oxalic acid in 6 parts water. It is a powerful poison, and requires care in its use. Slightly wet a cloth with the solution and rub the boiler. Wash clean with hot water.

(234) C. F. P. writes: I am about to erect a tobacco sweat house, 15 by 16, which must be completely steam tight. Can you tell me how many one-inch steam pipes it would require to heat this room, 15 by 16, 7 feet high, to a uniform heat of 90° day and night? I also need a moisture of 95°, which must be absolutely there day and night; would you recommend the heating by hot water or steam circulation? Is there any steam tight paper manufactured, which will stand moisture and heat any length of time? What will it cost me to get a hygrometer? A. You will require 75 feet of 1 inch pipe for your sweat room. If you have steam upon the premises, it is recommended. If not, a small greenhouse hot water stove is recommended. A galvanized water evaporator can be hung on the heating pipes for moisture. For ascertaining the amount of moisture in the room, we recommend a Mason hygrometer as the most reliable means, cost $2.50 to $3. They can be purchased through the optical trade. There is no paper lining that would stand the moisture and heat, unless thoroughly saturated with coal tar, which would impart a disagreeable odor to the tobacco. Many sweat rooms in New York are only lined with matched ceiling boards that have been well oiled with linseed oil and then painted with mineral paint (no lead). Some are only oiled.

(235) C. B. asks: I would like to know if the dynamo described in No. 600 could be made in half size by using exactly half the dimensions everywhere. Also if there would be any difference in the wire? A. To make a dynamo of one-half the capacity of the one referred to, reduce every dimension twenty-five per cent. If you make it one-half size linear measurement, the machine will have approximately one-fourth the power.

(236) H. M. C. writes: Please give definition and value of following terms: 1. Electro-motive force? A. The force directly producing an electric current. What it is, is unknown. 2. Ohm? A. The resistance offered to a current of electricity by a conductor through which a unit of electromotive force (one volt) will produce a current of one ampere. A cylindrical column of mercury one meter long and one millimeter in diameter has a resistance of 1·2247 ohms. 3. Megohm? A. One million ohms. 4. Microfarad? A. One millionth of a farad. A condenser of one microfarad capacity, charged at a potential of one volt, will contain one microcoulomb of electricity, enough to mantain a current of one ampere for $\frac{1}{1000000}$ second. 5. Volt? A. The unit of electromotive force. A gravity battery gives about 1·07 volt. 6. Ampere? A. The current produced by one volt through a resistance of one ohm. 7. Series? A. One succeeding the other. 8. Parallel? A. One by the side of the other, so as to be in action simultaneously. 9. Multiple? A. Several at once. 10. Multiple arc? A. Several voltaic arcs arranged in parallel between two conductors. This is the proper meaning, but it is applied to incandescent lamps, and means several disposed in parallel as just described. 11. Ampere hour? A. A current of one ampere maintained for one hour. 12. Compound wound? A. In a dynamo, having separately arranged windings on the electro-magnets.

(237) F. W. asks if men and women have been scalped and have recovered from it? A. Yes; there have been such cases, though they have occurred but rarely. One of the veterans in our office well remembers having seen, when a boy, an entirely recovered and healthy man who had been a subject of an Indian scalping knife. Possibly such survival has been due in some instances to the fact that the Indians, in hurriedly performing the work, removed only a portion and not the whole of the scalp. An instance was also reported, some years since, of an operative in an Eastern factory being scalped, from her hair having caught in the machinery, and of her recovery from the effects of the accident.

(238) H. L. W. asks (1) for a process of making soft water for the purpose of manufacturing liquid blueing with oxalic acid, without distilling. A. If the lime is present as bicarbonate, it can be precipitated by boiling. If it is present as sulphate, it should not cause you much trouble. 2. How to make a cheap electrophorus powerful enough to ignite gas or gasoline. A. Cast a cake of resin six inches in diameter and one inch thick. Provide for it a wooden box lined with tin foil. A tin disk four inches in diameter is provided with a central glass handle. To excite it, stroke the resin with a cat-skin, put the disk upon it as nearly central as possible, touch the disk with the finger, and then remove the finger. The disk, lifted by the glass handle, brought near a gas fixture, will give a spark.

Enquiries to be Answered.

The following enquiries have been sent in by some of our subscribers, and doubtless others of our readers will take pleasure in answering them. The *number* of the enquiry should head the reply.

