Notes & Queries

(1) J. L. J. asks: What composition for steam valves and cocks will expand the least? A. The following composition answers well: 20 parts, by weight, copper; 3 parts by weight, zinc; 3 parts by weight, tin.

(2) J. N. B.—We know of no work especially devoted to nickel plating. You will find a comprehensive article on nickel plating on p. 209, vol. 38, SCIENTIFIC AMERICAN.

(3) A. R.—You will find a receipt for cementing rubber on p. 250 (15), vol. 38, SCIENTIFIC AMERICAN.

(4) J. R.—No reward has been offered for perpetual motion.

(5) J. R. M.—Lepidolite is found at Hebron, Me., and near Middletown, Conn. It has about the following composition:

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	RbO	LiO	NaF	K	H_2O
50·32	28·54	0·73	0·51	1·01	0·24	0·7	1·77	2·6	3·12

Stillman has lately shown several lepidolites to contain cæsium—one sample from Bonn, Prussia, contained as much as 0·68 per cent, CsO.

(6) M. M. asks for the best method of cutting glass tubes used for water gauges. A. File in one side a slight notch; upon the opposite side place the two thumbs with ends of nails exactly opposite the notch; now grasp the tube with both hands and pull lengthwise on it, while you break it as you would a stick.

(7) J. H. A. G. asks how many cells of a Callaud battery are necessary to heat a short strip of platina foil ⅓ of an inch wide and ¼ of an inch long, hot enough to explode gunpowder? A. Eight.

(8) W. E. K. asks: 1. What quantity and size of wire shall I use for an electro motor? A. This depends on the kind of battery used, as there exists a certain relation between the resistance of the magnet coil and that of the battery. Where a quantity battery is used the wire may be larger than when the battery is arranged for intensity. 2. I have straight soft iron cores ¾ inch in diameter, eight in number: I calculate to use both ends of the cores if possible: the cores will be about 4½ inches in length; would such an arrangement generate any power for propelling light machinery? A. Yes, but U-magnets would be better. 3. What size wire is generally used for winding the permanent magnets of dynamo-electric machines, and also what size for winding the electro-magnets? A. Where permanent magnets are used they are not wound. When electro-magnets are employed, the size of wire varies greatly with the use to which the machine is applied; the same is true of the armature.

(9) S. D. C. asks: 1. How many pounds pressure will a boiler stand which is made of heavy tin, 10 inches diameter, 15 inches high, having 7 or 8 1¼ inch tubes? A. Safe working pressure, 15 to 20 lbs. per square inch. 2. Give directions for making a good machine which will furnish sufficient electricity to produce an electric light, said machine to be run by a small engine. A. See SCIENTIFIC AMERICAN SUPPLEMENTS Nos. 17 and 151.

(10) W. H. A. asks: 1. What is the weight of a United States gallon of water, and how many cubic inches in it? A. 8·331 lbs., 230·8 cubic inches. 2. What material will fit a piston in a cylinder water tight, so that when working the amount of friction shall be as small as possible? A. Any hard metal, accurately fitted. 3. Does it take as much power to raise a piston (fitting air tight in a cylinder) with water standing under it so that the water will rise as piston rises, as it requires to form a vacuum beneath piston? A. Yes.

(11) W. S. L. asks: 1. What size of copper wire gives the best effect in an electro magnet, such as is used in the De Meritens machine? A. For a small machine we think No. 14 or 16 would do. 2. Can the wire be purchased already covered, and where? A. From dealers in this city who advertise in our columns. 3. Is the effect the same if the permanent magnets are revolved instead of the electro-magets? If so, it would seem as if the wear of brushes, springs, or commutations, would be avoided by this plan. A. Permanent magnets lose their magnetism by jarring; it is, therefore, best that they should remain stationary. 4. Will steel wire bent into proper shape, hardened, magnetized, and wound into a bundle, magnet shape, make a magnet equally powerful with a compound plate magnet as used in the De Meritens machine? A. We think not, but it might answer very well. 5. Can the magnets be made with a set of bar magnets? A. Yes. 6. Will cotton do for covering for the wire? A. Yes. 7. Have you a recent work on the subject of Magneto-Electricity and the Electric Light? A. We intend publishing papers on these subjects at an early day in the SCIENTIFIC AMERICAN SUPPLEMENT.

