

## 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.*

W. H. S.—You can obtain "Allen's Artificer's Assistant" from Allen & Co., Publishers, 33 Murray St., this city price \$2.50. See condensed table of contents in last week's paper, page 235.

Vertical Engines, 10 to 15 H. P., thoroughly well made. John Hartick & Co., 47 Gold street, New York.

H. W. Johns' Asbestos Liquid Paints are the purest, most beautiful and durable paints in use. They are also more economical than the best white lead and oil, and are adopted by the most extensive users of paints in this country.

80 lb. dead stroke Power Hammer, in good order, for \$175; regular price \$750. Apply to T. Shaw, Mercury Gauge Warerooms, 915 Ridge Ave., Philadelphia, Pa.

Try Penfield Tackle Block Works, Lockport, N. Y. Water Wheels, increased power. O. J. Bollinger, York, Pa.

Who wants to make and introduce patented Sheaf Binder of sheet iron and wire—excellent—or buy rights? A rare opening. See Sci. Am. Sep. 21, 1878. Address J. Bannhr, 277 E. 10th St., N. Y.

For the most substantial Wood-Working Tools, address E. & T. Gleason, 52 Canal St., Philadelphia, Pa.

Bevel Protractor.—Patent for sale. Combines several drawing tools. F. L. Cook, Fairfield, Iowa.

Sugar House Machinery for Plantations. Manufacturers please send illustrated circulars and price lists to Box 315, Natick, Mass.

Wheelbarrows.—Over 50 styles, with felloe-plated, bolted wheels. Pugsley & Chapman, 8 Liberty St., N. Y.

Notice.—Charles N. Elliott, of N. Y., is no longer connected officially with the Ingersoll Rock Drill Company, and is not authorized to collect moneys or transact any business whatever for the same. By order of H. C. Sergeant, President; F. M. Pierce, President pro tem.

Wanted.—1,200 feet of side track (36 lbs. to the yard), second quality or good second hand railroad iron. Address Bodwell Granite Company, Vinahaven, Me.

For Sale.—One set Eccentric or Die Rolls. Henry Disston & Sons, Philadelphia, Pa.

Exhibition Magic Lantern and 60 Views, only \$25. Catalogue free. Outfits wanted. Theo. J. Harback, Importer and Manufacturer, 809 Filbert St., Phila., Pa.

The improved Gatling Guns fire over 1,000 shots per minute, and are the most destructive war weapons ever invented. Gatling Gun Co., Hartford, Conn., U. S. A.

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

Blowers.—One No. 5, two No. 6, regular pattern, steel, pressure Sturtevant's; one No. 6, Hot Blast Apparatus; also other sizes for sale very low. Exeter Machine Works, 140 Congress St., Boston, Mass.

Sheet Metal Presses, Ferracute Co., Bridgeton, N. J. Use the Patent Improved Sheet Iron Roofing and Drip Crimped Siding made by A. Northrup & Co., Pittsburg, Pa. Send for circular and prices.

The well known Asbestos Roofing has a larger sale than all other kinds of portable roofing combined.

Engine Builders' Brass Goods, Oil Feeders, Glass Oil Cups, Shaft Cups. All goods strictly first class. Address Cincinnati Brass Works.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N. J. English Agency, 18 Caroline St., Birmingham.

J. C. Hooley, Consulting Engineer and Mechanical and Scientific Expert, Lawrence, Mass.

Boilers ready for shipment, new and 2d hand. For a good boiler, send to Hilles & Jones, Wilmington, Del.

Punching Presses, Drop Hammers, and Dies for working Metals, etc. The Stiles & Parker Press Co., Middletown, Conn.

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

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

Presses, Dies, and Tools for working Sheet Metals, etc. Fruit and other Can Tools. Bliss & Williams, Brooklyn, N. Y., and Paris Exposition, 1878.

Pulverizing Mills for all hard substance and grinding purposes. Walker Bros. & Co., 234 and Wood St., Phila.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See advertisement.

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.

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

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

Best Wood Cutting Machinery, of the latest improved kinds, eminently superior, manufactured by Bentel, Margedant & Co., Hamilton, Ohio, at lowest prices.

