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P. M. S. will find an article on windmills on p. 241, vol. 32 .- G. M. F. will find a description of a Rhumkorff coil on p. 219, vol. 32 .- J. G. A. will find directions for bluing rifle barrels on p. 123, vol. 31.-C. A. M. will find on p. 266, vol. 34, directions for making an electric machine .-- C. B. P. will find on p. 218, vol. 31, directions for drilling glass. -O. O. O. will find something on violins on p. 75, vol. 36.-H. E. W.'s query as to lightning rods was answered on p. 44, vol. 36.-H. N. T. & Co. will find a recipe for tinning brass by the boiling process cn p. 10, vol. 28,-A. C. G. will find an answer to his query as to electro-magnets on p. 44, vol. 36.-G. S. will find directions for nickel plating on p. 235, vol. 33.-J. B. D. will find directions for making copying ink on p. 123, vol. 32. For copying without a press, see the description of the manifold process, on p. 154, vol. 30.-C. M. will find directions for making soft soap on p. 379, vol. 31.-P. M. will find a description of the caloric en-gine on p. 66, vol. 34.-H. P. will find directions for cuit, or would it be best to use double wire? If we use building an icehouse on p. 251, vol. 31,-C. T. H. will find an article on working in compressed air on p. 403, bury? Will silver do, instead of platinum, for tips on vol. 30.-C. S. can waterproof his leather boots by fol- the sending key? A. It is difficult to answer your queslowing the directions on p. 155, vol. 26 .-- C. A. B. will tions definitely, as they are in themselves indefinite. find a formula for the proportions of a safety valve on p. From six to ten cells in all will work a line of about a pipe, to penetrate it with an ordinary drill. It may be 363, vol. 29.-B. T. will find directions for galvanizing calculating the power of a wind wheel on p. 241, vol. 32. -J. F. will find an elaborate article on the power of small steam engines on p. 33, vol. 33.-D. H. L. will find a recipe for French polish on p. 11, vol. 32,-E. M. E. will find a description of the gyroscope on p. 91, vol. 31. -W. W. will find directions for making rubber hand stamps on p. 155, vol. 31. To coat iron with copper, see p. 90, vol. 31,-R. & A. will find on p. 43, vol. 32, a recipe for marine glue that will answer the purpose of a waterproof cement for labels.-W. S. can fireproof his shingles by following the directions on p. 280, vol. 28.-J. C. R. will find a recipe for a depilatory on p. 186, vol. 34.-A. E. H. will find something valuable on the nature of electricity on pp. 195, 228, vol. 33.-D. D. V. will find a recipe for a shoe polish on p. 73, vol. 26.-J. M. T., U. M., B. H., J. A. M. J., W. F. C., E. S. B., C. H. S., L. A. S., B. H. C., and others, who ask us to recommend books on industrial and scientific subjects, should address the booksellers who advertise in our columns, all of whom are trustworthy firms, for catalogues,

stones 4 feet 4 inches in diameter and a bolt reel 18 feet long? A. If you wish to work the mill up to full capahorse power; but you can do fair work with an engine only half as powerful.

(2) B. H. asks: What pressure will my boiler stand? It is § inch thick in the body, and ¾ in the ends; it is of cast iron, 4 feet long by 111/2 inches in ternal diameter. A. Working pressure, about 100 lbs. per square inch.

(3) J. P. L asks: How can I calculate the ower required to punch sheet metal? A. Professor Rankine's expression for calculating the work in foot pounds per stroke is: 12,500×circumference of hole× thickness of plate)2.

(4) E. J. D. asks: How many lbs. weight, dropping 25 feet, will work three lift and force pumps, the pumps making 40 strokes per minute each, and raising water 60 feet, being each 3 inches diameter of barrel with 5 feet stroke? How long would it take the weight to descend? A. The question is rather indefinite; but if you will specify your meaning more plainly, we will endeavor to answer you. It might be well to send a sketch of your device,

(5) E. J. W. asks: 1. How can I find the height and diameter of a smoke stack for a horizontal boiler? A. Make it with cross section equal to about $\frac{1}{5}$ of the grate surface. 2. Should a boiler set in brick have a larger smoke stack than one not set in brick? A. It is not necessary, other things being equal.

(6) C. H. asks: Please tell me if it is advisable to use a cross pipe on a double-acting water ram, from the ram to the head? A. We would be glad to receive a sketch and description of the present or proposed arrangement; and if you send one, we shall be better able to advise you,

(7) S. S. asks: In the case of pulleys with curved arms, is the strength of the arms at all affected by the direction in which the pulley is made to revolve? A. We do not think the difference is of much importance.

(8) C. B. H. asks: With a pipe 21 inches in diameter, with 5 feet head, on a 9 foot overshot water wheel, what amount of power will I get? A. With a well constructed wheel, you might obtain } of a horse power.

(9) R. P. D. asks: Is there any difference in the obstruction of the flow of the water, between the same rock in the same race (the depth of water being the same in both cases) being placed at right angles, or at an angle of say 45°, with the bottom of the race? A. As we understand the question, we think there would be no difference.

(10) J. H. asks: How large a volume of water can a 10 horse engine raise to the height of 150 feet? How large a continuous round stream would that volume make if not subjected to pressure? A. It will depend upon the size of the pipe, which can be large or small, and the columns of water will still be solid; but the volume discharged in a given time will vary because different amounts of power will be expended in overcoming the friction of the pipe.

