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.

NEW BOOKS AND PUBLICATIONS.

REPORT OF THE NEW JERSEY STATE COMMISSION FOR THE ENCOURAGEMENT OF MANUFACTURES OF ORNAMENTAL AND TEXTILE FABRICS. 1878. Trenton. 8vo., paper, pp. 90.

The greater portion of this pamphlet is devoted to a review of efforts made at home and abroad to secure the industrial and artistic education of the artisan class, the Commission believing that by such means the object aimed at can best be attained. A bureau of statistics like that of Massachusetts may be made very helpful in carrying out the work.

GENERAL INDEX TO APPLETON'S AMERICAN CYCLOPEDIA. 1 vol. 8vo. pp. 810. New York: D. Appleton & Co.

This volume is intended to make readily accessible the information given in Appleton's Cyclopedia, and must prove a great time saver to such as have frequent occasion to consult that work. It adds to the value of the general volumes as markedly as an elaborate index does to a book having a good table of contents; and at the same time it provides a handy volume for reference with regard to the spelling and pronunciation of names (English, foreign, and scientific), technical terms, and so on. Frequently an explanatory word or phrase is inserted in the index in such a manner as to obviate the need of consulting the general volumes at all. To some extent also it may be helpful in the search for information in other cyclopedias and special treatises.

Notes & Queries

(1) M. B. writes: Could you inform me if there are any set rules for the signals between the pilot and engineer on a steamboat, and give the signals the pilot uses in signaling boats? A. The ordinary code of engine signals is as follows: Engine stopped, 1 stroke on gong, go ahead slow; engine stopped, 2 strokes on gong, back slowly. Engine going ahead or back slowly, jingle bell, go fast; engine going ahead or back slowly, 1 stroke on gong, stop; engine going ahead or back fast, 1 stroke on gong, slow engine. The pilot signals are: Steamers approaching head on—Each steamer must pass to the light of the other, and the pilot who first determines to turn gives one short blast of the steam whistle, which must be immediately answered by the other pilot. Two short blasts, answered by other pilot, when first pilot considers it safer to pass to the left. Series of short blasts, in rapid succession, signifies that the pilot who makes them is in doubt as to the signals of the other pilot, and wishes to have them repeated. One long blast to be given within a half mile of a curve or bend, to be answered by the pilot of any other steamer within hearing. One long blast in a fog signifies that the steamer is under way. Three blasts in a fog signifies that the steamer is drifting or at anchor.

(2) W. W. S. writes: We have a 3 x 4 inch vertical yacht engine, with variable (link) cut-off, and we wish to get all the power we possibly can from it. 1. What kind, size, and pressure of boiler shall I require? A. Make a boiler 28 inches in diameter and 45 inches high, for 130 lbs. of steam. 2. What is the most power I can get from it? It is built strong. A. Probably about 5 horse power.

(3) E. J. P. writes: I have stated to a friend that the moon can never be absolutely full, which he denies. I base my assertion on the fact that if the moon were to be absolutely full it would pass into the earth's shadow and hence be eclipsed. Who is right? A. You are right.

(4) G. S. McG. asks if there is a formula given to calculate the height that water can be raised by suction at different elevations above the level of the sea, say from 8 to 10,000 feet. A. Multiply the height of the barometer in inches (reduced to a temperature of 32° Fah.) by 1·133. The result is the height, in feet, of a column of water that will balance the atmospheric pressure.

(5) P. C. asks for a recipe for harness blacking. The principal requirements are that it should make the leather flexible, waterproof, give a good smooth black finish so that dust will not adhere, easy of application, quick drying, not injurious to the texture. A. The following composition is said to give excellent results: Orange shellac, 1 lb.; alcohol (48 per cent) or wood naphtha, 1 gallon; dissolve; asphaltum (genuine), 1 lb.; neat's foot oil (hot), 4 fluid ozs.; soften the asphaltum with the oil and mix it with the lac solution; then add fine ivory black, q. s., and bitter almond oil, 1 oz. Agitate until uniform mixture is effected, and bottle.