We make steel castings from 1/4 to 10,000 lbs. weight, 3 times as strong as cast iron. 12,000 Crank Shafts of this steel now running and proved superior to wrought iron. Circulars and price list free. Address Chester Steel

Diamond Tools. J. Dickinson, 64 Nassau St., N. Y. Elevators, Freight and Passenger, Shafting, Pulleys, and Hangers. L. S. Graves & Son, Rochester, N. Y.

Blake's Belt Studs are the strongest fastening for Rubber or Leather Belts. Greene, Tweed & Co., 18 Park Place, N. Y.

Solid Walrus Wheels. Wood Wheels Covered. Fine Wool Felt Wheels for Polishing. Greene, Tweed & Co.

Holly System of Water Supply and Fire Protection for Cities and Villages. See advertisement in Scientific American of last week.

Extra Fine Taps and Dies for Jewelers, Dentists, and Machinists; in cases. Pratt & Whitney Co., Manufacturers, Hartford, Ct.

The genuine Asbestos Coverings for Steam Pipes and Boilers are manufactured only by the H. W. Johns Manufacturing Company.

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.

Machine Cut Brass Gear Wheels for Models, etc. (new list). Models, experimental work, and machine work generally. D. Gilbert & Son, 212 Chester St., Phila., Pa.

Hand Fire Engines, Lift and Force Pumps for fire and all other purposes. Address Rumsey & Co., Seneca Falls, N. Y., U. S. A.

Manufacturers of Improved Goods who desire to build up a lucrative foreign trade, will do well to insert a well displayed advertisement in the SCIENTIFIC AMERICAN Export Edition. This paper has a very large foreign circulation.

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

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

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

Address Star Tool Co., Providence, R. I., for Screw Cutting Engine Lathes of 13, 15, 18, and 21 in. swing.

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.



(1) J. W. R. asks: What figure will be generated by the oblique section of a cylinder by a plane passing through both sides of the former? A friend of mine maintains that it will be an ellipse, which I think is purely a conic section, and is generated by the section of a cone by a plane passing through both sides of it at a greater or lesser angle with the base. I do not find a satisfactory statement in the books. A. We are inclined to agree with your friend.

(2) H. & H. ask: What is the speed of a tornado and a hurricane? A. A tornado and a hurricane are the same. The speed of the wind in a tornado is 90 to 100 feet per second.

(3) G. A. D. asks where to obtain a cart-ridge that makes no report when fired. A. Such a cart-ridge cannot be made.

(4) B. K. B.—See answer to H. T., p. 155, last number of the SCIENTIFIC AMERICAN. The metals cannot be silver plated in the way you suggest.

(5) H. H. D. writes: I read in your paper several years ago about sawing wood with a piece of wire and electricity. Do you know whether it was a success or not? A. We do not think wood sawing can be economically done in the way mentioned. We are not aware that there is any patent on it.

(6) C. J. C. writes: In the issue of August 24, in answer to query C. J. C., you simply answer, "24 lbs." If I am not asking too much, will you please explain why it is as you say? A. The spring being under a strain of 24 lbs. pulls equally in both directions. If the spring balance were hanging from a fixed support with a 24 lb. weight attached, the downward pull on the support would be 24 lbs. + the weight of the scales. If you substitute one hand for the weight and the other for the fixed support, the result will be obvious. And if you place the scales in a horizontal position the result would be the same, leaving out of consideration the weight of the scales.

(7) J. W. B. asks whether a motive power can be produced without heat that will drive an engine (about 1 horsepower) either by the use of chemicals or compressed air and chemicals. If so, what is the process? A. You can use a spring, compressed air, or electricity. For addresses of manufacturers, you should insert a notice in the "Business and Personal" column.