(11) T. T. E. asks: Who was the maker of the first steam locomotive in the United States ? What was the man's name whoran it, and where did the trial trip take place ? A. The first locomotive that ran in this country was built at Stourbridge, England, by Mr. Horatio Allen, and was imported for the Delaware and Hudson Railroad. This was in the year 1829.

(12) W. W. B. asks: Is there anything that I can do to the glass in my show windows to prevent dampness freezing thereon? A. The remedy is to keep the air inside the store dry, so that there shall be no moisture to form ice **crystals** on the windows.

(13) J. A. W. asks: What is the proper number of the wire used for winding the magnet for the engine described in the SCIENTIFIC AMERICAN SUPPLE MENT of May 6, 1876? What is the proper size for the magnet? A. Engines of this kind can be made of various sizes; a small one with cores about an inch and a half long, and wound with about 200 feet of copper wire, will work well with one or two cells of battery of low resistance

relay without the relay, how many feet of No. 22 insulated copper wire will it need around each core of the electrothe ground circuit, how large an iron plate shall we mile length without a relay, the sounders having 250 or

(17) J. B. asks: What is a good preparalong? A. If you wish to work the mill up to full capa-city, you will need an engine of from 40 to 50 indicated mildew? A. Soak it in a strong alum solution and then will that ball have acquired the same velocity and moin a bath of ammonia water. Wash it well afterward with plenty of water.

> (18) J. V. B. asks: What oil is the best to soften lithographic rollers ? A. Cover the rollers with glycerin, not oil.

Would a coating of liquid glass adhere to polished steel? A. Yes. (19) A. F. asks: How are hairpins var-

nished? A. The varnish consists of gum copal or anime with fine ivory black, turpentine, and a little boiled oil. The coating is applied by dipping the smooth pins in a very thin solution of the above, and drying at as high a temperature as the varnish will bear without injury. This treatment is repeated.

(20) M. G. P. asks: Are not meerschaum pipes, after they have been used a time, subjected to some process to bring out the color ? A. No; but they are sometimes artificially colored with annatto and tohacco oil

(21) W. M. says: I have discovered a new or partly new method of case hardening; Heat the cast metal to a white heat, then feed the part to be hardened with prussiate of potash, pulverized, until the metal comes to a low red; then dip the metal in muriatic acid. This is a quick and reliable process.

(22) J. L. I. asks: 1. Is it practicable to increase the steaming capacity of a small portable engine by a smaller upright tubular boiler sus-pended in the smoke chamber in such manner that the heated gases shall surround a part of the auxiliary boiler and also pass up through its tubes, the feed water to be supplied by the pump at the crosshead first to the auxiliary boiler, and thence pass by a pipe inserted in its shell at the height of its proper water line, to the main boiler? Steam is to be also taken by a | but the castings turn a dirty, coppery black color. How pipe from the top of the auxiliary boiler to the steam dome of the main boiler. A. This arrangement mayanswer, if the products of combustion leave the boiler at a very high temperature. 2. How can I burn coal dust in a small portable engine? A. The general idea is to increase the draft, and prevent the coal dust from forming into large masses so as to choke up the air space

(23) G. T. asks: 1. What power can be obtained from a small engine, the cylinder of which is 2x6 inches stroke, with steam at 60 or 70 lbs. pressure, run- of dilute oil of vitriol. We do not think it advisable to ning at 150 revolutions per minute? A. About 1-horse attempt using the cans again for fruits or vegetables power. 2. What size boiler, horizontal and set in brick. would it require? A. Make one 18 to 20 inches in diameter, and 3 feet high.

this rule is laid down for finding the working pressure of steam boilers: 34,000 lbs, per square inch is the tensile strength of boiler iron; the rule for $\frac{1}{2}$ inch plates is to divide 4,250 by the diameter of the boiler in inches. The quotient is the working pressure, being one sixth of the bursting pressure. And it says that the rule for 1/2 inch plate is to divide 5666 6 by the diameter of the boiler in inches, and the quotient is the working pressure. I find that the figures in the firstrule are got by dividing the tensile strength by 8, and the figures in the latter rule by dividing the tensile strength by 6. What I want to know is, by what rule are these divisors, 8 and 6, obtained? A. These numbers are assumed, it being considered advisable to allow a large margin on the safe side in proportioning boilers.

(25) A. W. S. asks: Where can I find the method for working out the transit of Mercuryof 1878 ? A. In the Nautical Almanac, published by the Bureau of Navigation, Washington, D. C., the figures are published three years in advance for the purpose of ships which are taking long voyages.

(26) G. H. W. asks: Can egg or blood albumen be preserved for several months? A. Yes. Dry it perfectly by allowing to stand in a close vessel over pumicestone moistened with oil of vitriol.

(27) J. R. asks: Where can I get silica for making infusible brick ? A. The dried sand from the sea shore, or calcined and ground quartz rock (which is pure silicic acid) will answer.

