

Business and Personal.

The Charge for Insertion under this head is \$1 a Line.

Cheapest Maple Sugar & Ag'l Steam Boiler, 100 Sizes. Circulars free. H. G. Bulkeley, Cleveland, O.

Engines for Sale Cheap—Three 8x12 horizontal stationary; one 12x18; one 5x8. Also, one second hand 7 and 8 ft. Planers; 2—8 ft. 20 in. swing Engine Lathes; 1—6 ft. 15in. hand. Enquire at D. Frisbie & Co., New Haven, Conn.

A first class Exhibition Stereopticon for Sale, cheap. Address Box 755, Middletown, Conn.

For the best Small Portable Engine in market, address Peter Walrath, Chittensango, N. Y.

50 to 75 H.P. Engine (new or second hand) wanted for saw mill in Michigan. Send description and price to Lane M'g. Co., Montpelier, Vt.

To Machinists—Estimates wanted for specialties in quantities. Light work. Apply at once to Geo. Kreisler, 58 Goerck St., New York.

Manufacturers who are inclined to deliver some Machines of the newest inventions for making Cut Nails, Mac. Nails, Pointes de Paris, etc., are requested to send Pictures and Prices to Messrs. Thomas Regout & Co., Nail Manufacturers, Maestricht, Holland.

Iron Planer—A Second Hand 7 or 8 ft. Iron Planer wanted. Address H. Gillett, Lake City, Minn.

Mechanic, Foreman Wanted—A very good intelligent Machinist, one who understands all about Engine and other Machinery, and about Agricultural Implements, and ought to know all about the Foundry. Must give the best of reference. Will pay a good salary to the right man. Address, immediately, Wiese, Straub & Co., Pittsburgh, Pa.

Wanted—Manufacturers of Bucket and Tub Machinery to send price list and cuts of machines to L. X. White, Longmont, Colorado Territory.

Builders of Steam Shovels or Excavators, please send circulars to Hydraulic Press Brick Co., St. Louis, Mo.

Brown's Coal Yard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W.D. Andrews & Bro. 414 Water St. N. Y.

Wanted more Partners in U. S. and Canada. I will guarantee 100 per cent net profit, first year, on the money furnished. Best reference given and required. W. T. Bunnell, Ottawa, Canada.

Wanted—Manufacturer for a Water Meter on royalty. First cost, \$6. Durable; no water can pass without registry—perfect. To be seen in operation. Rare chance. Address G. C. Morris, Syracuse, N. Y.

Partner Wanted, with Capital, in the Wholesale Manufacture of Furniture in the best town in the West—terminus of Seven Railroads, connecting with all parts of Kansas, Nebraska, Colorado, New Mexico, Texas, Missouri and Iowa. Business of One Hundred Thousand Dollars already established, and Amount of Sales only limited to manufacturing facilities. Walnut Lumber abundant at \$35 per M. Address Lock Box 109, Atchison, Kas.

Wanted—2d hand Portable Engine, 3 to 6 H.P. Send description to Box 6, Stamford, Det. Co., N. Y. A first class Turbine Wheel for Sale or Exchange.

For New Years. Price only three dollars. The Tom Thumb Electric Telegraph. A compact working telegraph apparatus, for sending messages, making magnets, the electric light, giving alarms, and various other purposes. Can be put in operation by any lad. Includes battery, key and wires. Neatly packed and sent to all parts of the world on receipt of price. F. C. Beach & Co., 260 Broadway, cor. Warren St., New York.

Wanted, Agents in Foreign Countries, to sell my Bolt Forging Machines. J. R. Abbe, Manchester, N.H. Rue's "Little Giant" Injectors, Cheapest and Best Boiler Feeder in the market. W. L. Chase & Co., 93, 95, 97 Liberty Street, New York.

Flour, Feed, Paint, Ink, and all other kinds of Mills. Ross Bro's, Williamsburgh, N. Y.

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.

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

The New Remedy retains the Rupture in ease and comfort, night and day, till cured. Sold cheap. Fitted without charge, by the Elastic Truss Co., 688 Broadway.

Buy Boring and Sawing Machines of Gear, Boston, Mass.

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

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

At the "Scientific American" Office, New York, they use the Miniature Telegraph. See engraving in "Scientific American" Dec. 6, 1873. By touching different buttons on the desks of the manager, he can communicate with any person in the establishment without leaving his seat. Splendid for offices, factories, shops, dwellings, etc. Price only \$5, with battery, etc., complete for working. Made by F. C. Beach & Co., 260 Broadway, corner Warren St., New York.

Buy Gear's Improved Variety Moulding Machine. Ware Rooms, Boston, Mass.

