

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. The publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every weekly issue.

Wanted—The address of Mr. Good, or any manufacturer of Steam Generators inside the fire box or furnace of steam boilers. Address M. L. Slocum, Point Washington, Florida.

Books on Applied Science. Catalogue free. E. & F. N. Spou, 446 Broome St., New York.

For a thorough practical education in the duties of steam and mechanical engineers and firemen, apply to the National Institute, Stamford, Conn. For pamphlet and particulars, address Hy. R. Foote, C.E., Director.

Steam Traps; best and cheapest in use. No blowing through to start. T. Sault, New Haven, Conn.

The Friction Clutch that is doing work in many places satisfactorily, that has never been done by any other, can be seen at Institute Fair, New York. D. Frisbie & Co., New Haven, Conn.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, importers Vienna lime, crocus, etc. Condit, Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

The Secret Key to Health.—The Science of Life, or Self-Preservation. 300 pages. Price, only \$1. Contains fifty valuable prescriptions, either one of which is worth more than ten times the price of the book. Illustrated sample sent on receipt of 6 cents for postage. Address Dr. W. H. Parker, 4 Bulfinch St., Boston, Mass.

The Baker Blower runs the largest sand blast in the world. Wilbraham Bros., 2318 Frankford Ave., Phila., Pa.

Forsyth & Co., Manchester, N. H., & 213 Center St., N. Y. Bolt Forging Machines, Power Hammers, Comb'd Hand Fire Eng. & Hose Carriages, New & 2d hand Machinery. Send stamp for illus. cat. State just what you want.

Wright's Patent Steam Engine, with automatic cut-off. The best engine made. For prices, address William Wright, Manufacturer, Newburgh, N. Y.

For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

H. Prentiss & Co., 14 Dey St., New York, Manufs. Taps, Dies, Screw Plates, Reamers, etc. Send for list.

Presses, Dies, and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., N. Y.

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

Silent Injector, Blower, and Exhauster. See adv. p. 269.

Steam Excavators. J. Souther & Co., 12 P.O. Sq. Boston.

Bradley's cushioned helve hammers. See illus. ad. p. 270.

Sheet Metal Presses, Ferracute Co., Bridgeton, N. J.

Band Saws a specialty. F. H. Clement, Rochester, N. Y.

Eclipse Portable Engine. See illustrated adv., p. 189.

Brass or Iron Gears; list free. G. B. Grant, Boston, Eagle Anvils, 9 cents per pound. Fully warranted.

Patent Steam Cranes. See illus. adv., page 222.

Yacht Engines. F. C. & A. E. Rowland, N. Haven, Ct.

Draw'g Insts. & Mat. Woolman, 116 Fulton St., N. Y.

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

Noise-Quelling Nozzles for Locomotives and Steamboats. 50 different varieties, adapted to every class of engine. T. Shaw, 915 Ridge Avenue, Philadelphia, Pa.

Stave, Barrel, Keg, and Hoghead Machinery a specialty, by E. & B. Holmes, Buffalo, N. Y.

Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

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

Portable Railroad Sugar Mills, Engines and Boilers. Atlantic Steam Engine Works, Brooklyn, N. Y.

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

Repairs to Corliss Engines a specialty. L. B. Flanders Machine Works, Philadelphia, Pa.

Cut Gears for Models, etc. (list free). Models, working machinery, experimental work, tools, etc., to order. D. Gilbert & Son, 212 Chester St., Philadelphia, Pa.

Steam Heat Appa. Superior construction. See illustrated ad. p. 269.

Holly System of Water Supply and Fire Protection for Cities and Villages. See advertisement in SCIENTIFIC AMERICAN of this week.

Pays well on small investments; Magic Lanterns and Stereopticons of all kinds and prices; views illustrating every subject for public exhibition and parlor entertainments. Send stamp for 80 page Illustrated Catalogue. Centennial medal. McAllister, 49 Nassau St., New York.

Electro-Bronzing on Iron. Philadelphia Smelting Company, Philadelphia, Pa.