(28) M. D. K. says: I have a safe with two vaults inside, and a combination lock on each. One (14) E. A. S. says: A friend and I want to of them is now locked, and the combination lost. I put up a short telegraph line. Will it work without a wish to get it open, but see no way but to drill a hole on instrument? If so, how many 1/2 gallon cells of a line opposite to the holes that are in the tumbler the Callaud battery will it take at each end? To work wheels, so that a wire can be inserted to change the combination. The place where I want to drill is 21/2 inches thick and of chrome steel, so hard that no steel magnets of the sounder? Will it work with ground cir- drill will have any effect on it. Can I use a diamond drill? A. The best forms of diamond drills are patent. Dissolve these, and add tincture of cantharides 5 fluid ed, and you will probably find it cheaper and more satisfactory to obtain one, with full directions for use, from a manufacturer. It is quite likely, however, that you can soften the metal sufficiently, by the aid of a blowremarked, in addition, that combination locks can fre-

(31) C. P. B. asks: If a ball be fired from a mentum in its descent when it reaches a point 10 feet from the muzzle of the gun that it had in its ascent when it was at the same point? And will it penetrate as far into a piece of wood in its descent, say 10 feet from the muzzle of the gun, as it would have penetrated in its ascent had the ball struck the wood at the same distance from the muzzle of the gun? A. No; but in a

(32) M. L. F. says: I have a water tank 18 inches in diameter and 3 feet high. How many lbs. weight will it require to force the water 30 feet high through a 34 inch pipe? A. It will depend upon the velocity. It will take a weight of about 3,300 lbs, to just sustain the column of water in the pipe; and by increasing the weight, the water will be forced out.

vacuum it would.

(33) J. K. asks: How much power (rated as horse power in a steam engine) can be got from a suspended weight weighing 5 tons and falling 5 feet per hour? A. Your figures give 0.0282 of a horse power, nearly $_{33}^{1}$.

(34) J. H., Jr., asks: What is a safe working steam pressure per square inch for an upright boiler 30 inches in diameter, by 6 feet high, with twenty 3 inch flues, 4 feet long, made of 3-16 inch iron? A. From 50 to 60 lbs.

(35) E. J. B. asks: What is the chemical symbol for attar of roses? A. It consists of two compounds, one of which has but little odor. It is polymeric with olefiant gas, but its composition is not accurately known. Miller gives it as (C H₂) x, x being the unknown constituent.

(36) H. H. B., Jr., says: I have made several small models of sheet brass and cast brass; and in finishing I use a dipping bath of nitric acid, which leaves a beautiful finish on sheet brass and brass wire, can I remedy this? A. The rolled brass usually contains a larger percentage of zinc (yellow brass); besides its surface is denser and more uniform than that of cast brass. Use more dilute acid, and touch it up a little subsequently with rouge or tripoli powder.

(37) W. E. C. asks: I wish to use secondhand tomato cans, and a good many of them are very rusty. What solution can I steep them in to take off the rust, so that they can be used again? A. Try a pickle without first having retinned them, which is not impracticable.

(38) C. M. M. Co. says: We tried acetic (24) T. K. says: In a work on engineering, acid with glue for covering silver on mirrors, but it did not work to our satisfaction. Please let us know some other methods ? A. Use genuine asphalt (free from coal tar) and spirits of wine. After the addition of the latter allow to stand some time before using. Make of a suitable strength for using, and give as many coats as requisite for your purpose.

> (39) G. H. B. asks: What is the best disinfecting agent to use in a room where persons sleep at night, and are also employed during the daytime ? On building a fire, a close heavy smell fills the room. Carbolic acid and water sprinkled on the floor seems inadequate and evaporates rapidly. Can you suggest any harmless agent that will kill the close smell? A. The first thing to be done in a case of this kind where carbolic acid, which is one of the most powerful disinfectants known has been tried, and found, as you say, inadequate, is to investigate the room and its surroundings, and discover the cause. It must be remembered that disinfec-tants at the best but palliatives of the evil; and if the source remains, the smell and perhaps miasm may be generated faster than its capacity for injury is destroyed by any disinfectant, however powerful. A room without such positive source of noxious gases, should not become positively offensive, even when occupied by a number of persons day and night. Instead of beingregarded as a substance easily volatile, carbolic acid is one of the most persistent disinfectants, and the objection to it is not the thoroughness with which it does the work, but that its odor is so penetrating as to be to many unendurable. Use chloride of lime exposed in shallow vessels, if not too disagreeable to you. This does the work of disinfection very thoroughly. Or you can use a more elegant, though somewhat more expensive disinfectant, in the shape of permanganate of potash; and a solution of this salt in water containing persulphate of iron (Condy's fluid) is excellent.

> (40) U. S. A. asks: How can I make a liquid for shampooing the hair? A. Take carbonate of ammonia 1/2 oz., carbonate of potash 1 oz., water 1 pint. ozs., rectified spirit 1 pint, good rum 3 quarts. Moisten the hair with the mixture, rub till a lather is formed, then wash with cold water.