(6) C. G. asks: Does the generating of steam rapidly cause any extra strain on boilers when not allowed to go beyond a certain pressure, say 60 lbs.? A. Ordinarily, when a boiler is forced, it deteriorates more rapidly than when the combustion is slow.

(7) M. J. C. writes: I piped a stationary engine the other day, and ran the exhaust pipe 25 feet horizontal and 25 feet perpendicular: would the engine run better if I run my pipe down through the floor? A. If the exhaust pipe is sufficiently large, there would not be much advantage in the change. Data insufficient in first query.

(8) K. F. asks: Can the sound from a number of voices or instruments of any kind be heard at a greater distance than the sound from one voice or instrument, and what is the ratio of distance as compared with the combined number of sounds? A. Yes. "The intensity of sound is inversely as the square of the distance of the sonorous body from the ear," consequently the sound produced by four voices or instruments can be heard twice as far as the sound produced by one voice or instrument.

In making a phonograph from drawings in SCIENTIFIC AMERICAN SUPPLEMENT, are we not liable for infringement of Edison's patent? A. See editorial "Rights of Investigators," in No. 9 of current volume of SCIENTIFIC AMERICAN.

(9) C. N. O. asks: Which will support the greater weight, a 12 foot 8 inch diameter solid column, or a 12 foot 8 inch diameter ¾ inch metal hollow column? A. The former.

If a machine were made to use any natural force, as gravity, continuously, would it be perpetual motion, as that term is generally used? A. Yes.

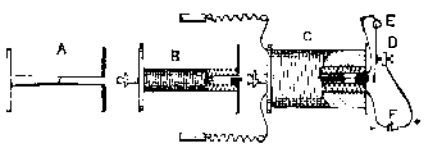
(10) W. H. B. asks for a method of preparing paper blue for clothes. A. Mix dry Prussian blue with about 60 per cent of hot water and 15 percent of potassium ferrocyanide (yellow prussiate) in powder; pass the mixture through a fine sieve, dilute it with a little hot water, and pass the dry unsized paper through the solution, and expose it to warm air until dry.

(11) G. A. R. asks: What is the best and cheapest substance to enamel bricks, and the mode appertaining? A. Ordinary red tiles may be enameled or glazed by subjecting them, while well heated, to the action of the vapor of common salt fused in the furnace.

(12) J. W. S. asks for a good black dye for restoring color on hats without boiling them in it, and also what makes a good dye for dyeing black by boiling? A. 1. Water, 100 parts; logwood, 40; sulphuric acid, 0·5; boil and add ferrous sulphate, 3 parts, copper sulphate, 1. 2. For 100 parts of goods, camwood, 8 parts, boil 30 minutes, and add potassium bichromate, 3 parts; alum, 1; argol, 1; boil for 30 minutes, then let off, and allow the goods to stand over night. Then boil for an hour in logwood, 45 parts; fustic, 8; sumac, 4.

(13) R. B. writes: 1. We have a telephone circuit of about a mile; there are no telegraph wires near it, and of late the clicking sound has become so great that at times the person speaking cannot be heard. Will you please inform me of the cause of the clicking sound? A. It is probably due to earth currents. 2. Is there a remedy for it, and if so, what is it? A. Use a return wire, or put a small resistance coil at each end of the line.

(14) F. F. C., W. A., and others: An ordinary induction coil may be made in the following manner: Turn a spool, A, of wood or hard rubber, 4 inches long with flanges, about 2½ inches in diameter. The spool should be ¾ inch internal diameter and quite thin. Upon this spool wind two layers of No. 16 insulated copper wire, as shown at B. Place around the coil thus formed two or three thicknesses of paper which has been soaked in melted paraffin. Upon the paraffin paper wind from 300 to 400 feet of No. 40 silk covered copper wire, placing under each layer a thickness of paraffin paper. The ends of the wire of the inner or primary coil extend outward through the flange of the spool, and one of them is connected with a post, E, to which is attached a current breaking spring, supporting an armature in front of a short soft iron plug in the end of the spool. The current breaking spring has



attached to it a small disk of platinum, which rests against the adjusting screw in the post, D. This post is connected with the battery, F, and the latter communicates with the terminal of the primary coil. The ends of the wires of the outer or secondary coil extend through the flange of the spool and are connected with binding posts. It will be noticed that the outer coil has no connection whatever with the inner one. The secondary current is induced by the current in the primary coil. To regulate the strength of the secondary current a bundle of soft iron wires is inserted into the spool and moved out as occasion may require.