Just Published—"Workshop Receipts" for Manufacturers, Mechanics, and Scientific Amateurs. \$2, mail free. E. & F. N. Spon, 446 Broome Street, N. Y.

Reliable 2d hand Engines, Boilers, etc., Cheap. Illustrated circulars free. E. E. Roberts, 52 Broadway, N. Y.

Iron Steam Boxes for Stave Bolts & Veneer Cutting Machines. T. R. Bailey & Vail, Lockport, N. Y.

Boul's Unrivaled Paneling, Variety Molding and Dovetailing Machine. Manufactured by Battle Creek Machinery Company, Battle Creek, Mich.

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

For Bolt Forging Machines, Bolt Holding Vises to upset by hand. J. R. Abbe, Manchester, N.H.

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

Brass Gear Wheels, for models, &c., made to order, by D. Gilbert & Son, 212 Chester St., Phila., Pa.

Superior to all others—Limet & Co.'s French Files. They are cheaper than English files. They are heavier, better finished, and better tempered. Send for price list. Homer Foot & Co., Sole Agents, 20 Platt Street, New York.

Universal Hand Planing Machine—A new labor-saving Tool, indispensable to every class of mechanics, working in iron or other metal, attached to any vise. Jacob E. Sutterlin, m'fr, 60 Duane St., N. Y.

All Fruit-can Tools, Ferracate, Bridgeton, N.J.

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.

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

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

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

Five different sizes of Gatling Guns are now manufactured at Colt's Armory, Hartford, Conn. The larger sizes have a range of over two miles. These arms are indispensable in modern warfare.

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

Damper Regulators and Gage Cocks—For the best, address Merrill & Keizer, Baltimore, Md.

Steam Fire Engines, R. J. Gould, Newark, N.J.

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



C. H. G. should use the best glue and make it as thick as possible.—J. E. H. Jr. will find instructions on the subject of the engineer's trade on p. 395, vol. 29.—J. H. P. can solder brass to iron with the preparation described on p. 251, vol. 23.—J. F. A. will find a recipe for harness dressing on p. 82, vol. 28.—J. N. F. can combine caoutchouc with glue by dissolving both in ether, free from alcohol. Bichromate of potash can be combined with glue by dissolving both in water.—J. S. T. does not give sufficient data to explain his meaning.—S. A. B. will find full particulars as to the canal boat reward on pp. 96 and 400, vol. 28.—W. T. C. can make a book table with the blackboard composition described on p. 299, vol. 28.—N. M. should harden his reamers by the process described on p. 315, vol. 29.—S. can waterproof his leather by using a drying oil.

C. W. asks what we mean by the lap and lead of an engine. A. The lap of a valve is the amount the face of the valve is widened beyond what is necessary to cover the port. The lead is the amount the steam or exhaust port is open when the piston is at the end of the stroke.

M. S. asks: 1. What kind of packing is best for the cylinder of a 10 horse portable engine, speed 160 per minute, using very bad water at times? What is the best for the piston rod? 2. What kind of paint will stand the heat of the engine? A. 1. The simplest form of metallic packing will answer, if your cylinder is smooth and truly bored. For the piston rod, if it is round and smooth, any of the various kinds of packing in common use will answer well. 2. There is a black varnish, made from petroleum, that is frequently used for iron work exposed to high temperatures.

W. I. B. asks: 1. What is the analysis of Turkey umber? 2. What is the analysis of terra di Siena? 3. On page 324 of your volume XXIX, I find an article on wooden railroads. Is there any such road now in use? If so, where? A. 1. It is an argillaceous brown hematite, containing sesquioxide of iron, silica, water, alumina, and manganese oxide. 2. It contains sesquioxide of iron, alumina, silica, water, lime, and magnesia. 3. There are quite a number of wooden railroads in Canada. You will find details of their descriptions and localities on p. 84, vol. 27.

L. B. asks: How large a boiler is necessary to run a one horse steam pump one hour, by compressing the air at once; and how large a cylinder is necessary to supply the above boiler, the engine running at fifty revolutions per minute? Is there any better way of running a momentum power than this? A. In the use of compressed air in the manner proposed, the pressure would be constantly diminishing, and there would be much difficulty in equalizing the power developed. We think such machines have been devised, however, and, if so, a notice in our "Business and Personal" columns would bring you into communication with the inventors.

J. S. D. asks: If the crown sheet of a boiler is 9 feet long, 4 1/2 feet wide, and 1 1/2 feet high between crown sheet and wagon top, how many square inches are there, and how many tons pressure are there on the crown sheet at 130 lbs. to the square inch? A. As we understand your question, the crown sheet is curved. Measure its width in inches by a tape line following the curve; multiply this by the length in inches, and by 130, and divide by 2,000, which will give you the pressure in tons.

