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. If not then published, they may conclude that, for good reasons, the Editor declines 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) B. R. asks: What is the best method of spreading a thin layer of selenium on glass surfaces and other smooth surfaces of that description? A. This is a subject of which there is but little known at present, for, as *Nature* says, "the investigation is one that requires to be carried on with the aid of a fully equipped laboratory, and is beyond the power of an ordinary experimentalist." It is, in the meantime, uncertain as to whether a transparent sheet of selenium can be more easily obtained by a method of precipitation than by mere mechanical treatment. It dissolves fuel in chloride of selenium and precipitates slowly in a botryoidal mass of black selenium. It also separates in the crystalline form from solutions of selenide of potassium or sodium. In its vitreous condition selenium melts at a temperature of about 220° Fah., and can be drawn out between mica plates to a thin red film.

(2) C. V. S. asks: 1. How many mercury flasks, as described in SUPPLEMENT, No. 182, would I need for a boiler for a boat 30 feet long, 6 or 6½ feet beam, and 3 feet deep? A At least 60 for water and 30 for steam. 2. In laying the keel, should it be of one piece of oak, 33 or 34 feet long, steamed and bent to form the bow; or should it be a piece of oak, 33 or 34 feet long, with the bow and stern post rabbeted to the keel? A. It may be steamed and bent, or the stem and stern posts may be scarped to the keel and fastened by rivets. 3. What size should the engine be for a boat 30 feet long, of the style described in SUPPLEMENT, No. 81, of the Flirt, built by H. S. Maxim? A. 5 inch to 6 inch cylinder and 6 inch stroke. 4. Could I with a boat of this size go from New York city to United States of Colombia, say to Aspinwall, and if so, what would I need besides compass, charts, and lamps? Would I have to get any papers permitting me to go on said voyage, as the owners of vessels have to have? A. It must be inspected and licensed if over 5 tons measurement.

(3) D. A. asks: 1. Which is the better device to keep steam on a self-propelling fire engine: to keep a banked fire in the furnace, or to use a heater similar to those employed with the ordinary fire engine? In fact, is the first method a safe one? A. We consider the heater the safest. 2. In connection with a heater for keeping water hot in an engine, which pipe should be the largest: the one leading to or from the engine? A. It is quite as well to have both pipes of the same size; but if a difference is made, the return pipe should be the larger.

(4) F. W. F. asks: 1. How can I polish a small plano convex lens which is slightly scratched on the surface? A. See article on lens making, vol. xliii. page 51, SCIENTIFIC AMERICAN. 2. What preparation shall I apply to paper or other substance to take pictures with a camera, and cost of same? A. This information to be of any practical value would require too much of our space. Consult some good work on photography. 3. Why is a meniscus lens better for the object glass of a refracting telescope than a double convex lens, so stated in SCIENTIFIC AMERICAN SUPPLEMENT, No. 252? Does it give less prismatic colors? A. With the meniscus there is less spherical and chromatic aberration. 4. I have a private acoustic telephone line; line wire very small size copper wire. At each end I have a wire also of copper two or three times as large as line wire, running down into moist earth and twisted around the line wire. Will these wires convey to the ground any charge which the line may receive during a thunder shower, preventing all danger to the inmates of the houses? A. Yes, providing the ground ends are terminated in a coil buried in a bushel or so of coke which is always enveloped in moist earth. It would be better to solder your ground wire to a gas or water pipe if possible.

(5) E. W. C. asks: 1. Can a rotary engine such as the "La France Fire Engine," be run backward by bringing the steam in through the exhaust pipe? A. Yes. 2. Could such engine be run by gas, by having the explosion at regular intervals? A. It might be run in that way. 3. Which would be the most economical, the above or a cylinder engine using gas, the power being 2,000 foot pounds? A. The cylinder engine.

(6) J. B. H. asks: What will restore on silks and silk laces luster lost in dyeing? A. Grate half a dozen large potatoes into a gallon of soft water, agitate briskly for a few minutes, and let stand 24 hours to settle. Carefully draw off the clear liquid, and with this sponge the fabric thoroughly. Press very strongly with hot irons—in one direction—between fine cloths; kept moist.

