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.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

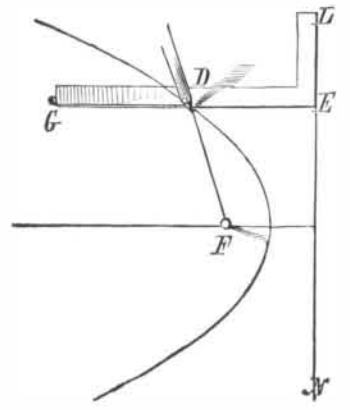
Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) J. E., Jr., writes: I have a bichromate battery composed of 12 cells; after 2 weeks I find that the carbon plates are covered with crystals; they interfere with the working of the battery. My belief is that I saturated the solution with too great an amount of bichromate. The battery is constructed after the form published in SCIENTIFIC AMERICAN, No. 146, consisting of porous cup, zinc, and carbon; the solutions are salt and sulphuric acid. A. They are crystals of potassio-chromium alum ($K_2Cr_2(SO_4)_4$ 24 Aq). They invariably form after a time in the bichromate battery when the acid bichromate solution becomes partially exhausted and concentrated by evaporation. The bichromate solution should be more frequently renewed.

(2) L. B. asks: How many horse power is a boiler, 10 feet long, 42 inches diameter, with 36 3-inch tubes, or an engine, 8 inch cylinder, 12 inch stroke, making 150 revolutions a minute, at 60 lbs. pressure? A. Boiler, 16 horse power nominally. Engine, 20 horse power.

(3) C. N. M. asks how the preparation is made now used by manufacturers of colored, glazed, and plated papers, to render the article partly waterproof, or to resist, in a measure, the rubbing away of the color when slightly moistened. A. The paper is heavily sized with a prepared glue size, and the printed colors protected by the subsequent application of a thin, colorless spirit varnish.

(4) A. G. asks how to describe a parabola by mechanical means. A. Place a straight edge to the directrix, E N, and apply to it a square, L E G; fasten



at G one end of a cord equal in length to E G; fix the other end to the focus, F; slide the square steadily along the straight edge, holding the cord taut against the edge of the square by a pencil, D, and it will describe the curve.

(5) W. B. M. asks: 1. Could a double dynamo-electric machine be made after the plans in SCIENTIFIC AMERICAN SUPPLEMENT No. 161, by placing two similar machines together end to end, and connecting the two armatures so as to form a continuous shaft, with the commutators at the outside end; and so winding the magnets as to bring dissimilar poles into juxtaposition? A. It might be done, but a single large magnet would be better, using an armature made in two sections, one shorter than the other, the shorter one being used to excite the magnet. 2. Could the current from one machine, arranged to work either with or without a battery, be used to excite the magnets of the other machine, and thus, as it were, multiply one machine by the other? A. This has been done in several different machines. 3. Could a dynamo-electric machine made with permanent magnets be coupled on to one of the other kind in a manner similar to the above, with a great advantage in the way of power of current produced from the second machine? A. Yes; Wilde's machine is arranged in this way.

(6) R. A. G. asks: Can copper be so refined by removing the sulphur that it will not tarnish more than tin or nickel? If so how refined so that it will tarnish the least? A. No; chemically pure copper quickly tarnishes in the air unless protected by a lacquer.

(7) B. R. J. asks: What is the cause of the drumming noise in some furnaces when the door of the boiler is closed tightly? I am now running a boiler which shakes the building to the foundation when the door is closed tightly. A. It is generally due to uneven firing, holes being formed through which the air rushes with great velocity. The noise can generally be stopped by the judicious application of a little coal.

(8) J. S. B. asks: 1. Has the State of New York awarded the prize offered for best method of obtaining rapid canal navigation without injury to the canal? A. Yes. 2. Was this prize offered simply for best method of preventing the washing away of the banks by the waves from the canal boat? A. No; it was found by experience that this washing was not caused by any of the boats that were tried, at the slow speed that they developed.

(9) G. G. asks: Can the telephone be worked by using a small creek in place of the second or return wire? A. Yes.

(10) D. E. J. asks where to find out how to make a small stationary engine. A. Consult the back numbers of the SCIENTIFIC AMERICAN and SUPPLEMENT.

(11) C. M. P. asks: Why will a locomotive having an air pump, pump more pressure of air into the air drum than there is steam pressure on the boiler? I have also noticed that a steam fire engine will also show more pressure of water in the hose than there is steam pressure in boiler. A. The pressure which an air pump will deliver against, will depend on the diameter of the pump and power applied.

(12) J. R. F. asks if refined petroleum has ever been tried in marine boilers as a preventive of priming, and if considered safe to use with steam at 50 or 60 lbs. pressure, and if so what has been the general results. A. We are not aware of the use of petroleum for checking foaming in boilers, but from the well known effect of the use of other oils in such cases, should expect beneficial results. We would advise introducing it in small quantities at first, and that its effect be closely watched.

