

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

Shoe-Peg Machinery, as follows: Sawing and Heading Machine, with 36 in. taper-ground saw. Price \$185. Baldwin Pointer, 3 rolls, good as new. Price \$137. Baldwin Splitter, with ratchet-feed. Price \$40. Boring Lathe, for cutting out knots. Price \$25. Bleaching Furnace and Fan, 13 in. Price \$35. New Steam Dryer and fixtures, containing over 600 feet $\frac{1}{2}$ in. pipe, copper-covered, and made in the most thorough manner, 25-bushel size. Price \$375. Screens, good order. Price \$37. Or, if all the above are wanted by one person, will put in the seven machines for \$740 cash. If desired, will sell the hangers, pulleys, and shafting used to drive same, at 6 $\frac{1}{2}$ c. per lb. There are two lines shafting, one $\frac{1}{2}$ in. diameter, 46 feet long, and one $\frac{1}{4}$ in. diameter, 25 feet long. This machinery is all in good order, ready to start up, and will turn out 20 to 30 bushels pegs per day, and with a few slight additions, costing but little, the capacity could be doubled. For further particulars, address S. C. Forsyth & Co., Manchester, N. H.

A Bargain—Jackson (Mich.) Ag'l W'ks for Sale. Wanted—The best Power Matching Machine in the market. Send circulars and capacity of machines to Melendy Bro's, Nashua, N. H.

22 years old—Inventive mind wants to work in machine shop. A. G. C., Lock Box 54, Lawrence, Kan. Cutler's Pocket Inhaler, patented through the Scientific American Agency, has had a more extensive sale, in a given time, than any medical instrument ever invented. Read advertisement in this paper, and send for a circular.

Lumbermen say, after using R. Hoe & Co.'s Chisel tooth saws many months, that they would not accept a solid tooth saw, with files and tools to keep it in order, if 1 $\frac{1}{2}$ c. free. They will run no other saw.

Wanted—A business man with \$10 to \$50,000, to manufacture the best gothic chairs, secured by patent. Manufacture and machinery now in operation; or I will sell part or all of the patent. F. W. Krause, 72 West Washington St., Chicago, Ill.

1 Horse Engine \$60, 2 horse \$100, without boilers, at T. B. Jeffery's, 253 Canal St., Chicago, Ill.

The American Standard of Bolts and Nuts (Chart) Price \$1. Address E. Lyman, C. E., New Haven, Conn.

The London M'f'g Co., 24 Grand St. N. Y., are making a very superior Varnish. In fact, it is considered the best in the market. Give them a trial and you will be satisfied.

"Amongst the live and progressive institutions of the day is Geo. P. Rowell & Co's Advertising Agency, No. 41 Park Row, New York. The establishment is so systematized, and their facilities are so ample, that the public is sure of being served in the most complete manner."—[Boston Post.]

25 per cent saving in fuel or extra power guaranteed to steam engines by applying the R. S. Condenser. T. Sault, Consult'g Eng'r. Gen. Agt., New Haven, Ct.

Wanted—A first class Pattern Maker. H. B. Smith, Smithville, Burl. Co., N. J.

Single, Double, and Triple Tenoning Machines of superior construction. Martin Buck, Lebanon, N. H.

Patent for Sale—An Acrobat performing all kinds of motions on a barrel or ball. A new Toy. F. C. Leyboldt, 243 North 5th St., Philadelphia, Pa.

Wanted—A Sorby-Browning Micro-Spectroscope, new or 2d hand. H. A. Sprague, Charlotte, Me., U. S. A.

To Iron Manufacturers—Wanted Iron Saw Blades for sawing marble. Send price. Boyd & Chase, Harlem N. Y.

We call attention of Amateur Workers in Fancy Woods to the advertisement of Messrs. Geo. W. Read & Co., on page 349, who have always a good supply of Fancy Woods on hand.

A First Class and Energetic Machinist wants to go into business of any kind. Any one knowing of an opportunity, please address Machinist, P. O. Box No. 378, Susquehanna Depot, Pa.

Dies and Punches—R. Woodman m'frs the Best. 50 Sudbury St., Boston, Mass. Manufacturers of Fancy Sheet Metal Work.

Lathe Wanted—Foot motion, screw-cutting, finely fitted. Address Screw Lathe, Herald Office, New York.

Gothic Furnace, for coal and wood, heats houses & churches. Send for book. A. M. Lesley, 226 W. 23rd St., N. Y.

Traction Engines, good order, for sale cheap—International Chemical Works, 10th St., Hunter's Point, N. Y.

Double-Entry Book-Keeping Simplified. The most successful book on the subject ever published. Cloth, \$1. Boards, 75 cts. Sent post paid. Catalogue free. D. B. Waggener & Co., 424 Walnut St., Philadelphia, Pa.

Bolt Headers, both power and foot, and Power Hammers, a specialty. S. C. Forsyth & Co., Manchester, N. H.

Main Driving Belts—Pat'd improvement. Address for circular, Alexander Bro's, 412 N. 3d, Philadelphia, Pa.

