or vats are kept well filled with the broken rock salt, the liquid flowing from the last of the series will be a saturated solution of salt. This is drawn off into large tubs or cisterns and allowed to stand for three hours to deposit the impurities. The clear liquid is then run into shallow pans and allowed to evaporate and crystallize by contact with dry air, or is first concentrated by boiling down in large caldrons seated on a furnace. In another plan of concentration lately developed the solution is caused to flow slowly downward over a series of pipes heated by circulation of steam under pressure within them.

(2) M. M. H.—One of the simplest methods of recovering silver from waste solutions is the following: First dilute the liquid about one-third with water (double this quantity if much gum is present), heat the solution to about 180° Fah., and gradually add solution of pure sulphate of iron (iron sulphate 5 ounces, water 1 pint) until no further precipitate forms. Decant the liquid portion, throw the precipitate on a filter, and wash it thoroughly with hot water. To the washed precipitate—consisting of finely divided metallic silver—add strong pure nitric acid and heat over a water bath until the silver has all been dissolved. Evaporate to dryness over the water bath (in a porcelain dish, capsule) and dissolve the residue in hot water (distilled or rain). Filter this solution and concentrate it over a water bath, then set it aside to crystallize. Remove the crystals, concentrate in a similar manner the mother liquid, and obtain another crop of crystals. These crystals (of nitrate of silver) are pure enough for ordinary purposes, but if required to be used

for photographic purposes they should be redissolved in water and recrystallized. Where the liquid containing the silver contains also much insoluble organic matter, it is sometimes preferable to separate the silver by evaporating the liquid to dryness and fusing the residue with an equal quantity of borax glass in a black lead crucible.

(3) F. A. C. asks: What will be the power of an engine 1¼ inch bore and 2¼ inch stroke, making 200 revolutions per minute with 40 pounds of steam, common slide valve engine? A. About one-twelfth of one horse power.

(4) E. G. A. writes: I am building a small portable engine, boiler twenty by ten inches and three-sixteenths thick boiler plate. What pressure of steam would be safe, and how may I conveniently test it by hydrostatic pressure? A. If well made, 150 pounds per square inch. 2. What pressure would raise a valve one-fourth inch in diameter, and lever pivoted three-fourths inch from valve stem and 1 pound weight, 4 and 6 inches from valve stem? Also please give me a rule for calculating safety valves, if there be such a rule. A. You can prove by a force pump, and having a proper gauge to show the pressure. Rule for safety valves: Multiplying the area of the valve in inches by the pressure per square inch, gives the total pressure, and that sum divided by the number of "leverages" will give the necessary weight, not taking into account the weight of valve and lever. Do not make your valve less than a half inch diameter.

(5) M. E. S. inquires for information as to tractive force upon macadamized roads. A. Some interesting experiments have recently been made to ascertain the tractive force requisite to move street cars and vehicles on a macadamized road. The apparatus used consisted of an inclined plane, at the upper end of which was an iron wheel, over which passed a rope. A loaded box car weighing, with its contents, 12,820 pounds was drawn up the grade by a weight of 970 pounds, suspended at the other end of the rope. The empty car, weighing 4,820 pounds, was drawn up the same grade by a weight of 283 pounds. A smaller box car, weighing when empty 2,730 pounds, was occupied by fourteen persons, and drawn up by 339 pounds, and when unoccupied by 176 pounds. An ordinary load of sand on a macadamized road was started by 514 pounds, and an empty hack, weighing 1,550 pounds, by 196 pounds. The same hack, with four passengers inside, required 236 pounds to move it. On a level road the load of sand was started by 240 pounds, while the large box car yielded to 56 pounds. These experiments were made by a horse railroad company to prove that their work was not unusually severe for the horses.

(6) P. G. H. asks for a cement for gas retorts. A. For cementing earthenware gas retorts, which have to withstand very high temperatures, the following cement can be used: Powdered glass, 5 parts; chamotte meal, 5; powdered borax, 1. Chamotte meal is obtained by pulverizing broken pieces of gas retorts. This cement is a hard glass, which only melts at the highest temperatures, then closes the leaks in the retort. To render the iron retort cover which closes the retort air tight, a cement is used consisting of schwerspath powder, to which as much soluble glass has been mixed as to obtain a paste of sufficient strength.