(13) A. E. W. asks: 1. Has the phonograph been perfected so that a speech, sermon, or a musical piece may be registered by having the speaker a few feet from the instrument, say 15 or 20 feet? A. We think not. 2. Has there ever been a telephone invented in which a diaphragm and artificial magnet are placed in the circuit of a common electrical battery? A. Yes.

(14) W. H. C. asks: Can you inform me if there is a cheap residuum of the distillation of petroleum of which can be made a cheap black varnish, and if so what solvent is used? A. The pitchlike residue remaining in the stills, where the distillation is not forced at the last, is sometimes sold as an artificial asphalt. It is soluble for the most part in oil of turpentine, benzine, or benzole.

(15) A. B. H. asks: 1. How to make a first class aniline black ink, something that will flow easy, be black when first written, and will not get thick when left standing a long time. A. Triturate ¼ ounce of commercial soluble nigrosine and 1 drachm of alum, with about ¼ pint of hot water, and digest for an hour in the water bath at 212° Fah., strain the resulting solution through a piece of fine cotton cloth, and dilute with a little hot water, if necessary, for use. It is well to add a few drops of clove oil to prevent alteration. 2. How to make a good blue ink. David's blue ink is just the color I want, but the trouble with it is, it wont flow when it gets a little old. I would prefer an aniline ink if there is any that will give a rich deep blue. A. Use Nicholson's soluble aniline blue in place of nigrosine as above. 3. How to make an aniline red. A. Warm gently 3 drachms of Porrier's soluble scarlet or red scarlet with about ½ ounce of water, and add a few crystals of tin salt (stannous chloride), or use a strong slightly ammoniacal aqueous solution of aurine or coralline. Address the chemists who advertise in these columns. 4. Would it be practicable to produce an electric light, the machinery to be driven by a weight? How large a weight would it take to produce electricity enough to light a room 15x20 feet with as much light as 3 or 4 gas burners would make the weight to fall 10 feet in five hours? A. With the Werdermann or Sawyer-Man lamps we think it would require the fall of about a ton weight through from 6 to 8 feet a minute.

(16) J. J. C. asks: If a rifle be shot off perpendicularly on a moving railroad car, where will the ball fall? A. By "perpendicular" we suppose you mean "vertical"; if so, when leaving the rifle the ball would have the same progressive velocity as the car, but the moment it leaves the rifle, its progressive speed (as well as its vertical velocity) is gradually reduced, and its path will be a curved one; the ball striking the ground in advance of the point from which it was fired and in rear of the position of the rifle at the instant of the ball striking the ground, as the latter has continued to advance with the train and with velocity unretarded.

(17) H. J. L.—We give below 19 patented fillings for safes: No. 1. Residuum of soda water manufacture. No. 2. Soapstone. No. 3. Tiles, alum and clay. No. 4. Alumina and ammonium alum. No. 5. Copperas and gypsum. No. 6. Starch, water, gypsum. No. 7. Alum in small pieces embedded in gypsum. No. 8. Epsom salt and gypsum. No. 9. Cement, lime, sawdust, and silicious mortar. No. 10. Paper pulp and alum. No. 11. Steam and water vessels. No. 12. Removable water vessels between the casings. No. 13. Moistened sponge and powder. No. 14. A system of fusible pipes with water. No. 15. Sulphuric acid in bottles with fusible plugs, and sodium carbonate to liberate carbonic dioxide on contact with the acid. No. 16. Paper pulp and alum. No. 17. Raw cotton, sawdust, and whiting. No. 18. Asbestos, plaster cement, chemical salts, and alum. No. 19. Asbestos, marble dust, pipe clay, gypsum, glycerine, mucilage, magnesium and sodium sulphates, borax, alum, sal soda, and paraffine.

(18) C. W. C. asks (1) if a tank lined with sheet lead would have any poisonous or injurious effect upon the water in case it was used as a cistern for rain water. A. Water stored in such a reservoir would not be fit to drink. 2. Can you inform me of any paint that can be used to paint the inside of a rain water tank so that water may be kept in it? A. Several well dried coats of good asphaltum varnish may be applied; but it would be better and safer to collect the water in clean wooden hogsheads or cemented cisterns.

(19) R. H. H. writes: A French burr millstone has come apart just between the face and the plastering. Can I cement it together with plaster of Paris without taking it all apart? A. A good cement can be made of alum and powdered burrstone. Plaster of Paris is generally used to cover the stone after making the joints with the cement.