(12) T. S. M. asks which will consume the most power, to place the driving pinion in a hoisting machine above or below the center of the large spur wheel? A. We think it will make no difference.

(13) G. E. F. asks: 1. How to make or mix the substance used in cold water pens. A. Mix any of the soluble coal tar dyes with gum water to form a thick paste, and after filling the case, dry at a gentle heat. 2. Also a good mucilage. A. Triturate 1 ounce of gum arabic with about 4 fluid ounces of hot water in a mortar, and add a few drops of clove oil. Or make a solution of dextrine in about 3½ parts of boiling water.

(14 W. E. G. asks what would be the power of an engine 2 inches bore and 4 inches stroke. Will an oscillating engine of the same size produce the same power with the same amount of steam, say 60 lbs.? What size should a boiler be for such an engine? Would an engine of this size run a lathe that swings 12 inches for turning iron? A. There will be no difference in the power of the two engines, if properly constructed. To determine the horse power, multiply together the mean pressure during stroke in pounds per square inch, the area of the piston in square inches, the length of stroke in feet, and twice the number of revolutions per minute, and divide the product by 33,000. Make a boiler whose heating surface is in the proportion of from 15 to 20 square feet per horse power. The engine can be used to run the lathe.

(15) J. F. S. writes: I am about to select a trade or profession. I have a taste for mechanical trades of all kinds, farming and mercantile business. I have a chance to go as runner in a bank in New York, or to go on a 400 acre farm in Indiana. 1. Which shall I do? A. Go on the farm by all means. 2. How can I distinguish oleomargarine butter from the genuine article? A. According to Professors Sechartier and Taylor, oleomargarine may be distinguished from pure dairy butter by examining a sample under a good microscope. The latter presents a nearly uniform color; the forms seen consist of oil globules and crystals of salt. When observed by polarized light very little change is observed, but if the specimen contain oleomargarine the field is speckled over with shining particles which change color with every quarter turn of the analyzer. A power of 75 diameters exhibits these changes very markedly. With a power of 250 diameters more or less animal tissue may usually be detected.

(16) H. S. asks how to solder German silver. I have tried what they call silver solder, with a blow pipe and a spirit lamp; the solder will not melt. A. Rub a lump of borax with a drop or so of water on a common slate or porcelain slab, until a thick paste is produced. Clean the surfaces to be soldered and paint on the borax paste; dip your silver solder in the borax paste and place it in position on the work. Pin the work on a charcoal or piece of pumice stone, with common tacks (not tinned), direct the reducing flame of a blow pipe upon the work until it becomes red hot, then project it on the solder. The small silver three cent pieces make excellent solder for German silver, brass, copper, iron, and steel. SCIENTIFIC AMERICAN SUPPLEMENT No. 20, contains full practical directions for soldering.

(17) J. S. writes: I have a quantity of lard oil that I think contains salt or acid. How can I test it? A. If the oil contains pure acid, a scrap of blue litmus paper rubbed with it will indicate the fact by turning red. A notable amount of salt is readily detected by taste. A little hot water will extract salt from the lard, and a drop of nitrate of silver solution (aqueous) added to the clear water from the oil will occasion a white curdy precipitate, if salt is present even in very small quantity.

(18) A. A. asks: 1. How many Bunsen cells of such size as could be made in a common glass tumbler would it take to furnish electricity enough for an electric light to light a room twenty feet square? A. About 100. 2. How many of capacity of 1 quart for glass jar? A. 50. 3. What is the size of jar most suitable for battery for electric light? A. One quart. 4. Would porous cells made of fine potter's clay of proper size and shape be suitable? A. Yes. 5. Is a glazed earthen jar as good as glass for outer jar? A. Yes. 6. Are common plant jars as good for porous cups as those made of finer and more compact clay. A. No.

(19) A. C. F. asks what size of steam pipe to use for an engine 8 inches x 10 inches stroke, running at 180 revolutions per minute at 60 lbs. pressure. A. A pipe 2 inches in diameter will answer.

(20) C. A. W. asks: Is the effect of the shock from an induction coil good or bad upon the body in good physical condition? A. Strong electrical shocks are injurious.