Electric Burglar Alarms and Private House Annunciators; Call, Servants' & Stable Bells; Cheap Teleg. Insts.; Batteries of all kinds. G. W. Stockly, Cleveland, O.

For Sale, cheap—One 60 H.P. Boiler, 40 Engines and Boilers. Address Junius Harris, Titusville, Pa.

Steam and Water Gauge and Gauge Cocks Combined, requiring only two holes in the boiler, used by all boiler makers who have seen it, \$15. Hillard & Holland, 62 Gold St., New York.

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

Hotchkiss Air Spring Forge Hammer, best in the market. Prices low. D. Frisbie & Co., New Haven, Ct.

"Pantograph" or Universal Worker—Best combination of Lathe, Drill, Circular, and Scroll Saw. E. O. Chase, 7 Alling Street, Newark, N. J.

To Manufacturers—Pure Lubricating Oil, Sample Package (24 gals.), \$7. Send to Geo. Allen, Franklin, Pa.

Educational Lantern Slides—Send for Catalogue of Prof. W. A. Anthony, Cornell University, Ithaca, N. Y.

Hotchkiss & Ball, Meriden, Conn., Foundrymen and workers of sheet metal. Fine Gray Iron Castings to order. Job work solicited.

For Sale—Second Hand Wood Working Machinery. D. J. Lattimore, 31st & Chestnut St., Phila., Pa.

Price only \$350.—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., 246 Canal St., New York.

Peck's Patent Drop Press. Still the best in use. Address Milo Peck, New Haven, Conn.

All Fruit-can Tools, Ferracite W'ks, Bridgeton, N. J.

Brass Gear Wheels, for Models, &c., on hand and made to order, by D. Gilbert & Son, 212 Chester St., Philadelphia, Pa. (List free.) Light manufacturing solicited.

American Metaline Co., 61 Warren St., N. Y. City. Genuine Concord Axes—Brown, Fisherville, N. H.

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

Faught's Patent Round Braided Belting—The Best thing out—Manufactured only by C. W. Army, 143 North 3d St., Philadelphia, Pa. Send for Circular.

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

Magic Lanterns and Stereopticons of all sizes and prices. Views illustrating every subject for Parlor Amusement and Public Exhibitions. Pays well on small investments. 72 Page Catalogue free. McAllister 49 Nassau St., New York.

Temples and Oilcans. Draper, Hopedale, Mass.

Water, Gas, and Steam Goods—New Catalogue packed with first order of goods, or mailed on receipt of eight stamps. Bailey, Farrell & Co., Pittsburgh, Pa.

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 \$6, with good Battery. F. C. Beach & Co., 246 Canal St., New York, Makers. Send for free illustrated Catalogue.

For best Bolt Cutter, at greatly reduced prices, address H. B. Brown & Co., New Haven Conn.

The Baxter Engine—A 48 Page Pamphlet, containing detail drawings of all parts and full particulars, now ready, and will be mailed gratis. W. D. Russell, 13 Park Place, New York.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon, 470 Grand Street, New York.

Spinning Rings of a Superior Quality—Whitinsville Spinning Ring Co., Whitinsville, Mass.

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

Solid Emery Vulcanite Wheels—The Original Solid 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, New York.

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

Notes & Queries

O. C. W. will find directions for utilizing old tin cans on p. 319, vol. 31.—G. A. B. and W. M. will find directions for bluing steel on p. 123, vol. 31.—S. M. T. can transfer engravings to glass by the process described on p. 123, vol. 30.—W. F. McL. will find a good recipe for making black ink on p. 203, vol. 29.—L. L. L. will find directions for soldering iron and brass on p. 251, vol. 28.—F. S. can exterminate moths from carpets by the process described on p. 388, vol. 29.—J. S. will find directions for making gun cotton on p. 282, vol. 31. Celluloid is described on p. 23, vol. 33.—T. M. W. will find directions for silvering mirrors on pp. 267, 331, vol. 31.—S. C. can mount chromos, etc., by following the directions on p. 91, vol. 32.—A. S. can water-proof his leather boots by using the recipe given on p. 155, vol. 26.—B. A. C. will find a recipe for a deplatory on p. 362, vol. 32.—G. will find a good recipe for stove polish on p. 219, vol. 31.

(1) A. McC. asks: What is the best speed for the bucket of an overshot water wheel? Our wheel runs at the rate of 10 feet per second. Some millwrights claim that if we reduce the speed one half we will get double the power out of the same water. Are they right? A. We could not answer positively without more data; but in general, the speed of the periphery of an overshot wheel is not more than 5 or 6 feet per second.

(2) T. J. C. asks: What is the best way of joining logs together, to form a boom? A. For ordinary cases, chains answer very well, if the logs are kept in position by piles, driven in pairs, at intervals.