(20) D. & C. write: 1. We run our mills with a Leffell wheel. The wheel is situated 60 feet from mill shaft and connected by a shaft 60 feet long. Will we gain any power by putting water house and wheel nearer, and how much? A. The gain will be very slight, and will hardly justify the expense of moving. 2. Please tell us how to bend rims, buggy shafts, plow handles, etc., cheaply, without the use of a steam boiler. Can they be bent by simply boiling? A. They can be softened by boiling, but the operation is more tedious than when a steam box is used. 3. How can we mix up Portland cement mortar to resist the action of water? A. You can make a mixture of 1 measure cement and 2 measures of sand.

(21) W. S. writes: To try a proposed experiment, I will need a bi- or tri-chloride of sodium. Can this be obtained, or made cheaply, and what process? A. Sodium is a monad metal, and combines with but one equivalent of chlorine. You will not succeed in procuring a di- or tri-chloride.

(22) H. writes: 1. I want to build a steam launch 47 feet long, 10½ feet beam, slanting at sides 8 inches each side, and in front about 10 feet of bottom flat; will a 6 horse power boiler and engine propel it in the swift water of our Western rivers, the Ohio and Wabash, say a fair rate of speed 5 or 6 miles up stream? The boat will be built light, one deck, boiler and engine 1,400 lbs. empty. The boat will not draw light with boiler and engine in place more than 6 inches. A. No, a 6 horse power (actual) would not drive it more than 5 or 6 miles per hour in smooth water. 2. What position of wheel would be most advantageous, on sides or at stern? A. Stern. 3. Would belt gearing answer as well as cogwheel? A. Belting would not do as well as gearing; it would become wet and slack, and slip. 4. Could wire belting be made available? A. No.

(23) W. H. W.—The plant is the evergreen or pyracanth thorn (*Cratægus pyracantha*), a native of the south of Europe, distributed several years ago in the United States as a hedge plant. It is excellent for the latter purpose, in a climate no more severe than that of Virginia. An accidental variety with white berries has proved hardy near New York in the most severe winters. The plant is propagated by cuttings, although dealers in shrubs and trees might possibly have seeds for sale.

(24) F. J. writes: Our newspapers state that a "peculiar explosion took place on the Ottawa river; about one hundred feet square of ice, twenty inches thick, was thrown up into the air, followed by a loud report; it is supposed to have been caused by the gas from a deposit of sawdust in the bed of the river." I wish to ask: What kind of gas was generated; also what was the action of the gas, and why did it explode? A. We cannot explain the occurrence on the hypothesis that it was primarily caused by sawdust. We have known such explosions to occur through the sudden yielding of thick ice at its weakest point to the stress of air confined and condensed by an unusually strong or obstructed current below.

(25) J. A. L. asks: 1. What is the resistance per mile in copper wire, No. 17 and No. 25 American gauge? A. Approximately 20 and 168 ohms respectively. 2. What temper is best for strong and constant magnets? A. A straw color. 3. What is the best method of magnetization, by currents or by friction, on a permanent or electro-magnet? A. By contact with a strong electro-magnet or by inclosing them in a helix traversed by a strong electric current. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 142. 4. What should be the lifting power of a horseshoe magnet, weight half a pound? I made one which will lift nine times its weight: is that a good one? A. Your magnet does very well. 5. Can I obtain from you back numbers of the SCIENTIFIC AMERICAN or the SUPPLEMENT, giving directions for making telephones, microphones, or phonographs? A. Telephones, No. 142. Microphones, No. 163. Phonographs, No. 133. 6. What kind of carbon will do for Edison's telephone, and how can it be made? A. The carbon used in Edison's telephones is deposited from burning kerosene oil. Mr. Edison's method is to set a lamp smoking, collect the carbon, and form it into buttons under strong pressure.

(26) Bolckow asks: 1. Will two steam engines, size 2 inch bore and 4 inch stroke, with cranks at right angles, give more or less power than one engine 2x4, using a flywheel to overcome the dead center, with a steam pressure of 100 lbs. per square inch in the boiler? A. More. 2. Did Congress ever pass a law prohibiting the running of traction engines over public roads? A friend of mine claims Congress did enact such a law, while I claim that it did not; that the roads are open to all, and that the driver of an unruly horse runs his own risk. Who is right? A. You are right.

(27) C. S. asks: Does using the flywheel as a driving pulley detract from its efficiency as a flywheel. Does the use of a pulley larger than a flywheel on the flywheel shaft affect the efficiency of the flywheel? A. No, in either case; but the effect would be better if the flywheel were larger than the pulley.

(28) M. P. asks: How can I conveniently straighten brass or iron wire without a wire straightener? A. It cannot be done without a straightener of some kind. Probably the simplest straightener is three steel pins driven into a plank. If the pins are properly arranged and the wire is drawn over the first, under the second, and over the third, it may be straightened well enough for some purposes.

(29) B. A. M. asks whether the greater bearing is on the upper or lower side of the crosshead when the engine is running back. A. On the upper side.

