

## 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.

Drawings and Engravings of Machinery a specialty. Pemberton & Scott, draughtsmen, 37 Park Row, Room 30.  
Assays of Ores, Analyses of Minerals, Waters, Commercial Articles, etc. Technical formulae and processes. Laboratory, 33 Park Row, N. Y. Fuller & Stillman.

Manufacturers of Clamps or Claws for Sleeve and Hose Supports, send samples and prices to A. P. Smith, Rock Falls, Ill.

The Amateur Telegrapher's Text-Book, containing complete instructions in private Telegraph or Telephone Line building; also, illustrations showing the different parts of Morse Instruments and Telephones, with full instructions for making them. Jerome Redding & Co., 36 Hanover St., Boston, Mass.

Special Planers for Jointing and Surfacing, Band and Scroll Saws, Universal Wood-workers, etc., manufactured by Bentel, Margedant & Co., Hamilton, Ohio.

For Sale.—Letters Patent for Self-measuring Fluid Tank or improvement in liquid measures; best in the market—cheap for cash. Address Box 143, Geddes, N. Y.

North's Universal Lathe Dog. 347 N. 4th St., Phila. Pa. Wanted.—A first-class Engine of 200 to 250 Horse Power, to be cheap for cash. Address J. M. Hannahs, 97 Maiden Lane, New York.

For Mill Gearing, Shafting, Pulleys, and Hangers, address T. B. Wood & Co., Manufs. Chambersburg, Pa., for price.

Wrought Iron, while Forging, made capable of being Hardened. Box 370, Terre Haute, Ind.

Adjustable Steam Gauge.—The whole Patent or Rights for sale, or would arrange with parties to Manufacture. It can be tested by common spring scale, and adjusted by turning screw; cannot freeze up or get full of dirt. Address Fred McIntosh, Atlantic, Cass Co., Iowa.

Manufacturers of Flying Horses, etc., etc., please send catalogue and price lists to Box 19, Donaldsonville, La.

Steam Yacht "Hiawatha" for sale.—Length, 40 ft.; beam, 8 ft. 5 in.; engine, 12 H. P.; speed, 12 miles. For particulars apply to J. M. Meredith, Exr., Maiden Creek P. O., Berks Co., Pa.

24 inch Second-hand Planer, and 12 inch Jointer, or Buz Planer, both in first-class order, for sale by Bentel, Margedant & Co., Hamilton, Ohio.

For Town and Village use, comb'd Hand Fire Engine & Hose Carriage, \$350. Forsaith & Co., Manchester, N. H.

Wrenches.—The Lipsey "Reliable" is strongest and best. Six inch sample by mail 60 cents. Roper Caloric Engine Manufacturing Co., 91 Washington St., N. Y.

Cornice Brakes. J. M. Robinson & Co., Cincinnati, O.

Friction Clutches warranted to drive Circular Log Saws direct on the arbor, and Upright Mill Spindles, which can be stopped instantly; Safety Elevators, and Hoisting Machinery. D. Frisbie & Co., New Haven, Ct.

Union Eyelet Company, Providence, R. I., Manufacturers of Patented Novelty on royalty or otherwise.

Improved Wood-working Machinery made by Walker Bros., 73 and 75 Laurel St., Philadelphia, Pa.

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsaith & Co., Manchester, N. H.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See ad. back page. Painters' Rapid Graining Process. J. J. Callow, Clev'd, O.

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

John T. Noye & Son, Buffalo, N. Y., are Manufacturers of Burr Mill Stones and Flour Mill Machinery of all kinds, and dealers in Dufour & Co.'s Bolting Cloth. Send for large illustrated catalogue.

Power & Foot Presses, Ferracute Co., Bridgeton, N. J.

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.

1,000 2d hand machines for sale. Send stamp for descriptive price list. Forsaith & Co., Manchester, N. H.

Steel Castings from one lb. to five thousand lbs. Invaluable for strength and durability. Circulars free. Pittsburgh Steel Casting Co., Pittsburgh, Pa.

For Best Presses, Dies, and Fruit Can Tools, Bliss & Williams, cor. of Plymouth and Jay Sts., Brooklyn, 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.

Sperm Oil, Pure. Wm. F. Nye, New Bedford, Mass.

