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vol. 32, a good recipe for vinegar .-- McC. Bros. queries as to mjectors were answered on p. 91, vol. 36 .- A. B. will find directions for removing inkstains from paper on p. 154, vol. 30.-G. L. W. will find an excellent recipe for dried yeast on p. 204, vol. 33.-J. T. B. will find on p. 203, vol. 30, a recipe for cement for fastening leather to rubber.-P. T. will find something on making superphosphate of lime from bones on p. 90, vol. 36.-F. B M. will find an article on lubricants for drilling iron, brass etc., on p. 43, vol. 35.-W. A. H. will find directions for making rubber hand stamps on p. 208, vol. 35.-L. M. C. should repair his rubber boots with rubber cement made according to the recipe on p. 203, vol. 30.-W.R.R. should apply to the Massachusetts Institute of Technology, Boylston street, Boston.-S. L. M. should abstain from using hair dyes; but a comparatively harmless one is described on p. 138, vol. 27.-A. F. G. is informed that we know nothing of the toughened glass of which he speaks .- T. W. W. will find directions for making cheap telescopes on p. 186, vol. 30 .- S. R. S. can blue watch springs or other steel goods by following the instructions on p. 123, vol. 31.-R. D. R. should thin his shoe polish by adding more ink.-J. M. & Co. should read our article on p. 241, vol. 35, and they will find that no decision as to the respective merits of exhibits was made by the Centennial judges.-A. B. W. will find directionsfor soldering all metals on p. 251, vol. 28. We know the nature of the clays .-- H. A. L. will find directions for galvanizing iron castings on p. 346, vol. 31.-S. will find a recipe for waterproofing paper on p. 17, vol. 33. -J. L. T. will find on p. 324, vol. 32, directions for making salicylic acid.-E. E. K. can make his lightning rod of either iron or copper. See p. 277, vol. 35. Copper is a better conductor than iron.-O. A. H. willfind directions for vulcanizing rubber on p. 378, vol. 28.-D. H. C. cannot calculate horse power of an engine unless he knows the mean steam pressure in the cylinder and the piston speed, as well as the dimensions of the cylinder. See p. 33, vol. 33 .- J. H. B. will find a recipe for a silver-plating fluid, for use without a battery, on p. 468, vol. 32. To bleach beeswax, see p. 299, vol. 31. For a varnish for polished brass, see p. 310, vol. 35.-P. P. H. 34.-V. A. S. will find directions for making a cheap bathis question as to molding rubber on p. 203, vol. 35.-

published in the SCIENTIFIC AMERICAN SUPPLEMENT.-E. J. B. will find directions for painting transparencies for magic lanterns on p. 330, vol. 35.-A. H. B., C. F. P., T. W., C. E. R., C. H. S., C. M. W., F. B., A. L., R. L., S. M. H. N., F. H., 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

(1) W. E. L. asks: 1. Which is the most economical to heat a dry house with, hot air or steam? Our boiler has capacity to supply steam for a fifteen horse engine, but our engine is but two horse power. A. If you have the appliances, steam will be best for you to use. Enclose a low coil of pipe in the drying room, and admit cold air below it; have registers in the floor for the air to escape, and conduct it to a fine built against or around your chimney; this will insure a circulation. 2. How large a dry house can we heat with steam from this boiler, without robbing the engine? A. This you had better prove by experiment, as so much depends upon conditions.

(2) C. M. F. asks: What shall I use in filling the grooves in a ceiling so as to make it smooth enough for wall paper? A. The usual course is to paste | narrow strips of thin cloth over the joints.