(41) H. J. asks: 1. How high above the water line on a return flue boiler can I, with safety or withoutdane or of hurning the iron risk running the fire quently be picked without great trouble by experts; and, 'A. The fire should not strike any part of the boiler passing through the flues and having been cooled down, are sometimes returned along the sides and over the top of the boiler. 2. How can I tell the horse power of a boiler and of an engine ? A. We do not know what is olein, thus separated, used for butter purposes? If not, ine and by the horse power of a boiler. As foryourenwhat is the proportion of acid to 100 lbs. tallow? A. gine, the power will depend upon the pressure of steam, the point of cut-off, and the piston speed. See p. 33, vol. 33. (42) L. W. S. asks: Will a two flue boiler, (30) J. R. C. asks: Please publish a recipe 28 feetlong and 48 inches in diameter, supply with steam an engine 16 x 36 inches, running at 75 revolutions per minute, if I double the length of the grate bars, making them 7 or 8 feet long, using dry pine slabs for fuel? A. The boiler will be large enough for average work if the engine is well designed, but probably will not supply sufficient steam to run the engine up to full power, with steam following for 2-3 or 7-8 of the stroke.

(1) H. L. W. asks: What is the size of the smallest engine that is capable of driving a pair of mill-

iron on p. 346, vol. 31.-J. T. M. will find a method of 300 feet of No. 32 copper wire each. The ground cirnot a good substitute for platinum contacts.

> (15) A. S.-Use a little litharge in your ink. The burnishers used in finishing plated goods are of various forms; some of them are used in the lathe. They are usually made of hard, polished steel or bloodstone.

(16) P F asks: 1. How can I dissolve bones with acid? A. Digest the bones for some time in warm, strong hydrochloric acid. 2. Is sulphuric acid best for this purpose? A. No. Hydrochloric acid is best. 3. What sort of vats are used? A. Large vessels of stoneware or porcelain-lined iron are best. 4. How much acid is required to dissolve a ton weight of bones? A. The amount of mineral salts contained in hones varies to some extent with the age of the animal from which they were obtained, the younger bones contain the smaller proportion. The average amount of inorganic constituents of the bones of cattle is from 40 to 70 per cent, the principal part of which consists of tribasic phosphate of lime. In practice, it will be found that a weight of acid equal to that of the bones is needed. a stone with a muller.

cuit should not be used for very short lines. Silver is if you can have the safe opened in this manner, it will above thewater line. The products of combustion, after probably be more satisfactory than either of the others.

> (29) J. E. F. says: In answer to G. W. R., you say: "Use 10 to 13 lbs. sulphuric acid to 100 lbs. tallow, to separate the stearin from the olein? Is the This method is not employed in the manufacture of butter from suet. See p. 337, vol. 35.

for printers' red ink ? A, Boil linseed oil till smoke arises, then apply a lighted paper stuck in a cleft stick; and then remove the pot from the fire, allowing the oil to burn till it can be drawn out into strings half an inch long. Add 1 lb. rosin for each quart of oil, and 1/2 lb. dry brown soap cut into slices; put the latter in cautiously, as the water in the soap causes a violent commo-Then grind up the oil with sufficient pigment. tion. Vermilion, red lead, carmine, Indian red, Venetian red,

(43) C. C. B. asks: What kind of lamp is and the lakes are all suitable for printing ink. Grindon most efficient for heating the boiler for a small steam engine? What oil is the best? A. Good alcohol is the crude methylic alcohol (methylated spirit wood naphtha) is nearly, if not quite, as useful, and is very much in boiling water. Cold water does not dissolve it very cheaper. Any of the heavier oils, such as lard, sperm, rapidly. mineral sperm, and many of the heavier distillates of petroleum, may be used for this purpose with very good results, provided a suitable tubular boiler and a tall chimney is employed. Under these conditions complete combustion is obtained and there is no soot deposited.

(44) A. B. Y. says: 1. I have been making clay moulds from type, and I have taken a beautiful impression every time; but italways cracked in the drying. Is there anything that would prevent its cracking? A. Add a little plaster of Paris and salt; dry at a very modcrate temperature at first, and the mould will not crack. 2. What could be put into the clay that would make it very hard afterit was dried ? A. Try a strong solution of water glass and aluminate of soda.

(45) J. L. A. says: Is there any known acid that will cut or eat glass? If so, what is it kept in, and what use is made of it? A. Hydrofluoric acid is used for this purpose. The acid is usually kept in vessels of gutta percha or lead. It is obtained by gently heating together fluorspar and strong oil of vitriol in a suitable retort, and dissolving the evolved gases (fluoride of hydrogen) in distilled water.

(46) F. E. K. says: 1. Our boilers are 22 feet long, and 44 inches in diameter, thickness of shell is 3-8 inch, of heads 1-4 inch, with two 16 inch flues. The heads are stayed with 5 stay rods, and 20 stay bolts. There is one 4 mch safety valve for the two boilers. I once asked you what is the greatest pressure they will safely bear. You replied: From 50 to 60 lbs. Do should be exercised in order to avoid accidental ignition you consider them low pressure boilers? A. The of the violently boiling turpentine. The vessel should term "low pressure" is rather indefinite. Thus, 50 or be covered and removed from the source of heat im- to convert it into kerosene oil? A. Crude petroleum is 60 lbs. per square inch might be considered high pressure for marine boilers, and low pressure for small it is advisable to add a little raw oil to the fused varnish stationory boilers. In the case of your boilers, the pressure is not much below the average that is maintained in boilers of about the same size. 2. What is the safest and best mode of testing boilers? A. Filltheboiler with water, load the safety valve to the desired pressure, and heat the water gradually.