(7) S. B. P. asks: Will you give the formula for making a good paste stove polish? A. The following liquid stove polish is recommended:

Pulverized black lead.....2 pounds.
Spirits of turpentine.....2 gallons.
Water.....2 ounces.
Sugar.....2
Mix.

(8) J. L. B. and J. J. ask for a receipt for taking printing ink out of paper. A. This is not an easy matter. It is said, however, that it can be accomplished to a limited extent by means of ether or a solution of soap in water, naphtha, benzol, hot solutions in water of potassium or sodium hydroxide (caustic potash or soda).

(9) J. H. asks how to erase scratches made by amalgam on vulcanized black rubber plate and cylinder friction electric machines. How are the plates polished to keep from fouling by amalgam? A. The best way to prevent the scratches is by making the amalgam very fine and to apply it with tallow. Scratches made on glass cannot be removed except by grinding the glass, which is more expensive than purchasing new glasses. The rubber plates would have to be repolished.

(10) J. S. D. asks (1) how to make liquid glass or as it is sometimes called water glass. Will it solidify when in bulk, and if so in what is it soluble? A. The alkaline silicates are prepared by pressing silica with the hydrates, carbonates, nitrates, or other salts of the alkali, metals containing volatile acids or by boiling flint, sand, etc., in with strong solutions of the caustic alkalis under pressure. For full details see SCIENTIFIC AMERICAN SUPPLEMENT, page 5061, No. 317. 2. How can I make a night light with sweet oil and phosphorus? Is anything necessary, and should the vessel containing them be kept air tight? A. See answer to query No. 54, current volume, issue for Jan. 13, 1883.

(11) W. A. F.—Chloride of gold is prepared by dissolving gold in nitro muriatic acid, evaporating to dryness, and dissolving the resulting crystals in water. We would recommend you to purchase the chloride of gold. Its manufacture is attended with dangers which in the hands of an inexperienced may lead to serious accidents.

(12) W. T. V. asks: 1. What is the best solvent for India rubber gum? A. According to the *British Journal of Photography*, a mixture of methylated ether and petroleum spirit is said to be the best solvent. 2. How is rubber cement made? A. See formulas for cements in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158. 3. Will pure Para gum answer in place of gutta-percha where the latter is given in a formula for cement? A. It is probable the substitution can be made; however, the Para rubber is more expensive.

(13) J. W. S. writes: I have a cambric balloon which is too porous to retain heated air in order to make it ascend. What can I coat it with to make it air tight, flexible, and at the same time add but little weight to it? A. Apply a varnish made as follows: Melt India-rubber in small pieces with its weight of linseed oil, and thin with spirits of turpentine.

(14) A. D. F. asks: 1. What is the best filling for mahogany, and how made and used? A. Take equal parts by weight of whiting, plaster of Paris, pumice stone, and litharge, to which may be added a little French yellow, asphaltum, Vandyke brown, and terra di Sienna. Mix with 1 part japan, 2 of boiled oil, and 3 of turpentine; grind fine in a mill. Lay the filling in with a brush, rub it in well, let it set 20 minutes, and then rub it clean. 2. What is used to stain or color mahogany and cherry to give them the appearance of age? A. Boil half a pound madder and 2 ounces logwood chips in a gallon of water and brush well over while hot; when dry go over the whole with pearl ash solution, 2 dr. to the quart. 3. What is the process used to photograph on wood for making wood cuts? A. Consult SCIENTIFIC AMERICAN SUPPLEMENT, No. 53. 4. What simple cement or compound will fasten a paper label to glass and not be affected by moisture or be easily removed? A. Starch paste with which a little Venice turpentine has been incorporated while it is warm. 5. Is hyposulphite sodium made in this country? A. It is.