(30) C. E. A. asks: 1. What is the power of an engine with 4 inch stroke, 2½ inch bore, running 600 revolutions per minute, with 120 lbs. of steam? A. If worked without cut-off, 5 horse power. 2. What are the dimensions of an upright boiler which would run such an engine? A. You would require a vertical tubular boiler of 95 feet heating surface. 3. Can a boiler be made from coils of gas pipe? If so, how is the best way to coil the pipe, and how much pipe will it take, and what will it cost for a boiler for the above engine? A. A boiler of coiled pipes can be made. Apply to iron pipe workers.

(31) X. Y. Z. writes: 1. I have an electric engine; the magnets are wound with No. 17 cotton covered wire (Stubs' gauge). I want to use Daniell's battery with porous cups 4 inches high and 1⅝ diameter. What quantity and intensity shall I use to get the most power? A. It depends altogether on the construction of the engine. You can easily determine by experiment which method of connecting up the batteries is best. 2. How many of the above cells will it take to make an electric light to light a room 12 feet square? A. 50. 3. How can I loosen the binding screws, that are corroded in carbon plates? A. It is possible that soaking them in hot water may be of some benefit.

(32) R. B. N.—Prices for yacht engines: 3 inch cylinder x 5 inch stroke, $640; 3½ inch cylinder x 5 inch stroke, $720; 4 inch cylinder x 6 inch stroke, $800, including boiler, propeller, and appurtenances. For maker's address, see our advertising columns, or insert an advertisement in the Business and Personal column.

(33) A. F. B. asks: What is the length of 1 lb. of No. 28 copper wire? Also of 1 lb. of No. 24 copper wire? A. By Birmingham W. G., of No. 28 there would be 1686·34 feet; of No. 24, 683 feet. By American W. G., of No. 28 there would be about 1955 feet; of No. 24, there would be about 827 feet.

(34) M. F. S. asks: Will a fish placed in a pail of water increase the weight? The pail is supposed to be brimful. A. If the pail is so full that the water displaced by the fish runs over, the pail will weigh the same as before, as the specific gravity of the fish is the same as that of water.

(35) J. V. A. asks: What are the proper dimensions for making a compound bar magnet capable of sustaining a weight of 20 lbs.? A. Jamin by arranging together several thin plates magnetized to saturation succeeded in making bar magnets which support 15 times their own weight. The dimensions of a magnet to support a given weight will vary greatly with the quality of the steel from which it is made and the treatment it receives.

(36) J. G. S. asks: What is the cause of foaming in boilers, and what is the remedy? My boiler is horizontal. A. There are several causes of foaming in boilers, namely, impure water, deficient circulation, or small steam capacity. The remedy to be applied would depend upon which of these causes operated. The introduction of oil with the feed water in small quantities will frequently check foaming for a time.

(37) H. C. P writes: I am making a drawing camera from "Aids to Drawing" in SUPPLEMENT, No. 158, and have two double convex lenses about one inch in diameter, and I would like to know how to use them, and at what distance from the lenses to place the ground glass, and about what size box it would require for the camera so as to bring the rays to a focus and make the image appear plain on the glass. A. You will need but one lens, which may be either single or double convex. For practical purposes you may get its focal length by holding it remote from a window in front of a white surface, and moving it back and forth until a clear image is seen on the white surface. The distance between the lens and the surface is the same as that which should separate the lens from the ground glass. The size of the ground glass and of the box will of course be controlled by the size of the image which the lens is capable of forming.

(38) W. H. R. writes: 1. The saw mill here contains a circular saw driven by a direct belt from the pulley on the shaft of the turbine water wheel, the belt running over guide pulleys up to the saw. It is now desired to use the power without running the saw and for other purposes, and not wishing to go to the expense of putting in a bevel gear, as that in this case would be rather an expensive job, we wish to know if a quarter twist belt from the water wheel to a line shaft is practicable for the heavy work of driving a 46 inch circular saw. A. A quarter turn belt would not do well for so heavy work, and would wear very rapidly. 2. The center of the pulley on the saw shaft is at right angles with a line drawn through the center of the driving pulley. What is the correct position for the driving pulley on the line shafting so as not to use a guide pulley? A. For ascertaining position of pulleys, see p. 27. (5), current volume of the SCIENTIFIC AMERICAN. 3. Is it a good method of stopping and starting the saw to use a belt tightener? A. We see no objection to this plan.

(39) B. F. M. writes: It takes from 10 to 18 barrels of water per day to run a grain separator with an agricultural engine. I propose to make a tin pipe, 1 foot diameter, 6 feet high, terminating below in a 20 gallon tank, from which an extra pump is to elevate a continuous stream in at top of pipe, running over shelves to the bottom, the exhaust all discharging into bottom of said pipe. How much water can I probably save? Would it not be more economical to dispense with nozzle and consequent back pressure, and use small fan to create draught? A. By changing the exhaust as proposed, you could probably effect a saving of between 15 and 20 per cent.