(47) P. W. S. says: I have a tank or cistern holding about 90 barrels coal tar. What is the best manner to get it out, as the cold weather prevents dip-ping it out? A. If it becomes too thick to be taken out with a dipper, it is scarcely probable that an ordinary pump can be used. You might employ some form of steam ejector in which the steam would first soften the tar, and then force it out; or a steam pipe might be introduced into the tank, and when the tar was softened it could be dipped out.

(48) J. J. S., and others: The specific heat of water is found to be higher than that of any other substance, and for this reason is taken as unity. If we take 1 oz. water at 174° Fah., and 1 oz. ice at 32 Fah., and put them together, we shall have, when the ice has melted, 2 ozs. of water at 32°. The ounce of water has therefore parted with 142° of its heat in melting the ice, which heat is said to have become latent. Water, at the normal atmospheric pressure, boils at 212° Fah., which is its maximum of temperature. Here again this apparently anomalous phenomenon occurs. When the temperature of the water reaches 212°, it becomes stationary; and further addition of heat is absorbed in converting the water into steam, which has the exact temperature of the water which produced it. Here also has heat been rendered latent, with an accompanying change in form of the water. As from ice to water, likewise from water to steam: or from solid to liquid, from liquid to gaseous. On condensation of the steam and recongelation of the water, the exact amount of heat absorbed or rendered latent is given out. A certain weight of steam condensed at 212° gives out 950 of latent heat. In its descent from 212° to 32°, it gives out 190° sensible heat, and again in its recongelation it restores 142° of latent heat, amounting together to 1,272°. Pressure influences the boiling point of water, and for that reason water may, by the application of adequate pressure, be heated so as to melt lead. Likewise, as the pressure de-creases, the boiling point is lowered. At the hospital of physics. St. Bernard, in the Swiss Alps, which is 8,400 feet above the sea, water boils at 184° Fah.

(49) J. M. L. says: Please tell me the best method of clarifying cotton seed oil? A. The best method is to treat with sulphuric acid, and afterwards with steam, as follows: The agitator is constructed of wood, lined with lead. After introducing, say 500 gallons oil, the agitator is set in motion, and 26 lbs. oil of vitriol are added by means of a perforated leaden trough, so as to spread it as a shower over the whole surface of the oil. The time employed in the addition of the acid should not be less than 30 minutes, and the agi-tation should be continued for 8 hours. It is then alallowed to stand for 10 hours, the acid drawn off, and the oil pumped into a steaming tank of iron. It should then be steamed for 8 hours with 1/2 inch steam pipe, at 20 lbs. pressure. Allow to stand for 30 hours, draw off water, and pumped into receiving tanks (of wood lined with lead). A competent carpenter should be able to after the washing of nitro-glycerin? A. In the manufacture construct the apparatus. The lead lining should of of sulphuric acid from pyrites, the pyrites are subjected lutely necessary. The engine, however, will generally We did not find gold in the sample sent us. -W, B.-course be burned, not soldered. (50) S. E. E. asks: Please find enclosed some powder called porous silica, for polishing metals, etc. Can this be made artificially? A. A similar article may be prepared by treating a strong solution of water glass (silicate of soda) with a small quantity of strong oil of vitriol. If the solution has been sufficiently strong, after standing a few hours in a warm place it will completely pensive. gelatinize. Wash this well with cold water, decant or filter off the washwater from the gelatinous silica (hy drated silicic acid), place the latter in a suitable vessel, and dry over a good fire. See also articles on pp. 20 and 240, vol. 35.

solved by water alone, hot or cold? A. It is quite soluble

(52) M. B. asks: How can I remove the pitch stains from an engraving? The stains were from the colored gum exuding from the retaining board of the frame, A. Soak the print for some time in hot water, and then in a solution (strong) of chloride of lime. This will remove the stain without injuring the engraving.

(53) A. J. D. says: 1. I wish to make some of the glue by the recipe given in your reference book, but do not know what kind of ether to use? A. Use maintained by many that this gives much better results. The naphtha should be warm. 2. Will vulcanized rubber answer? A. Vulcanized rubber will not answer. Use crude caoutchouc. The ether referred to in the recipe was what is commonly known as sulphuric ether or common ether.

(54) E. J. B. says: One work on chemistry mentions oil of rose as an essential oil containing 2 feet deep. Unless you can get this pipe below the frost, oxygen, and another says it contains no oxygen. Can you tell me its composition? A. The essential oil of rose deep, and fill in hard with dry coal culm, you will find is destitute of oxygen; it is a carbo-hydrogencompound. your object attained. If you can get but 2 feet below The proper formula is C_{20} H₂₀.

(55) T. H. K. asks: What can be done with copal varnish when it gets thick and candied? Can it be thinned, so that it can be used? A. It will be necessary to melt the candied varnish, and, while fused, to add a sufficient quantity of oil of turpentine. Great caution mediately after the turpentine is added. In many cases, before introducing the turpentine.

(56) D. P. W. says: In SUPPLEMENT No. 19 is given a description of a small electric locomotive. Can one be made to run with Leclauché battery of 4 small zine, etc., immediately begin to distill over and are concells? If so, please give about the size to make the different parts of the locomotive. A. The Leclauché battery is not suitable for such work. See answer to G. U.S. on this page.

(57) G. U. S. says: I wish to construct an electric locomotive the same as described in the Scien-TIFIC AMERICAN SUPPLEMENT, No. 19. Of what size should the magnets and cores be, and with what size and quantity of wire should they be wrapped to give the largest possible powers with a six cell Grove battery? A. Use about 230 feet of No. 18 copper wire for the four helices and make the cores about 11/2 inches long.