(7) E. B. asks: What are the dimensions and tonnage of the yacht America, whether she is keel or center board, and the lengths of her spars? A. Yacht America's original dimensions were: Length on load, water line, 90 feet 8 inches; breadth, extreme, 22 feet 6 inches; carpenter's tonnage, 210 tons. Her present masts are: mainmast, 78 feet long; foremast, 76 feet 6 inches; mainboom, 70 feet long; foreboom, 26 feet long.

(8) F. L. P. writes: In your issue of January 22, in reply to L. D. G., you say the pressure on the feed pipe is a trifle more than on the boiler. Will you be so kind as to explain how you get the extra pressure? A. The difference in pressure is due, first, to the greater area, the upper, than the underside of the delivery valves; second, to the friction of the valves; and third, the friction of the water in the pipes and passages.

(9) U. D. M. asks: 1. What is the rule for running a belt from one pulley on to another on a bevel so as to run the shafts on an angle? A. You will find the rule with a diagram on page 27 (5), Vol. 40, SCIENTIFIC AMERICAN. 2. How much power can we use on the end of a 1½ inch shaft 250 feet long, without twisting it? A. It depends upon the speed of the shaft. 3. How large a steel wire rope do we need to 5 horse power, 250 feet from first pulley? A. It depends upon the speed of the rope. You can get tables of sizes and speeds from manufacturers of wire rope. 4. Which is the cheapest and best to use for 5 horse power, 250 feet from driving pulley, steel wire rope or iron shaft? A. Wire rope.

(10) J. S. H. writes: I have an office hand lithograph press for printing letters on stone. I get a splendid impression of transfer on the stone, but after dampening the stone with a sponge it seems to take the ink almost as readily as the transfer, thus smutting up the print. I use a buckskin roller and printer's news ink. Can you tell me how to proceed so that the stone will not take the printer's ink except where the transfer ink strikes, and how to get a clear and clean print? A. Let the stone dry and wash it with a 2 per cent aqueous solution of nitric acid; rinse in water and then in weak gum water preparatory to inking. Add a little stale beer or vinegar to the water used for dampening. Use good lithographic ink.

(11) B. I. B. asks: What kind of varnish or oil will be best for preserving eggs, and how can it be applied so as to have a thin, even coating? I want something in which eggs can be dipped. A. You may try ordinary linseed oil (used for this purpose in Germany), or thin alcoholic shellac varnish. See SUPPLEMENTS, Nos. 53 and 65; also SCIENTIFIC AMERICAN, Vol. 39, p. 375.

(12) J. S. H. writes: I see many inquiries in your columns asking how to clean the aniline ink from printing pads after through printing. I can answer. Saturate a sponge in water as hot as possible to bear the hand in, pass the wet sponge across the face of the pad and the ink will disappear. Then rinse off the face with the sponge dipped in cold water. Experience has also taught me that when the print begins to get dim, if you will dampen the face of the pad with a sponge dipped in cold water, the ink becomes as bright as at first, and in this way a much larger number of letters may be pulled than if this process is not employed.

(13) C. C. C. asks: Is there no way in which rubber could be softened in process of making rubber stamps except by heat? A. Sulphide of carbon, benzole, turpentine, and the essential oils in general cause rubber to swell and soften. While thus softened it may be moulded; but as the oils or other liquids used escape by evaporation it shrinks again. Softening by heat gives more satisfactory results.

(14) T. B. asks: Which has the most friction, a locomotive crank pin seven inches in diameter or one four inches in diameter, the width of bearing being the same in both cases? A. The conditions being the same, the friction would be the same in both cases, but the loss of power would be greater with the larger pin, as the friction acts upon a longer radius.