(15) C. B. writes: My brownstone front stoop is covered with a green mouldy substance that looks bad. Please give me a recipe for removing it and not injuring the stone. I notice a great deal of it in all cities, only on the south side of the street. A. Try a little strong aqueous solution of caustic soda. It should remain ten minutes in contact with the stone, which, after washing with water, should be well rubbed with a stiff brush or broom.

(16) D. W. A. writes: I want a cheap and simple method of manufacturing gas for an experimental air carriage, not out of coal. Also the size of a cigar shaped balloon large enough to raise about 300 lbs. A. Where coal gas is not obtainable the gas (hydrogen) is prepared by decomposing dilute sulphuric acid (oil of vitriol 1 part, water 3 parts) with scrap iron in capacious wooden vessels or casks. For the amount of materials required, etc., see p. 107 (22) and (8), current volume, SCIENTIFIC AMERICAN, also p. 64, vol. 32.

1. What do you mean, when you say, in speaking of a screw for propelling boats, that it has a pitch of 16 inches? Do you mean that the screw is of such an angle that if continued around the shaft it would make one revolution around it in that distance? A. Yes. 2. And for a small screw, say of 10 or 12 inches diameter for small canoe, what pitch should it have and how many blades? And should the blades be curved or straight? A. A true screw with three blades, pitch 1½ times the diameter, will do very well.

(17) H. B. asks what size a boiler and engine should be for marine use (size of engine 2 inches in diameter and 3 inches stroke), double engines. I want the engines for a row boat, with speed from 6 to 8 miles per hour. A. Make a tubular boiler, 24 to 28 inches in diameter, 4 feet high.

(18) A. E. R. writes: 1. I am running a Corliss engine, made about the year 1863. The cylinder is 14 inches x 3½ feet, 50 revolutions a minute, and 60 lbs. steam. In setting the valves I gave the cut-off valves ⅛ lead, and the exhaust valves ¾. I do not think the boiler safe above 60 lbs., and the engine has to work rather hard to do the work required of it. Am I getting the best results with the valves set as stated? A. We think these are good proportions; but the only way of telling certainly whether the valves are set to the best advantage would be by an indicator diagram. 2. How can I test sperm oil to tell if it be pure, and is it considered the best oil for cylinders? A. We do not know of any very simple tests except that of use. Some of the natural oils are much used for cylinder lubrication.

(19) S. K. asks if the United States Steam Boiler Explosion Commission will experiment again this year. A. We believe the Commission has adjourned *sine die*.

(20) D. S. E. asks: Is it at all possible for a steam boiler to burn out if it is kept free from scale and has the proper care in keeping it clean? Even with a forced fire or a blast, can the boiler receive any injury when the above care is taken? A. If the boiler is so designed that there is not a free circulation, it can be burned, when perfectly cleaned, by a powerful blast.

(21) C. E. G. asks: I wish to raise the greatest amount of water possible, using a 5 or 10 horse power engine. Please give the best machine for that purpose. A. We think a good rotary pump will give the most satisfactory results.

(22) G. W. writes: As we contemplate building a steamboat we have clubbed (six of us) together, and we come to you for advice. We should like to build a boat to carry about 20 persons. Can you give us an idea how to have it built, such as length, width, size of boiler, engine, and screw, and about the cost? A. We take the following from the price list of a well known builder of steam yachts: Hull, 38 feet over all, 7½ feet beam, 3½ feet draught. Engine, 5½ x 7 inches. Propeller, 3 feet diameter, 4 feet pitch. Boiler 3 feet diameter, 4½ feet high, 170 square feet of heating surface. Price $2,300.

