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

(1) M. M. B. asks: What is meant by 500 diameters when applied to the power of a microscope? Does it mean that an object is magnified five hundred times, or that it appears five hundred times larger than with the unaided eye? A. Linear magnification is meant when so many diameters are spoken of. Superficial magnification equals the square of the linear magnification; for instance, the former will be 250,000 when the latter is 500.

(2) T. W. F. writes: I wish a recipe for the destruction of iceeggs on hogs, without injury to the skin; or some solution that will drive them away. A. Rub along the spine and inside the thighs a mixture composed of 4 ozs. of lard, one tablespoonful of sulphur, and one tablespoonful of kerosene oil.

(3) A. S. B.—The insect is what is commonly called the carpet beetle. Le Conte, who received the first specimens from Oregon, referred it to *Anthrenus lepidus*. Dr. Lintner points out that they conform in many respects to *A. scrophulariæ*, and examples reared by Mr. Fuller from larvæ taken in New York city were clearly identical with the last named. It is a difficult pest to dislodge; cotton moistened with benzine, or preferably kerosene, and forced into the cracks of the floor, under the surbass, etc., according to Lintner have thus far proved the most effectual means of destroying them and preventing new innovations. The ordinary applications of camphors, pepper, tobacco, turpentine, etc., are powerless against it.

(4) P. H. L. asks for a recipe for a cement for mending rubber goods. A. Caoutchouc, 1 part; benzole, 5 parts; digest with occasional stirring until solution of the gum is effected. Or fuse together equal parts of pitch and gutta percha, and to this add about 2 parts of linseed oil containing 5 per cent of litharge; continue the heat until the ingredients are uniformly commingled. This is applied warm to the fabric.

(5) J. S. O. asks: How can I mix a paste or what ingredients are best to use to fasten wall paper and border so that when we glue-size and varnish on them the edges will not curl up and draw off? We have tried flour and starch paste, and also used glue in small quantities, but have had the same trouble in each case. A. In place of water alone try a strong solution of shellac 4 parts, and borax 1 part, in boiling water; cool and add wheat or, better, starch flour to proper consistency.

(6) H. H. asks how to tin strap iron, that is, put a tin coating on so it will not rust. A. Clean the iron by submitting it to a bath of 1 part oil of vitriol and 30 parts water, and scouring with sand if necessary; dry it in warm sawdust, and then pass it through a bath of molten tin covered with tallow or rosin oil.

(7) A. O. D. asks: 1. How can I temper steel the hardest, such as scrapers and small pieces of steel? A. You will find full instructions in Joshua Rose's papers on "Practical Mechanism," that have been published in the SCIENTIFIC AMERICAN. 2. What rule is used to calculate the horse power of a compound engine? A. Multiply the mean effective pressure in pounds per square inch in each cylinder (to be ascertained by the application of the indicator) by the area of each piston in square inches, respectively; multiply each of the above products by the piston speed in feet per minute in the cylinder to which it refers, add the two products, and divide by 33,000.

(8) W. C. E. asks: Can water be raised 24 feet high with a steam siphon with as much economy as with a steam pump? A. We think there is but little difference, in general.

(9) J. T. asks: What is cat silver used for? Is it used for anything in this country? Webster says it is a "mineral, a variety of mica." If it is good mica, what is it worth? Would a mine of it pay to work? Is it not used in the atove business? A. The name was once applied to the small scales of mica (the glimmer of the Germans) forming the sand derived from a yellowish mica schist. It has been used in paints or varnishes, sealing-wax, bronze powders, and with sizing in decorative art. Large pieces of clear mica (Muscovite)—from 2 to 15 inches—are of commercial value. See article on the "Utilization of Mica," p. 241, vol. 34, SCIENTIFIC AMERICAN.

What is a good article of stillingia worth in New York city? A. The extract is sold at $1 per lb.

(10) A. P. writes: I am running a stationary engine 14 x 36, with two 2-flue boilers 24 feet long, 42 inches diameter, 12 inch flues, which have been in actual use 28 years, and for the last four years been under pressure night and day, and never had but one patch on them in all this time. I tested them at 100 lbs. 4 weeks ago, and they stood it well. Can this number of years be beat? Please answer and let me know. I carry an average pressure of 60 lbs. to the square inch. A. This is an excellent record, speaking well both for the boiler maker and the engineer. We would be glad to hear from any one who can make as good a showing.

(11) W. W. writes: I am running a mill which stands 140 yards from a creek. The bottom of creek is 33 feet below mill; the well at mill is 37 feet deep; by raising dam 4 or 5 feet, which will give me 8 feet fall in the well, can I run a siphon? A. Yes, but to no particular advantage, as we understand the situation. However, if you will send a sketch, with dimensions, showing proposed arrangement, we shall be better able to judge.

(12) A. B. P. asks: How can I make potassium sulphocyanide? A. Potassium ferrocyanide (yellow prussiate), deprived of its water of crystallization by heat, is mixed with half its weight of sulphur and the whole heated to tranquil fusion for some time in an iron pot. When cooled the mass is boiled with water, decanted from the residue, mixed with enough potassium carbonate to precipitate all of the iron, filtered, and concentrated over a fire to a small volume, from which crystals of potassium sulphocyanide separate on cooling.