(3) S. C. B. says: I intend using a permanent tread power. Is there any disadvantage in placing it on a level, requiring the horse to work in harness instead of on an inclination? My own views are that the horse will work more easily on the level, which distributes the labor upon his legs nearly equally, whereas the other plan overtaxes the hind ones. A. Probably the matter can only be settled definitely by experiment. Some inclination is generally considered advisable, so as to allow part of the weight of the animal to act against the resistance. We imagine some of our readers can furnish useful hints on this subject; and if so, we would be glad to hear from them. The tread power is not ordinarily as efficient as the lever power, in which the horse walks in a circle of large diameter; and for a permanent power, it is better to call in the aid of steam.

(4) H. H. A. asks: What kind of oil should be used as a base to mix with powdered slate to paint a roof with? A. Linseed oil is the best to use, and the expense for one roof would not be very great.

(5) H. C. E. says: 1. I have a boat, 21 feet long by 7 feet 6 inches beam, drawing 12 or 15 inches of water. I built an engine 3x5 inches, with a link motion. Is the engine large enough for the boat? A. Yes. 2. I have a $\frac{1}{2}$ inch feed pipe and $\frac{1}{4}$ inch exhaust. Is the exhaust too small for the engine? A. It will answer very well. 3. What size of propeller should I use? A. Of 18 or 20 inches diameter, 2 $\frac{1}{2}$ feet pitch. 4. What size of boiler is required? A. About 2 $\frac{1}{2}$ feet diameter, 4 feet high. 5. What is meant by the pitch of a propeller? A. It is the distance it would move the boat, at each revolution, if it worked in an unyielding medium, like a screw in a nut.

(6) C. A. A. asks: Is it any benefit to a rubber band to oil it? A. Quite the contrary.

What is the best way to treat poets to make them last? A. It is recommended to dip them into tar.

Are small vertical engines, with cast iron flues, as safe as those with wrought iron tubes? A. We do not understand what you mean by the flues of an engine; but if you refer to the boiler, the wrought iron tubes are preferable.

(7) E. F. asks: Is there anyway of setting glass in skylights? A. To make a good skylight, use iron bars and adopt a steep pitch; 45° is none too steep. Purchase your putty or cement of the patent vault light manufacturers of this city. If you wish to repair a skylight, use the same kind of cement but you cannot depend upon wooden bars.

(8) S. H. D. asks: How can I take a copper counter die from a brass die? A. Take a plaster of Paris cast from the die, and use it as a mold, melting two per cent of spelter with the copper to flux it.

(9) A. L. C. asks: What percentage of sea water is salt? A. Ordinary sea water contains about 3 per cent, by weight, of salt.

It is said that Pythagoras knew how to predict an eclipse by means of the saros. What is a saros? A. It was an ancient astronomical period, the length of which is a subject of debate.

I want to build a model ship 6 feet long. Can you give me some rules that will assist me in shaping the hull? A. Get a drawing of the lines of some well designed ship, and work from that.

(10) J. M. H. asks: By what process can finely ground flint glass be incorporated with Babbitt or other metal for lining boxes, for heavy machinery running at high speed? The object is to prevent the heating and rapid wear of the journals. A. We know of no process, and we think that the mixture would cause the bearings to abrade.

(11) G. E. P. says: Some time ago you discussed the proposition that the top of a wheel of a wagon in motion moved faster than the bottom. Is there any formula for computing how much faster the top moved than the bottom, or than the hub? A. At the highest point the velocity is twice as great as at the center, and at the lowest point the velocity is zero.

(12) A. H. asks: In making bell metal (about 77 copper to 23 tin) I have been in the habit of employing a flux composed almost entirely of lime. Over 5 per cent of the metal is burnt up; and the slag will sometimes be an inch thick in the bottom of the reverberatory furnace. Is there a flux which will effectually separate the metal from all impurities? A. Use a little borax or sal ammoniac.

(13) C. A. B. asks: What will remove, from the walls of a brick building, the oozings or collection of saltpeter? A. It is probably not saltpeter, for if it were the rain would remove it, it being very soluble in water. If it is an insoluble salt of lime, try a little dilute muriatic acid, and then wash well with water.

(14) G. F. says: 1. I have a six horse horizontal engine; it makes a slight thump which I am unable to locate. The center of the driving shaft is $\frac{1}{4}$ inch higher than the center of the cylinder; would that cause a thump? A. The shaft being out of line is most probably the cause of the thump. 2. I am running a line shaft at 120 per minute, and an engine at 75. Could I economize by putting a larger pulley on shaft and running the engine at 100 per minute, using same pressure? A. The proposed increase of revolutions will prove economical, providing the wearingsurfaces and the proportions of the various parts are large enough to sustain it. The thump would, however, increase with the speed.

(15) R. R. Z. asks: What will dissolve hair and wool mixed with small pieces of bone? I wish to retain the ammonia. I want to use it in a drill as a fertilizer. A. Ammonia can be obtained from bones, etc., only by a process of destructive distillation. It does not exist, in any quantity, in the bones themselves, but is formed when they are decomposed, in airtight vessels, by a high temperature.