(58) A. B. L. asks: 1. How many and what A. Fifty half gallon cells will answer well. 2. What form of battery will be the best? A. Grove or Bunsen. 3. What will be the approximate cost for running the same, per hour? A. Probably about 50 or 60 cents. 4. What should be the diameter, shape, and focus of the lenses composing the condenser? A. Double convex and three or four inches in diameter; they are supplied with the lamps. 5. Can the effects of the heat on the object and objective be obviated by interposing a glass cell filled with ammonia-sulphate of copper, alum, or some analogous solution between the condenser and object Would it have the same effect if the cell were inslide? terposed between the light and the condenser? A. Yes: but, as a general thing, it is scarcely necessary. 6. Will the electric light give off enough heat to necessitate the use of iron for the camera, or would old mahog-any well clamped inside do as well? A. The lamp should be of sheet iron. 7. Should the condenser be fixed permanently as regards the object stage, or should there be means of varying the distance between stage and condenser? A. Better make it adjustable. Where, if anywhere, can I find detailed description of electric light or oxyhydrogen gas microscope? A. See remarks on solar microscope in almost any work on

(59) F. J. S. asks: 1. I want a solvent for vulsolution, which, on cooling, will leave a coating of rubber. A. Place the material, cut in small shreds in a strong (boiler iron) air-tight vessel, provided with a good safety valve, and introduce into it 4 or 5 parts of bisulphide of carbon for each part (by weight) of rubber. Close all the openings, and place the vessel over a suitable water bath, or, what is better, have a small steam coil inserted within the boiler. Heat for an hour at the boiling point of water. This will insure the complete solution of the rubber. The vapor of the bisulphide is very inflammable; and when mixed with air, it is exheat only.

How can I recover the sulphuric acid from the waste,

best fluid for use in any lamp where luminosity is not re- ent names for the same substance. The latter is the manufacture good gunpowder on a small scale, and its quisite, and smoke is objectionable. For this purpose proper appellation. 3. Can dry silicate of soda be dis- manufacture is attended with some danger.

1. Is it safe to use cocculus indicus for catching fish, and are the fish so caught poisonous? I have seen boys use it (bruising the berries and mixing them with fiour paste); and after gutting the fish they sell them to the Chinese.

A. The berries do contain poisonous fluids, and should not be used for any such purpose, 2. Is it lawful? A. We are not aware that there is any law to this effect.

of bichromate of potash would you use in mixing Indian ink for drawing purposes, by the method given on page 26, vol. 36? A. Reduce a small quantity of the bichromate to powder and dissolve in a limited quantity of the less or more? A. One cubic inch of water would boiling water. There should be an excess of the salt be-make about 230 cubic inches of steam of 100 lbs, pressgood petroleum naphtha instead of the ether. It is yond what is taken up by the water. When the solution has cooled, pour it off from the residue, and bottle. When required for use, dilute the solution with about one third its volume of water, and it is ready for use

> (62) W. K. D. says: In reply to A. L. C., who asks how to protect lead pipe laid in the ground, from frost: Do not under any circumstances use saw dust to fill in around the pipe if you can dig a ditch only sawdust will be utterly useless. If you can dig 3 feet the surface, the only sure way would be to make a box, say 1 foot square, the whole length of the pipe, and fill in with dry culm, laying the pipe in the center. Make three sides of the box first, fill half with culm, lay the you have plenty of culm, fill a few inches over the box before throwing in the dirt.

(63) W. N. asks: How can I refine petroleum lag with wood as you suggest. first washed by agitation with water, then with sulphuric acid (oil of vitriol), and the last traces of acid removed by washing again with water. It is then run into capacious stills fitted with suitable condensers and a gentle heat applied, when the lighter products, naphtha, bendensed and collected separately. As the temperature is raised from time to time oils of greater specific gravity come over. Kerosene oil is one of these distillates. See p. 808 of the Scientific American Supplement for full particulars.

(64) C. C. says: I have a Brussels carpet which has been damaged by rain; and the green dye from a wool mat has run into it. What will take that color out and restore the carpet as before? A. Before we can give you any definite advice we must see a sample of the material, or know what constitutes the green dye. Try alcohol and water, or methylated spirit.

(65) S. W. D. E. asks: 1. What are the comsize cells will be necessary to produce an electric light ponent parts of firebrick, and how are they proportioned sufficiently powerful for the electric light misroscope? and mixed? A. They consist principally of an impure variety of fireclay (silicate of alumina) containing a very small quantity of organic matter. The clay is freed as far as possible from any gravel which it may contain moistened thoroughly with water, moulded into the re-quisite form by suitable machinery, and dried in the air. When sufficiently hard to bear handling, they are subjected to a moderate heat in a kiln, and afterward heated strongly. This treatment removes the last trace of moisture, and consolidates the brick. 2. How much pressure to the square inch will firebrick stand? A. This depends a great deal upon the quality of the brick and the way in which the strain is applied. The limit of tensile strength in the average fire brick is, perhaps, about 100 lbs

> (66) W. B. H. says: Will you give me a recipe for making paraffin paint? A. Mix together good asphalt and paraffin in equal parts, melt, and stir well together. Add to this a small quantity of finely ground caustic lime with constant stirring, and apply to the surfaces of the tank with a large brush. When this has 2 or 3 minutes after the current is connected? A. Join cooled, put on another coating of pure molten paraffin, applied quickly and evenly.