For Boul's Paneling, Moulding, and Dovetailing Machine, and other wood-working machinery, address B. C. Machinery Co., Battle Creek, Mich.

Patent Scroll and Band Saws. Best and cheapest in use. Cordesman, Egan & Co., Cincinnati, O.

Chester Steel Castings Co. make castings for heavy gearing, and Hydraulic Cylinders where great strength is required. See their advertisement, page 286.

Lansdell & Leng's Lever and Cam Gate Valves. Cheapest and best. Leng & Ogden, 212 Pearl St., N. Y.

For Best Insulated Telegraph Wire, Telephone Wire, and Flexible Cordage, Eugene F. Phillips, 67 Stewart St., Providence, R. I. W. H. Sawyer, Electrician and Supt.

The Turbine Wheel made by Risson & Co., Mt. Holly, N. J., gave the best results at Centennial test.

Vertical & Yacht Engines. N. W. Twiss, New Haven, Ct.

Vertical Scientific Grain Mills. A. W. Straub & Co., Phila.

Dead Pulleys, that stop the running of Loose Pulleys and Belts, taking the strain from Line Shaft when Machine is not in use. Taper Sleeve Pulley Works, Erie, Pa.

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

Water Wheels, increased power. O. J. Bollinger, York, Pa.

NEW BOOKS AND PUBLICATIONS.

SYNOPSIS OF DECISIONS OF THE TREASURY DEPARTMENT FOR 1877. Government Printing Office, Washington.

This is a handy compilation for reference, containing the more important recent decisions of the Department in regard to the construction of the tariff, navigation, and other laws.

HINTS TO PLUMBERS AND HOUSEHOLDERS. By W. L. D. O'Grady. American News Co., New York.

A useful little pamphlet, containing many serviceable hints, especially in regard to precautions against sewer gas. Illustrated with descriptive plates.

SPECIFICATIONS FOR FRAME HOUSES. Palliser, Palliser & Co., Architects, Bridgeport, Conn.

A form for use in making contracts for building frame houses costing from \$500 to \$15,000, being complete and practical specifications covering all essential points. Blank spaces are left for details which change with the difference in class and cost of houses, such as sizes of timber and parts not shown on plans. Messrs. Palliser, Palliser & Co. have done the public, and mechanics especially, a great service in preparing these specifications, which obviate a great deal of writing and tend to prevent errors by making all the points perfectly clear.



C. C.—Please send address.—"Curious."—Consult "Science Record" for 1874, p. 390.—C. E. P.—If we correctly understand your question, we do not know of such a device.—L. A. G.—See SCIENTIFIC AMERICAN, p. 203 (26) vol. 35, and pp. 91 (33), 267 (17); also article on p. 1326, SUPPLEMENT No. 83.—A. W.—Recipes for writing inks may be found on pp. 250 (4), and 219 (18) current volume of the SCIENTIFIC AMERICAN; also on pp. 75 (54), 123 (15), 327, 299 (18), 124 (49), 300 (61), vol. 37. Recipe for a good maulage is given on p. 283 (38) vol. 37.—N. C. L.—Your metal was probably not made hot enough.—C. A. S.—We think you can do all that is required with ordinary powder by making the holes deep enough.—W. O. C.—See SUPPLEMENTS Nos. 46, 47, 48, and 50, for descriptions of spring motors.—W. F. C. S.—By taking the logarithm of the quantity, and multiplying it by the exponent (3/6 or 1/7, as the case may be), the result is the logarithm of the quantity raised to the required power. The other example referred to is perhaps a misprint, and may be intended for a coefficient. If you will send a copy of the paragraph, it may be plainer.—L. R. C.—Such tools as you describe have been tried. They do not appear to be in general use.—J. W. B.—See answer 67, p. 251, SCIENTIFIC AMERICAN, April 20, 1878.—F. H. W.—You should obtain a specification of the patent.

(1) W. A. asks whether common seashore sand can be utilized for building purposes. A. Generally it cannot; it presents surfaces too smooth and pebble-like to hold well.

(2) J. E. T. asks: How can cracks in hard finished walls and ceilings be filled? A. Use plaster of Paris mixed with a strong solution of alum.

(3) W. H. S. asks: 1. What is the best steel for magnets? A. That will depend somewhat on the style of magnet that is to be made. For permanent horseshoe magnets, the German spring steel is generally preferred. 2. To what degree should it be tempered? A. Leave it hard. 3. Is there a practical treatise on magnetism? A. Consult Miller's "Electricity and Magnetism."