What are the proportions used in making "oil of apples" from fusel oil? I tried it by guess, but the product smelled like walnut hulls? A. Make a cold mixture of 1 part each of amylic alcohol (fusel oil) and 1½ part of dry valerianate of soda; heat the mixture gently for some time on the water bath, and then mix it with a quantity of water, when the oil-like amyl valerianate will separate. This dissolved spirits of wine constitutes commercial apple oil.

Is methylated alcohol manufactured in this country for chemical uses? Is it cheaper than ordinary alcohol? A. Yes. It is somewhat less expensive.

(13) E. A. B. asks: Will a water wheel 3 feet under the water, in a wooden flume, make a good ground connection for a short telegraph and telephone line, say 1,000 feet? A. Yes.

(14) J. B. asks: 1. Is electric light used on metallic or ground circuit? A. Metallic. 2. How many lights can be made on one circuit, or will it take a separate conductor for each light? A. A separate conductor is required for each.

(15) C. J. M. asks: 1. How much insulated wire, No. 30, does it take for a telephone (for each magnet), the magnet being a permanent one, 5 inches long and ⅜ inch in diameter? A. No. 30 wire is not fine enough. Use 1 oz. of No. 38 or No. 40 for each magnet. 2. And for what distance would such a one answer? A. 100 miles. 3. Also, will rust on an iron wire interfere with its use? A. No. 4. I was once told that the wires should not be any closer than 2 inches from the house or any other object. How is this? A. The line wire should be supported on insulators.

(16) R. C. C. asks: 1. How far from an electro-magnet can I attract or draw the metal to be attracted? A. If at ⅛ inch distant the armature is attracted with a force measured by 100 grains, at 1 inch it would equal but 1 grain, etc. 2. Does it require the metal to be attracted to be in weight equal to the strength or force of the magnet? A. No. 3. For strength or attraction which is preferable, a horseshoe or a magnet made from gas pipe, as illustrated in your previous issue? A. The horseshoe form is one of the best.

(17) G. E. S. writes: I made a phonograph, to the best of my belief according to your description in the SCIENTIFIC of March 30, 1878. It will not reproduce my voice. Following is the description of the one I made: A brass cylinder 8 inches long, 12 in circumference and about 1/16 in thickness, with threads cut on 16 to the inch and 1/32 in depth. Cylinder working on an iron rod which runs through cylinder, and held in position at each end of cylinder by open brass work. Rod works through brass bearings, threaded to correspond with cylinder. The mouthpiece is a small wooden round box, lid off, and hole 1 inch in diameter cut out of bottom. Small rubber tubing laid in box, on that a regular telephonic diaphragm with more tubing on top, the whole being fastened down by brads. The spring is thin brass fastened to mouthpiece holder, and reaches to center of diaphragm. A common steel sewing needle, large size, point rounded off a little, ½ or ¾ inch long, is driven half through brass spring. Upper end of needle has small piece of rubber on, which rests lightly against diaphragm, other end running in groove on cylinder. Makes a slight mark on tinfoil when I turn crank, and slight indentations when I talk on the diaphragm. The reproduction is a grating sound. What is the fault and how can I remedy it? A. SCIENTIFIC AMERICAN SUPPLEMENT No. 133 will contain full information for the construction of a phonograph.

(18) A. asks: 1. How can I decompose water by electricity? A small volume of water only. Is it necessary that the current pass directly through the water? A. Place water in a suitable vessel and add to it a small quantity of sulphuric acid to increase its electrical conductivity. Fill two test tubes with the acidulated water and support them with their months below the surface of the water in the vessel. In the month of each tube insert a plate of platinum, and connect the plate with the poles of a battery of 4 or 6 Bunsen cells. Oxygen is liberated at the positive pole, and hydrogen at the negative pole. 2. Would magnetism or electricity generated by friction answer the same purpose? A. Static electricity decomposes water feebly. 3. Is there any other practicable way of decomposing water? A. By subjecting steam to an intense heat.

(19) C. W. D. writes: 1. There are parties making chilled plows who claim they chill or harden their iron by putting something in the ladle of melted iron before pouring it into the moulds. Can you tell me of anything that will do the same? A. We do not know of anything. If any of our readers can furnish information on the subject, we would be glad to hear from them. 2. What is the result of putting scrap iron or steel in the cupola when melting, or in the ladle of melted iron? Does it melt and unite with the cast iron? If so, does it do any good, or does it burn up and amount to nothing? A. It generally improves the product. 3. Will malleable iron melt in with cast iron in a cupola? A. Yes.

Can you tell me where I can buy a mechanical pigeon like the one described in your "Science Record" of 1873, p. 548? A. You can obtain it from a dealer in sportsman's goods.

(20) R. D. asks: Can you inform me of any material which, if put in a cup or other vessel, would disengage sulphurous or other poisonous fumes sufficient to saturate a confined space of 1 cubic yard at a cost of 5 to 10 cents without the use of fire? A. Throw a few scraps of zinc and a drachm of arsenious acid into a wide-mouthed bottle containing dilute sulphuric or hydrochloric acid. The gas given off—arsenious hydride—is extremely poisonous even when diluted with much air. Hydrogen sulphide may be economically procured by the action of dilute oil of vitriol on pulverized ferrous sulphide (FeS); this is prepared by exposing red hot iron filings to fused sulphur, or by fusing together in a crucible 5½ parts of iron and 12 parts of common crystallized iron pyrites (FeS_2).

OFFICIAL.

INDEX OF INVENTIONS

FOR WHICH

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

May 7, 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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