(67) W. J. P. asks: I have an emerywheel of 2 inches face and 6 inches depth for grinding skates, etc. I broke it while driving the spindle in. The fracture has the appearance of good cast iron. It broke incanized rubber or old rubber shoes, etc., to make a cheap to nearly equal halves. How can I unite them? A. The stone may be cemented by means of a paste of oxychloride of zinc (used largely by dentists). Cover the fracture surfaces with a thin coating of the paste, place the pieces accurately together, and press strongly in a vise. To insure a strong joint, it should be left undise examined, with the result stated: turbed in a warm place for a week or two.

> (68) F. H. asks: Is it easier for an engine to drive a certain amount of machinery when placed piece of cast iron containing much carbon. The matrix close to it thanat the end of long shafts, line as well as internediate? A. Yes.

because of the offensive odor of the solvent, the operation is best conducted in the open air, and with steam done? A. In general, it is more economical to have the defined crystals of carbonate of lime, and garnet. No. boiler large enough to furnish all the steam that is re- 5 appears to be slag from an iron furnace. No. 6 is clay quired with very slow combustion, or, in other words, to containing a small percentage of sulphur and crystals considerably larger

(69) J. C. M. asks: Which are more easily

the large wheels can be drawn more easily than when on

small wheels, on account of the greater leverage afforded by the former. If there were no resistance to motion

(71) A. D. asks: 1. An upright tubular boiler is 9 feet high and 40 inches in diameter, with 190 tubes, 2 inches in diameter and 6 feet long, with 3 feet heating surface in grate and firebox. Firebox is 32 inches in diameter. How many cubic feet of water would a boiler of this size evaporate in one hour, pressure being 100 lbs. to inch? A. Between 7 and 8, with a strong draught and good coal. The evaporation of a boiler depends largely, of course, on the rate of combus-(61) F. H. asks: About how strong a solution | ton, and the above figures are for a high rate. 2. One cubic inch of water, under pressure of 100 lbs. to the inch, is converted to steam. Would it expand to 1,600 times its volume, pressure remaining the same, or would it be less or more? A. One cubic inch of water would ure.

> (72) W. S. asks: If a cylinder, filled with compressed air, be brought to a red heat, would there be danger from a suddenignition of the oxygen within, or would the expanse of air be gradual up to that temperature? A. There would be no danger. Oxygen is not combustible.

> What is electricity as produced by friction? Can it be a substance eliminated from the air, or produced by a finer division of its particles as the air is ground up in its passage between the cushion and cylinder. A. Probablyno one can tell you exactly what electricity is; but your definition would be generally regarded as a statement of what it is not.

(73) J. C. D. asks: What is the best material for covering a cylinder of an engine, to prevent rapipe, then fill full with culm, and nail top board on. If diation? The cylinder is steam-jacketed with steam from boiler at 70 lbs. pressure. The outside of cylinder is covered with wooden lagging with space left for the non-conducting filling. A. Use felt for the filling, and

(74) H. M. says: In a recent issue, you give an answer on the subject of crocus. I wish to say that crocus is made as follows: Calcine sulphate of iron, then roast it with a strong fire until acid vapors cease to rise; cool, wash with water until the latter ceases to affect litmus, and then dry.

(75) E. C. asks: We are at work out of doors, and our tools on cold mornings are all right; but if held to the fire, the frost comes out, although it was not seen before. I claim that the frost is in the steel, all through it, because they break much more easily. Another claims that the frost does not go into the steel. A. The appearance is caused by the condensation of the moisture in the atmosphere, due to the sudden variation of temperature. The same effect is caused by ice water in a glass.

(76) F. H. T. asks: I am building a small engine, 11/2 x 3 inches, and I hardly know how to proceed. Is it necessary to have packing rings on piston, or will it do to just turn the piston so that it will fit in the cylindernicely? A. A solid piston nicely fitted and say 5 inch thick would do; but a ring would improve it

(77) R. D. H. says: 1. By diminishing the speed of the governor, can I increase the speed of the engine? A. Yes. 2. What will be the safe working pressure in pounds of steam of a boiler 26 inches in diameter and 48 inches long, of 1/4 inch thick iron, single riveted with several 3 inch flues? A. About 50 lbs.

(78) H. Isenbeck, St. Petersburgh, Russia: For grain elevators, address Gill & Mansfield, New York Central Railway, 60th street, New York city, or George Milson, Buffalo, N. Y.

(79) T. H. S. asks: 1. How many quart cells of the gravity battery will be necessary to work a telegraph in my house, and should they be connected for quantity or intensity? A. Three or four cells should be sufficient, connect in series. 2. How can I arrange a gong for a burglar alarm so that it will keep striking for one end of the magnet wire to the armature lever, use a spring for the back contact, and connect this to the rest of the circuit as the magnet wire would be if the instrument was used in closed circuit.