Hydraulic Cylinders, Wheels, and Pinions, Machinery Castings; all kinds; strong and durable; and easily worked. Tensile strength not less than 65,000 lbs. to square in. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

Fleetwood and Dexter Scroll Saws, Tool Chests, etc. Send for circular. Jas. T. Pratt & Co., 53 Fulton St., N. Y.

Catechism of the Locomotive, 625 pages, 250 engravings. The most accurate, complete, and easily understood book on the Locomotive. Price \$2.50. Send for a catalogue of railroad books. The Railroad Gazette, 73 Broadway, New York.

Wm. Sellers & Co., Phila., have introduced a new injector, worked by a single motion of a lever.

or Shafts, Pulleys, or Hangers, call and see stock at 79 Liberty St., N. Y. Wm. Sellers & Co.

Wanted—A practical Miner, with capital, to work an iron mine, with all necessary machinery on the spot. Good inducements offered. Capitalists will find this an excellent investment. Address R. W. S., Post Office, Montreal, Canada.

The New Economizer, the only Agricultural Engine with return flue boiler in use. See adv. of Porter Mfg. Co., page 270.

The E. Horton & Son Co., Windsor Locks, Conn., manufacture the Sweetland Improved Horton Chuck.

Wanted—A competent young man to write specifications of patents in an attorney's office, and instruct inventors in matters relating to patent law. A young lawyer preferred. The very best references required. Address, stating terms, previous employment, etc., "Examiner," Post Office Box 2979, New York.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co., Box 423, Pottsville, Pa. See p. 285.

The Dupligrath. Price \$3 and \$5. Quickest, cheapest, and best for duplicating letters and pen drawings. 5,000 impressions. Specimens and circulars for stamp. Fortunes to Agents. Wm. R. Brooks, Phelps, N. Y.

Valve Refitting Machine. See adv., page 269.

Special Wood-Working Machinery of every variety. Levi Houston, Montgomery, Pa. See ad. page 269.

A Hardware House in Birmingham, England, wish to purchase, or work under a royalty, some patented article of general utility connected with the hardware trade. Holders of patents for such articles would do well to address John Norton & Sons, P. O. Box 1901, New York, giving full particulars.

To Inventors.—Will purchase Patented Articles which can be made of tin, or on royalty. Toys, Household articles preferred. Tin Toys, P. O. Box 773, N. Y. City.

NEW BOOKS AND PUBLICATIONS.
LECTURES ON POPULAR AND SCIENTIFIC SUBJECTS. Trubner & Co., London.

It is not often that a member of the English House of Lords takes sufficient interest in scientific and mechanical matters to write and lecture on these subjects. The Earl of Caithness, author of the above work, is unlike in this respect most of the members of the English Parliament, and it is perhaps to this fact that the volume before us possesses increased interest. The work is composed of several chapters devoted to such subjects as Coal and the Coal Mines of Great Britain; Science applied to Art; Past and Present Means of Communication; The Steam Engine, etc. The chapter on coal and coal mining, with the author's graphic description of the dangers and hardships of the miner's life, and his detailed account of the *modus operandi* of excavating and raising the coal to the surface, is of special interest. The author has visited this country several times, and while here spent considerable of his time among our manufacturing establishments and machine shops, investigating and studying into our ways of conducting industrial enterprises of all kinds. Lord Caithness takes a lively interest in all new inventions, and is the patentee of several ingenious contrivances, some of which have been illustrated in this paper. He was among the first to introduce steam plows and other agricultural machinery operated by steam. The Earl of Caithness owns large estates in the northern part of Scotland, where the producing season is short, hence the necessity, as well as his taste for new improvements, impels his adoption of the best and quickest working agricultural machines that are made.

ELECTRO-MAGNETS.—The most minute, complete, and practical description of electro-magnets and their armatures ever printed, illustrated by 51 engravings. SUPPLEMENT, No. 182. This article describes every known form of electro-magnet, and contains full directions for making magnets for telegraphic instruments, call bells, electric engines, experimental purposes, etc., giving method of winding; the proper size of wire for magnets for different purposes; the resistance of wires; the method of calculating the strength of electro-magnets; proportions of armatures; arrangement of polarized armatures, and other items of valuable information.