(15) J. W. asks: 1. What sized belt will give 180 horse power under following conditions: Driving pulley 7 feet in diameter, driven 4 feet, belt in contact with one half the circumference of 4 feet pulley, speed of belt 3,300 feet per minute? Please give rule. A. Calculate by the following formula, $\frac{WS}{600}$ = horse power, W = width of belt in inches; S = speed of belt in feet per minute. In your case belt should be 33 inches wide in round numbers. In this case 600 is used for a divisor, because of the favorable conditions; for narrow belts use 800.

(16) E. H. asks (1) how much power a certain size pulley (say 12 inches diameter, 6 inches face) will transmit at a given speed to a pulley of equal size. A. We suppose your pulley of 6 inches face would run a 5 inch belt. A safe rule for the power of a belt is $\frac{W\ S}{800}$ = horse power, where W = width of belt in inches, and S = speed of belt in feet per minute. From this you can get the power of your pulley. 2. Can you recommend a book treating on the subject? A. "Cooper on the Use of Belting."

(17) L. J. C. asks for the best methods of sticking paper together to make paper boats, pails, or things similar. A. One of the following cements will probably answer: 1. Waterproof: gum rubber, 1 lb.; shellac, 2 lb.; benzole, 12 lb. Cut the gum rubber into fine shreds, and macerate it with frequent agitation in the benzole until dissolved. Then place the vessel (out of doors) in a bath of hot sand, and gradually add, with constant stirring, the powdered shellac. Heat and stir until a perfectly homogeneous mass is obtained—marine glue. In heating, the best vessel to use is a porcelain enameled iron dish. For a stirring rod use a pestle. 2. Gum rubber, 1 lb.; asphaltum (not tar), 2 lb.; benzole, q. s. Cut the rubber fine, macerate until it is dissolved in the benzole, then gradually add the asphaltum, triturate together in a mortar until all is softened and dissolved. It should have about the consistence of molasses. 3. Resin, 2; boiled oil, q. s.; plaster of Paris, 2; turpentine oil, ¼. Melt the resin in the heated oil, remove out of doors, and stir in the plaster and turpentine while hot.

(18) W. R. R. writes: We are building a water tank 15 feet diameter, 10 feet deep, to hold water pumped from a well; the water will be used to supply and wash out our locomotives. Should the inside of tank be painted? If so, what is best? A. Paint with brown oxide paint (oxide of iron), ground in and mixed with pure linseed oil.

(19) J. S. M. asks: Are the rims of railway car wheels chilled? If so, will the rim and center of the wheel, when remelted, be equally soft in temper? A. They are chilled, and when remelted, the effect of the chill is, to a great degree, destroyed.

(20) J. T. M. asks for a receipt for staining whisky barrels a weather-beaten color. A. Use a strong aqueous solution of green copperas (sulphate of iron) or nitric acid.

(21) C. W. V. writes: 1. I want to tin hoop iron. What can I use to take off the scale? I have tried muriatic acid, but it does not seem to clean it. A. Pickle in a bath of muriatic acid 1 part, water 20 parts, until the red oxide disappears, rinse and heat to redness to remove the scale, hammer on an anvil, and immerse in a bath of fermented bran water at 100° Fah. for about 12 hours. On removing brighten by pickling in oil of vitriol 1 part, water 20 parts, at 100° Fah. Finish by scouring with hemp and fine sand. This is the usual method. 2. Can I mix lead with the tin? If so, what proportion can be used? A. Lead can be mixed with tin up to 50 per cent, but in such a bath the lower portions soon become richer in lead on standing, and the results are not good.

(22) J. S. B. M. asks: 1. How can mica be dissolved so as to form a varnish? A. Mica cannot be dissolved so as to be useful in the way you propose. 2. What is the best article I can use to bring zinc (metal) to a high polish for engraved signs? A. Use fine pumice stone and a little oil first, and finish with fine tripoli.

