

Business and Personal.

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The Catechism of the Locomotive (which is now being published weekly) in the Railroad Gazette of April 18, will contain engravings and descriptions of the Steam Whistle, Throttle Valve and Grates, and accurate engravings, made to a scale of 1/4 in. to 1 ft., of 8-wheeled locomotive by the Grant Works, 8-wheeled, 10-wheeled, and Mogul Locomotive by the Baldwin Works. Single copies 10 cts. \$4 a year; \$2 for 6 months. Address The Railroad Gazette, 73 Broadway, New York.

A practical Machinist, competent by experience, would travel and sell machinery for some responsible company. Address F. S. Williams, Binghamton, N. Y.

Removal—L. & J. W. Feuchtwanger, of 55 Cedar St., have removed to 180 Fulton St., two doors above Church St., New York.

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For Surface Planers, small size, and for Box Corner Grooving Machines, send to A. Davis, Lowell, Mass.

The "Scientific American" Office, New York, is fitted with the Miniature Electric Telegraph. By touching little buttons on the desks of the managers, signals are sent to persons in the various departments of the establishment. Cheap and effective. Splendid for shops, offices, dwellings. Works for any distance. Price \$5. F. C. Beach & Co., 263 Broadway, New York, Makers. Send for free illustrated Catalogue.

The most Perfect Power Hammer—Exclusive Right for sale, or built on Royalty. Particulars of Samuel Pennock, Kennett Square, Pa.

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Steam Boiler and Pipe Covering—Economy, Safety, and Durability. Saves from ten to twenty per cent. Chalmers Spence Company, foot East 9th St., N. Y.

Pattern Letters and Figures, to put on patterns of castings, all sizes. H. W. Knight, Seneca Falls, N. Y.

For best Presses, Dies, and Fruit Can Tools, Bliss & Williams, cor. of Plymouth & Jay, Brooklyn, N. Y.

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Brown's Coal-yard Quarry & Contractor's Apparatus for hoisting and conveying materials by iron cable. W. D. Andrews & Bro., 414 Water St., New York.

For Solid Emery Wheels and Machinery, send to the Union Stone Co., Boston, Mass., for circular.

Lathes, Planers, Drills, Milling and Index Machines. Geo. S. Lincoln & Co., Hartford, Conn.

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

Temples & Oilcans. Draper, Hopedale, Mass.

Hydraulic Presses and Jacks, new and second hand. E. Lyon, 470 Grand Street, New York.

Peck's Patent Drop Press. For circulars, address Milo, Peck & Co., New Haven, Conn.

Small Tools and Gear Wheels for Models. List free. Goodnow & Wightman, 23 Cornhill, Boston, Ma.

The French Files of Limet & Co. are pronounced superior to all other brands by all who use them. Decided excellence and moderate cost have made these goods popular. Homer Foot & Co., Sole Agents for America, 20 Platt Street, New York.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement. Andrew's Patent, inside page.

Two 50 H. P. Tubular Boilers for Sale (Miller's patent) very low, if applied for soon. Will be sold separately or together. Complete connections and pump. Holske Machine Co., 279 Cherry Street, New York.

Lovell's Family Washing Machine, Price \$5. A perfect success. Warranted for five years. Agents wanted. Address M. N. Lovell, Erie, Pa.

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Wanted—A first class Machine, known among Hinge Makers as a Slitting Machine. Address Wheeling Hinge Company, Wheeling, W. Va.

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A. F. Havens Lights Towns, Factories, Hotels, and Dwellings with Gas. 61 Broadway, New York.

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Rue's "Little Giant" Injectors, Cheapest and Best Boiler Feeder in the market. W. L. Chase & Co., 93, 95, 97 Liberty Street, New York.

A Superior Printing Telegraph Instrument (the Selden Patent), for private and short lines—awarded the First Premium (a Silver Medal) at Cincinnati Exposition, 1871, for "Best Telegraph Instrument for private use"—is offered for sale by the Merchants' Mfg and Construction Co., 50 Broad St., New York. P. O. Box 496.

Woolen and Cotton Machinery of every description for sale by Tully & Wilde, 20 Platt St., N. Y.