ELECTRICAL CABINET.—Directions for making a few pieces that may be arranged in several different combinations, forming a great variety of interesting and instructive instruments, including an electro-magnet; two keys and sounders; a call bell; an electric motor; a magneto machine; an induction coil; an interrupter; a telephone; a microphone; an electrical pendulum; a galvanometer, and other interesting and amusing pieces of apparatus. In SUPPLEMENT No. 191.



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 this office. Price 10 cents each.

(1) N. C. writes: In SUPPLEMENT, No. 105, page 167, Dr. D. C. Chapman gave directions for silvering on glass which does not work for me. You will oblige an old subscriber by directing him where or how the process of silvering and gilding on glass can be learned—the kind of work that is done on patent medi-

cine cards and signs. If there is any book that will give the desired information, please give title and place where it can be procured. A. Your failures were probably due to lack of manipulative skill. Consult Collingham's "Sign Writing and Glass Embossing" and "The Painter's and Gilder's Companion." Address the booksellers who advertise in these columns.

(2) C. V. asks how to color horn any color.

A. Horn may be dyed a great variety of colors by means of hot solutions of the aniline (coal tar) dyes.

(3) C. T. G. asks: 1. What kind of cement or compound can I make or procure cheaply, that will do, in place of fire brick, in furnaces subjected to much internal wear and great heat? A. Use a mixture of 200 parts fine clay (kaolin), 80 parts quartz sand, and one part iron oxide, passed through an 80 mesh sieve and made into a smooth paste with water. Must be dried slowly. 2. What hooks are the best for the purpose of self learning assaying and metallurgy? A. Address the booksellers who advertise in these columns.

(4) P. V. Q. asks how to prepare a cement for hard rubber. I wish something that will resist the action of the solution composing a photographer's bath: A. Melt together equal parts of pitch, gutta percha, and orangeshellac. Use hot, and press the parts firmly together until the cement has hardened.

(5) T. E. C. asks if there is any known gas, when exposed to the air, or common coal gas, that will take fire. If there is any such, please tell me what it is, and how made. A. Phosphureted hydrogen inflames spontaneously on contact with air. It may be prepared by boiling together in a small retort caustic potassa or slaked lime, water, and scraps of phosphorus. The beak of the retort should dip beneath the surface of water, and the air in the retort should be carefully displaced by carbonic acid or coal gas before heat is applied, otherwise an explosion may occur. The gas is slightly soluble in water, possesses an odor resembling garlic, and burns in air with a very brilliant white flame, forming water and phosphoric acid.

(6) E. C. writes: 1. In answer to D. H., on February 23, 1878, page 124 (27), you give a cement for leather, made of equal parts of pitch and gutta percha, to be softened with naphtha. How is the naphtha mixed with it, and in what is the proportion? A. Cut the cooled mixture into shreds, cover with naphtha, and keep in a warm place (away from fire) until properly softened. 2. Can I clean leaves of books without injuring the leaves or print? A. Press between the leaves strips of clean blotting paper (white) previously moistened with strong clear solution of bleaching powder (calcium hypochlorite) in cold water. When properly bleached remove traces of adhering "bleach" with moist blotting paper moistened with water containing a trace of sulphite or hyposulphite of soda.

(7) J. C. asks for instructions as to electroplating with nickel and silver. The articles to be plated are such as are described in SCIENTIFIC AMERICAN of August 16, 1879 (brass and Britannia spun articles). I want to know how to make a battery, what chemicals are used, and how long the articles are left in; in fact I want to know the whole process. A. You will find a comprehensive article on nickel plating, on p. 209, vol. 38. See also pp. 76 (23), 139 (27), 219 (6), 250 (14), 251 (56), and (61), same volume. For description of batteries see SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 157, 158, 159, and 167, p. 208 (21), current volume SCIENTIFIC AMERICAN.

