(24) W. S. J. writes: We have a tubular boiler, upright, 32 2-inch flues. The boiler is made of five-sixteenths iron, 24 inches diameter; length of flues 36 inches. What would be the safe working pressure for such a boiler? Is this size boiler large enough for a 4 horse power engine? A. If all other parts are equal to the strength of the cylindrical shell, 150 lb. The government rule would allow more. It is equal to 4 horse power with good fuel and a sharp draught.

(25) W. E. H. asks: 1. Is it practicable for me to convey power for my elevator (say 4 horse power) from a mill 500 feet distant by a wire rope? A. Yes, by dividing the distance and putting up an intermediate carrier shaft and pulley. 2. What size wheels and rope do I want? I know wire ropes are run in this vicinity for like purposes for short distances. A. A rope three-eighths or seven-sixteenths in diameter, on 4 foot pulleys, making 120 to 140 revolutions per minute, will be ample.

(26) B. and B. write: The suction pipe of a steam pump being 2½ inches inside diameter, the ends plugged up, how many holes of ¼ inch in diameter should be put in the pipe (to serve as a strainer) to perfectly supply it with water? A. One hundred.

(27) L. P. L. writes: The mercury in my thermometer has separated. How can I remedy it? A. By gently jarring the separated portion down.

(28) J. G. R. writes: 1. I wish to make the small French battery used by physicians, called the French pocket battery. It uses some salt of mercury in the battery. A. You will find this battery described in SUPPLEMENT, No. 159. 2. How many layers, and what is the number of wire in the primary coil? Also, what is the number of wire in secondary, and how many layers? A. Primary, No. 20, 4 layers; secondary, No. 40, 10 or 12 layers. 3. What is the size of core and number of the iron wire? A. Core, ⅜ inch, composed of No. 20 iron wires. 4. How long, and how big round is the spool? A. 3½ inches long, 1 inch to 1⅛ inches in diameter. 5. What is the salt used in the battery? A. It is proto-sulphate of mercury. 6. Of what does the negative pole consist? A. Zinc. 7. How heavy ought the armature iron to be? A. One or two pennyweights. 8. What are the proportions of peroxide of manganese and carbon in the porous cell of the Leclauche battery? A. About equal parts.

(29) M. N. asks: Suppose a thin band cylindrical or slightly conical, about the screw of a ship. Would not some of the force wasted in moving the water in a direction perpendicular to the axis of the screw, be made useful in propelling the ship? A. Such bands have been tried repeatedly, but without advantageous results.

(30) A. W. J. asks how long a first-class air pump should hold its vacuum—air pump with single brass barrel? A. If pump valves, joints, and pipes be practically tight, for many hours.

(31) W. W. & S. ask how much difference is there between one ton hard coal and one ton soft coal in heating power? A. The evaporative power of good anthracite coal is rather higher than that of bituminous with suitably proportioned boilers. 2. Does it injure a boiler more firing with hard coal than soft? A. No, if the coal be free from sulphur.

(32) W. P. writes: I have a yacht 24 feet long, 6 feet beam, 3 feet deep; which I am going to run with a 6 horse power engine and 8 horse power boiler; intend it for pleasure and light towing in slack water. Am not so particular about speed as power. Will you please inform me in your valuable paper what sized propeller I need for this engine? A. Judging from the information given, we would say about 30 inches diameter and 3 feet pitch.

(33) J. L. asks: 1. Can the steam from an 8x24 be condensed in a cistern 8 feet wide and 16 feet deep? A. Yes, but you must have means of changing the water, as it would gradually get hot and become incapable of condensing the steam. 2. Would the water from the condensed steam be fit to be used again for the boiler? A. Yes. 3. How could I make an electric battery so as to run it with vinegar? A. A zinc and copper plate plunged into vinegar will generate an electric current, but it does not make a desirable battery.

(34) E. D. asks for a recipe for a black ink for use on the "copygram." Colored inks are prohibited in the army, and I know no place where labor can be saved to better advantage with a "copygram" than in the army, with its duplicates, triplicates, etc. I can take ordinary copying ink and get two or three impressions, but not entirely satisfactory ones. A. Try a strong aqueous solution of nigrosin, soluble aniline black.

(35) J. M. asks where the stone is found from which plaster of Paris is made. A. Gypsum is found in New York, Michigan, Virginia, Ohio, Canada West, Nova Scotia. The most important beds are those of the Paris basin at Montmartre.

(36) F. M. O. asks what materials, and the proper proportions of the same, are required to make what is now considered to be the best copying pad, with directions for mixing them. There have been so many receipts printed, that it is difficult to tell which is the best. I want to make one pad 10x12 inches. A. See page 325, Vol. 41, SCIENTIFIC AMERICAN.

(37) L. S. W. asks what the dimensions and the size and number of tubes of a boiler for a 5 horse power engine are, and have it plenty large enough; also, what would be the cost of such an one. A. Thirty inches diameter and 6½ feet high. 40 or 42 tubes, 2 inches diameter and 48 or 50 inches long, cost about $290.