Dean's Steam Pumps, for all purposes; Engines, Boilers, Iron and Wood Working Machinery of all descriptions. W. L. Chase & Co., 93, 95, 97 Liberty Street, New York.

Parties needing estimates for Machinery of any kind, call on, or address, W. L. Chase & Co., 93, 95, 97 Liberty Street, New York.

Dickinson's Patent Shaped Diamond Carbon Points and adjustable holder for working Stone, dressing Emery Wheels, Griststones, &c., 64 Nassau St., N. Y.

Steam Fire Engines—Philadelphia Hydraulic Works, Philadelphia, Pa.

One Mills and Portable Grist Mills.—Send for Catalogue to Tully & Wilde, 20 Platt St., New York.

Waterproof Enamelled Papers—all colors—for packing Lard and other oily substances, Chloride of Lime, Soda and similar Chemicals, Cartridges, Shoe Linings, Wrapping Soaps, Smoked or Dried Meats, and Dehydrated Vegetables, Shelf Papers, and all applications where absorption is to be resisted. Samples on application. Crump's Label Press, 75 Fulton St., New York.

For descriptive circulars, and terms to Agents of new and saleable mechanical novelties, address James H. White, Newark, N. J., Manufacturer of Sheet and Cast Metal Small Wares.

Paragon Gold Quill-Pens—The best in use. C. M. Fisher & Co., 102 Fulton Street, New York.

Emerson's Patent Inserted Toothed Saws, and Saw Saws. See occasional advertisement on outside page. Send Postal Card for Circular and Price List. Emerson, Ford & Co., Beaver Falls, Pa.

Spools, Button Molds, and all small turned goods made by H. H. Frary, Jonesville, Vt.

T. D. W. can best adjust the pea of a scale by experiment, with a known weight.—J. G. P. will find an explanation of the wire rope and sheave mystery on p. 191, vol. 29.—J. H. will find directions for waterproofing canvas on p. 122, vol. 27. Varnish for chromos is described on p. 164, vol. 27. A solution of gum dextrin is sometimes used on postage stamps.—E. H. will find directions for galvanizing wrought iron on p. 202, vol. 30.—K. will find a recipe for fine shoe polish on p. 73, vol. 26.—W. W. P. will find that marine glue, described on p. 202, vol. 30, will answer his purpose.



A. R. B. asks: What elements are removed from the soil by the growth of cabbage? A. The outer leaves of perfectly ripe cabbage are composed of albuminous substances, 1.16 per cent, woody fiber, gum, and sugar, 5.0 per cent, ash, 2.2 per cent, water, 91.1 per cent. The heart leaves contain a little more water, and a little less of the other constituents. It removes potash, lime, phosphoric and sulphuric acids principally from the soil. These acids are in combination with the various bases which are absorbed by the growing plant.

A. L. C. asks: 1. If I take a tube of suitable length and diameter, and on one end put a double convex lens of about 6 inches focus, and in front of this end a mirror, at the other end a triangle, is there any way by which I can project that triangle on to the mirror, so that I may be able to see it from the outside? A. Not when arranged in the manner stated. 2. Can you give me any information in relation to the different species and character of the marine vegetation of the Great Banks of Newfoundland? A. See the reports of the exploring expeditions sent out by England and the United States Government. 3. What is the best theory on the physical constitution of the sun? A. The sun is supposed to consist of a central solid or liquid mass, which is surrounded by two or more shells or envelopes, which consist of the vapors of the various metallic and other bodies constituting the sun, and of gases, especially hydrogen in a state of intense ignition.

F. T. H. asks: 1. Can I prepare ammonia arsenite as a reagent? A. Ammonia arsenite, (NH₄)₂PO₃As₂O₃, is produced, according to Pasteur, when very strong aqueous ammonia is poured upon arsenious oxide. It exists only in contact with ammonia, quickly giving off ammonia in contact with the air. It forms a yellow precipitate with silver salts. 2. What degree of heat can I obtain in an evaporating dish on an oval copper water bath over a Bunsen burner? A. You cannot obtain a heat over 212° Fah. in an ordinary water bath, whatever the containing vessel and the source of heat may be. 3. What are the specific gravity, hardness, and other mineralogical properties of borate of lime? A. The specific gravity of borate of lime is between 2.84 and 2.98. It is sufficiently hard to scratch fluoate of lime, or calcium fluoride. Its color is white, shaded with gray or green, and sometimes milk white and translucent or nearly transparent. One variety is gray, white, and reddish in concentric stripes. Before the blowpipe it swells into a milk-white mass and then melts into a transparent glass, colorless, or sometimes pale rose colored. It is composed of lime, silica, boracic acid, and water.