(80) C. S. asks: Would a die made of an alloy of copper and tin in equal parts do to stamp on copper, or would it be too brittle? A. We know of no alloy that would answer this purpose,

MINERALS, ETC.-Specimens have been received from the following correspondents, and

H. H. T.-We should be happy to see the specimen of the tin ore mentioned. The specimen you send is a is slag from a blast furnace. You did not pay sufficient postage on your letter; 12 cents due.-H. V. H.-No. 1 Is there a saving of fuel in having a large boiler and is arsenide of nickel. No.2 is apophylite (carbonate of than is abso- of carbonate of lime,-No. 7 is colamine,-G. O. P.a carburet of iron usually containing a small percentage of manganese. It is not a natural formation. drawn, high wheels or low ones, provided they are load- in the manufacture of Bessemer steel.-S. M. W.-Your ed alike? A. We presume you intend a comparison be- oil will make a very good lubricant, if freed from the tween wheels of large and small diameter. A load on bituminous matter which it contains. It contains a considerable percentage of paraffin oil. Send us a larger sample of it.-A. V. S.-Your stone has been pronounced by dealers to be very good, as far as may be judged from so small a fragment, for polishing purposes and hones. If it can be quarried in large pieces, sufficiently homogeneous and without flaws, it may prove marketable. We have seen similar stones from Arkansas, -G. S. B.-It is geocronite, a double sulphide of antimony and lead.

of lime (bleaching powder)? A. This is not feasible. slaked lime to an atmosphere of chlorine gas, which ab-

the resulting sulphurous acid gas, together with nitric at which it was designed to run.

acid vapor and steam, is conducted into a series of large, lead-lined chambers, the floors of which are covered with a layer of water, which dissolves and condenses the sulphuric acid as fast as formed. Sulphuric acid cannot be manufactured economically on a small scale by any of the methods now in use. The necessary plant is very ex-

(60) F. S. asks: 1. Can you give me a recipe for making good, clean gunpowder? A. Rifle powder consists of sulphur, 10 parts, finest charcoal, 15 parts, nitre, 75 parts. Each of the several ingredients is first dried and reduced to an impalpable powder; then they

other than the inertia of the body to be moved, the large wheels would have no advantage over the small ones. (70) McC. Bros. ask: 1. Will injectors lift water as well as discharge it, or do they require a

(51) J. McI. asks: 1. What is the most simple are mixed thoroughly, and moistened with water. The head of water? A. They are made both lifting and nonlifting. 2. Will they work water as hot as 150° or 200 process of converting chloride of calcium into chloride paste is then ground together between stones to insure a close and uniform admixture, after which it is removed, Fah.? A. It is best not to heat the water more than Hypochlorite of lime (chloride of lime, bleaching powder) pressed into blocks and dried. When dry, these blocks 190°. 3 Will muddy water wear them out very rapidly? is commercially prepared by exposing slightly moist, are brought against a revolving toothed wheel, which . A. They will probably not work satisfactorily unless the granulates the powder. The granular powder is then water is passed through a strainer or filter. 4. Whatare sorbsit largely. 2. Is not muriates of lime the same passed through sieves which remove all the coarser the comparative merits of injectors and good steam substance as chloride of calcium? A. They are differ- | granules, and prepared for market. It is difficult to | pumps? A. There is not very much difference.

E. D. L. asks: Can any one give me the dimensions of the old English standard and the American wire gauges? Does Stubs' steel wire gauge correspond to either of the above?-L. W. F. asks: What is the method pursued by hub cutters for transferring a new design upon steel in the manufacture of jewelry and

Scientific American.

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coin?-S. D. says: There is a certain species of wood Eyeglass, J. S. Spencer... vhard pine imported from Belgium, others that it is species of ash. Does any one knowwhatit is ?- V. C. asks: How is inlaid woodwork done, and how are the has crooked wings like the wings of an eagle, it flies aery rapidly, and it makes great havoc among young chickens, etc., which it seizes without stopping, making a rapid swoop upon them. It is hardly ever seen except | in the neighborhood of its nest, which is always made on the bare rock, on lofty cliffs. The eggs are of a very dark red, a little mottled with white. It is very noisy, and screams when any one goes near the nest. What is its proper name?

COMMUNICATIONS RECEIVED.

The Editor of the Scientific American acknowledges with much pleasure, the receipt of original papers and contributions upon the following subjects:

On a Bread Toaster. ByT. C. H. On Boiler Explosions. By J. R. R. M., and by H. P. G. C.

On the Climate of Oregon. By M. W. W. On Aerolites. By J. S. D.

Also inquiries and answers from the following: G. K.-H. M. S.-J. A. H.-C. H. P.-J. G. G.-T. S. -J. A. G.-O.J. S.-C. R. S.-S. L. M.-O. B. S.-S. -F. E. J.-G. W. S.-R. H. M.-W. H. R.-P. A. B. J. B.-J. M. V.-E. M.-W. G. R.-C. F. E.-E. R. C. -B. S. G.

HINTS TO CORRESPONDENTS. Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who sells paper bag machines? Who sells refrigerators? Who sells steel springs for use in small motors? Who sells parlor skates? Whose is the best nautical telescope? Who sells a fireclay preparation, por ous enough to admit the passage of gas, as in a wire gauge burner ?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be ex



Fire escape, J. F. Werner..... 186,070 186,013 Fruit and jelly press, J. W. Powers...... 186,162

 Gas lighter, E. T. Thomas
 186,068

 Gas manufacture, M. Williams
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