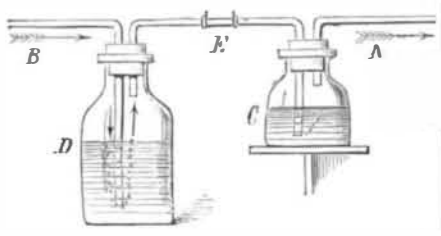
(23) E. H. B. asks: What is the method used to keep an ice house dry—the air dry—so that eggs or products similar can be kept in it for some months without spoiling? A. The dryness of an ice house depends more on its construction than anything else. The ice receptacle should be located so that the moisture of the room may be condensed on it and conveyed away.

(24) G. T. asks for a receipt for a first class office mucilage. Something that will not blister the paper as most of them do. A. Try the following: Good gelatin, 5 oz.; rock candy, 20 oz.; gum arabic, 3 oz.; water, 20 oz.; oil of cloves, a few drops. Soak the gelatin in the cold water over night, then heat to boiling for several hours (replacing the lost water), and gradually introduce the other materials.

(25) M. L. B. asks for a good receipt for a preparation that will effectually stop a constant steam leak when red lead is insufficient, such as around stud bolts, or cracks in castings, etc. I once was handed for trial a preparation resembling yellow clay to be ap-

plied just before turning on steam, that became very hard; but lost name of article. A. Iron cements or rust joints are generally used for such purposes. The following receipts are good: 1. Iron borings, pounded fine in a mortar, 1 lb.; sal ammoniac, in powder, 2 oz.; flowers of sulphur, 1 oz. Mix the whole thoroughly dry. For use mix 1 part of the above with 20 of fine iron borings, and mix with water to the consistence of mortar. Use at once. 2. Iron borings, 2 lb. (clean); flowers of sulphur, 1 oz.; sal-ammoniac, 1 oz. 3. 98 parts fine, clean iron borings, and 1 part each flowers of sulphur and sal-ammoniac, all dry. Mix thoroughly and moisten with hot water, when required for use. 4. Fine clean iron borings, 1 lb.; sal-ammoniac and spirit of salt, each half an ounce; water to moisten thoroughly when required for use. The joint should be allowed to rest for at least 10 hours before putting under pressure. For cracks calk in a little rope yarn fiber first, then calk in the cement.

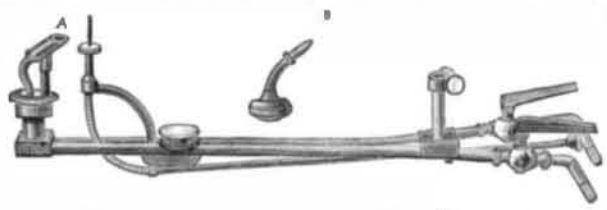
(26) C. M. asks for an easy chemical test for injurious gas in rooms warmed by a coal furnace. A. We know of no simple way of testing air for such impurities. Carbonic oxide, the most to be dreaded of such products of combustion is very difficult to detect, in such a connection by chemical means, but as it usually accompanies or is accompanied by carbonic acid gas, in such cases the detection of any considerable quantity of the latter serves as an indication of the presence of the former. Carbonic acid is detected in air by drawing the air through a solution of lime in distilled water (clear filtered). Carbonic acid precipitates carbonate of lime from such a solution, making the liquid more or less milky. It should be remembered that all air contains a trace of carbonic acid, hence the liquid will always be more or less affected. Experiment first with pure out-of-door air, then with the air of a badly ventilated room, passing about the same volume of air, and you will soon be able to judge whether very much



carbonic acid is present or not. A simple apparatus for such tests is made from two glass bottles with good stoppers and a few pieces of glass tubing, as indicated above. D contains the lime water. C, a safety bottle to prevent the entrance of air from the lungs entering through E. The mouth is applied at A. The air enters at B.

(27) R. A. & J. S. ask: Have you ever known machinery of 170 horse power driven by a rubber belt? What should be the width of a belt to convey that amount of power? A. Yes, if the speed of your belt is 3,000 feet per minute it should be about 30 inches wide. We refer you to two cases mentioned in "Cooper on Belting," page 157.