(3) S. K. S. asks: How can I easily ascertain which of several sugars contains most saccharine matter? A. The amount of saccharine matter in a given quantity of raw sugar is determined now, almost exclusively, by means of an instrument called a saccharimea solution of the sugar, and is examined by a thin plate of the mineral selenite, the solution will be found to have caused a rotation of the beam towards the right. A sugar solution of 61 cubic inches (34 fluid ozs.), containing 2315 grains of sugar, turns the ray of polarized light, of 7.88 inches length, 20° to the right; with twice the amount of sugar, 40°, etc. The scale is generally graduated to read percentages directly. One of the best chemical tests is the following: Dissolve 617.32 grains of sulphate of copper in 2,469 grains of distilled water and add 5.14 ounces of neutral tartrate of potash in a little water, and 11/4 pints of caustic soda ley of specific gravity 4.12. The solution should then be diluted (with distilled water) to 2.438 pints at 60° Fah.; and 3.1555 ozs. of this solution corresponds to 77.17 grains of dextrose or 73.31 dry sugar. The sugar solution (of known strength) is added to a sufficient quantity of the reagent and bolled for a few minutes in a glass flask. The sugar reduces the copper to protoxide, which is removed from the solution by filtration, and weighed.

rag carpet weaving, and have on hand a quantity of un- ley and a 3 foot driving wheel with a heavy rim. If you bleached cotton warping which I wish to dve red or green. Will you oblige by giving some rough, ready, cutting, a balance wheel on the saw mandrel will assist, distant through 11/2 inchsteam pipe laid on a level with and cheap way of dyeing with the above colors? A. The aniline colors are the brightest and least troublesome to handle. With these, for the most part, wool requires no mordant. Cotton goods require to be mordanted with tannic acid in alcohol or by animalizing the fibers with albumen. You can purchase these dyes. together with the proper mordants already prepared, with instructions for use from any druggist.

(6) J. N. A. asks: Is there any instrument ure. How large a tubular boiler will I need? contrivance to register the changes of temperature? A. In the United States signal service observatories, ad. pressure? A. It would be best to make some experivantage is taken of the expansion and contraction of ments with one of the engines before building the boiler. Very long wires of brass, zinc, and iron; and of the un. But if this cannot consistently be done, it may be well equal expansion of thin bands of brass and steel, which | to design a boiler capable of evaporating 24 cubic feet causes a compound har of these metals to curve by a slight change of temperature. Some of these latter are in the form of large springs. Besides these, the old photometric method is still in use at some stations. In this, the light is caused to pass into a dark box, over the top of the column of mercury in an ordinary thermometer, where it leaves a record on a moving slip of photographic paper. None of these instruments are in the market.

Is steam used as a motor at as low temperature as 212° Fah.? A. No.

(7) A. W. asks: Is it possible that an ice boatcan travel faster than the wind? A. Yes. On smooth ice, the wind blowing with a velocity of fifteen miles an hour, a firstclass ice boat may be sailed sixty miles an hour, or three times faster than the wind.

(8) J. L. asks: I am in charge of two boilers, 16 feet x 50 feet, with 56 tubes of 31% inches diameter. The boilers are suspended at each end by a col-They have been two years in use, using one at a umn. boilermaker caulk them, but in a short time they were leaking. A friend proposes to have belts turned to fit in 15 rivets). I say the nuts coming in contact with the same will burn, and be dangerous. Which is the better plan? A. The bolts and nuts would answer and would not burn; but to ream out the rivet holes and put innew rivets would probably be the best plan.

(9) M. P. asks: Where can I have failed in my efforts to produce the firstclass waterproof blacking, directions for making which are given in your number of September 9, 1876? I have followed the instructions as carefully as possible-both by the aid of heat and without it-I have also varied the proportions of the will find directions for straightening wire on p. 299, vol. ingredients given, and all without success; and as I am most anxious to attain my object, I shall be thankful for any help you will kindly afford me. A. The following are the materials and method employed in the manufac-V.S.tery on p. 43, vol. 35.-T. P. H. will find an answer to any help you will kindly afford me. A. The following are the materials and method employed in the manufac-W. W. should study the lessons on mechanical drawing ture of an excellent blacking, and one which we can vouch. Dissolve 18 ozs. caoutchouc in 9 lbs. hotrapeseed oil by constant stirring. Add to this 60 lbs. finest ivory black and 40 lbs. molasses, with 1 lb. finely ground gum arabic previously dissolved in 20 gallons vinegar, No. 24; the whole to be triturated in a paint mill until lbs. commercial oil of vitriol with constant stirring for half an hour. Repeat this half hour daily stirring for 2 weeks, add 3 lbs. gum arabic in very fine powder, and continue the daily stirring, as before, for 2 weeks longer. It is then ready for use. Care should be taken to avoid loss of the solvent by evaporation. For blacking in paste, nse only 12 gallons vinegar. A good blacking is also made by mixing 3 ozs. ivory black, 2 ozs. molasses, a tablespoonful sweet oil, 1 oz. oil of vitriol, 1 oz. gum arabic dissolved in water, and 1 pint vinegar. Will you give me directions for preparing a firstclass