(8) H. G. W. writes: It has frequently been remarked that the instinct of the lower animals is quite liable to mistakes. I noticed lately something of this nature so singular that I send you an account of it. While engaged reading in my sitting room, I saw by a glance from my paper a butterfly—the Vanessa atalanta—settle upon the front door post, remaining quiet, excepting a slight but continuous vibration of the wings. Soon there appeared a humming bird, which, remaining poised in air, repeatedly thrust its bill between the insect's wings. After retaining position for several moments, the butterfly moved about, attended by the humming bird, until the latter, evidently disgusted with the traveling tendencies of the seeming blossom, flew away. A. Since the humming bird is an eater of small insects it is more probable (the observation being correct) that the bird mentioned above was in search of parasites upon the butterfly, than that it mistook the insect for a flower.—Ed.

(9) N. T. E. asks: Can a band saw running on three foot pulleys be run with half the width belt of a saw running on six foot pulleys, both using the same amount of power and traveling the same number of feet per minute with the same size of driving pulleys? A. No, as we understand your meaning.

(10) K. L. D. asks how to make the so-called chloride of nitrogen with as little danger as may be to life and property. A. The following is perhaps the safest method of preparing the mixture in small quantities: A somewhat dilute and tepid (not hot) solution of ammonium chloride (sal ammoniac) in distilled water is poured into a clean porcelain dish, and a bottle of chlorine, the neck of which is quite free from grease, inverted into it. A clean shallow and heavy leaden cup is placed beneath the mouth of the bottle to collect the product. When enough of the oily nitrogen chloride has been obtained, the leaden vessel may be carefully withdrawn, with its dangerous contents covered with a stratum of the ammonium chloride solution. Contact with combustible organic matter of any kind determines its immediate explosion, so that the vessels employed must be scrupulously clean.

(11) W. N. F. writes: The statement is often made that a locomotive can start no load greater

than its own weight. How important an element in the power of a locomotive is its own weight? A. The weight of the engine prevents the slipping of the driving wheels, or permits the exertion of tractive force; the statement in regard to starting is not generally true.

(12) E. B. asks: Can air be brought to a freezing point by setting it in motion? Are there any works on scientific ice making or air cooling? A. By condensation and rarefaction, yes; not otherwise, as we understand you. When air is condensed by pressure, part of its latent heat becomes sensible heat; and if the condensed air is allowed to stand until it regains its former or normal temperature, and is then released, it will be found as much colder than the surrounding air as it was hotter the moment after compression. The cooling of the condensed air may be facilitated by bringing it, or the vessel containing it, into contact with cold running water. You will find the principles of ice making machinery and processes described and illustrated in Knight's "New Mechanical Dictionary." See also pp. 95, 335, and 168, vol. 37, and 159 and 387, vol. 38, of the SCIENTIFIC AMERICAN.

(13) G. W. F. asks: What advantages has the oscillating engine over the ordinary crosshead engine, and why is it not more used? A. The advantages claimed for oscillating engines are compactness and decrease of weight. There are many engineers who consider the trunnion packing and necessary methods of support objectionable.

(14) J. F. McC. asks: 1. Do all manufacturers of articles which have a taper head, such as wood screws, etc., make the same taper or angle? If they do what is the angle? A. The angle of 90° is generally used. 2. Is there a standard angle or taper for lathe centers (both ends)? If so, what is it? A. 60°.

(15) H. S. asks how to make sulphurous acid (SO<sub>2</sub>), and how to liquefy it on a small scale. A. Place 1 oz. of clean copper wire or turnings and 4 or 5 ozs. of concentrated sulphuric acid in a glass retort which it will about half fill, and carefully heat the contents until the gas begins to pass over. The gas may be liquefied by passing it through a perfectly dry stout glass U tube, surrounded by a mixture of pounded ice and salt, 2 of ice and 1 of salt. If the upper ends of the U tube are provided with stop cocks (or hermetically sealed with the blowpipe) the contents of the tube may be retained in the liquid form when the tube is removed from the refrigerator. The gas should be passed through tubes containing sodium sulphate and calcium chloride to free it from impurities and moisture before entering the condenser.

(16) L. writes: A Lockridge air brake is operated by an eccentric on engine driving axle. The air pump is 7 inches diameter and about 5 1/4 inches stroke. The engine with 5 foot driving wheels has to average 30 miles per hour. The air pump piston is packed with a sole leather cup which gets very dry and hard in a run of 50 miles, so much so as to be useless. Can you tell me of any process by which the leather can be made to do better? A. We think that if you will lubricate the cylinder you will have no further trouble.