(21) J. C. F. asks: 1. In damping the diaphragm of phonograph described in SUPPLEMENT No. 133, do you simply cut small pieces of rubber tubing and place on the diaphragm? A. Short pieces of rubber tubing are placed between the diaphragm and its support, and are allowed to exert a slight pressure on the diaphragm. 2. Will fine copper wire insulated with guttapercha do for the coil in a telephone as well as silk covered? A. The gutta percha covering is generally too thick; silk covered is preferable.

(22 W. D. S. asks: 1. In the best kind of safety valves for steam boilers does the area for escaping steam gradually increase as the pressure increases? A. According to experiments made by the United States Boiler Inspectors, common safety valves, when properly proportioned, are as efficient as those which give an enlarged area for increased pressure. 2. Are the air compartments in ships' rooms done off for floating power alone, or are they sometimes used for storage? A. The compartments having doors are ordinarily used for storage. 3. Would an invention be valuable that would automatically close the doors between the air compartments without any machinery in case a hole was made in the vessel below the water line? A. We think it quite likely, if superior to the arrangements in use.

(23) W. A. M. writes: I have a bottle of pure bay oil, will you please inform me how I can make bay rum suitable for toilet purposes? A. 10 fluid drachms of oil of bay rum; 1 fluid drachm of oil of pimento; 2 fluid ounces of aceticether; 3 gallons of alcohol 95 per cent; 2½ gallons of water; mix, and after two weeks' repose, filter.

(24) G. C. asks: What is the best method of protecting the lungs against dust while sweeping? A. Breathe through a moistened sponge.

(25) E. G. McD. asks how to make marking fluid for the backs of Brussels carpets. A. An excellent ink for this purpose is prepared by triturating 4 parts of powdered soluble nigrosine in about 15 parts of hot water, and straining the hot solution repeatedly through fine silk or filtering through filter paper, using a hot funnel. See also inks in SCIENTIFIC AMERICAN SUPPLEMENT No. 157.

(26) Engineer asks which of the two is the largest—the Cincinnati water works, or the new water works about completed at Pittsburg, also their relative capacities. A. Perhaps correspondents from these localities will kindly send us particulars.—ED.

(27) W. Z. B. asks: 1. Can water be forced into a boiler above the water line? It may not be advisable, but can it be done? A. Yes. 2. Our office is heated by coils of pipe which drain themselves completely, where they, and their outlets, are subject to no other pressure than that of the atmosphere. If both outlets are connected to the dome of a boiler carrying 60 lbs. of steam, placed below these outlets, will the pipes still drain themselves? A. Yes, if there is sufficient fall, and the pipes are properly arranged. 3. Our water works give a pressure of 125 lbs. to the inch. If a pipe was connected from the main to the dome of a boiler carrying 60 lbs., would water enter the boiler? A. Yes.

(28) W. asks: 1. Will steam or water deposit scale when not coming in contact with heated surfaces? A. Water may do so. 2. Will steam when not superheated cause oxidation of brass? A. To some slight extent.

(29) T. D. H. says: 1. I have a telegraph line about 300 feet, No. 14 copper wire, gas pipe grounded, and on it are two learners' instruments and two bells (box pattern). How many jars will I want of Lockwood or Watson batteries to work it? A. Four. 2. What is the comparative strength and usefulness on a line of these two batteries? A. There is not much difference. 3 If an office ground both line and local on one binding post, and thence by one wire to the ground, is there any danger of a return current if one be grounded and the other in use? A. No. 4. What will take knot and dust marks (from cracks) out of an engraving? A. Moisten the parts thoroughly with soft water, and press strongly between hot sheets of bibulous paper. When cool moisten with strong cold solution of fresh sodium hypochlorite, and when sufficiently clean, moisten again with a little sodium hyposulphite solution, and, after a time, absorb excess of moisture with clean blotting paper, and press between sheets of the same with hot irons until perfectly dry.