(16) W. H. M. and M. L. L. say: We want to bore a well in low land, where salt water flows and penetrates in the earth to the depth of 15 feet. Will galvanized tubing prevent the salt water from mingling with the fresh without the joints being screwed or soldered together? A. If you strike a spring of fresh water, the tubing you speak of will answer very well.

(17) S. G. asks: How can I extract the oil from kip pieces without injury to the leather, which is to be used for heels for shoes? A. Try bisulphide of carbon.

(18) A. says: The supply pipe from the boilers to a horizontal engine is 75 feet long and 14 inches diameter. It connects to the steam chest by an 8 inch pipe, 15 feet long. The cylinder is 40 inches in diameter, and of 46 inches stroke; it has a waste pipe from each head, that runs along to a flywheel pit, and then, by a quarter turn, down 15 feet into 2 feet of water. The engine worked water while working a heavy train of rolls. Parties here say she drew the water from the flywheel pit through the waste pipe. I say not, as there was 60 lbs. steam pressure to work against. Which is right? A. You are right, according to the account; the other parties may be right if the engine was a condensing one.

(19) B. F. G. asks: Is there anything that will dissolve shellac besides alcohol? A. Shellac dissolves in a hot solution of borax in water.

(20) W. C. asks: 1. What is the stream line theory? Allusion was made to a new theory averring the non-resistance of water or any perfect fluid to bodies moving through it, by Professor Froude, in a lecture which you printed about three weeks ago. That singular theory was called the theory of stream lines; but it was only alluded to. Will you explain what it is? A. It may be

briefly expressed, in the Professor's own words, as follows: "A submerged body traveling at a steady speed through a stationary ocean of perfect fluid will experience no resistance."

How deep in the water can a dredge operate? A. It might not be safe to fix a precise limit, as it is generally found that, when dredging ought to be done, machinery can be designed to do it.

(21) A. B. says: I heated equal parts of manganese peroxide and potassic chlorate in a test tube, which I drew to a point, but I could not produce an oxygen flame. What was the reason? A. Oxygen, by itself, is not inflammable. Try a piece of wood splint with a spark on the end; the oxygen will cause it to burn very brilliantly.

(22) T. C. asks: How can rosin be purified for violinists' use? A. Treat the powdered rosin with a mixture of 6 parts cold alcohol and 1 of ether; dissolve the residue in boiling alcohol, and evaporate this solution to dryness over a water bath. If the residue be now melted, it yields, on cooling, a colorless substance as clear as crystal.

(23) H. D. M. says: I assert that as high a rate of speed as 70 miles an hour had been made on an English railroad. A friend says that 45 or 50 is the highest speed ever made. Which is right? A. A speed of 70 miles an hour has frequently been made in England for short distances. Some of the trains are timed to run at nearly 60 miles an hour. Similar speeds are occasionally made in this country.

(24) M. S. J. asks: What liquids can I use to dissolve white chalk, so as not to destroy any of the properties of the chalk, but leave it in a liquid state? A. You cannot dissolve chalk and leave its properties unaffected. Rub up precipitated chalk with a little gum water.

(25) J. P. S. says: As I am about to build a burial vault, can you give me some information as to how the inside of the vault should be built, and whether it should be shelved or not? A. A burial vault is usually built into the side of a bank of earth, in such manner as to have the floor thereof one step or so above the ground in front. A medium size would be 12 by 18 feet on the exterior, with the narrow end for front. Make the interior height 10 $\frac{1}{2}$ feet and cover with a semi-circular arch. Construct the receptacles for coffins at the back end of the vault; these may be about 20 inches high, 28 inches wide, and 8 feet in depth. Make the bottoms or shelves of these receptacles of planed blue stone or slate slabs, 2 $\frac{1}{2}$ inches thick, placing the first slab upon the floor of the vault, showing its thickness above the floor; build the upright partition walls of brick in cement, and 4 inches thick. Make the slabs wide enough to serve for two compartments each, there being four in the width of the vault. This will give you four tiers of four receptacles each, and two in the upper curve of the crown, making eighteen in all. The front ends of the partitions should be faced with the blue stone or slate, into which facing cut a groove, and insert a closing slab of marble or other stone to close each opening. Pave the space in front of the cells as a vestibule with stone—which may be fine marble tiling, if so required. The entrance door may be closed with either an iron gate or marble slab, so inserted as to be easily taken out. The exterior may be faced with granite and the walls coped with the same; but the top needs only to be cemented so as to shed the water, covered with mold, and laid with grass sod.

(26) C. D. B. says: I have a compound composed of the following ingredients: Venice turpentine, sweet oil, lard, and beeswax. What cheap substance, that will not injure the skin, can I add to destroy the smell of the turpentine? A. You will have to counteract the objectionable odor by the addition of some agreeable perfume.

(27) E. D. S. asks: Is there any substance that will serve better than good sponge for filtering a $\frac{1}{2}$ inch stream of water? The chamber for filter will be 2x3x4 inches, and I wish to arrest merely the floating particles. A. Try a carbon filter.