(40) D. L. D. asks: In discharging a rifle does the recoil occur at the moment of explosion or after the ball leaves the muzzle? A. It commences at the instant of explosion, and continues until the pressure is relieved by the exit of the ball.

(41) W. E. F. writes: I use a large iron tank, in which I boil a vegetable fiber under 60 lbs. steam pressure. The fiber contains tannic and other acids and iron. I am told that the iron and acids in the fiber combine with the iron of the boiler, forming a kind of ink which dyes the fiber, making it hard to get white; but that if I can use a boiler in which the iron plates alternate with zinc plates (if practicable) this will establish a galvanic or electric condition that will prevent the formation of this black ink or dye; or that if I secure a few zinc plates to the inside of the boiler, the same happy result will be obtained. Is this the case? A. The arrangement of a few plates of zinc, in good contact with the iron within the tank, as suggested, would doubtless protect the iron and fiber, but you will probably find that the addition of a few ounces of carbonate of soda introduced with each charge will prove as effectual and more economical.

(42) T. J. B. asks: What effect would vitriol have on the skin, and what is it used for? A. If you refer to undiluted oil of vitriol (sulphuric acid), it would quickly disorganize or char the skin. The acid diluted with from 10 to 30 parts of water is sometimes administered in very small quantities as a refrigerant, to check profuse perspiration, in skin diseases to relieve the itching, and in dyspepsia, etc.

(43) C. E. S. asks for the process so generally used for coating malleable or gray iron castings with copper. I can deposit the copper all right, but cannot get the luster or polish. Castings are very small, will average about 1 oz. each and easily handled. A. Rub the clean iron, or tumble it in a barrel for a few minutes with bran, sand, or saw dust, moistened with a solution of 3½ ounces of copper sulphate and 3½ ounces of sulphuric acid in about 3 gallons of water, rinse in running water, and dry in sawdust. The iron should not be allowed to remain too long in contact with the copper solution or absorbent materials containing it.

(44) T. T. P. asks: Could a siphon be made to turn a water wheel with sufficient force to pump the spent water back and up to the proper elevation to again supply the siphon, thus causing the wheel to be kept in motion by the same water? If not, why not? A. No, because it would require a creation of power.

(45) L. W. Y. asks: How many gallons of fluid will 400 feet of 2 inch (inside diameter) pipe hold? A. About sixty-five and one third United States gallons.

(46) E. L. asks (1) how to ascertain the speed of belting. A. Multiply the diameter of the pulley in feet by 3·1416 times the number of revolutions per minute. 2. Could you tell me the necessity of having the lever and ball attachment to the valve stem of a governor save for the purpose of changing the speed? A. The object is to render the governor more sensitive. See SCIENTIFIC AMERICAN, vol. 31, p. 389. 3. In your opinion is it a detrimental practice for firemen to admit cold water on the hot ashes in the furnace to avoid dust when cleaning fire? A. Yes.

(47) J. J. L. asks: 1. How long will magnetized steel, with constant use, retain its magnetism? A. It depends upon how it is used. If submitted to jars or shocks, or if the armature is applied and removed many times in succession, the magnet will be injured. 2. Does it lose its magnetism from non-use? A. If provided with an armature it may improve. 3. Does the quality make any difference? A. Yes. 4. I have flat bar steel ¼x¾. Can I have that size magnetized to lift from 4 to 8 lbs.? A. It may sustain the weight mentioned, but it probably will not lift it.

(48) H. M. R. writes: We have a 6 foot wheel and 2 inch rope for hoisting purposes. The groove in the wheel and the rope have both worn very smooth, so the rope slips with a heavy load. Can anything be done to the wheel to make the rope hold better? A. Wind the wheel tightly in the bottom of the groove with small tarred rope.

(49) E. H. asks for a receipt for making a cement to stick rubber to iron. A. Fuse together equal parts of gutta percha and pitch. For cement receipts see SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.

(50) O. H. P. asks for directions for making alcoholic shellac varnish. A. Place a quantity of gum shellac in a bottle; pour over it enough 95 per cent alcohol to cover it. Allow it to stand for 24 hours, shaking it occasionally.

(51) T. C. writes: I wish to propel a Sharpie boat, with paddle wheels, at the speed of 12 miles per hour. The boat is fifty feet long with 8 feet beam, and draws 8 to 10 inches water. 1. What should be size and power of boiler and engine? A. We would not advise the use of paddle wheels in so small a boat; you can hardly attain the speed you want, except by the use of feathering wheels. The power required could not well be determined without knowing the model of the boat. 2. Would two cylinders be better than one? A. For maneuvering, yes; otherwise, no. 3. Would I gain anything by gearing up with cog wheels to increase revolutions? A. No.