J. P. asks: 1. How can I make a porous cup for a galvanic battery? Will plaster of Paris be suitable? 2. How can I make a plug of carbon? 3. Is iron wire suitable for the poles of a battery? If not, what kind should I use? 4. What sized wire is best for the above battery? 5. What proportion of acid and water should I use for the exciting fluid? 6. How long will the exciting fluid last before it must be renewed? 7. What is the best mode of cleaning the carbon and zinc, and how often should they be cleaned? 8. How many cells 10 inches high x 6 diameter, with zinc cylinders and carbon plugs, will it take to make a good electrical light? 9. What is the most suitable way of fastening carbon points on the poles of batteries? 10. Is nitric acid the best to fill the porous cup with, and how long will it last before it must be renewed? A. 1. The cup may be made of any porous earthenware. 2. The carbon is generally prepared from coke and soft coal, mixed together and heated in a finely powdered state, being made compact by a concentrated solution of sugar. 3. Yes. 4. This you can only tell by experiment. It should be so large that it does not become excessively heated. 5. This also will be best determined by experiment. 6. It depends entirely upon the work the battery has to perform. 7. The zinc should be covered with an amalgam of mercury. 8. From forty to fifty. 9. Force them into a socket. We advise you to get some good work on the subject of electricity, such as Noad's "Text Book."

J. F. McE. asks: What are the merits of an inverted direct-acting vertical engine, and in what points is it superior to a common horizontal engine? A. Its advantage consists in the small horizontal space occupied. Where space is not a matter of importance, a horizontal engine is ordinarily quite as good.

J. A. asks: Is there any preparation for smoking meat without fire? A. The peculiar compound which gives meat its flavor when smoked is creosote. The flavor imparted by smoking can be imitated by immersing the meat, for a longer or shorter time, in water, brine or vinegar containing creosote in solution. This was probably the secret you mention.

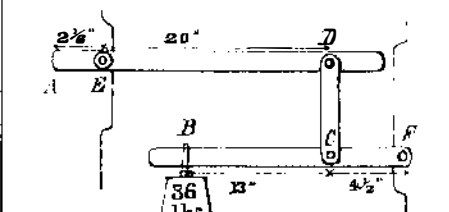
V. S. asks: Which city has the largest population in the world? A. London, England.

E. H. B. asks: Are there not more explosions of upright boilers than horizontal ones? Are not upright boilers made stronger, in proportion to their size, than any other kind? Are there not fewer explosions, proportionally, in locomotives than other boilers? A. We think we can answer yes, in general, to all these questions.

F. E. W. says: 1. I have a boiler which was blown off as usual, when the steam was up, of course, and nothing more was done to it. To preserve it, I have been told to get up steam with the boiler full of water and about a gallon of oil, and then blow it off. Is this necessary, or is there a better way? 2. What will renew the color of blue woolen cloth that has been damaged by strong saleratus water? A. We do not think this plan will be very efficacious. If the boiler can be kept dry, that will be the best way to preserve it. 2. Possibly you can restore the color by the use of lemon juice.

F. W. C. says: I would like an answer to the following questions, that is, if your journal is to be continued, a point on which I feel dubious, as you have incurred the wrath of J. O'K. Murray. I have a stream furnishing 400 cubic feet of water per minute, and a fall of 100 feet in a fourth of a mile. I am using 42 feet of this fall on a turbine; but I want more power. Will it be safe and practicable to use 100 feet head on a turbine, or would a water engine be better? I never knew a wheel to have so great a head, and am fearful that the strain would be too great on its bearings. Can you tell me whether water engines are used in this country? A. We think you can use all the head of water with perfect safety. By inserting a notice in our "Business and Personal" columns, you will hear of a number of water engines.

W. McL. asks: What power will the weight (36 lbs.) in the accompanying engraving exert at A? E and F are the fulcrums of the compound lever. A. The solution is as follows: 36 x 13 x 20 = weight balanced at A x 4 x 5 x 2.5; hence weight balanced at A = 882 pounds. It may simplify the question to look at it in another way.



If the point B falls one foot, the point C will fall 4.5 + 18 = 22.5 of a foot, and in so doing will raise the point A (2.5 + 20) x 2.5 = 52.5 of a foot. But by the principle of virtual velocities, the power and weight are inversely proportional to the distance moved; hence one pound at B will balance 1 + 52.5 = 53.5 pounds at A, and 36 pounds at B will balance 36 x 53.5 = 882 pounds at A.

