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G. McK. does not state the materials of which his dried varnish consists.—A. S. will find a re-cipe for dressing skins in the Indian manner on p. 266, vol. 26.-C. H. B. is informed that iron gas pipe is not 5 per cent of the total iron manufacture.-B. B. S. will find full directions for solder of all kinds on p. 251, vol. 28.-C. L.N. will find the directions on p. 7, vol. 80, for constructing a telescope, trustworthy and correct.-J.D. H. will find instructions for skeletonizing leaves p. 815, vol. 29. Suggestions for preventing echoes in buildings are given on p. 356, vol. 29 .- J. N. F. will find some valuable information on the restoration of burnt iron on p. 51, vol. 30.-E. H.B. The attraction of gravitation is the attraction of all portions of matter for each other.—A. O. W. The prismatic colors are often visible in a halo, or in a fog of any kind. There is no generally accepted theory of the aurora borealis. Meteors are sup posed to be small portions of matter floating through space; they are attracted to our center of gravity, and become incandescent by friction with our atmosphere. A.F.B. will find that amarine glue, made of best glue and caoutchouc, will remain flexible if enough caoutchouc be used.-J. W. B., of Nashville, Tenn., does not send his name.-L. M. should apply to the master mechanic of some railroad for a situation as fireman.-W. C. T. will find directions for building cement walls on this page.-M. H. W. can fasten leather to iron by following the directions on p. 42, vol. 26. Cementing emery to cloth, leather, and wood, is described on p. 266, vol. 26. -W.A. R. can cast rubber by the process detailed on p. 253, vol. 29.-L. B.'s questions are incomprehensible. -F. L. S. can find the proportions of acids for silvering glass by experiment. We have never heard of any successfulmode of silvering glass by electro-deposition -A. B. D. will find directions for mounting and var nishing chromos on p. 154, vol. 27. For picture frame filling, see p. 90, vol. 29.—C. W. H. Jr. can attach cioth to cast iron by the process described on p. 42, vol. 26 -H.E. cannot do harm by having an investigation of his engine.-D. W.G. will find a bar or chisel handy for knockingclinkersfrom the sides of a stove.-J. A. will find directions for transferring engravings on p. 138, vol. 30. Chinese white or the mineral off an enameled card will do to whiten the surface of the block .- W. K.

B. B. E. asks: What shape or degree of onvexity musts plano-convex lens have to ensure the least spherical aberration? A. The smallest curvature possible, in other words, a long focus lens.

C. R. asks: How much power is saved by the use of sperm oil for lubricating purposes as com-pared with lard, tallow, or mixed oils? A. There will be from 1 to 5 per cent of difference in the friction with different lubricants, according to Morin's experiments.

T. M. Jr. asks: 1. Do you know of any nake of engines with the ordinary eccentric valve cutting off at both ends of the stroke alike? What would be the advantage of such an arrangement? A. It is sometimes done by making the lead different at each end of the stroke. 2. What could I do to prevent danger to surrounding buildings from sparks coming out of the stack of a cupola while casting? A. We cannot recom mend any very reliable preventive.

A. P. G. asks: Has any steam frigate, any sea going vessel of any class, ever attained a sp of 25 miles an hour, under ordinary conditions? A. of have seen it stated that one of the English blockade runners, during the war, made a speed of 22 miles an hour; but this is not well authenticated.

S. says: Is smoking cigarettes very injuri-ous, on account of the paper in which the tobacco is wrapped? A. The paper is injurious, but notmoreso than the vile weed it encloses.

F. G. W. asks: Howheavy a weight with a fall of 20 feet will it require to run a sewing machine. on ordinary work, for an hour? A. A weight of 8,000 lbs.

H. R. G. says: I would like to mold some rubber blocks. How shall I dissolve my rubber? Would plaster of Paris do for molds? A. Dissolve in bisulphide of carbon. Plaster of Paris will answer for molds.

G. W. F. says, in reply to M, who asks what causes his pump valves to thump: "I set up an ngine runking at 150 revolutions with a pump which thumped. I put a bolt with a large head up through the air chamber and screwed it down over the valve, not letting the valve lift so high. Then I put a jam nut on top to keep it from turning, putting rubber between nut and air shamber, to make it tight. The head of the bolt, coming close to the valve, keeps it from lifting too high. It has worked all right ever since. [We are much obliged to our correspondent for this letter. Our readers would do good service if they would send us notes of this kindon matters of general interest.-EDS

W. B. asks: What effect will frost or rain have on a wall made of water, lime, sand, and clay How should these ingredients be mixed? How should water, lime, sand, and small limestone be mixed to make a wall? Howwould water, lime, sand, and soft coal cinders do for a wall? A. To build concrete walls it is not safe to use anything but the best cement, broken stone, gravel, and clean sharp sand. One barred of the best Portland cement will be sufficient for 18 barrels of the other ingredients, filling the interstices between the particles of stone and gravel and adding nothing to their bulk. The cement should be well in orporated with the other ingredients, and supplied with sufficient water to set well.