(4) C. E. H. writes: In Porter's book on the "Indicator," p. 213, it is stated that "a horizontal engine is perfectly balanced in the horizontal direction by a counterweight equal in weight to the entire mass of the reciprocating parts, revolving opposite to the crank, and having its center of gravity at a distance from the center equal to the length of the crank." Is the same true, in a vertical direction, of an inverted vertical engine, such as is used in most tow boats, and would such an engine so constructed be free from lateral vibration? A. The effect of this mode of counterbalancing is to produce the greatest strain at about the half-centers, where it is resisted by the rigidity of the frame and foundation.

(5) W. R. A. asks: Will increasing the number of check valves between a pump and boiler decrease the strain on said pump; that is, will a pump work any easier with two or three check valves than with only one? A. Quite the contrary, in general, we think.

(6) E. B. S. asks: 1. What is an aneroid barometer? A. It is a metallic barometer, in which the pressure is received on the sides of a thin metallic box, from which the air is partially exhausted. 2. Is it as good as a mercurial barometer? A. It is not so reliable for permanent use without readjustment as a good mercurial barometer.

(7) M. C. asks: What is the average diameter of the propeller wheel used by the National, Cunard, Inman, Anchor, and other ocean steamers? A. It varies greatly in different steamers. A fair range will be from 19 to 23 feet.

Will it require more force to fill a 5 foot tank by forcing water into the bottom than over the top? A. Ordinarily, no.

How far will a ball go, shot from a cannon on the rear end of a railroad train, going at a velocity of 60 miles per hour, the cannon fired in an opposite direction? A. See p. 273, vol. 32.

What is the best acid to use on a steam fire engine for cleaning brass, copper, German silver, and nickel plate? A. You can use oil of vitriol diluted with water for the brass. Ordinarily, no acid is required for the other metals.

(8) In answer to R. A., who is troubled with a rusting boiler: By feeding into the boiler, every morning, a whitewash of lime and water, until a light scale is formed, we think you can prevent further corrosion.

(9) G. W. T. asks: Which part of a buggy wheel runs the fastest, the bottom or the top? A. The top moves the fastest, considering the motion with reference to some fixed point without the vehicle, because each point in the periphery of the wheel describes a cycloid.

(10) H. E. W. asks: How do manufacturers of the buttons for hotel annunciators, etc., cut the thread on the button to screw on the cap? A. It is done in a lathe, with a "chaser."

(11) W. H., Jr., writes: I am thinking of building a small propeller, and an engineering friend of mine advised me to use a rotary pump for the engine. How would it work, and how much power could I realize? Could I drive a boat 20 feet long, 5 feet beam, at a good speed in this way? A. Rotary pumps or engines can be used for such a purpose as ordinarily built. Such an engine would require a boiler capable of furnishing about twice as much steam as would be needed for a well designed reciprocating engine developing the same power.

(12) S. T. M. asks: 1. What causes the hair to become prematurely gray? A. A chemical change, not thoroughly understood, which affects the oily pigmentary matter. The change is not necessarily a sign of loss of vitality, as gray hair often grows as vigorously as any other. 2. Is there any remedy? A. None that is reliable. It is thought, however, best not to wear close fitting and unyielding hats, which also tend to produce baldness. 3. Would having the hair cut close be beneficial? A. It sometimes adds to the vigor of the growth, but would probably not affect the deposition of coloring matter.

(13) A. D. asks: What is fire damp, and how does it originate? A. Fire damp, also called marsh gas, or light carbureted hydrogen, is composed of carbon and hydrogen in the proportion of one atom of the former to four of the latter (CH<sub>4</sub>), or carbon 75 per cent and hydrogen 25 per cent. It is generated by the decomposition of coal, and is frequent in bituminous mines, often producing terrible explosions. The mixture of air to produce an explosion may be from 7 to 14 times that of the gas.

(14) C. C. asks: How can I stain the white portions of black walnut so as to correspond with the rest of the wood? A. Use a moderately strong aqueous solution of potassium permanganate.