oil for watches? It should be free from gummy matter, have lubricating power. A. For delicate machinery pure olive oil is in general use. For this purpose glycerin has also lately been employed, and mixtures of gly-1 1 on the sieve, the water ran through, leaving nothing cerin with sperm and olive oils. One of the best watch but the wet coagulum. oils now in use is prepared from finest sperm oil. We are not, however, in possession of sufficient information concerning the precise method pursued in its production to warrant us in formulating a recipe for its preparation.

(10) M. J. says: We have built a tank house small that the paper clogs them. about 40 feet high and 15 feet square at the base, and 12 feet square under the eaves. The tank is in the top story of a building; it is 10 x 10 x 8 feet. and it leaks. We made the tank out of 11/4 inch matched flooring 6 inches wide; the joints were well tarred, but it was no good. So we laid another layer of common flooring inside of the 114 inch layer or outside body of the tank, and used white lead on the joints throughout, and had the floor coated with tar; but it still leaks, and a new difficulty has presented itself in that the water which comes from the tank tastes very strongly of tar. How can I stop the leaking of this square tank without using any poisonous substance, as all the water used for culinary purposes and drinking comes through this tank? A. You would have done better to have made a circular tank secured with iron hoops, the tank increasing in size towards the bottom. Your surest remedy now is to line your present tank with sheet lead, properly put in by a plumber.

(11) G. M. G. says: I wish to make a circular saw arrangement to run by treadle or foot power. If I put a fiv wheel on large enough, can it not be made to run all right? The saw is 8 inches in diameter; what intend using the saw for sawing short stuff or for cross as the power stored up in the balance wheel will carry the ground? A. Use the steam pipe, but jacket it thorthe saw through a short cut.-J. E. E., of Pa.

How much water will be evaporated per hour at that speed and of water per hour. You may allow from 30 to 35 square feet of heating for each cubic foot of water to be evaporated per hour.

(14) S. W. asks: Can you give me a method of rendering soap fat, so as to get the grease free from water? A. The fat is heated, not boiled, in a vat (see article on p. 22, vol. 36) with dilute oil of vitriol for some hours, which treatment separates the fat completely from the scrap, and it, being lighter than the pickle, rises to the surface, where it is allowed to stand for a short time, molten, until the water is eliminated by its superior gravity. By this method the water may be completely separated without difficulty.

(15) J. E. W. says: I have a piece of land of 100 acres, and I cannot get water by digging wells. I have a spring of very best water at the base of a hill which affords 12 or more gallons a minute. I want to force the water 100 feet high into a large tank 1,000 feet from spring, and let half the water into this tank and the other half 50 feet higher to the top of hill, to another time. The boilers leak on top of the fire; we had a tank 500 feet from first tank, making in all 1,500 feet from spring. Which would be the best, windmills or steam power, to pump the water? A. We judge from and take the place of the rivets (some of the leaks take your remarks that a windmill would answer your purpose very well; and we advise you to adopt it in preference to the steam pump.

> (16) R. B. G. says: In the SCIENTIFIC AMERICAN of September 30, 1876. I notice a problem given by C. D. S. to find the radius of a circle, the chord and versed sine being given. The formula given is erroneous. When using the square of 1 and dividing by 1, you do not materially change the result. But take anyother number than 1 for the versed sine, and you will readily perceive the catch in your formula. If C. D. S. will use the following old formula he will be always right. Thus: Chord = 6 inches, versed sine 2''.

us 22.6". Your formula gives:

 $\frac{\left(\frac{C}{2}\right)^2}{+V. 8.^2}$

 $\frac{2!}{2 \times V. S.}$ = rad. 237. Now the proof is as you

stated. Rad. $- \sqrt[4]{rad.^2 - semi-chord^2} = V. S., which$ No. 24; the whole to be triturated in a paint mill until shows your formula erroneous, giving the versed sine smooth. Then add, in small successive quantities, 12 0.193 instead of 0.2. A. The two expressions are affke, and will give the same value for the radius, if the proper substitutions are made. By a slight reduction, either formula can be changed into the other.