(38) F. S., referring to the electric machine described in SUPPLEMENT, No. 161, asks: 1. Would the power of the machine be increased any if made larger, say ½ or twice as large as the drawings given? A. Yes. 2. Is it necessary to have the bearings at each end of the armature secured to the sides of the magnet, and if not, will they have to be insulated from the base? A. The bearings of the armature may be secured to the base of the machine. They need not be insulated. 3. Will it do for the two arms of the magnet to be joined at the bottom? A. They may be joined by some non-magnetic material such as brass, rubber, wood, vulcanized fiber; but they should not be united or joined by iron or steel as the magnetic current would then be through the ends of the magnet and the connecting piece, instead of through the armature. 4. Would it do to have the commutator made of hard wood covered with rubber or gutta percha? A. Hard wood without the covering of rubber will answer very well.

(39) M. T. J. asks for the best method of magnetizing large size horseshoe magnets? If large quantity battery and electro-magnet is used please give proper proportions. A. The simplest method of magnetizing horseshoe magnets is to draw them from the bend to the poles across the face of an electro-magnet, breaking the current as the poles of the steel magnet come opposite the poles of the electro-magnet. This operation is repeated until the steel is fully charged. The electro-magnet for this purpose should be about 6 inches long, with soft iron cores 1 inch in diameter wound with eight layers of No. 16 cotton covered copper wire. The battery should be 4 to 6 cells of Bunsen, which may be connected either for tension or quantity.

(40) E S. F. writes: 1. I am making one of the telephones described in No. 142 of SUPPLEMENT. I should like to know what kind of wire I must use. Will No. 24 copper wire do? If not, what size shall I take? A. The size of wire is given in the article referred to. It should be No. 36 or No. 38 silk covered copper wire. No. 24 will not answer. If you make the telephone shown in Fig. 2, in SUPPLEMENT 142, you should make the spool as thin as possible, and the clamp which binds the magnets together should be of brass, rubber, wood, or some other non-magnetic material. 2. I am making in connection with this an electric call-bell, and I should like to know also if one bell of a common gravity battery will do? The distance between the telephones will be about 550 feet. A. See telephone calls, in SUPPLEMENT 162. One cell of gravity battery will do, if everything connected with the line is adapted to it; but it is preferable to use 2 or 3.

(41) C. E. asks (1) how to make a cheap magic lantern. Have a lens 2½ inches diameter and about 7 inches focal distance. A. You cannot make a very satisfactory instrument with a single lens, although you may use it for projecting very transparent slides on a small screen by arranging a box for containing the lamp and receiving the slides and making an adjustable tube for holding the lens from 5 to 8 inches from the slide. 2. How to silver glass for mirrors, say two or three inches square? A. For methods of silvering glass, see SUPPLEMENT 105.

(42) A. E. R. asks (1) how to make an Edison transmitter? A. See SUPPLEMENT 163, for a full description of Edison's transmitter. 2. I have made an Edison transmitter, but it does not work to perfection, it seems to be loud enough but it "buzzes." Can you tell me the cause? I use a carbon taken from a common carbon battery. Is there anything better? A. Use lampblack collected from the chimney of a petroleum lamp. 3. I have read that the primary wire of the induction coil should be on the outside, but I have mine on the inside: which is correct? A. Either will do. 4. Is there a spring used in a transmitter, and if so, for what purpose? A. There is no spring in Edison's transmitter.

(43) F. H. B. writes: I am thinking of putting up a telephone with another room. Will you please describe the most easily made receiver and a transmitter that will transmit, perfectly and distinctly, words spoken in a moderately low tone? I would like to have the transmitter made to appear from without, somewhat like the one that looks like a small box, with the diaphragm in the center of the door. The greatest distance that the telephones will have to work is about 150 to 200 feet. Please also tell me if, for this distance, there is an instrument that will take the place of both receiver and transmitter, and will transmit speech nearly as well? A. The Blake transmitter described on p. 274, Vol. 41, SCIENTIFIC AMERICAN, would answer your purpose. One of the telephones described in SUPPLEMENT 142 will answer as a receiver. It is probable that some of the best forms of magneto-telephones would answer both as transmitter and receiver, but you will get better results by using a transmitter and a battery.

(44) D. P. D. asks: What is the difference between the velocipede and tricycle? The derivation of the latter and bicycle tells me the one has three wheels, the other two. But what the velocipede is in contradistinction to the other two is unknown to me. A. The word velocipede means swift foot, and applies properly to two, three, and four-wheeled vehicles propelled by foot.

(45) W. H. S. asks: 1. Does the copper wire wound on a horseshoe magnet require to be insulated? A. Yes. 2. What batteries will be required and what sized magnet to lift twenty pounds? A. Use two cells of Bunsen battery. Make the magnet four inches long with half inch cores, and wind with eight layers of No. 18 cotton or silk covered wire.

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[OFFICIAL.]

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FOR WHICH

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

March 30, 1880,

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.

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