(17) C. P. K. writes: I made a telephone as described in No. 5, vol. 39, but although I followed directions very carefully it will not work; so I want to know what kind and thickness of cord or thread to use, and what is the greatest number of turns or angles in the thread which will not interfere seriously with its conducting power. I had to make 16 turns to adapt it to the purpose for which I wish it. I used A sewing silk, and afterwards waxed apothecary's twine, but without success. I have had better success by using a 2 inch gold beater's skin for a diaphragm and a fine silk thread supported at the angles with loops of thread. A. We do not think the thread telephone will work around more than 4 or 5 angles. The rubber loops should be put under considerable tension.

How can I make impression paper, like the inclosed sample? A. The paper (unsized) is prepared with a warm paste of lard, with a few per cent of beeswax and lampblack.

Can I make any solution of beeswax to flow on glass plates like collodion for etching purposes? I have tried the ethereal solution, but it is too mealy. A. You may dissolve the wax in benzole or absolute alcohol—the glass should be thoroughly dry before flowing. It is best to warm the plate afterwards to cause a semi-fusion and hardening of the coating.

(18) C. J. B. asks: What is the best form for a steamboat drawing not more than 2 1/4 feet of water when loaded, carrying from 50 to 75 persons with comfort—propeller, side wheel, or steam wheel? And which could be run with the greatest speed, say 12 to 15 knots an hour? A. We think a sidewheel boat would be preferable, on some accounts.

(19) W. H. B. asks: What weight (pounds) placed on the middle of a cast iron bar 1 inch by 1 inch (square section), and 3 feet long between supports, would deflect it the 100th of an inch; and what weight the 50th of an inch (casting to be of good No. 1 pig soft machine casting)? What would be the section of the material now known as steel castings (square section) to have equal resistance to deflection as the cast iron above mentioned? A. Trautwine gives the following rule, with approximate constants, remarking that the constants, in important cases, should be determined by experiment.  $w$  = weight of bar, in pounds, between supports.  $W$  = center load in pounds.  $D$  = clear span in feet.  $B$  = breadth of bar in inches.  $d$  = depth of bar in inches.  $I$  = deflection in inches.  $I = \frac{(w \times 0.625 + W) \times D^3 \times \text{constant}}{B \times d^3}$ . Constant: Average cast iron—0.000025. Average steel—0.000013. From this formula you can calculate answers to your queries.

(20) A. S. asks: Can a boat be propelled against the wind, using a windmill as the motive power? I claim it can; a friend of mine claiming to the contrary, he says the windmill would turn the screw, but the force of the wind against the windmill would keep the boat stationary, and with friction and the wind against the boat the boat would drift astern. Will you please settle the question in your next issue? A. We think you are right.

(21) G. L. asks for the best method of making paste for use with a pasting and folding machine. A. Four parts, by weight, of glue are allowed to soften in 15 parts of cold water for some hours, and then moderately heated until the solution becomes quite clear; 65 parts of boiling water are now added, with stirring. In another vessel 30 parts of starch paste are stirred up with 20 parts of cold water, so that a thin milky fluid is obtained without lumps. Into this the boiling glue solution is poured, with constant stirring, and the whole is kept at the boiling temperature. After cooling, 10 drops of carbolic acid are added to the paste. This paste is of extraordinary adhesive power, and may be used for leather, cardboard, etc., as well as for paper. The paste in the reservoir should be kept from the air as much as possible to avoid loss of water by evaporation.

(22) C. F. H. asks for the best form of a mild galvanic battery, which can be used daily for the benefit of the health without giving a violent shock. A. See reply No. 24 in No. 9 of current volume of this paper.