(17) G. C. R. says, in relation to the subject of testing milk: A solution of subsulphate of iron does the work admirably. I took two wide mouthed bottles of the capacity of nearly 2 ozs. each. In No. 1, I put 1 oz. milk, added 5 drops of the iron solution, and mixed them by shaking, merely closing the mouth of the bottle with my hand. The milk was at once divided into water, containing the excess of the solution of and should neither freeze nor act upon metals, and yet iron, and coagulum. On bottle No. 2, I fixed a small piece of wire gauze in a box, so as to have a border around the sieve. On pouring the contents of bottle No.

> (18) B. asks: In preparing books for sewing, will a set of saws 8 inches in diameter, each saw having 8 teeth, cut the paper to 1% inch depth as well as a set of the same size having more teeth? A. The more numerous the teeth the better, unless they are so

> (19) H. & F. say: During the recent frosty weather, an upright tubular boiler was caught well filled with water, which froze so hard that the boiler sprung the bolt heads and seams; so that when fire was again started and steam up, it leaked, and let steam escape from many places. After caulking up these places, however, the leaks seemed to be stopped, and she now carries her usual head of steam; but the boiler is very plainly sprung outward, and our anxiety is to know whether she has received any permanent injury from this strain, or been weakened in any manner? A. We have known of several cases resembling yours. D would be impossible for us to say certainly, without a personal examination, whether or not your boiler has been permanently injured; but, as far as we can judge from your account, it seems probable that no serious damage has been done.

(20) T. & H. ask: We wish to put up a steam saw and planing mill run by a 40 horse power engine with governor. At a distance of 150 or 200 feet therefrom is a large building for ginning cotton, requiring, say 10 or 12 horse power, to drive successfully. Which would be the best way to run said cotton gins, by (4) H. N. R. says: I have set up a loom for must be the size of the fly wheel? A. Use a 3 inch pul- a line of shafting from saw mill to gin house (the land must be the size of the fly wheel? being level), or to put a 12 horse power engine in the gin am from the boilers 150 or 200 to take her oughly to prevent radiation.

Scientific American.

J. M. will find on p. 17, vol. 30, an article on the examination of engineers.-J. M. P.'s theory of the chord of an arc, to decide the area of a circle, is correct. Can he find the angle or number of degrees in the arc?-M. N. will find directions for fastening sheet rubber to metal on p. 101, vol. 34. He should use marine glue if he wants a waterproof cement. See p. 43, vol. 32.-T. will find directions for polishing wood in the lathe on p. 139, vol. 35.-G. B. will find directions for preserving natural flowers on p. 204, vol. 28.-T. W. will find directions for putting a polish on starched goods on p. 213, vol. 34.—P. L. L. will find on p. 91, vol. 36, an answer to his question as to marine glue.-W. H. P. will find directions for nickel-plating iron on p. 235, vol. 33. For galvanizing iron, see p. 346, vol. 31.-D. H. will find a description of a pantagraph on p. 179, vol. 28, -O. J. S. will find a recipe for a black walnut stain on p. 90, vol. line colors, which may be purchased already prepared, 32. For polishing boxwood, see p. 315, vol. 30.-S. L.M. will find on p. 330, vol. 26, directions for making an æoli-an harp.—E. will find on p. 344, vol. 34, a description of we cannot recommend the use of hair dyes under any the fastest trains on railways.-J. J. will find on p. 106, conditions.