J. T. asks: 1. What will dissolve ultramarine to make writing fluid? A. Ultramarine can be suspended in a mucilaginous liquid, like ordinary mucilage, for the purpose you mention. 2. Will soluble glass dry on an iron surface exposed to friction? A. We do not advise the application of soluble glass where metallic surfaces rub together. 3. Will a long belt transmit more power than a short one? A. No.

S. B. says: 1. We have a cellar heater, with three hot air pipes heating five rooms; one of the pipes runs into a flue, which heats two rooms on the first floor and one on the second floor. There are no dampers in the hot air pipes or in the flue. When we want all the heat in the two rooms on the first floor, we close the registers on the other pipes and the upper part of the flue, which leaves a vacuum in those pipes and the flue. I think that, if we had dampers in pipes in the cellar by the heater, and one in the flue right above the register on the first floor, we should get more heat. A. It is usual to provide dampers in the hot air pipes near the furnace in the cellar; and you would save some heat by having them, namely, that portion which escapes from the pipe not used, by radiation from it, and by the register in the room not heated, which seldom or never closes tight. 2. Can you inform me what the sizing that plumbers put on the pipes, preparatory to wiping the joints, is made of? A. It is prepared with lamp-black and glue boiled in water, with sometimes a little lager beer put into it.

A. B. asks: What is the value of antimony, what is its use, and where is it mostly found? A. Alloys of antimony, with lead and tin, are largely used for type metal. An alloy of 90 parts of copper, 5 of zinc, and 5 of antimony is used for sockets in which the steel or iron pivots of machinery are at work. The gray antimony ore is found in the Hartz mountains in Germany, and also in Cornwall, Auvergne, Hungary, and Borneo. The oxide of antimony is found in Algeria and is smelted in France. Red antimony, which is a compound of oxide and sulphide of antimony, is found in Tuscany. The mode of working the ores is too long to be given here.

A. E. F. asks: Will you give me a recipe for making a good quick dryer for oil paint? A. Linseed oil 1 gallon, powdered litharge 1/2 lb.; simmer with frequent stirring until a pellicle begins to form, remove the scum; and when it has become cold and has settled, decant the clear portion. This is used by house painters.

E. L. D. asks: How can I remove enamel from gold without heating? The enamel is the blue kind used for ornamenting jewelry. A. The enamel to which you refer, being a species of glass, can be removed without heat by the action of hydrofluoric acid. This is most easily applied by wetting the enamel with sulphuric acid and then sprinkling over it some finely pulverized fluor spar (calcium fluoride), by which means hydrofluoric acid is set free and attacks the glass, the gold not being affected by either acid. The sulphuric acid should be slightly warm, and care taken to avoid the fumes and getting the acids on the hands, as hydrofluoric acid is very corrosive to the skin. Several applications may be necessary. Wash off and dry after each application.

P. H. W. says: To heat water I placed a copper tube in a coal stove; the tube is 13 inches deep, 5 1/2 inches diameter, with a ball made on the circle of same diameter. It was filled nearly full; and while boiling rapidly, I attempted to take it out, but the steam was rising so fast that I could not place my hand near to it. I then poured a little cold water into it, which checked the steam entirely, so that there was no visible steam arising from it. I took it out and set it on a cold plate of iron, where it stood 6 or 8 minutes, then took it by the ball again, holding it two minutes. There was no sign of steam arising from the water, but as soon as I attempted to pour it out, the steam burst forth in such volume that it was only with the greatest effort that I succeeded in keeping it from scalding my hand. Did the cold water remain on the top, and at a lower temperature, condensing the steam, until poured off? A. The explosion was caused by the power which water in a quiescent state has of retaining a large amount of steam, and setting it free when shaken or suddenly agitated.