(28) G. C. asks: Would the Cornish or double beat valve be suitable for an engine with 30 inch cylinder and 42 inch stroke, making 65 revolutions per minute with a pressure of 80 lbs.? The reason for wanting to adopt it is that the engine has frequently to be worked by hand, with full head of steam. A. If the Cornish valve can be applied, it will be suitable.

(29) A. T. B. says: We make steam in our boilers for the purpose of evaporating brine, using a pressure of 50 or 60 lbs. to the inch. Would the same fuel make more salt if no pressure were carried in the boilers? A. If there be no pressure in the boilers, the heat will not exceed 212°, and only hot water could be conveyed away from the boilers. If steam is to be circulated to any distance from a boiler, there must be a pressure to move the steam through the pipes.

(30) F. F. T. asks: Which would be the most economical as regards fuel, to run an engine at 110 or at 160 revolutions per minute? A. Generally, the higher speed is the most economical.

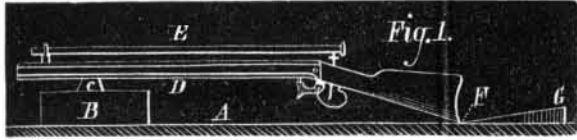
(31) D. M. M. asks: How can I re-japan stands of sewing machines, without baking them? A. Take asphaltum 45 lbs., fuse, and add boiled oil 10 gallons, red lead and litharge each 7 lbs., dried and powdered white copperas 3 lbs.; boil for 2 hours, then add of dark gum amber, fused, 8 lbs., hot linseed oil 2 gallons. Boil till the mixture is pasty, then thin with oil of turpentine 30 gallons.

(32) E. H. says: I want to build a 20 horse power water wheel, and to have the buckets attached to some flexible material like those of a corn elevator. What would be the best material to fasten the buckets to? A. An endless chain. 2. How can I calculate the horse power obtained? A. In the absence of any given conditions, we cannot tell you how to calculate the power except from the duty obtained from the device when in practical operation.

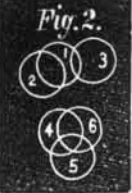
(33) H. E. K. asks: How are buckskin gloves, etc., cleaned? A. Wash them in lukewarm soft water, with a little Castile soap, oxgall, or bran tea, then stretch them on wooden hands, rub them with pipe clay moistened with beer; let them dry gradually, rubbing them from time to time so that they do not lose their shape in drying.

(34) G. asks: What are the ingredients of blue or mercurial ointment? A. Take prepared lard 1 lb., mercury 1 lb., prepared suet 1 oz. Rub them together in a marble mortar till metallic globules cease to be visible.

(35) A. H. H. says: In your answer to G. L. B. you say "the recoil of a rifle is felt before the ball leaves the barrel," which means, I suppose, that the recoil comes before the ball passes out of the gun. Not being satisfied with this answer, I made a few experiments, and the results do not fully agree with you. I tried an experiment as represented in the engraving. The rifle I used



had telescopesights and a hair trigger, and weighed altogether 7½ lbs. Caliber was 0.4 inch; the ball was 1½ inches long, and 70 grains powder was used. On a very firm table, A, was secured a block, B, high enough to bring the barrel, D, parallel with the table. At C, I fastened a yoke 4 inches long at right angles with the barrel, D, to keep the gun from turning over on one side when it was discharged. The stock rested on the table at F; and back of this was placed an inclined plane or wedge, as shown at G. I fired three shots, and in Fig. 2 have marked them 1, 2, 3. I then removed the wedge and fired three more shots, marked 4, 5, 6. At every discharge the recoil was so great that the rifle left the table entirely. You will see that there is only ½ an inch difference in the location of the bullet. By moving the gun back on the wedge ¼ inch, the sights are on the lower shots; and when on the table they are on the upper ones. Distance was 60 feet.



Why is it, if the recoil takes place before the ball leaves the gun, that there was not more difference in the shooting? A. The explanation of these experiments is probably somewhat as follows: As soon as the explosion of the powder occurs, a pressure is exerted in the barrel tending to impel the ball forward, and the gun backwards. If there is anything, such as a human shoulder, at the end of the stock, the recoil is felt at once; and if the shock is considerable, it is apt to injure the accuracy of the aim. If, however, the gun is free to move backward, as in the experiments made by our correspondent, it will commence to move at the same time that the ball does, under the influence of the same pressure; but being many times heavier than the ball, the latter acquires the velocity due to the pressure in a much shorter interval, and is out of the barrel when the gun, under the action of the same force, has just moved a little.

(36) S. S. asks: Please give me a recipe for crystallizing alum on a wire basket. A. Dissolve as much powdered alum in hot water as the water will hold; then suspend your wire basket in by a thread, and let it cool.

(37) W. H. asks: Does water, placed in a cup on the top of a stove, have any effect in purifying the air? A. No; but it prevents the excessive dryness of the air, which is very injurious to health.

(38) J. F. says: I have a gutta percha pocket drinking cup, and I broke one of the rings; can you tell me if there is any way to mend it? Glue would not hold it. A. Melt together equal parts of gutta percha and pitch. Apply hot.