(5) E. J. F. asks: 1. What is the best preparation for promoting the vigor of human hair, and what will prevent its turning gray prematurely? A. See p. 50, vol. 36. 2. Whatis the best method of restoring the color to faded switches of human hair without re sorting to the use of hair dyes which contain poisonous ingredients? A. The natural color cannot be restored in such hair except by the use of dyes. Wash the hair thoroughly with soap and water, and dye with the aniand accompanied with instructions, from any druggist

(12) J. J. G. savs: 1. If I pump 130 lbs. of air into a boiler 30 inches in diameter and 20 feet long, in the evening, will I have the same pressure in the morning? A. If the temperature of the air is unchanged, the pressure will remain constant, in this case. If the air becomes heated, the pressure will increase; if cooled, the pressure will fall. 2. Is 130 lbs. of air equal to 130 lbs, of steam, and is expansion of air less than that of steam? A. There is not much difference between the expansion of air and steam, for constant temperature; but where there is no gain or loss of heat, the difference is considerable. 3. Has any one invented an air locomotive? A. There have been quite a number of compressed air engines invented. If your device is an improvement over others, it may be worth your while to

gines 10 inches stroke by 3 inches diameter. I wish to current is required to produce the same degree of mag-run them 500 revolutions per minute, with 25 lbs. press. netization. 3. Will No. 30 wire magnetize satisfactorily

bring it to the notice of the public.

(21) W. S. H., Jr., says, in reply to a correspondent who asked for a soldering fluid that will not corrode tools: For the past three years, I have used a fiuid the fumes of which do not rust tools (I cannot say what actual contact might do, as I do not spatter my fluid about. It consists of muriate or iodide of zinc in crystals 1 oz., best alcohol 21/2 to 3 fluid ozs. It keeps best in a glass-stoppered phial. I have found the above to work full as well as the old kind, and much prefer it to anything Ihave ever used for the purpose.

(22) W. T. asks: 1. Why will not common charcoal do for the carbons for a bichromate battery? It does work for a short time. A. It will do, but its porous nature and brittleness are great objections to its use. 2. Is it as easy to magnetize a rod of soft iron, 12 inches long, as it is to magnetize one 2 inches long, provided the (13) H. L. H. says: I have 6 oscillating en- same number of layers are used? A. Yes, but greater Scientific American.

[FEBRUARY 17, 1877.

STEAM PUMPS

FIRST PHILES, CE TE NIAL, PHILA, VIENNA, PARIS, NEW YORK, BALTIMORE, BOS'I ON. Send for Circular of fecent patiented improvements. THE NORWALK IRON WORKS CO., Bouth Norwalk, Conn.

put 4 layers on to a core of that size, intending to put between them and are not connected together. I on about 20, but the result, so far, does not encourageme heat 125 large rooms with them, that do not have reg to proceed. My object was to run a good sized core, ular heaters in and only have a large quantity of with a very small quantity battery. A. Two to four piping hung on the walls in a zigzag form. The steam layers of No. 16 or 18 copper-covered wire will answer passes directly through about 280 or 300 feet of piping your purpose better. No. 30 is used only when the re- before reaching my return pipe in every room. Those sistance of the circuit, exclusive of the magnet coils, is that are close to the boilers get the most steam and recomparatively great. 4. Why is platinum used for vi-brating tongues? I have some of brass and copper that distance retain the water so that the lower part of the work very well. A. Because it is less oxidizable than most other metals. 5. How is sheet brass toughened? A. By rolling or hammering. 6. How is iron softened of water. Is it safe to set boilers without having a for electro-maguets? A. By heating it red hot and then allowing it to cool very slowly.

(23) J. M. M. asks: What metal will expandand contract the most by heated air? How much would a bar of metal 10 feet long and $\frac{1}{2}$ inch square expand for each degree of heat? A. Lead, zinc, and tin are among the most expansible solids, their coefficients of linear expansion per Fah. degree being abont as follows: Lead 0.000016, zinc 0.000017, tin 0.000015.