(8) H. G. writes: 1. I intend to build a boat, about 20 feet long, with two engines, diameter 1 1/2 by 3 stroke, 350 revolutions, 75 lb. pressure. How can I obtain the most speed, by using a screw or side wheels? A. A screw. 2. Please give dimensions of screw. A. About 15 or 16 inches diameter. 3. Which is best, wood or tin, for hull? A. Wood. 4. Will I need license for her? The engines are plain slide valve engines. A. Yes. Apply for information to the steamboat inspectors of your district. 5. Inclosed find a puzzle that I can't get any one to solve. A. The puzzle is the old well-known square puzzle. The loss or gain of one square is owing to a cause which you will discover when you measure the squares accurately in both positions.

(9) W. D. R. asks for a cement which will repair a broken meerscham pipe, the fracture being where it is thoroughly saturated with nicotine. A. Moisten fine zinc oxide with a hot saturated solution of zinc chloride to form a thin paste. Use hot, and press the parts firmly together until the cement has hardened.

(10) J. N. B. asks (1) how the dark spots can be made on horn to make it represent tortoise shell. A. Use a strong aqueous solution of silver nitrate mixed with gum arabic so as to flow properly from a brush. A little red lead may be mixed with it to give it body. After standing an hour soak in soft water for several hours before finishing. Pieces of horn may be united by softening the edges with boiling water and then submitting to powerful pressure while surrounded with boiling water. 2. Where can loadstone be obtained? A. Loadstone or magnetite may be obtained of any mineralogist. Immense bodies of it occur in Northern New York State.

(11) T. M. J. writes: 1. I am sinking a shaft in a coal mine 150 feet deep. At 100 feet from the bottom I have struck a spring making 2 barrels of water per hour. As I am going to place a boiler (and engines) at the bottom of the shaft, to haul coal, would the 100 feet be full enough to force the water into the boiler in any way, and how? A. If your boiler pressure is much over 40 lb., you cannot do it without the aid of a force pump. 2. How great a pressure of steam could the water be forced against by its own weight? A. About 40 lb. pressure. 3. If we place a tank at the spring, would a large pipe be better than a small one (or any advantage) in leading the water down to the boiler? A. There will be no advantage in using a very large pipe, but it must be large enough to supply whatever pump you may use.

(12) S. E. P. asks: What is meant by the term "ohms," so often used in describing electric apparatus? A. An ohm is the unit of resistance to the passage of an electric current. It is about equal to a cylindrical wire of pure copper, one twentieth of an

inch in diameter and 250 feet in length, or of 330 feet of iron wire 0.155 of an inch diameter.

(13) W. H. S. asks: What will remove old putty from old sash (wood sash, of course)? I want something that will do it quick and not break the glass, as I am liable to with a hot iron. Is there an acid that I can use that is quick in its action and cheap? A. We know of nothing better than the iron.

(14) C. B. L. asks how to get rid of fleas in the house? They were first noticed in the garret, but have since spread themselves through the house, and are a perfect pest. A. Try placing sprigs of pennyroyal in different places around the house, or sprinkle essence of pennyroyal about.

(15) W. E. F. writes: In No. 196, SCIENTIFIC AMERICAN SUPPLEMENT, you state that "starch boiled long in water is transferred into 9-10 dextrose and 1-10 dextrin." Will you please state what these two articles are? Are they insoluble in water? Can they be deposited in paper pulp or in textile fabrics with alum or acid, or would the union be mechanical, if any, and be washed out with the water? Will it add to the finish of the articles? Are they like a gum or paraffine? A. Dextrine is British gum, used as a substitute for gum arabic on postage stamps and envelopes. Dextrose—dextroglucose—ordinary glucose or grape sugar (starch or corn sugar). Both of these are quite soluble in cold water, and both are commercial articles. The former is extensively used for sizing cotton goods.

(16) A. C. E. writes: 1. I have a 36 gallon barrel, a pipe 3 inches diameter, 7 feet long. If I raise the barrel 7 feet, and tap in bottom with pipe, can I get 20 lb. pressure at bottom of pipe to run a 1 1/2 inch Backus water motor, using 1/2 inch jet? A. No; you will have but 4 lb. pressure. 2. How can I fill the barrel or keep it full? A. Pump up the water into your barrel. To get 20 lb. pressure you must raise your barrel about 44 feet above the lower end of the pipe. Cannot you catch water from the roof of some building?