(52) E. G. A. asks: Through what chemical process is the paper passed that is used in recording telegraphic messages, a blue mark being produced each time a current of electricity is passed through it? A. The paper is saturated with one of the following solutions: 1. Nitrate ammonia, 2 lb.; muriate ammonia, 2 lb.; ferricyanide of potassium, 1 oz.; water, 1 gallon. 2. Iodide potassium, ½ lb.; bromide potassium, 2 lb.; dextrine or starch, 1 oz.; distilled water, 1 gallon.

(53) C. B. asks: 1. Does it make any difference whether the screw end of a phonograph shaft rests in a Babbitt metal bearing instead of a steel one? A. No. 2. What is meant by elastic tubing in description of phonograph in SUPPLEMENT No. 133: does it mean small rubber hose, and which way should they be placed, end ways or flat, and how many pieces? A. Small rubber tubing placed flatwise; it requires 4 or 5 pieces.

(54) S. B. G. asks how the pier was put in the rapids of Niagara river for the bridge to Goat Island. It is a mystery to me, and doubtless is to many others who have seen the rapids. A. Mr. P. A. Porter, one of the owners of Goat Island, furnishes the following account of this piece of engineering: First, a large and strong bulkhead was built in the shallow water near the shore; a solid backing was put in behind this, and the whole well floored over with plank. On this platform, and parallel with the river, several strong rollers were securely fastened. Large oak trees were felled and hewed "tapering" so that when finished they were about 18 inches square at the butt, 15 inches square at the top, and about 80 feet long. Large auger holes were then bored through the smaller ends of these. Two of these timbers, laid parallel and 6 feet apart, were placed at right angles to the river, the smaller ends lying on the rollers and projecting over the water, and the shore ends heavily weighted down. Levers were then applied, and these timbers were run out until their front ends reached an eddy in the water. Two men, each provided with a strong iron-pointed pike staff (through the holes in the upper ends of which some 10 feet of new rope was drawn), walking out to the ends of these timbers, drove their pikes down among the stones, and tied the timbers to them. Around these pikes the first pier was built and filled with stone. Other timbers were then run out, all were planked over, and the first span was finished. The other spans were completed in the same way.

(55) B. B. S. asks: Which will require the least battery, a double telegraph line two hundred yards in length, or a single line with ground wire same length? A. The double line.

(56) F. G. & S. write: We have an upright boiler, 9 feet high by 4 feet diameter, 124 2-inch flues, which leaks very bad at times. When there is a hot fire in the boiler the flues scarcely leak at all, but as soon as we throw in fresh coal and deaden the fire it commences to leak. The flues are rolled; if the flues were beaded, would it stop them from leaking? A. Your leakage must be due to unequal expansion and contraction. Beading the tubes would probably remedy the trouble in a measure. How is your feed water introduced? Does not the starting or stopping of the feed affect the leakage?

(57) G. W. & S. ask: Is a belt in a half twist liable to slip as much as one running straight? A. If by half twist you mean running shafts at right angles to each other, the twist belt is more liable to slip, as it has less surface of contact with the pulleys.

(58) F. C.—In experimenting with a magnetic motor I am at a loss for a non-conducting material. The magnetism penetrates all substances I have been able to find. Do you know of any non-conductor that is likely to answer my purpose? A. No.

(59) M. F. asks: Which of two engines has the most power according to steam consumed: one with an 8 inch diameter cylinder and 10 inch stroke, or one with a 7 inch diameter and 12 inch stroke? A. 8 inch cylinder and 10 inch stroke.

(60) O. B. H. writes: In No. 8, Vol. XL. of the SCIENTIFIC AMERICAN, in the description of an "Electric Pen," you say toward the end of the article referred to: "The pen may readily be made far more rapid in its action than the costly instrument alluded to." Will you be so kind and inform the writer of this in "Notes and Queries:" 1. How to accomplish a more rapid action of the pen? A. By using a stiff spring in the interrupter, and adjusting it carefully, the sparks may be made more rapid than the revolutions of the wheel of the electric pen. 2. Whether a one cup Grenet battery with induction coil, as commonly used in medical practice, will answer in connection with the pen? A. A medical coil is not suitable for the purpose. 3. How many cups of a Grenet battery without induction coil it would require to furnish a current strong enough to perforate common note paper? A. It cannot be done by the batteries alone.