(24) E. S. says: In answer to your correspondent P. J. S., who having read " that the seed of sunflower is the most healthy feed that can be given to tion. horses in winter and spring, half a pint a day keeps them in health and spirits, with sleek coats, and more animated than any other feed. It prevents heaves and some other disease," and he inquires if there is any truth in it. I have a large number of horses under my care, and had the above feed recommended to me. I gave it a trial, and found it to do good, it bringing horses into a good condition in a short time. The seed contains an oil which the horse seems to relish, when the, seed is mixed with other food; and given in half pint doses, it aids digestion and acts as a mild laxative, and as such may prevent some cutaneous diseases and other disorders arising through constipation. I have never used it as a preventive of heaves, but know it to give relief to horses afflicted with them. I have also used it with good results on a horse whose lungs had been left impaired by a severe attack of pneumonia, and whose respiration was difficult and laborious, and it afforded considerable relief. The following is also a very good food for horses, and may be used for the same purposes as the above: It is composed of 2 quarts oats, 1 bran, and 1/2 pint flaxseed. The oats are first placed in the stable $1\frac{1}{2}$ inches at the top. The copper is $\frac{1}{27}$ of an inch thick, bucket, over which is placed the flaxseed. Add boiling How much pressure will it stand? A. You can carry a water, then the bran (do not mix), covering the mixture with an old rug, and allowing it to thus rest for 5 hours, when it is mixed and ready for use. The bran absorbs while retaining the vapor, and the flaxseed binds the oats and bran together. A greater quantity of flaxseed would make the preparation too oily and less relished. One feed per day is sufficient; it is easily digestible and is especially adapted for young animals. It also tends to fatten

(25) H. F. B. asks: Can I return the condensed water of a coil of pipe into the boiler without the use of a pump? A. With properly designed heaters, you may possibly be able to return the water; but it will be better to use a trap specially constructed for the pur-

(26) O. O. M. says: I have a model sidewheel boat 45 feet long by 12 feet beam; it draws 14 inches of water. I want to put two direct connecting engines in it. What size will I need? What size single 5 is clay slate, of no particular value. No. 6 is clay, engine will I need? What size wheel should I use? A. containing a large quantity of carbonaceous matter, Diameter of wheels, 8 to 10 feet. For engines, 7 to 8 etc. No. 9 is red hematite (sesquioxide of iron). If inches diameter, 1 to 18 inches stroke, or a single engine in large quantities, it is valuable as an ore of iron.—W. H. J.—The substance consists of carbonate of lime, a

(27) D. B. T. says: In the open air, water boils at 212°. In a boiler having an air pressure of six atmospheres, it will not boil at less than 320°. What would occur in a steam boiler having a pressure of six atmospheres of steam, if we turn air of seven atmospheres pressure into it, without allowing the temperature to rise? Would all the steam be condensed or would the air be diffused through the steam according to Dalton's law of the diffusion of gases? If so, why? A. If the temperature of the air was not raised, none of the steam would be condensed, and the mixture would follow Dalton and Gay Lussac's laws. This follows from the definition of a perfect gas. You will find a good discussion of this subject in Rankine's "Treatise on the Steam Engine."

(28) T. S. S. says: I wish to build a governor, the arms of which, from the centers of motion, shall measure 6 inches, the balls to be 2 lbs. weight each. Howmany revolutions per minute will be required to raise the arms to a horizontal position? A. You cannot raise the arms to a horizontal position, at any rate of speed, but you may approximate the position quite close ly. A full explanation is given on p. 389, vol. 31.

(29) H. H. H. asks: I have a horizontal bar suspended from two wire ropes and guyed to the floor with four more; it however turns with the hands. How should the suspension rope and guys be fixed to the bar so that it will not turn, and will be perfectly stationary A. The manner in which the bar is set up by profes sional gymnasts is probably as good as any. The bar is secured to two uprights, so that it cannot turn. These uprights rest on the floor, and the guys are attached to them.

a core 3% inch in diameter and 8 inches long? I have two flues each. They have a two foot brick wall pipes have water in them all the time. I have no pump, and have to depend on my condensed steam for supply pump, injector, or other reliable way of supplying them, or can I safely depend on condensation for supply? A. Without knowing the size of rooms and character of building, we could not form a very definite opinion as to the economy. We think it would be well for you to attach a trap of the kind that is made for returning the condensed water from heating coils. 2. In starting steam in the morning, there is a continual cracking and thumping noise until I have a complete circulation. I have about 35 drip cocks to assist in letting the air out, besides two main air cocks. A. To get rid of the crack ing and thumping noise, it will be necessary to re-arrange