(239) W. H. M. asks: Please describe the method of firing red hot shot. We know it has been done, but it seems impossible to gain any personal information.

(240) F. C. L. asks: Can you inform me about how deep the water is in Niagara river, from one to two hundred feet back of the great falls? Is the rock in river bottom here comparatively level? Also state the rapidity of current at this point. Does the city of Buffalo offer $100,000 premium to the party furnishing the most feasible scheme to utilize the power of the falls?

(241) H. C. W. asks whether it is easier for a fireman to keep steam on an 80 h. p. boiler to run a 50 h. p. engine (14 × 20, 180 revolutions) or a 75 h. p. engine doing the same amount of work as the 50 h. p. engine, it requiring 80 lb. of steam to run the 50 h. p. engine, and do the work. We fire with the refuse from rotary veneer machines and poplar bark, and sawdust from a heading saw. We find it pretty hard work to keep 80 lb. of steam on our 80 h. p. boiler to run 50 h. p. engine. Would we find it any better to put in a larger engine? Would we find it any more work to keep steam?

Replies to Enquiries.

The following replies relate to enquiries recently published in SCIENTIFIC AMERICAN, and to the numbers therein given:

(35) Circular Saw, Connections, etc., for same.—Your saw, 36 inches, should travel 1,000 revolutions per minute. You cannot obtain this speed without using a belt or multiple gearing. Better use a belt. If you have a fly wheel 5 feet in diameter on your engine shaft, you will need a pulley 1 foot in diameter on your saw arbor, providing your engine travels 200 revolutions per minute, which it should, with a boiler pressure of 150 pounds. It would then indicate 27·6 horse power if the stroke is 8 inches. This arrangement will allow of your cutting 5,000 feet of lumber per day, if your boiler is of sufficient size. But I do not think it is. Your description is too meager to permit of an estimate being made of its power. You should give number and size of tubes and size of fire box.—S. H. PRATT, M. E.

(56) I. S.—With the velocity of the air in the pipe at 14 miles per hour, with pressure of 100 lb. less the friction and other losses, we compute that you may realize 8,000 horse power, and for 200 lb. pressure nearly double, or say 15,000 horse power.

(58) W. H. C.—White porcelain clay or kaolin is a silicate of alumina, known by its soft, greasy feel and absorbent nature when touched to the tongue. Address L. A. Solomon & Bro., 216 Pearl Street, New York, importers of clays, for prices.

(59) F. H. G.—For coal, the grate should be 24 inches from the boiler; and for the small power you intend to use, you may make the grate surface only 3 ft. wide, if the grates are 4 ft. long. This can be done by false sides upon the grate, of fire brick; or an independent wall from the ash pit on each side.

(60) H. B.—For computing the indicated horse power of an engine: Multiply the area of the cylinder ($D^2 \times 0{\cdot}7854$) by the mean engine pressure, taken from tables, for mean pressure due to cut-off, and this product by the travel of the piston in feet per minute, and divide by 33,000. The mean engine pressure for ¼ cut-off = 0·637 of boiler pressure; for ⅜ cut-off = 0·766; for ½ cut-off = 0·86. For computing the distance of the weight on the safety valve lever: Multiply the area of the safety valve ($D^2 \times 0{\cdot}7854$) by the required pressure for blowing off. Divide this product by the weight of the ball. Multiply the quotient by the length of the fulcrum in inches and decimals; the product will be the distance in inches and decimals from the fulcrum to the center of the ball. Thus for a 3 in. safety valve, 100 lb. pressure, 60 lb. ball, fulcrum 2 in.: 3^2 in. = 9 in. × 0·7854 = 7·06 × 100 lb. = 706 lb., and 706 ÷ 60 = 11·76 × 2 in. = 23·52 in., 23½ in. from the fulcrum to the center of ball.

(73) 1. Resistance of accumulator and lamp.—Watts = 250 per unit of time. Amperes × volts = number of watts. 2. Resistance of lamp, 183·3 ohms. 3. The resistance of carbon is about 6-10 as much at a white heat as cold. 4. You cannot unless you allow one or more of the arc lamps to go out, without reducing greatly their brightness. 5. The batteries should be connected in series with the lights. —C. A. C.

(74) E. A. B.—Bromide Prints.—See SCIENTIFIC AMERICAN SUPPLEMENT, No. 330, practical hints on the making of bromide and gelatine prints.