(15) F. J. F. asks: What ingredients are necessary for making ten pounds of roller composition for a printing press? A. Cooper's best glue 8½ pounds, extra sirup 2 gallons, glycerine 1 pint, Venice turpentine 2 ounces. Steep the glue in rain water until pliant, and drain it well. Then melt it over a moderate fire, but do not cook it. This will take from 15 to 25 minutes. Next put in the sirup and boil three-quarters of an hour, stirring it occasionally and skimming off impurities rising to the surface. Add the glycerine and turpentine a few minutes before removing from the fire, and pour slowly. Slightly reduce or increase the glue as the weather becomes colder or warmer.

(16) C. D. E. asks what preparation awning and tent makers use to prevent their canvas from mildewing. A. Use the following: Alum, 2 pounds dissolved in 60 pounds water; blue vitriol, 2 pounds dissolved in 8 pounds water; to which is added gelatine, 1 pound dissolved in 30 pounds water; lead acetate, half a pound dissolved in 30 pounds water. The solutions are all hot, and separately mixed, with the exception of the vitriol, which is added. See also receipts for waterproofing cloth. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 317.

(17) W. O. C. asks: 1. How can I clean shells? A. To clean shells; Make a lye by boiling strong ashes, allow it to settle, pour the lye over the shells, and boil them six or seven hours, or longer if they are large; then soak and wash frequently in fresh water. 2. How to glaze pipes without heating. A. As to glaze for pipes, see SCIENTIFIC AMERICAN SUPPLEMENT, No. 226, for varnishes to protect iron.

(18) J. H. writes: Please give me, in your column of Notes and Queries, a good paste or glue for attaching paper labels to stone, Indian relics, geological specimens, etc.

A. Starch.....2 drachms.
White sugar.....1 ounce.
Gum arabic.....2 drachms.
Water.....q. s.
Dissolve the gum, add the sugar, and boil until the starch is cooked.

(19) E. P. asks for a receipt for bleaching ivory. A. See article on Hydrogen Peroxide for this purpose, page 5572, SCIENTIFIC AMERICAN SUPPLEMENT, No. 349.

(20) E. P. W. asks: What mixture can be put into paint or on to canvas, before it is painted, to prevent it from absorbing so much paint? A. Size your canvas with rather thin glue size.

(21) B. B. asks: Will you inform me what metal or substance is the most sensitive to heat or cold—that will expand or contract the most? I wish to get something that one or two degrees will affect. A. After mercury, zinc is the metal most sensitive to heat and cold.

(22) K. N. asks: 1. What is the composition of water glass and what its properties? A. Read SCIENTIFIC AMERICAN SUPPLEMENT, No. 317, page 5061. 2. What authorities can I read on the subject? A. See "Watts' Dictionary of Chemistry," under head of Silicates, also "Spon's Encyclopedia of the Industrial Arts," and like technological dictionaries. 3. Is there any combination with which color can be given to glass (stain glass) so as to withstand heat and water without danger? A. Aniline colors dissolved in alcohol can be mixed with water glass. Ordinary glass if treated by the La Bastie process will stand heat and water.

(23) F. A. B. asks how the aniline ink for rubber stamps is made. A. Dissolve crystallized aniline black, half an ounce, in pure alcohol, 15 ounces, and add concentrated glycerine, 15 ounces, to the solution. This liquid is poured upon the cushion and rubbed with a brush.

(24) J. R. M. writes: I am greatly annoyed by a continuous output of soot from my chimney flues, especially the kitchen flue, where I have a portable range attached. My chimneys are all considerably higher than the roof of the house, they have terra cotta tops on, and have only been in use one year. Yet they throw out soot almost continually, which falls like rain over my new paints. Can you suggest a remedy? A. Probably your best plan is to clean your chimney and burn anthracite coal. You do not mention what kind of coal you burn; take it for granted that you burn bituminous. With this coal, perfect combustion is the only remedy for sooty chimneys and atmosphere. Perfect combustion can only be had by applying some smoke consuming device or by feeding the fresh coal beneath the fire so that the smoke will have to traverse the hot coal. This arrangement is provided for in stoves and ranges in the Western market.