> (32) J. J. says: 1. A reservoir $\frac{1}{2}$ mile square in surface, 20 feet deep, 2 miles from town, and 200 feet above the level of town, has 2 pipes, of the same size and length. One is inserted at foot of reservoir, the other is inserted 19 feet above the first, or as near the surface as practicable without admitting air. Both pipes are brought to the same level in town. Would there be any difference in the pressure or amount of water discharged? If so, why? A. As long as the proper level was maintained in the reservoir, there would not necessarily be any difference in the action of the two pipes be yond what would be due to their difference in length and shape. 2. What would be the effect if the last mentioned pipe was fed from a box three feet square, the water being kept at the same height as the reservoir? A. The box, under the conditions named, would answer just as well as the reservoir for the connection.

your heating apparatus, so as to secure better circula

(33) H. S. P. says: 1 I have a small copper boiler 12 inches high and 8 inches in diameter; it has a funnel inside, 8 inches in diameter at the bottom and pressure of 20 lbs, per square inch. 2. How large an en gine will it run? A. Make one $1 \ge 1_{\frac{1}{2}}$ inches,

MINERALS, ETC.-Specimens have been received from the following correspondents, and examined, with the result stated:

H. A. S.-Your precipitate consists principally of organic matter and sulphur, together with a small quantity

of silicic acid,-J. D. R.-It is galena, sulphide of lead, and contains, in 100 parts, lead 87, sulphur 13 parts (by weight) .- M. T. D.- No. 1 is a silicate of alumina and lime, together with carbonate and sulphate of lime, blende, and sulphide of lead. No. 2 is jamesonite (3 Pb S+2 Pb S₃), and contains in 100 parts, lead 43.6, sulphur, 56.4 parts .-- G. S. M .-- Nos. 1, 2, 3, 7 and 8 are impure clays (silicate of alumina) containing considerable quantities of lime and sesquioxide of iron. They might be employed as material for the manufacture of bricks. No. 4 might be called a low grade of potter's clay. No.

little magnesia and iron, some fine sand, and a considerable quantity of alumina and silicate of alumina, or clay. The greater part of the alumina, clay, and sand may be removed from the water by slow filtration through gravel, and the iron and bicarbonate of lime by the addition of the proper quantity of clear lime water. The quantity of lime water requisite may be determined by experiment with known volumes of the water and reagent.

COMMUNICATIONS RECEIVED.

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

On Transporting Ships Overland. By E. R. On Brushing the Teeth. etc. By S. M. A. On Nature and Life. By E. S. N. On the Coast of France. By P. G. On a Cave in Pennsylvania, By P. M. On the Geographical Distribution of Animals, etc. By G. D.

On the Flight of Birds. By F. B.

On the Diagonal and the Side of a Square. By T. F. Also inquiries and answers from the following:

G. W. E.-J. B.-J. W.-P. T. C.-M. M.-J.G. G. G. M. W.-J. J.-E. F. Y.-R. A. J.-E. M. E.-G. K. -L. A. S.-C. F. P.-M. M. C.

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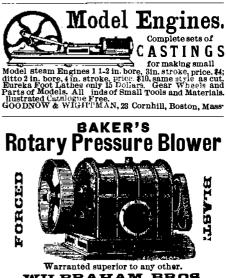
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(30) J. B. asks: Why is it that the low pressure cylinder of a compound engine is made larger in diameter than the high pressure? Would not the effect be the same if the terminal pressure in the high pressure cylinder acted upon a piston of the same size, instead of a reduced pressure (due to larger space occupied) acting upon a larger piston? A. One of the objects of the compound engine is to obtain a high grade of expansion; another is to employ a comparatively low temperature in the cylinder which is exposed to the cooling action of the condenser; and it is also desirable, generally, to have the equivalent mean pressure the same in each cylinder. We think these are the principal reasons for making one cylinder larger than the other, when only two cylinders are used.

(31) C. J. A. says: 1. I have two low pressure boilers, 18 feet long and 40 inches in diameter, with way be expeditiously obtained.

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 hasket, 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.

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