(39) P. H. asks: Is there any method by which scale can be prevented from forming on the inside of a tubular boiler? A. The means of prevention vary with the qualities of the water. Unless the nature of the impurity be known, no specific can be recommended.

(40) D. T. S. says: I have noticed that in this section the willow trees all lean to the north. Can you tell me why? A. We think it is simply indicative of the average direction of the wind. Young willows grow quite rapidly, and their yielding nature makes them very sensitive to the slightest breeze.

(41) L. H. B. asks: How can I fire a charge with a battery? A. Solder a short piece of very thin platinum wire to copper wires leading from the battery to the place where the discharge is to be effected; place the platinum wire in powder or other explosive substance, and, when the proper moment arrives, include the battery in circuit. It is doubtful if one cell will be sufficient, certainly not unless the resistance of the circuit, including that of the battery, is very low. A large bichromate cell without porous cup would answer better than a Grove.

(42) F. M. asks: Can air be heated by electricity? A. Yes.

(43) G. F. B. says: The last two batteries I have made have not been successful. I use zinc and carbon plates. My solution consisted of sulphate of mercury 1 part, bichromate of potash 2 parts, sulphuric acid 4 parts, water 15 parts. When I first put the solution in the batteries, I got a very strong current of electricity; but after 15 or 20 minutes' use, it got very weak, and, after using a few times, the batteries would not work at all. The liquid turned to a greenish color, and there was a black sediment at the bottom of the jar. What is the matter? A. Single fluid bichromate

cells cannot be depended upon to furnish a steady current for any length of time. Their constancy, however, may be somewhat increased by causing air to bubble through the solution. Renew the solution, and brighten the connections.

(44) J. W. asks: 1. What is in the porous cup of a Léclanché battery? A. Peroxide of manganese. 2. If the magnet of a relay become partially magnetized, is there any way of drawing the magnetism out? A. Careful annealing is the only permanent way.

(45) J. C. L. asks: What is salt of steel? A. Probably muriate of steel, used in medicine, is intended by this term.

(46) G. W. F. says: I am building a small magnetic battery, and do not know how to arrange the wire to derive the currents from it. Can you help me? A. Make an ivory or hard rubber ring to go on the shaft, to this ring fit another of brass, and fasten the two together with screws; after which saw through the brass ring on opposite sides and in the direction of its length. The outer ends of the coils are then to be soldered to the semi-cylindrical pieces of brass, and two stiff springs, to which wires are attached for terminals, are made to press against the latter.

(47) O. P. asks: 1. Is there any metal that can be permanently demagnetized? A. Yes, tempered steel. 2. How is it done? A. By enclosing it in a helix in which a powerful electric current is circulating, or by rubbing it several times from its middle point to the ends with a permanent or an electro-magnet. Care must be taken to use opposite ends of the charging magnet for the different halves of the magnets to be charged.

(48) E. G. A. asks: Are there any cases on record where lightning passed down a lightning rod, when the rod, being tested, was found to be in good order, or (in other words) its resistance was small? A. We do not recall any at this moment; but as more or less electricity continually traverses all rods, cases might be found. Sometimes a very heavy charge destroys the efficiency of the rod; the defects, however, are usually apparent in such cases.

(49) J. A. R. asks: What is the reason that in electro-silverplating the silver blisters on the work and comes off in spots? A. All deposits are apt to blister and come off when the objects are not properly cleaned. 2. Where can a work on electro-silverplating and gilding be bought? A. Works on electro-deposition are obtainable at almost any of the large bookstores. Sprague's "Electricity: Its Theory, Sources, and Application" can be recommended.

(50) C. J. M. asks: 1. Can you give a recipe for varnishing the coils (outside) of an electro-magnet? A. Shellac is good, and is often used for the purpose. 2. In laying wires under carpets or other dry places, must the wires be insulated? A. It will answer to use uninsulated wires if the ordinary battery current is employed. Such wires are, however, apt to cause much annoyance by getting together and thus interrupting the circuit.

(51) J. W. E. asks: Is there any remedy for dreaming? A. When the digestive organs are in good order, and there are no external noises or other circumstances to excite dreams, sleep is seldom disturbed in this way; but any troubles in the alimentary canal are usually accompanied by painful dreams, more or less intense. Keep your body in health, and your rest will probably be uninterrupted.

(52) F. J. asks: What ingredients can we put into flour paste, for uniting two or more thicknesses of paper, and to stand the effect of steam? A. We do not know.

(53) K. asks: Suppose that a gas, condensed by pressure to a liquid form, is cooled by a refrigerating mixture to a considerably lower point than another quantity of gas likewise condensed, but which is at the ordinary temperature of the surrounding atmosphere. Will the first or cooled gas in expansion possess an appreciably greater capacity for absorbing caloric than the non-refrigerated gas? A. The gas which had undergone the greatest refrigeration would, upon the expansion to its original volume, absorb the greatest amount of heat, other things being equal.