(17) G. H. writes: We experience difficulty in getting sound brass castings when cast on iron pump plungers etc. Can you suggest a remedy? A. The iron should be clean and free from rust, and before placing in the mould it should be warmed so that no moisture will condense on it.

(18) H. F. J.—The plant you send is the dog fennel (*Eupatorium feniculaceum*, Willd.), a common weed in fields and damp soils, ranging from Virginia to Florida.

(19) M. O. asks (1) how to test the purity of castor oil. A. Castor oil is sometimes adulterated with rape seed oil; this may be detected by its not dissolving in strong alcohol and also by its diminished density. Pure castor oil is soluble in an equal weight of alcohol specific gravity 0.82. 2. How can I purify and sweeten castor oil? A. Take 1,000 parts of the oil, 25 parts of purified bone black, 10 parts of calcined magnesia. Mix them carefully in a vessel of glass or tinned iron, and let it stand for three days with occasional agitation, then filter through paper or felt.

(20) E. S. F. asks for the processes for bluing or browning gun barrels. Is there any process that an amateur can apply other than by heating, that is, by means of acids or other chemicals? A. To give iron a blue tint, apply nitric acid, and allow it to act until the iron is covered with a thin film of oxide, then wash the barrel dry and oil it. To give it a brown color, dissolve 2 parts of chloride of iron, 2 parts of chloride of antimony, and 1 part of gallic acid, in 4 parts of water; apply to the barrel with a sponge, and allow it to dry. Repeat the coating until the desired color is attained. Wash with water, dry, and finally rub the surface with boiled linseed oil. The chloride of antimony should be as nearly neutral as possible.

(21) E. T. W. asks: What will prevent boiler tubes from leaking? I have a good tube expander, and can expand them so as to prevent leaking until the furnace begins to cool down, then they will leak as long as any steam is in the boiler. The tubes are 3 inch, and the boiler of the locomotive style, and the water we are using strongly impregnated with sulphur or other mineral. A. It is possible that the sulphuric acid in the water is the cause of your trouble; if so, the addition of carbonate of soda to the water will counteract the effect. Locomotive engineers sometimes stop such leaks by introducing through the supply pipe or hand hole a small quantity of cotton waste (lint). The escape through the leak soon carries the cotton to that point and plugs the aperture. Bran and meal are also used for this purpose.

(22) C. L. B. writes: I notice in No. 160 of the SCIENTIFIC AMERICAN SUPPLEMENT, a cheap induction coil. 1. What would such a machine cost? A. \$35 to \$40. 2. Could it be improved upon by winding the primary in sections, and so increasing the magnetism of the core of iron wires? A. We think not. 3. Would a larger core of iron wires be beneficial? A. No. 4. Would it heighten the effect if with the same amount of wire a shorter and thicker coil should be made? A. No. 5. Would it improve it to increase the condenser? A. It would be well to have a large condenser made in sections, so that more or less of it might be used.

(23) A. P. asks: Can you tell me what cheap material I can use to unite coal broken very small, and coal dust, to make it in the shape of bricks or blocks that would bear transportation on wagons or cars, without breaking? A. A mixture of hot tar (bitumen or asphaltum) and dry clay has been successfully employed for this purpose, we believe.

(24) F. H. writes: Some time ago I saw in your paper an item about barometer handkerchiefs, so-called because the device printed on them changes color as the weather changes. Won't you please tell me how to put the device on? What chemical shall I use? Can I do it with an ordinary printing press? A. Use a dilute solution chloride of cobalt and dextrine. Try applying it with a rubber stamp.

(25) C. L. W. writes: In SCIENTIFIC AMERICAN SUPPLEMENT, No. 149, you describe a battery in which a flower pot is used for the porous cell. Would such a battery do for an electric call bell, on a fifty foot