(30) W. S. D. writes: 1. I have made a steam engine cylinder 1¼x2 inches; now I want a boiler, can I get steam enough by using a boiler on a common cook stove—boiler to be about 8 inches in diameter made of cast iron? I want it to run a bracket saw on large work. If this will not do, how can I generate sufficient steam? Of what can I make a boiler; and how large? A. If you set the boiler in the fire, you can probably make enough steam. It would be better to form it of copper, from 8 to 10 inches in diameter. 2. Is cold rolled iron as good as steel for piston rods, arbors, etc.? A. It is not as strong, comparing good qualities of each. 3. How shall I temper machine steel to have it the toughest? A. You can make the steel very hard, by heating it and plunging into cold water. After this, you can temper to any less degree of hardness, by reheating, and allowing it to cool somewhat, before plunging into cold water.

(31) E.W. T. asks: What form would be the best to copy to make a small magneto-electric machine, costing from $8 to $10? I want a continuous current for physiological experiments. A. Probably Clarke's machine would be best for your purpose, but we do not think you can make one for the price named.

(32) J. G. A. and C. K. will find receipts for ebonizing woods on pp. 191 (19), 219 (67), and 251, vol. 38, SCIENTIFIC AMERICAN.

(33) W.B.S. writes: In heating our factory we take steam from the steam dome, and the return or drain pipe into the heater then (after the pipes are heated up) turned into the mud drum. It seems there is enough greater pressure at the mud drum to prevent the return water from flowing back into the boiler by a head of about eight feet or more generally. How can this be remedied? A. Ordinarily, this is not enough head to secure good circulation, in an extensive system of radiators, unless all the return pipes can lead with a fall into a vertical main. Fortunately the difficulty can be easily solved by adding a good trap.

(34) S. G. B. asks if there is a difference between one "square foot" and one foot square. A. Square foot is the more comprehensive term, since it includes the "foot square" (*i. e.*, a square one foot each way) and all other figures having the same area, 144 square inches. The first is a unit of measure, without regard to form; the second is a particular form of a particular size.

(35) A. G. L. asks: 1. Is there anything that will prevent kerosene oil from smoking when used for cooking purposes? I used three tubes similar to those used on torches, but a black deposit soon formed on the bottom of the kettle. A. The burner for a kerosene stove should be made on exactly the same principle as a first class lamp burner. 2. Can I make the electric light by using a battery composed of zinc and copper plates immersed in solution of 9 parts water, 1 part sulphuric acid, the plates being 3 x 4 in., ⅜ in. thick; how many cells would be sufficient? A. 50 such cells would produce a light, but not for a great length of time, as a battery of this kind is not constant. 3. What size copper wire is best for connections? A. No. 12 or 14. 4. When I melt zinc in an iron ladle it is brittle; is it fit for battery plates? A. Yes.

(36) R. W. S. asks: If a malleable iron casting $\frac{1}{16}$ of an inch thick by 2½ wide, is securely held at each end by a solid support, so that there is two inches of unsupported metal between the supports, what pressure in pounds brought to bear upon the center of the casting will break it? A. Trautwine gives the following rule: Breaking weight in pounds

$$= \frac{(\text{Depth in inches})^2 \times (\text{Breadth in inches})}{\text{Clear length in feet}} \times 4200$$

This rule is for the case in which the ends are immovably fixed.

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

S. F.—It is a micaceous sand. Not valuable. We could not indicate the probable value of the stone from your description alone.—J. G.—It is magnetic iron sand—magnetic iron oxide or magnetite. It will make an excellent quality of iron if properly smelted. It may be freed from sand and other impurities by means of large magnets.—J. B.—The light colored specimens are principally marcasite (an iron sulphide), with traces of copper and arsenic, in slate. The other sample contains a large per cent of lead (galena) and chalcopyrite (iron copper sulphide). The ore will probably prove of value.—J. T.—The quartz contains galena (lead sulphide) and a little chalcopyrite and zinc. The property is doubtless of some value.

COMMUNICATIONS RECEIVED.

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

Wagon Wheel Problem. By M. S. C.
On Subdivision of Electric Current. By J. T. P.
Metric System. By R. F.
Facts and Figures for Mathematicians. By L. S. B.
Electric Light Telegraph. By F. P.
Acoustic Telephone. By E. D. V.

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

HINTS TO CORRESPONDENTS.

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.

Many of our correspondents make inquiries which cannot properly be answered in these columns. Such inquiries, if signed by initials only, are liable to be cast into the waste basket.

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.

[OFFICIAL.

INDEX OF INVENTIONS

FOR WHICH

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

November 5, 1878,

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.

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