(28) A. M. B. and others inquire how to make an oxyhydrogen jet for a magic lantern. A. The cut shows a very convenient form of oxyhydrogen jet. It is provided with two interchangeable jets, A B; the spindle, which holds the lime cylinder, is adjustable lengthwise of the gas tubes, and is rotated by a flexible shaft connected with a revolving spindle extending to



the back of the lantern. The burner is supported by a rod (not shown) projecting from a movable base. The jet, A, is of the annular form, the small central jet being for oxygen and the annular jet surrounding it for the hydrogen. There is no internal communication between the two pipes. The jet, B, combines both gases in the chamber beneath, and is not safe unless both gases are under equal pressure. Common illuminating gas may be used in place of pure hydrogen in the jet, A, and it may be taken directly from the burner of an ordinary gas fixture. Where two lanterns are employed the dissolving effect is secured by turning off the oxygen.

(29) S. M. W. asks for the process of gilding on common stone china, such cheap ware and gilding as we see so frequently at present in the shops. Also can such ware be gilt by a gold solution without the use of fire? A. The gilding is done either by an adhesive varnish or by heat. The varnish is prepared by dissolving in hot boiled linseed oil an equal weight of either amber or copal. This is diluted with a proper quantity of oil of turpentine so as to be applied as thin as possible to the parts to be gilt. Let stand after varnishing about 24 hours, then heat in an oven until so warm as almost to burn the fingers when handled. The heat softens the varnish, which is then ready to receive the gold leaf, which may be applied with a brush or pledget of cotton, and the superfluous portions brushed off. Burnish when cold, interposing a piece of thin paper between the gold and burnisher. Where burning in is practiced the gold reduced to powder is mixed with powdered borax glass (anhydrous borax), moistened with a little gum water, and applied to the clean surface with a camel hair pencil. When quite dry the article is put into a stove heated to about the temperature of an annealing oven. The gum burns off, and the borax, by vitrifying, cements the gold with great firmness to the surface.

(30) M. M. H.—To temper gun springs, heat them evenly to a low red heat in a charcoal fire, and quench them in water with the cold chill off, keeping them immersed until reduced to the temperature of the water. Place an iron pan containing lard oil and tallow, in about equal quantities, over a fire, and place the springs therein, and heat the pan until its contents take fire; then hold the springs in the flames, turning them over and over and dipping them occasionally in the oil to keep them blazing; when the oil adhering to them blazes freely when they are removed from the flames, place them aside to cool off.

(31) B. A. and others ask how to produce an illuminating composition. A. Cleanse oyster shells by well washing, expose them to a red heat for half an hour, separate the cleanest parts, and put into a crucible in alternate layers with sulphur; now expose the vessel to a red heat for an hour at least. When cold break the mass, and separate the whitest parts for use. If inclosed in a bottle it is said the figures of a watch may be distinguished by its aid. To renew the luminosity of the mass place the bottle each day in the sun, or in strong daylight; or burn a strip of magnesium wire close to the bottle. The sulphide of lime will thus absorb light, which will again be available at night.

(32) A. R. asks how to utilize old bones for fertilizing purposes. A. Unless the quantity is very large, the bones should be crushed fine as possible with a heavy iron hammer, mall, or with a large stone mortar. Place the fragments in a heating compost of yard manure and ashes, taking care to moisten it frequently with liquid manure if to be had, or with water in default of the urine. By spreading a thin coat of fresh earth or plaster over the pile, the escape of the valuable ammonia will be prevented. Six months' time will suffice to disintegrate the bones and produce as complete and effective a manure as can be made on the farm. The proportion of ashes to bones should be at least an equal amount of ashes as of bones; more will do no harm. The larger the amount of manure, within reasonable bounds, the better; at least two or three times as much as of both the others is advisable.