(61) C. N., Jr., asks (1) for the best mixture for polishing tortoise shell. A. Tortoise shell is usually finished by filing, scraping, and the application by a buff wheel of powdered pumice stone and water, putty powder and water, and lastly by means of rotten stone in water. 2. What can I do with a gunstock that has had a very severe wetting so that it has raised the grain of the wood and made it rough? A. File it, scrape it, and polish it, by applying to it with a woolen cloth, alcoholic shellac varnish, 2 parts, boiled linseed oil, 1 part, well shaken together before each application. The polish must be rubbed briskly after each application until the surface is smooth and dry.

(62) E. L. asks: What is the horse power value of a jet of steam through a one inch pipe 50 feet from the boiler, at a pressure of 50, 75, and 100 lb. per square inch respectively? A. There is no definite relation between the discharge of steam through a pipe and the horse power at 50 lb. pressure per square inch (total); the weight of steam discharged would be 34·6 lb. per minute; at 75 lb. pressure, 51·39 lb. per minute; and at 100 lb. pressure, 67·8 lb. per minute; but the horse power these several pressures of steam are equal to will depend upon the manner of its use, whether in condensing or non-condensing engines, simple or compound, and to what extent it is used expansively.

(63) C. M. S. asks how to clean lace. A. Lace may be restored to its original whiteness by first ironing it slightly, then folding it and sewing it into a clean linen bag, which is placed for 24 hours in pure olive oil. Afterwards the bag is to be boiled in a strong solution of soap and water for 15 minutes, then well rinsed in lukewarm water, and finally dipped into water containing a slight proportion of starch. The lace is then to be taken from the bag and stretched on pins to dry.—(*Spon.*)

(64) T. A. M. asks: Is there any remedy for air holes in plaster of Paris casts for moulding rubber stamps? A. By properly mixing the plaster air holes may be avoided. Take about the quantity of water required for mixing the batter, sprinkle into it the plaster, allow it to settle to the bottom, pour off the surplus water, stir it carefully, and pour. After pouring, it is well to jar the type to liberate any air bubbles that may adhere to the face of the type.

(65) J. J. M. asks: Do you know anything better than borax for welding steel? A. The following has been suggested, but we cannot vouch for it: "Heat the pieces to be joined together, roll them in marble dust, and join them promptly, subjecting them to a good hammering." Should any of our correspondents find this a practicable method we should be pleased to hear from them.

(66) C. G. writes: I have some cider which is boiled down; one quart of it may be diluted with 4 quarts of water and taste good. When I mix water with it and let it stand for a few weeks, it spoils. How can I remedy it? A. Add a small quantity of calcium sulphite to the cider, and keep it from the air in bottles or sealed jars.

(67) O. A. S. asks: 1. What is the average cost of quicksilver by the cwt. or ton? A. Mercury is quoted at 55 cents per lb.; the cost varies considerably with the market. 2. Does the supply exceed the demand? A. No. 3. If by a new discovery it should become useful in large quantities generally over the United States, for mechanical purposes (I mean in addition to its present uses), what would be the prospect of procuring it? A. Quicksilver mines are few in number. An increased demand for the metal would, for a time at least, proportionately increase its market value.

(68) P. J. N. asks if unleached wood ashes and Peruvian guano, say about half and half of each, may be mixed together for fertilizing purposes; or whether there are chemical properties in one which would neutralize the chemical properties in the other, and thus deteriorate their fertilizing value? I propose using this combination in the cultivation of the potato. A. The addition of a small quantity of the ashes to the manure used at the time of planting will prove advantageous; the quantity mentioned would be excessive. Consult Johnston's "Agricultural Chemistry," and "Chemistry of the Potato," Bliss.

(69) B. A. M. asks: 1. By what means is glue maintained in the liquid state? A. Use strong acetic acid. 2. How is slating fluid or slating silica made? A. Dissolve water glass in boiling water to a thin syrup, and form into a paste with a mixture of equal parts of dry plaster of Paris and fine calcined clay passed through an 80 inch sieve. 3. What are the principal uses of silicate of soda, and how can it be made sufficiently fluid to flow easily? A. It is used extensively in the manufacture of artificial stone, in mortars, cements, and lutes, as a vehicle for pigments in fireproof paints and varnishes, in stereochromy, in soaps, and certain laundry preparations, in metallurgy as a flux, and in various laboratory operations. It may be dissolved and diluted with boiling water.

(70) E. F. F. & H. S. P. write: In making the cakes of powdered carbon, peroxide of manganese, and gum lac, as expressed in SCIENTIFIC AMERICAN SUPPLEMENT, No. 159, page 2528, Fig. 48, how is the gum lac made to mix freely with the other ingredients? A. Gum shellac powdered is mixed with the peroxide of manganese and carbon in a dry state. The whole is made to cohere by heating the mixture until the shellac is melted.