F. M. B. says: 1. While on the roof of my house, watching the chimney burning out, I noticed a stream of electrical fire or light passing on to the point of the platinum arrow or weather vane attached to the lightning rod and passing off from the opposite end. I touched the point of the arrow with my hand and the light ceased; on removing my hand, the electrical current was again established. I reversed the arrow in direction, putting the point opposite to the wind; again the light ceased. On letting go of the arrow, the point turned toward the wind and the electrical light was resumed again. At the time the wind was blowing from southeast, rain and sleet were falling, and the barometer was low. The following questions arise: Does electricity go with the wind? A. Atmospheric electricity is caused by the advancing clouds. 2. No lightning being seen, was this voltaic electricity? And if so why did not the current pass from the arrow to the lightning rod, and thence pass to the ground instead of passing off from the reverse end of the arrow? All the connections of the copper rod are good and the lower end is nine feet in the ground, which is moist. The rod near to and below the arrow is coated with soot from the chimney: would this prevent the flow of electricity to the earth? A. It was not voltaic electricity.

J. D. S. says: I am informed that there is a method by which tracings made on tracing muslin can be reproduced on prepared white paper. I believe a negative is prepared directly from the tracing, and afterwards printed on the prepared paper by exposure to the sun. What solution is used, or how is the negative obtained? A. The drawing is properly mounted in front of the camera, and a photograph is taken in the usual manner. This negative is then employed for solar printing by direct contact with sensitized paper.

W. says: In Dr. Hayes' "Open Polar Sea," he states that he procured sufficient fresh water for the crew of his schooner by boiling sea water in a common tea kettle, using a cask as a condenser. Is it so easy a process to purify sea water? If so, what is the use of the expensive apparatus sold in Europe for this purpose? We hear of the crews of vessels perishing of thirst. Surely, if there is a simple process of purifying sea water, it should be made widely known. A. There is no difficulty in procuring water free from saline matter in the manner described. But water, so distilled, differs from natural water by containing no air and being free from certain small amounts of mineral matter, which make spring water lively and palatable. The aeration and filtration of distilled water complicate the apparatus and render it expensive.

G. W. asks: Can wood be petrified, and how is it done? A. One method is: After the tree is felled, place the root end in a solution of sulphate of copper and acetate of iron. After remaining for a few days, the wood is completely saturated. Another method is to place the wood in a vessel from which the air is exhausted; sulphate of iron or alum solution is then let in and pressure applied. The wood is then partially dried, and afterwards it is treated with a solution of chloride of calcium in the same manner. Or the wood can be impregnated with water glass, and then treated with an acid.

C. E. Y. asks: Can metallic zinc be obtained from the muriate of zinc, or can a coating of zinc be deposited on iron or other metal from the muriate of zinc? A. The muriate of zinc has been employed, but is said to possess no peculiar advantage.

G. C. H. says, in reply to J. N. W.'s query as to the excessiveness on the plank: The board was recently brought to Utica and shown to the scientific men of the place, among others to Mr. S. W. Chubbuck. He immediately said that it was the result of compression; and to convince the others, he selected a piece of clear pine, laid it upon a block of iron, and struck it one blow with a hammer. It was then placed in a vise and sawn down through the edge; immediately the compressed wood bulged out and assumed the shape it now has. I enclose you the piece. I think that the original one can be accounted for in the same manner. The tree either struck a stone or other substance in falling, and was thus indented at that spot, or the board has been prepared for a joke. A. Mr. Chubbuck has certainly succeeded in producing an appearance similar to that of J. N. W.'s board, and his explanation is correct.

S. asks: How thick is the earth's surface or crust? At what depth in the earth will it be hot enough to fuse all known substances? A. It is ascertained that at a depth of a very small proportion of the earth's diameter, all known substances would be in a state of fusion. Experiments made at Creuzot, France, led the observers to believe that, at a depth of 50 miles, the heat would reach 4,600° Fah, more than sufficient to melt platinum. As to artesian wells, see p. 241, vol. 30.

E. E. asks: What can I use to make a joint steam tight? A. Use equal parts of white lead and red lead, and add as much boiled linseed oil as is required to make a putty.