(23) J. J. N. asks if vertical retorts for the distillation of coal are much in use. A. Such retorts are rarely employed in this country.

(24) H. H. C. writes: In a back number you stated that if a person wanted to become a locomotive engineer, shop experience would be requisite, therefore I ask: 1. Would it make any difference whether I worked in the machine shop of a foundry or car shop? A. A locomotive manufactory would be the best. 2. Is there any work published on "Locomotive Engineering?" If there is, please state the title and author. A. Forney's "Catechism of the Locomotive" is a useful work. 3. What is the average pay for locomotive engineers on our Western railroads? A. From $2.50 to $3 a day will probably represent a fair average. 4. After having shop experience, how should I proceed to become an engineer? A. Try and procure a situation as fireman on a locomotive.

How many miles of railroad does Australia possess? A. In 1876 there were in Australia 1,680·5 miles of railroad in operation, and 1,376 miles in course of construction.

(25) G. W. M. asks: Can I obtain a liquid of greater specific gravity than sulphuric acid? A.

(Specific gravity at 32° Fah.)

Mercury	13·59
Bromine	3·18
Phosphorus terbromide	2·92
Silicon bromide	2·81
Stannum (tin) perchloride	2·26
Arsenic terchloride	2·20
Methyl iodide	2·19
Sulphuric acid	1·85

(26) J. S. Q. writes: I have a tugboat, 60 feet long, 14 feet wide, scow bow and stern. She runs 7½ miles per hour up stream, and makes all the steam I want to carry, 120 lbs., with lump coal. I wish to use slack instead of lump coal, and will ask your advice in making alterations for burning slack. The engine is 10 inch, 12 inches stroke; boiler is firebox make, 11½ feet long; boiler shell is 8 feet long, 36 inches in diameter, has 43 flues 2½ inches in diameter, 8 feet long; firebox is 3 by 3 feet, the grate bars have ½ inch opening. She exhausts in the chimney; the exhaust pipe nozzle is 12 inches above top of flues, and is cramped from 2½ to 1¼ inches. The smoke box door at the after end of boiler is not tight, leaks great deal of air; the flues are coated with a heavy scale, and still she makes plenty of steam with lump coal. I propose to remove all the scales, which I can do, and keep the flues clean, and reduce the opening in the grate bars to ⅛ inch, and cut the nozzle off even with the top of the flues, and leave the opening 2½ inches, and make the smoke box door at the after end of the boiler air tight, and then I think I can make 120 lbs. of steam with slack. My chimney is 12 inches wide. A. We think it quite probable that your plan will be successful. You may have to increase the draught by a steam jet.

(27) W. McC. writes: Having had some doors to varnish, I was asked if I could leave them so that the panels would be glossy and the stiles dead or flat. Now I would like to have you tell me if there is anything that will kill the gloss on varnish and still not injure it. A. You might rub them down with fine pulverized pumicestone and leave the surface without polish.

(28) D. W. B. writes: 1. The switching engine No. 60 of the N. Y. & N. H. & H. R. R., after the steam has been shut off, and while fetching, makes a heavy thumping noise, apparently in the cylinders. The engineer does not know how to account for it. What is the cause? A. From your account we judge that it may be due to water in the cylinder, or contraction of some of the steam connections, but the data are scarcely sufficient to enable us to form a very intelligent opinion. 2. How is the air exhausted for the vacuum brake? A. By a steam ejector. 3. How can I compute the horse power of a locomotive? A. Multiply the mean pressure on the piston in pounds, by the piston speed in feet per minute, and divide the product by 33,000.

(29) C. F. B. asks: Can any reader of the SCIENTIFIC AMERICAN give me a rule to measure rubber belting in the roll? A. The following rule is given in Cooper's work on belting: D=diameter of outer coil in inches. d=diameter of inner coil in inches. n=number of coils. Length in feet equals $0{\cdot}1309\ n \times (D+d)$.

(30) W. H. A. asks for a formula for preserving insects. A. Labouliere recommends for the preservation of insects in a fresh state, plunging them into a preservative fluid consisting of alcohol with an