(54) F. M. asks: What roots are used in medical practice, which have the property of giving a jet black color? A. Extract of logwood, walnut peels and shells, coppers and nutgalls are employed for staining black. We know of no single root that will give a satisfactory black stain.

(55) K. says: I saw in a recent issue of your valuable paper an answer to a correspondent who wished to obtain a colorless solution of salt of copper. If he will take strong aqua ammoniac, and place it with copper chips in a bottle, in a short time he will have a salt of copper in solution which, while exposed to the action of air, will be of a fine blue color, but, upon corking the bottle airtight, in a few hours will become colorless, until again exposed to the air, and so on. A. Our observations with regard to the ammonio-cupric oxide do not sustain yours.

(56) W. K. asks: Can lighting gas be made from nightsoil and dead animals, the gas being used, and the residue employed for fertilization? A. We think the gas would not be rich enough in hydrocarbons to be employed, and the residue would probably be badly carbonized.

(57) J. O. M. asks: Why are bricks made in Philadelphia so much richer in color than those made in Albany? A. It is due to the large proportion of red oxide contained in the material.

1. How is red oxide of lead made? A. It is obtained by roasting litharge at a temperature of about 500°, in contact with the air. 2. How is red oxide of iron made? A. The coarse pigment is obtained by pulverizing and igniting the red or brown hematite. The finer grades are prepared by precipitation of a solution of ferric sulphate or chloride with excess of ammonia, and washing, drying, and igniting the yellowish-brown hydrate thus produced.

(58) S. S. S. asks: What is the most durable paint to put on a steam pipe? A. There is a black varnish, made from petroleum, which answers as well as anything of which we have knowledge. We have received so many inquiries on this subject that we think it would be well for manufacturers of this varnish to advertise in our columns.

(59) S. H. B. says: 1. I want to make a steam engine boiler, to be 3 inches by 4 inches and 6 inches long. Would copper nearly as thick as cardboard do for the boiler? A. Yes. 2. Would a mixture of zinc and pewter do for the cylinder? A. Yes. 3. Is there any danger of a boiler bursting that is made of such copper? A. You should put in a safety valve. 4. Please explain how the steam gets from steam chest to cylinder. A. Through an opening or port, over which the valve moves. 5. How large must I make the different parts of the engine? A. Get a good drawing of an engine, and proportion the parts from that.

(60) F. D. says: 1. I have invented a tool for breaking slag in furnaces, and wish to know where it can be put to a very severe test. A. Take it to an iron foundry. 2. Is there much clinker formed in the furnace of steamers, and how is it removed? A. With some kinds of coal a great amount of clinker is formed. It is generally removed with a slice bar.

(61) P. L. V. H. says: My son, aged 19, is desirous of becoming a skillful engineer in the merchant marine; he has worked at the machine business some two years, is well up in mathematics, understands the theory of the steam engine, both marine and land, and can furnish testimonials as to character and ability. What course should he take to become fitted for the position of chief engineer on one of our large ocean steamships? A. His best plan will be to enter the merchant service in as good a position as he can obtain, and work his way up.

(62) R. K. asks: Is there a machine for carrying sand from a river bank to a boat at a distance from the shore? A. There is a sand pump in the market, working on the principle of the steam siphon. Such pumps were used in making the excavations for the Brooklyn bridge.

(63) W. Y. says: A friend says that when an engine is on the center the live steam port should be open. I say it should be shut. Who is right? A. Ordinarily it is advisable to have the steam port slightly open when an engine is on the center. This is called giving the valve steam lead. 2. He says that the right name for the crank pin is the wrist. I say the crank pin is correct. Who is right? A. Both terms are correct, that is to say they are both sanctioned by general usage. The term wrist pin, however, is more general in its application than crank pin.

(64) E. N. says: I have run a stationary engine for 13 years, but have no certificate. What should I have to pass an examination in to obtain one? A. It will depend upon the local laws of your State. Apply to an inspector.

(65) R. W. asks: 1. What is the proper area of steam passages for small engines up to 6 inches diameter? A. Make the area of your ports one eighth that of the cylinder. 2. When the diameter of cylinder, stroke of piston, and pressure are given, by what rule do you determine the number of revolutions which an engine ought to make? A. Calculate this from the duty to be performed. See p. 33, vol. 33.

(66) H. J. E. asks: I. How should wax be prepared for waxing stove patterns, and how should it be applied? A. Get the best beeswax; then slightly heat the castings, and rub them over with the wax, wiping off the surplus wax with a piece of soft rag.

(67) T. P. says: 1. I have to use a round cast iron sleeve, 9 inches long and 2¼ inches in diameter, with a square ¼ inch hole through the center of the same. The foundry where I now get my castings uses common sand or clay cores, which leave the corners of the holes rough. The holes must be smooth and straight. Baked cores are liable to warp. Is there not some better plan? A. Have the sand cores faced with plumbago. 2. Could an iron bar be prepared and used as a core, and yet come out of the casting when cold? A. An iron bar cannot be used.