F. H. B. asks: What is the advantage of constructing shot guns of laminated steel or twist iron barrels? Two old hunters here claim that a shot gun barrel made of pewter on any other material would throw shot just as well as guns of the best madesteel, if they were subjected to the samecharges of powder, and say that the material of which they are made makes no difference in the shooting. A. Provided the shape of the barrel is not changed by the discharge, we think the old hunters are right. It is not difficult to see, how ever, that a much lighter construction can be secured, with the same strength, by making the barrels of tough iron.

E. F. C. asks: 1. In constructing an induc-tion coil, how many thicknesses or layers of wire should there be in the primary coll, and why should it be com-posed of coarser wire than the secondary? A. From one layer upward, although there is but a slight gain be yond a certain point. It is made of coarserwire in or der to afford less resistance to the electric current. 2 How is the secondary coil to be wound? Should it be done by commencing at one end of the wire, and wind ing it upon the primary coil, as threadis wound upon a spool? A. It is best to wind it on flat layers like the coils of a rope, and insulate each layer from the next by a ring of oiled silk or other insulator. 3. How many cups of Daniell's battery, 8 inches high by 6 inches di ameter, would be required to run the coil described on p. 316, vol. 29. so as to produce perceptible shocks? A Six cups of Daniell's battery, with a properly construct ed coil, should give sparks several inches in length.

J. H. D. says: 1. I am running an engine of about 75 horsepower, an ordinary horizontal with common slide valve. I wish to reverse the motion or speed how can I heat do it, as I cannot very well get access to the valve? An engineer gives me the following rule: Place the crank in position snswering to the end of the stroke, and mark the valve stem with file or chisel close up to the gland of stuffing box; now place the crank on the opposite center, looson the eccentric and turn it round upon the shaft until the mark on the valve stem comes out to the edge of the gland, and fasten the eccentric." Is this a correct rule, and will it give the same lead as before? It does not seem to me izeit by trial at the cylinder cocks. 2. On p. 331 of your vol. 29. in answer to F. H. D.'s query as to the proper dimensions of steam and exhaust pipes, you give a table taken from W. S. Auchincloss' work on valve and link motion. What I wish to know is how to use the table: I cannot exactly see into it. Will you please make it a little clearer for me and several others? A. The piston speed in feet per minute is twice the number of revolu tions per minute multiplied by the length of the crank in feet. For example, an engine having a diameter of 16 inches anda stroke of 2 feet, making 100 revolutions per minute, has a piston speed of $2 \times 100 \times 2 = 400$ feet per minute. The area of the piston is 201 squareinches, and from the table it appears hat the area of steam pipe should be $201 \times 0.058 = 10.653$ square inches, which corresponds to a diameter of a little more than 82 inches. O. C. W. says: I have a pipe 3 inches inside diameter and 20 feet long, standing erect with closed valve at the bottom. It is filled with water. What is the pressure on the valve? A. The weight of the water, if the valve has the same diameter as the pipe. 2. How can I increase the pressure without ma king the pipelonger or forcing the water in at the top of the pipe? A. By dissolving something in the water to make it heavier.

L. W. asks: Will a rotary engine of 3 horse power propel a small side wheel boat 30 feet long by7% feet beam? It draws 12 inches of water. The boat has a medium flat bottom and is sharp forward. Her engine ruus at 300 revolutions per minute, and is geared to wheel shaft in proportion of 4 to 1. What speed ought to be obtained, the diameter of wheel being 5 feet 6 inches, with 8x10 buckets? A. With such an engine, the peed would probably not exceed 2% miles an hour.

H. G. C. says: Has the twist or rotary mo-tion, given to a rifle ball by the pitch of the lifting, anything to do with its velocity or the distance to which it may be thrown by a given charge of powder? A. The twist diminishes the velocity.

C. Y. says: Please state what is the size of the quantity galvanic battery necessary to heat an iron wire the 1-25th of an inch in diameter to red or white heat? The liquids are to be nitric and sulphuric acids. A. About twenty cells.

N. D. S. asks: Isthere a law that will hin-der me from putting a steam saw mill on a boat and running it. (by steam) to any place? I am not a licensed engineer. Can any inspector force me to have my boller tested against my will, if I only carry my own property? A. We do not think that your case will fall under the requirements of the steamboat law.

M. W. R. asks: How can I restore the color of a black sik velvet cloak that had lime water on it, turningitto a light brown? A. Further injury may be prevented by rubbing the spot first with dilute acetic acid and then with water, but the coloring matter has been destroyed and can be restored only by dyeing again.