(71) W. S. writes: I have a breech loading shot gun which has had the browning taken off by salt water. I would like to ask how to stain gun barrels a rich brown such as seen on our best guns. A. 1. Mix chloride of antimony to a thin cream with olive oil, and apply this uniformly to the warm iron. It should be left undisturbed until the requisite degree of color is developed. A few drops of nitric acid is sometimes added to the paste to hasten the operation. 2. Nitric acid, ½ oz.; sweet spirits of niter, ½ oz.; spirits of wine, 1 oz.; cupric sulphate (blue vitriol), 2 oz.; chloride of iron tincture, 1 oz.; water, 40 oz.; warm the water, dissolve in it the powdered copper salt, cool and add the other materials. Use the burnisher and scratch brush to produce the markings. For polishing a piece of hard wood is used. Finish while warm with rather thin pale shellac varnish (colored with dragon's blood if desired), polished after drying with the hard wood polisher. The time required to properly brown the iron is about 24 hours. The iron should be scoured or cleaned with moistened lime before applying the browning composition.

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

A. C. O.—No. 1. A serpentine rock. No. 2. Contains quartz, orthoclase, magnetic pyrites, and traces of copper glance. No. 3. Serpentine rock containing much iron sulphide. No 4. Quartzite and ferruginous earth or ocher.—G. H. P.—The silicious limestone (not shale) containing bituminous matters offers no positive indications that petroleum exists in the locality in paying quantities; on the contrary, thousands of dollars have been lost by oil seekers in this rock. See chapters on petroleum in Professor Winchel's "Sketches of Creation."—J. S. F.—It appears to be a wax of the paraffine series (ozocerite or hatchettite). If found in large quantities, of some value. Larger specimens are desirable to settle the question.

COMMUNICATIONS RECEIVED.

On Perpetual Motion. By J. K.

On the Gary Motor. By W. W. G.

On the Analysis of some Ancient Pieces of Metal. By E. H. S. B.

A Simple Ellipsograph. By S. W. B.

On the Telephone. By F. F. P.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

February 25, 1879,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings. will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Amalgamating ores, apparatus for, C. E. Ball 212,644
Ammonia, muriate of, W. Gentles 212,596
Axle box, car, G. J. & S. J. Shimer 212,631
Axle box, car, J. N. Smith 212,735, 212,756
Axle lubricator, vehicle. E. Gollipher 212,684
Balances, lever, C. F. Kleinsteuber 212,559
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Basket, S. Friend 212,679
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Binder for paper tablets, B. C. Murray 212,729
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Burial casket, J. R. Nelson 212,565
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Fence post and fastening, Johnson & Eccleston 212,706
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Hame, harness, W. B. Hayden 212,691
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Letter carrier's pouch, R. Hale 212,551
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Yoke, neck, C. Hauff 212,689

TRADE MARKS.

Canned goods, A. Stephani & Co 7,049
Catarrh remedy, A. De Voe 7,053
Cigars, J. Elbling 7,048
Cigars, cigarettes, and smoking and chewing tobacco, S. Jacoby & Co 7,047
Flour, E. F. Jackson 7,046
Grain cradles, scythe snaths, etc., Semple & Birge Manufacturing Company 7,051
Preparations for filling, covering, and preserving wood, Bridgeport Wood Finishing Company 7,050
Shirts, collars, cuffs, etc., O. S. Baldwin 7,044
Smoking and chewing tobacco, cigars and cigarettes, Goodwin & Co 7,045
Toilet preparations, Coudray & Flls 7,052

DESIGNS.

Carpet, J. Campbell 11,037, 11,038
Font of printing types, R. Smith 11,039
Handkerchief, A. Tilt 11,033
Knitted fabric, D. Briggs 11,030
Knitted fabric, C. Jackson 11,031, 11,035
Knitted fabric, H. A. Truitt 11,032, 11,036
Match boxes, H. Rosenberg 11,040
Padlocks, C. H. Beebe 11,041
Pistol handles, H. H. Hopkins 11,034
Pocketbook fasteners, L. B. Prahar 11,042

English Patents Issued to Americans,

From February 25 to February 28, inclusive.

Bolts, machinery for packing.—C. D. Rogers, Providence, R. I.

Card setting machines.—J. Russell *et al.*, Springfield, Mass.

Files, process for sharpening.—D. W. Watson, Malden, Mass.

Lanterns.—E. B. Requa *et al.*, Jersey City, N. J.

Motors.—E. Molera *et al.*, San Francisco, Cal.

Mowing machines.—P. Mast *et al.*, Springfield, Ohio.

Paper for covering silver.—J. Torrey, New York city.

Piston rod packing.—T. Tripp, Boston, Mass.

Quoins.—R. F. Gillin, Brooklyn, N. Y.

Revolvers.—W. C. Dodge, Washington, D. C.

Sifting apparatus.—J. T. Parlour, Brooklyn, N. Y.

Staples, machine for clinching.—G. W. McGill, N.Y. city.