1. How can I polish steel by hand? A. After fine filing, use emery cloth, then crocus, and finally rouge or polishing powder. 2. Is there any liquid used after polishing? A. No.

(68) B. F. S. asks: How shall I fill and polish church pews of ash, trimmed with walnut? A. The best way is to French polish them. See p. 11, vol. 32.

(69) P. D. says: In "Practical Mechanism," Joshua Rose says, of the boring bar with the adjustable cutter head, that it will bore a round hole, even though the bar may run out of true by reason of either or both of the centers being misplaced, or even though the bar itself may have become bent in its length. I should infer from this that he means to say that any other form of a boring bar would bore an oval or other irregular hole in similar circumstances. I claim that no form of boring bar will bore an unround hole by reason of being bent in its length or running out of true. The cutter that is farthest from the center will do all the cutting, but at the same time it will describe a true circle. A. A boring bar with a fixed

head will bore a round hole whether the bar runs out of true or not, providing the carriage carrying the work travels in a line with the center line between the centers on which the bar revolves; but if the bar runs out of true with the shears (as in case the back center of the lathe is set to one side), the hole bored will be oval, although the cutters revolve in a circle.

(70) C. F. asks: How can I extract the gold from emery paper which has been used to polish gold? A. If the paper be treated with a little mercury, the latter will remove all the gold, with which it forms an amalgam. If this amalgam be subjected to a strong heat in a small iron retort (the beak of which or its connection should dip beneath the surface of some cold water), the mercury will be vaporized, and, distilling over, be condensed in the water, leaving the gold behind in the retort. Avoid inhaling the mercurial vapor. It is very pernicious.

(71) F. H. F. asks: Please give me a rule for laying out eccentric gearing. A. Find the center of the hole in the eccentric, and then set the compasses to within half an inch of the extreme circumference of the eccentric part, and mark a line clear across; then find the center of that line, and draw a line from it to the center of the shaft hole, which line will be the throw line, on which a center should be marked at a distance of half the required amount of valve travel, measuring from the center of the eccentric hole; and from these centers mark circles of the required diameters to suit the shaft and the strap. All the marking should be done on the plain and not on the hub side of the eccentric.

(72) D. S. C. asks: How can I mix aniline red to put on leather, so that it will not turn dark when it is varnished with shellac? A. The darkening of color is probably due more to the substances used in tanning the leather than to the varnish. The common solvent is a mixture of equal parts alcohol and water.

(73) F. L. H. says: There is a gentleman at this place who uses old kerosene barrels to put cider in. He claims that a little cider will cleanse the vessel thoroughly, after which it can be used for packing pork and other things, without causing them any injury. The cider seems to have an action on the oil, if added to a portion in a bottle. Please tell me the chemical action by which this result is obtained. A. If this method is successful, it probably depends upon the slight solubility of the oil in the small percentage of alcohol contained in the cider.

(74) A. K. says, in reply to G. A. F.: It is very likely that calamine has been found in Oregon, as carbonate of zinc occurs very frequently in that Territory. But only a wet analysis will determine it.

(75) J. G. says, in answer to C. A.'s query as to the force of gravity deviating the ball from its direction of projection: This is always so, except when that direction is vertical. In firing at any object out of a vertical line, a certain amount of elevation must be given to make up for the distance through which the ball will fall (on account of its weight) between the instants of leaving the barrel and striking the object.

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

B. C.—It is Prussian blue.—T. L.—It is red hematite, a good iron ore, but it contains considerable siliceous matter.—W. P. C.—The name of the plant is *apios tuberosa*, a genus in the natural order *leguminosæ*. Its common name is ground nut or wild bean. The tubers are edible, but their value as food has not been determined. The brown-purple flowers are fragrant, and the plant is quite common in moist thickets in New Jersey.—L. B. D.—It is a fine crystal of sulphuret of lead or galena.—H. W. C.—It is lead ore of good quality.

J. P. O'C. says: I am tending a steam hammer, the weight being 4,000 lbs., including drop and piston. The inside diameter of the cylinder is 18 inches, and the hammer has a drop of 3½ feet. How many lbs. will it strike without steam on top, and how many lbs. will it strike with 90 lbs. of steam to the inch?—C. E. B. says: A roller weighing 112 lbs. is supported on an inclined plane, the gradient of which is 1 foot in 2, by a force which acts along its slope. What is the magnitude of this force, and what is the pressure on the plane, friction not being taken into account?

COMMUNICATIONS RECEIVED.

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

On the Interstellar Space. By —, and by T. H.
On Whistling. By H. B. N.
On the Washington Monument. By J. M.
On Skinning the Rhinoceros. By N. G. P.

Also inquiries and answers from the following:
A. N.—R. K. McM.—R. W.—C. J. J. R.—C. D. B.—J. G. B.—J. J. R.—W. A. H.—R. F. R.—T. M. C.—T. V.—W. M.—C. P. H.—J. O'B.—H. J. R.—P. & K.—D. M.—C. D. B.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.