(23) C. F. G. writes: My driving pulley on main shaft is 96 inches diameter, and I run my engine at 100 revolutions. My driven pulley on countershaft is 29 inches, and the driving pulley on countershaft is 39 inches, and pulley on saw mandrel is 24 inches, which gives my saw 537 revolutions per minute, and consequently does not give my saw speed enough. Now the trouble is, if I enlarge my driving pulley on countershaft, the saw does not give the same satisfaction as it now stands. I know that the saw ought to have more speed, and I do not know how to proportion my pulleys to get proper speed. How shall I make the necessary changes so as to give my saw 1,000 revolutions per minute, and if I am driving my engine too fast for the length of stroke? The cylinder is 12 inches bore, 3 feet stroke. A. If you have room it might be better to put in an additional countershaft. If this is not convenient, enlarge the pulley on engine shaft. In this case it may be necessary to widen the belt. The speed of the engine is not too great, if it is well built.

(24) A. O. P. writes: In the propulsion of vessels, other things being equal, which has the most pulling power, the screw or the side wheel? A. The screw, as we understand your meaning.

(25) J. H. H. writes: I am using a four side moulding machine at a speed of 4,000 revolutions per minute, to plane blind slats. It feeds at the rate of 1,240 feet per hour, and does its work so that no further finish is required, although many of the slats are for oil finish. I find that one tenth of an ounce difference in weight of the cutting bits will produce the ridges spoken of in your reply to G. B. M. (17) in No. 6 of current volume. Hence I conclude that the cutter heads must be exactly in running balance. It is no uncommon thing to see a planer running with a jar and noise that is deafening, and, in shop parlance, turning out good wash-board stuff. The fault is with the operator. Every shop should have a pair of balance scales, and the planer knives should be balanced every time they are ground. The result will be, with a good machine, good smooth work and a reduction in cost of repairs. I say a good machine, that is, any machine with true arbors and a perfectly balanced cylinder head is a good machine, or at least will do smooth work, other things being equal.

(26) C. J. O. writes: The statement that the use of tomatoes as an article of food produces or promotes the development of cancer has created some excitement here. Is there any foundation for such a belief? A. No.

(27) B. H. S. and J. R.—The following methods are recommended for tempering mill picks: 1. Take 2 gallons rain water, 1 oz. of corrosive sublimate, 1 of sal ammoniac, 1 of saltpeter, 1 1/4 pints rock salt. The picks should be heated to a cherry red and cooled in the bath. The salt gives hardness, and the other ingredients toughness to the steel; and they will not break if they are left without drawing the temper. 2. After working the steel carefully, prepare a bath of lead heated to the boiling point, which will be indicated by a slight agitation of the surface. In it place the end of the pick to the depth of 1 1/2 inches until heated to the temperature of the lead, then plunge immediately in clear cold water. The temper will be just right if the bath is at the temperature required. The principal requisites in making mill picks are: First, get good steel. Second, work it at a low heat; most blacksmiths injure steel by over heating. Third, heat for tempering without direct exposure to the fire. The lead bath acts merely as protection against the heat, which is almost always too great to temper well.

(28) J. M. F. asks: What is the cheapest, or rather, which will throw or raise the most water, say 4 feet high, a properly constructed marine pump, or an elevator made of two chains connected together by boards and running in a flat box driven by a 5 or 10 horse power engine? A. We recommend the pump.

(29) G. B. asks: How powerful a telescope is required to see Saturn and his rings, and also one that will bring Jupiter's moons in view? Tell me how large one it must be, and where one could be purchased, and the probable cost. A. A telescope having a two inch objective would answer, although a three or four inch would be much better. Any of the dealers in optical instruments could supply you. The cost of a good two inch is \$55.

(30) S. B. B., A. H. P., N. H. S., G. R., and others.—The diaphragm of a phonograph needs to be clamped tightly in the mouthpiece between two rings of blotting paper. The mouthpiece should be tight or nearly so. The wooden hammer or spring should not spring except at a point near the end attached to the mouthpiece. The spring should not be too delicate, and it must bear with some little force on the diaphragm. The needle should be short and carefully sharpened. A long needle and a weak spring will cause rattling. The paraffin is applied to the plaster of Paris cylinder to permit of turning without chipping it.

(31) J. H. asks for the best and most economical method of making a cellar bottom waterproof against the tide. I have already without the desired ef-