L. W. says: 1. Please give a formula for determining time from an observed altitude of the sun. 2. What is the best practical mode of polishing a set of drawing instruments by hand? A. 1. The apparent time = 1/2 the hour angle, and the error of the watch or clock = 1/2 the hour angle + the equation of time - the indication of the watch at the time of observation. The true altitude of the sun is the observed altitude of the lower limb - correction for refraction + apparent semidiameter of the sun + the sun's parallax in altitude. The hour angle is thus calculated: Make S = [270° - (true altitude + sun's declination + latitude)] + 2. Then the hour angle = twice the arc whose sine is [± sqrt(cos. (S + latitude) x cos. (S + sun's declination) + cos. latitude x cos. sun's declination)]. 2. Use rottenstone and oil.

G. H. B. asks: Will you give me the correct mode of a fire test for coal oil? A. There are instruments made in this city, for the purpose of testing oil. They consist essentially of copper vessels containing thermometers, so that the oil can be heated to the desired temperature, and the test for ignition be applied. You will find a description of a method lately invented in France, on page 358, vol. 29.

C. B. asks: Will you please tell me how many grains of coal it will require, burned in an ordinary locomotive boiler, to melt one pound of snow or ice? It is proposed to melt the snow in streets by superheated steam to be discharged upon the snow. I want to make approximate estimate of the cost of the fuel necessary to do the work. A. This question can only be determined theoretically. The latent heat of liquefaction of ice is about 144° Fah.; and one pound of coal, burned in an ordinary boiler, will develop about 10,657 units of heat. Hence, if the steam acts with perfect efficiency, to melt one pound of ice will require the consumption of about 98 grains of coal.

S. S. C. asks: 1. Is the oxyhydrogen light expensive, difficult or dangerous to produce and manage for magic lantern exhibitions? 2. How does the oxy-calcium light compare with it in these particulars? 3. What has been the usual method of preparing the lime for the oxy-calcium light? 4. Would the ingredients for lime cylinders, mentioned in the SCIENTIFIC AMERICAN, for oxyhydrogen lights, answer for oxy-calcium as well? A. The two lights are the same. The light is quite suitable for the purpose you mention. Ordinary chalk will answer very well.

G. L. C. says: 1. I propose propelling by steam a boat 16 feet long x 3 1/2 feet beam, and intend to use a propelling and steering gear fastened to stern of boat by a clamp hinged as a universal joint. The engine and boiler attached to said gear or propeller are to be made very light. The engine is to be connected by a rubber education pipe. Will this be feasible? 2. What style of engine is best for lightness? 3. Is there any flexible material better for this purpose than rubber? 4. About how large should I make the boiler? How thick should copper be to stand 100 lbs. pressure? 5. Is the three cylinder engine patented? If not, would it be right for me to make one for my own use without consulting the builder? 6. Has the moon any influence on the earth's vegetation or animal creation, such as planting corn and other produce, cutting the hair, weaning children, etc.? A. 1. Your plan is probably feasible, but not a very good one. 2. An upright engine will answer your purpose very well. 3. We think not. 4. Your cheapest and most satisfactory plan will be to buy the machinery from a reputable dealer. 5. It is patented. You can build one, if it is not patented in this country. 6. We think not.

W. F. asks: 1. How can I make a simple battery for use in plating jewelry, spoons, etc., either with gold or silver? 2. Can a person get a patent on the emblem of a secret society, to be used on the death of a member? Will the Office recognize such a thing? A. 1. Read description of the Tom Thumb battery in SCIENTIFIC AMERICAN of December 6, 1873. 2. You can patent any new ornamental design or emblem. See our advertisement about patents in another column.

A. C. M. asks: How can I best make gas for working an engine? What is the maximum pressure per square inch that I can obtain? A. There are several machines in the market for the manufacture of gas from naphtha and other light hydrocarbons, without the aid of fire. By the use of a pump, you could compress the gas until it attained any desired tension.

J. S. M. asks: 1. Would it damage the plates of a boiler to open the blow-offcock before hauling the fire, and let the water be going out while the fires were being hauled, getting the fire all out before the crown sheet became bare? 2. Would it do any harm then to pump in cold water in a half an hour afterwards? 3. When the throttle is closed and the steam is allowed to go down, is it the best plan, when steam is again being raised, to let the throttle be open until the steam works the water out of the pipe? If this is not done, and steam is raised, when the throttle is opened, there is almost always a cracking and shaking of the pipe. 1. I suppose the condensed water is the cause of this; but I should think that, when the water finds an opening, it would pass out easily without any noise. Why is it that it does not? 4. Would it be a good plan, when a boiler foams badly, to lead a pipe from the delivery of the pump to the top of the boiler, so as to pump some water to quiet it? A. 1. This is not advisable. 2. It is best to let the boiler become quite cool before pumping in water. 3. Yes. The noise in the pipes is caused by the water striking against them, the steam having first condensed and formed a vacuum. 4. The objection to this plan is that the water would strike against the braces, and might break or strain them.