(15) R. T. N. asks: How large an engine will it take to run a common rowboat? A. For an ordinary Whitehall rowboat, 18 feet long, to run at a speed of 8 miles an hour, the engine should have two cylinders, 2 inches diameter and 3 inches stroke; tubular boiler 24 to 28 inches in diameter, 4 feet high, propeller 22 to 24 inches in diameter, with 3 feet pitch.

(16) M. J. asks: 1. Can more than two telephones be used on one circuit? A. Yes. 2. Must they be at the terminus? A. No. 3. In transmitting music can a chorus be heard as clearly and distinctly as a solo? A. No.

(17) G. A. W. asks: How can I form an earth connection for a telephone where there are no gas or water pipes to attach the wire to? A. Bury a quantity of scrap tin or iron, through which is laid 20 or 30 feet of naked copper wire, of about No. 8 gauge. On this metal heap sprinkle 10 or 12 lbs. of common table salt, and cover the whole with earth, but leave one end of the copper wire projecting above the surface. The metal should be buried in moist earth, at whatever distance that may be below the surface.

(18) S. J. K. asks: 1. How can I put up a dry battery (in sand)? A. Make a watertight box, of about 1 cubic foot capacity, out of sheet lead 1/4 of an inch thick, and nearly fill it with clean white sand moistened with a solution of sulphate of copper. The lead box forms the positive pole of the battery, and a plate of zinc buried in the sand forms the negative pole. 2. Is there any preparation into which the wax moulds, used in electrotyping, can be dipped, to substitute the use of plumbago? A. See answer 28, p. 250, of SCIENTIFIC AMERICAN, of April 21, 1877; p. 177, September 22, 1877; and p. 284, answer 48, November 3, 1877.

(19) C. B. W. asks: Cannot a helix be formed by winding the uncovered wire in the first layer with the different coils separated by the thickness of the wire, giving the helix the appearance of a screw; then covering the first layer with a piece of silk or cotton and winding the second layer, each coil occupying the groove left in the preceding layer, and so forcing the silk between the wires, and so of successive layers? A. Yes, but it is awkward to properly connect the ends of each layer of wire.

How can a rail be 1 foot out of balance when its support is only 1/4 foot from the center of length? A. Regard the rail as a lever in which the weight of one arm is balanced by the weight of the other arm; when it is moved as you mention, one arm is made 6 inches shorter and the other 6 inches longer than it was when balanced; the relative difference is 1 foot.

With what can paper collars be made waterproof? A. Float each sheet of paper in succession in a bath of albumen, and hang up each sheet to dry; then coagulate the albumen by floating each albumenized sheet in a bath of hot water.

(20) F. R. R. asks: Which way will an Artesian casing stand the greater hydraulic pressure without bursting or collapsing, from the inside out or from the outside in? A. The casing will withstand the greatest internal pressure, because it is shown, both by experiment and theory, that when exposed to internal pressure the strength varies inversely as the diameter and thickness; while for an external pressure the strength decreases more rapidly as the thickness decreases, and also as the length increases. You will find the matter discussed in Rankine's "Treatise on the Steam Engine."

(21) E. W. D. asks: 1. If I make a telephone with a soft iron core and use a battery, will it infringe on Mr. Bell's patent? A. That will depend on other circumstances. 2. The other day, when it was damp, we worked telephones 70 miles very successfully; since, in clear and dry weather, we could only get indistinct sounds from the same distance and over the same wire. What is the reason? A. It may be owing to loose joints in the main line, which in wet weather become filled with water, so that then the conductivity of the line becomes more uniform throughout its length.

(22) W. U. asks: Is there any positive proof that there is a resisting medium in space? A. Not by any physical tests. See answer to P. L. W., page 250, SCIENTIFIC AMERICAN, April 20, 1878.

Is the earth's orbit approaching a circle? A. From observations made at distant periods it has been discovered that the eccentricity is subject to a continual slow diminution. The amount of the diminution of the greatest equation of the center (the measure of eccentricity) is placed at 17-6'' in a century.

Will two bodies in space falling together under the influence of mutual attraction move toward each other in straight lines, or will they tend to describe a conic section about one another? A. On the assumption that there were no other matter in space and no interfering force they would approach in a straight line, in accordance with Newton's first law. Consult Maxwell's "Matter and Motion" and Norton's "Astronomy."