(75) L. M. C.—For your thermostatic bar, cuta strip of sheet iron and a strip of sheet zinc 1 inch wide and long enough to reach across the incubator box. Rivet or solder the ends together, and wind twine tightly around for the whole length to hold the pieces close together, or if convenient, the strips can be soldered together. Fasten one end to the inside of the incubator. The other end will swing with the variation in temperature, to regulate a damper or the heat in any way that you may devise.

(77) Recovery of Silver from Waste.—The waste papers are thoroughly washed in water and this added to any first washings of silver prints. Sodium chloride (salt) is added till precipitation is complete, decant the solution, wash the precipitate with water, and again decant. The remaining precipitate is dried and then ready to reduce to metallic state. The silver chloride is mixed with about an equal portion of a mixture of sodium and potassium carbonates and fused in a clay crucible. A few minutes after fusion pour the contents of the crucible into some clay dish and allow to cool, when the silver button is easily separated from the mass. The cotton filters should be burned and the ashes treated with nitric acid. Dilute and precipitate with salt and proceed as above.—E. W., Jr.

(77) Recovering Silver Waste.—1. Burn the material, and treat ashes with nitric acid and water, 50 per cent solution. Then filter and evaporate, leaving silver nitrate. 2. Know of no method for reproducing negatives directly. You may make a positive on glass first, and then copy another negative from it. —C. A. C.

(78) Red gas flame.—Suspend in the flame a fine wire gauze basket containing strontium nitrate.—C. A. C.

(82) Raising a weight.—The power required would be the same in each case.—C. A. C.

(83) Who invented the telephone?—The telephone was invented by Philip Reis in 1861. Bell's patent is dated 1876.—C. A. C.

(84) Lapidaries' wheels.—The wheel used by lapidaries is a flat copper disk, charged on the edge with powdered emery, or a steel disk charged with diamond dust. It is used in the same manner as a circular saw.—C. A. C.

(86) M. C. H.—Matches.—Clear white pine is used for matches. We can mail an excellent work on the fabrication of matches by Dussauce, for $3, its price.—Address Paul Pryibil, 463 West 40th St., New York, for splitting machines.

(87) F. S. W.—Hot Water Heating Apparatus.—The hydrogen which you ignited at the air cock is not explosive; it requires to be mixed with a proper proportion of air to become so. There may be a possibility of vegetable matter in the water of your hot water apparatus disengaging a small portion of gas, which may accumulate in a radiator. In steam boilers, the flow of steam carries any gases of decomposition with it, and also all air that might make an explosive mixture.

(90) T. G. A.—Granite ware is glazed with porcelain enamel in the same manner as other kinds of enamel ware. The difference being in glazing both inside and outside, and in the color and quality of the glaze. Any colors can be utilized that are available for chinaware. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 248, 314, enamels and enameling.

(91) W. H. B.—Wire Netting for Drying.—Nothing that you can put on the wire netting in the frames will resist disintegration by the glue. Regalvanizing is the only remedy.

(94) 2. Battery for Heating Wires.—I think you will find the Grenet or simple bichromate of potash battery the best for heating wires. One cell, with a zinc plate 2¼ in. × 1⅛ in. between two carbon plates of the same size, heats ⅛ in. of No. 30 platinum wire to a white heat in two or three seconds. For greater length of platinum wire, connect more cells in series. With greater battery power, you can probably obtain white heat in a second. The battery fluid soon becomes exhausted with this work.—L. B.

(94) Telephone call bell.—1. The bell would be rung over the wire by the magneto call bell, but the resistance of the wire is too great to operate by a battery. 2. You do not mention the length of wire to be heated.—C. A. C.

(95) Movements of the ocean.—Two. The tidal movement caused by the attractions of the sun and moon, and the ocean currents, as the Gulf stream, caused by the rotation of the earth and the unequal heating of the waters at the equator and the poles.—C. A. C.

(96) Horse power of waterfall.—1. Over the 25 foot fall, 1·527 H. P. 2. Over the 50 foot fall, 3·054 H. P.—C. A. C.

(97) Leather belt.—Always turn the grain or hair side of the belt to the pulley.—C. A. C.

☞ Books or other publications referred to above can, in most cases, be promptly obtained through the SCIENTIFIC AMERICAN office, Munn & Co., 361 Broadway, New York.

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AND EACH BEARING THAT DATE.

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