G. N.—Animal vaccine virus can be obtained at all times and in any quantity from Frank P. Foster, M.D., Director of Vaccine Department, New York Dispensary, 187 Center Street, New York City. It is furnished in three ways: On slips of quill, costing each 25 cents; in capillary tubes, costing \$2 each; and in entire crusts, costing \$2 each. The first is the most handy to use. The method of using it is so simple that it is within the power of every one to vaccinate: Bare the arm to be vaccinated to the shoulder, and, taking a large needle, scratch the skin two inches below the shoulder in cross lines until a place the size of a three cent piece looks watery; then dip the quill into warm water for a second, and rub the smaller end upon this spot for a few seconds. Allow the arm to remain bare for some minutes until the spot seems dry. Each quill is sufficient for one person; but the capillary tube contains sufficient virus, in a liquid form, to vaccinate ten or twelve persons. It is necessary to blow the lymph out of the tube upon a knife blade in minute quantities at a time, and rub the knife blade upon the spot prepared as before described. The crust may be macerated in water and then applied. Virus is prepared for use in this way: When the pustule upon the cow is full of matter, the small quills are dipped into it, allowed to dry, and rolled in tin foil. The capillary tube is simply a very fine glass tube, one end of which is dipped into the matter; the matter will nearly fill the tube, by what is called capillary action of the tube. Then the portion of the tube not filled with matter is broken off, the two ends sealed up with sealing wax, and the tube is now ready for transportation. Vaccine virus from the cow is the purest and most efficient known, first, because young and healthy heifers are the only animals from which the virus is taken, and secondly, because it can always be obtained fresh from the physician above mentioned. A letter, addressed to him enclosing 25 cents or \$2, will be answered by return post by a letter containing the quill or tube.—S. H. C., M.D.

W. H. J. asks: Will a siphon draw water 100 feet high, if it had 150 feet fall? A. No. The rise of water would be less than 34 feet.

M. C. asks: Is there any machinery for utilizing the power of water, as it is ordinarily laid on in dwelling houses? A. Yes. Water engines and small turbine wheels, for driving sewing machines and other purposes, are in the market.

E. L. S. asks: 1. Is it possible for gas to escape from a burner when lighted, unconsumed? A. No. 2. Is it the revolution of our earth which produces the atmosphere? A. It does not produce the atmosphere, but causes certain great movements in the atmosphere, such as the trade winds.

D. C. S. asks: Has heating with hot water been adopted in this country? A. There are several firms in this city who make heating by hot water a specialty, as also some in the other principal seaboard cities, and who have put their apparatus in a great many buildings, both public and private. The expense, however, of heating by this method is fully as great as that of steam.

E. M. B. asks: 1. What are the most powerfully explosive substances or compounds known, that can be obtained in large or inexhaustible quantities? A. Gun cotton, nitro-glycerin, dynamite, and duxin. One part by weight of gun cotton is equal in projectile power to 5 parts of gunpowder; 1 part of nitro-glycerin to 8 parts of gunpowder. 2. Which of said explosives are the cheapest per unit of explosive power? A. Nitro-glycerin. 3. Which of said explosives burns or explodes with the least smoke or ashes? A. Gun cotton should leave no residue. 4. Is there any treatise upon explosives that will give me all the known properties of the principal explosives? A. See our advertising columns for booksellers' addresses.

G. S. R., H. B. G., and others question the accuracy of our answer to W. L. N., in which we stated that it is not a fact that all matters that form scale in a boiler float on the water as scum. A. Compounds of lime are precipitated from solution in water as the temperature increases, and the carbonate of lime, being light, rises to the surface of the water, if there is a good circulation in the boiler. The sulphate of lime, which is heavier, sinks almost immediately after precipitation. Both of these substances can be most readily removed by a surface blow, since they are formed more rapidly as the temperature of the water increases. When the boiler is not in use, the particles of carbonate of lime no longer rise to the surface, but settle down upon different parts of the boiler.

C. P. H. asks: How many pounds of nitrate of ammonia would be required to freeze a gallon of water? A. Theoretically, nearly 4 lbs. when the temperature of the water is 68° Fah., but in practice a larger quantity, owing to the absorption of heat from the containing vessels.

J. G. H. asks: 1. Can sugar be kept liquid by any chemical process? A. No. 2. How can copying ink be made from common writing ink? A. By the addition of a little sugar. 3. Can water colors be made to copy, the same as copying ink? A. This can be easily tried.