(33) H. P. R. asks how to make a small battery for operating electric jewelry. A. The essential parts of such a battery are, two plates of carbon, one plate of well amalgamated zinc, and a solution made by dissolving 2 parts of bichromate of potash in 20 parts of hot water, and when cold adding 1 part of sulphuric acid. The zinc plate is placed between the two carbon plates, leaving a space on each side. The carbon plates are connected together and with one of the conducting wires, the zinc plate is connected with the other conducting wire. The zinc and carbon plates may be attached to a rubber stopper fitted to a small jar or bottle containing the bichromate solution at the bottom below the ends of the plates, and the solution may be brought into contact with the plates by turning the bottle down on its side. This battery works powerfully for a short time, but the solution soon becomes exhausted and must be replaced.

(34) M. B. B. asks: What is the best and easiest way of making a magneto or crank battery—one that can be made at home? A. There is no really easy way, but perhaps the easiest way is to mount an electro-magnet wound with No. 36 wire on a shaft so that it may revolve in proximity to the poles of a permanent U magnet. The sides of the magnet should be parallel to the plane of rotation of the electro-magnet and as near to the latter as possible without actual contact. The terminals of the magnet wire should be soldered to a commutator consisting of a split ferrule attached to an insulating cylinder on the magnet shaft. The ferrule should be divided at diametrically opposite points, and one end of the wire should be attached to each half of the ferrule. The commutator cylinder thus formed and connected is pressed by two springs insulated from each other and connected with metallic handles to be grasped by the person treated by the current. The commutator cylinder is turned upon its shaft until the maximum current is realized, when it is fastened. The machine may be driven by a small round belt, and its power may be augmented by using a compound permanent magnet.

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

M. M.—The boiler incrustation consists of iron, lime and alumina sulphate, carbonate and silicate, derived from impure feed water. It may injure the metal if allowed to accumulate.—C. S. T.—No. 1. Garnets—the stones are hardly clear or perfect enough to be of much value to jewelers. No. 2. Diallage—a lime magnesia silicate. No. 3. Limonite—an iron ore. No. 4. Marcasite—white iron pyrite. No 5. Serpentine and calcite. No. 6. Calcite—crystallized lime carbonate.—F. F.—No. 1. Quartz rock. No. 2. Granite.—G. D. H.—It contains lead acetate, beside much organic matter. Would require a chemical analysis.

COMMUNICATIONS RECEIVED.

On a Method of Applying Tin Foil to Leyden Jars. By T. S.

On Multicolor Printing. By E. G. B.

English Patents Issued to Americans.

From January 14 to January 18, 1881, inclusive.

Boats and vessels, masting and rigging for, J. McLeod, New York city.
Cake machinery, J. H. Mitchell, Philadelphia, Pa.
Caoutchouc, treating, G. M. Mowbray, North Adams, Mass.
Carpet-cleaning machine, W. McArthur, Philadelphia, Pa.
Dumping boats, N. Barney, Bergen Point, N. J.
Fog signal, F. Brown, New York city.
Grain drier, G. B. Boomer, New York city.
Metallurgical furnace, J. G. McAuley, Denver, Col.
Piston rod packing, C. C. Jerome, Chicago, Ill.
Screws, countersinking wood, J. Eckford, San Antonio, Texas.
Tool holders, J. M. Bibbins, Williamsport, Pa.
Valves for steam engines, J. N. Rowe, Rockland, Me.
Waterproof fabric (2 cases), D. M. Lamb, New York city.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

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

January 18, 1881,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, 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. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

Air compressor, C. A. Mayrhofer ... 236,713
Air purifying apparatus, I. W. Parmenter ... 236,839
Apparel, wearing, A. Maltby ... 226,825
Baling press, G. W. McKenzie ... 236,827
Beehive, D. C. Cripe ... 236,785
Belting joint, E. P. Farnum ... 236,675
Beveling tool, edge, Gooding & Taylor ... 236,801
Blind, J. J. Angus ... 235,752
Bolt cutter, H. K. Porter ... 236,695
Book rest, A. P. Massey ... 236,685
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Boot and shoe counter support, Howe & Shepard ... 236,705
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Corset steel fastening, I. Ulman ... 236,862
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Door spring, M. C. Mohr ... 236,688
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