G. C. J. asks: Would it not be handy if the makers of metal-turning lathes would try a lathe before they send it out of the shop; and when it turns accurately straight, mark the tail stock, and have a scale, say 2 inches, 1 inch on each side of the mark? I think it would save time and trouble in a shop. The scale would be handy in turning tapers. A. We have seen lathes marked in this manner. It is hardly necessary, however, as any good mechanic can readily adjust the tool.

C. W. M. asks why it is that the frame of a building, or rather the shape of the frame, can be plainly discovered through weatherboarding. A building has had three coats of paint, and the weatherboarding is half inch thick. At a distance of twenty-five yards, I can easily count every post in the building. A. It is probably owing to the unequal transmission of heat through the different parts of the building, so that some portions are drier than others.

E. D. P. asks: Is there any better substance for cores than common sand? I want something that will dissolve or burn up, and leave the hole in the casting perfect. A. This would be a great desideratum if it could be discovered. Anything that would burn up, however, would prevent the formation of a perfect casting. The only plan would be to use some substance that could be dissolved by a liquid, after the casting was made. We need hardly say that the discovery of such a material seems to be very doubtful.

J. F. W. asks: How can I straighten vulcanite set squares, which have become warped and twisted by exposure to the sun or fire? A. We think your best plan will be to get new ones.

W. C. L. asks: Of what is red shellac varnish made? Will it do for outdoor work, such as wagons and other vehicles? A. Red shellac varnish may be made by dissolving 8 ozs. of the common red lac in 1 quart of alcohol. The best shellac is of a pale color. Shellac varnish is used for pictures, metal, wood, etc., and particularly for toys. Copal varnish is the kind used for carriages, wagons, etc.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined with the results stated:

M. V. M.—Two of your specimens are galena, sulphide of lead. The others are sandstone, more or less impregnated with oxide of iron. Galena is often argentiferous, or contains sufficient silver to make its extraction profitable. The presence of silver in these ores, however, can only be accurately determined by a chemical analysis.

R. W. S.—No. 1, galena and iron pyrites. 2, argentiferous galena. 3, galena and pyrites. 4, argentiferous galena. 5, pyrites and galena.

H. B.—The specimen you send is bituminous shale. It very frequently accompanies coal, and is considered, when found alone, a strong indication of the existence of coal in the vicinity. It often contains mica and iron pyrites.

C. H. D.—Your specimen is iron pyrites, a sulphide of iron, a very common and abundant mineral.

R. W. B. sends a specimen of a fiber, which, he states, is the product of an insect resembling a spider. He asks as to its value for manufacturing purposes. A. Efforts have frequently been made to utilize material like sample enclosed, but generally without success.

F. C. K.—The water (from a coal mine) shows the presence of oxide of iron in suspension, and the sulphate of iron and a little free sulphuric acid in solution. The scale is chiefly oxide of iron, containing some sulphate hardened by heat. The presence of these substances shows that the coal contains iron pyrites, from the decomposition of which they have been produced. Iron pyrites, or sulphide of iron, when exposed to air and moisture is apt to decompose, the sulphur oxidizing to sulphuric acid, which combines with the oxide of iron, also forming, producing sulphate of iron. This salt contains generally a little free acid, which has evidently been the chief cause of the corrosion of the iron pumps. Pumps made of brass, or better, a composition of copper and tin, will obviate this difficulty. To fit this water for boiler use, the acid must be neutralized, the iron precipitated, and the water filtered. To effect this, the cheapest way is to add a solution of common carbonate of soda, which will precipitate the iron in the state of carbonate. The water must then be filtered. It will then be free from suspended oxide of iron, free acid, and sulphate of iron in solution, but will contain instead sulphate of soda in solution, which, being quite soluble, will not be so liable to form scale as the ordinary salts contained in water. We would advise condensing the escaping steam, to avoid the expense of purifying every charge of water to the boiler.

W. J. F. asks what is the composition of the brass used in the government engine work?—C. P. C. asks for a description of a ditching machine, suitable for cutting trenches for irrigation.—L. Z. asks how to destroy slugs. Salt will not do it.—W. H. C. asks whether the structure of our bodies is such as to render natural the choice of one hand or foot over the other.—G. P. T. asks how snapping gum (a species of candy) is made.