(23) J. C. M. asks: 1. If two steam gauges are put on a boiler, one at the top, the other at the bottom, how much more will the bottom one show? A. The difference due to the pressure of the water above it. 2. What is the temperature of the water in a boiler when there is 60 pounds of steam to the square inch? Does the temperature of the water rise with the steam? A. The temperature of the water is generally about the same as that of the steam; in this case about 277°. 3. What difference in the working of an engine does it make when the areas of the exhaust and supply pipes are the same? A. None, ordinarily. 4. Can any harm arise from carrying your boiler full of water, say two inches from the top of an upright tubular boiler? A. If the boiler will furnish dry steam under such circumstances, we do not think there is any harm done.

(24) N. H. D. writes: I wish to make an electro-magnet capable of sustaining from 100 pounds to 125 pounds weight. Please advise me. A. To form the core bend a piece of soft, round iron, one inch in diameter and two feet long, into the form of the letter U; on each of its arms slip a spool or coil of insulated wire, three inches in diameter and about eight inches long, formed by winding No. 16 copper wire, cotton insulation, on a mandrel or shaft of round iron, one inch in diameter and one foot long, wrapped with four layers of foolscap paper. As each layer of insulated wire is wound on the mandrel it should be brushed over with hot glue, and when the spool is thus wound, and the glue between each layer of wire is thoroughly dry, then the mandrel is knocked out of the spool. Wind each spool in the same direction, and when the spools are slipped on the core, connect the inside end of one spool of wire with the inside end of the other spool of wire; this will leave two ends of wire, which are to be connected with the poles of a battery of five of Grove's cells.

(25) H. F. H. asks: What is the rule to find how many square feet of heating surface is necessary to warm a greenhouse? Hot water pipes are used. Would it require more than if for an ordinary room? Is any allowance made for double sashes? A. Where double sashes are used, the heating surface furnished for an ordinary apartment will be sufficient; but for single sashes the heating surfaces can be made twice as great, to advantage.

Which is the most paying trade, carpentry or cabinet making? A. If a cabinet maker is a man of good taste and with some knowledge of design, his trade is generally more remunerative than that of the carpenter; or this is generally true, at least, in a community where taste is a merchantable commodity.

(26) E. M. C. asks: Other things remaining the same, would the horse power of an engine increase and decrease in direct proportion with the length of the cylinder? A. Yes.

What are the standard average wages of machinists and coppersmiths? A. There is no standard. Machinists earn from \$2 to \$3 per day, and good coppersmiths from \$3 to \$4.

Please state the dimensions of one of the first class ocean steamers. A. The Britannic is 467 feet 2 inches long, 44 feet 2 inches beam, 33 feet 7 inches depth, and measures 5,004 tons.

(27) S. H. P. asks: Who was the inventor of the mariner's compass? A. It is uncertain. The invention is sometimes ascribed to Flavio Melfi, or Flavio Gioja, a Neapolitan, about the year 1302. Some authorities assert that it was brought from China by Marco Paolo, a Venetian, in 1260. The invention is also claimed by both the French and English.

Is there any heavier metal than platinum known? A. No. Iridium and osmium have nearly as great density.

At what degree of heat is common illuminating gas ignited? A. According to Draper it requires a temperature of little less than 1000° Fah.

(28) S. L. P. writes: Suppose an upright steam pipe closed at the top, and live steam admitted at the bottom, would the condensed steam be held at the top of the pipe, or would it drip back as fast as condensed? A. The water would be at the bottom.

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

D. F. R.—The doleritic rock contains much iron and a little titanium. It does not contain silver or other valuable metal.—L. N. G.—Gneiss rock containing marcasite—a sulphide of iron.—T. J. H.—Larger specimen contains crystals of franklinite (zinc-manganese-iron oxide). Zincite—red oxide of zinc and feldspar. The smaller sample is metallic antimony with a trace of bismuth.—N. G.—The schistose rock contains sulphide of iron.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure the receipt of original papers and contributions on the following subjects:

Patent Court. By A. W. S.  
Amendment of the Patent Laws. By C. S.  
Arctic Expeditions. By J. S.  
Are the Seasons Growing Colder? By L. S.  
Astronomical Discrepancies. By L. S. B.  
Cinders in the Eye. By J. H.  
Nebular Hypothesis. By S. M.  
Notes on the Telephone. By L. L. D.