A.S.G. says: A stream of water moves at therate of 10 miles an hour, with a fall of 1 foot per mile; what is the momentum of the water per square foot? A. The horse power of the water per square foot of cross section is equal to the velocity of the water in feet per second multiplied by 62.4 times the hight dne to this velocity, and divided by 550. To illustrate: Velocity in feetper second=14.6. Hight due to this velocity (14.6)2 +64 4=3.3 feet. Horse power of water per square foot of cross section, $\frac{14 \cdot 6 \times 3 \cdot 3 \times 62 \cdot 4}{3 \cdot 3 \times 62 \cdot 4} = 5 \cdot 3$ nearly. 550

S. C. Z. asks: 1. At what part in a machine isit that the dead point most frequently occurs? A. It is the position of the crank when the piston is at either end of the stroke. 2. Can you tell me of any chemical that will dissolve mica? A. Most varieties are decomoosed by sulphuric or hydrochloric acid. The silica can then be dissolved in hydrofluoric acid, or a solution of caustic alkali.

P. says: A neighbor bought a cast steel plow and put it into gravelly soil. After using it half a day, he found the mold board badly creased and fur-rowed. He then exchanged the steel plow for a cast fronce. It is well known that a steel sleigh shoe sticks worse on bare ground than a cast iron shoe. Is steel softer than iron? If not, how do you account for these facts? A. This may be explained on the supposition that the steel was of poor quality and badly tempered, so that it was not homogeneous in texture, and did not ave the same degree of hardness throughout.

G.O. A. asks: Will a solid ball of iron weighing 25 lbs. fall a distance of 1,000 feet quicker than a ball of thesame description weighing 1 lb.? A. No. 2. Will a cylinder of iron 1 inch in diameter and 12 inch eslongfall 1,000 feet quicker than a cylinder 1 inch in diameter and 1 inch long, if dropped end foremost? A.

S. says: We have a tubular boiler running night and day, using water pumped from the river, with-out any filtering. We find, after running three or four days, that the water foams in the boiler to such an exanddrawoff part of the water, and refill with fresh. Can you give me through the columns of your paper any method to prevent foaming? Is the use of tallow or anyotheroily substance injurious to a boiler? We have in use an upright boiler feeder, and until recently have used the exhaust from the pump to assist in heating waterfor the boiler, the pump piston being lubricated by tallow. The question has arisen whether the tallow used would materially affect the boiler or in any way have a tendency to cause foam by entering into a com-bination with matter contained in the water. A. The foaming seems to be caused by impurities in the water, which raise the boiling point. Blowing off a portion of the water at intervals may remedy the trouble, but it would be better to use a feed water heater that would extract the impurities. Oil and tallow will do no harm, unless they contain impurities.

J.E.C. asks: I. Will it increase the draft of a portable engine when not in motion to connect : small pipe with the boiler and let it extend into the smoke stack? A. Yes. 2. If so, what sized pipe should Luse for a 12 horse power engine, and how far up in the mokestack should it extend? A. About a quarter of an inch in diameter. Run it up three or four feet.

E. I. asks: 1. What are the proper di-L. E. I. ASKS: I. VY HAL ALO THE PAPER menetons for the ports of a cylinder 4%x6 inches, running 250 revolutions at 60 lbs. pressure? A. Make the port area one half that of the piston. 2. What would be the power of such an engine? A. Horse power equals pressure on piston in poundsmultiplied by piston speed in feet per minute, divided by \$3,000.

J. G. G. G. R. says: 1. I sit opposite a large stained glass window in church. I am shortsighted and cannot, with my eyes wide open, see the snapeof the figures, but if I close thema little, every little line, etc. that it would. A. It would not give the same lead; and stands out very clearly. Why is this? A. Shortsighted-if you do not know the amount, you may have to equal-ness is owing to a too great convexity of the eye, the rays of light coming to a focus before reaching the retina. Themuscularaction of nearly closing your eyes may have the effect of flattening the humors of the eye sufficiently for distinct vision, and of also cutting off extraneous rays of light, like the stop or disphragm used in the telescope. 2. I have not a heavy voice, but when Iget up in the morning it is a deep bass. This continues for about an hour, and then it resumes its natural tone. How is this? A. It looks as if your voice were not inclined to rise until an hour after its owner. You had better consult a physician, as this may he awing to some slight bronchial or throat complaint. 8. Would a device for preventing an engine from get-ting on a center pay? A. Such a device might in some circumstances be an improvement. 5. Is there any method by which a person could copy music faster than with a nen, something in the way of types, etc. ? A. n instrument has been invented by which, it is said, in the act of playing the plauo, the composer's musical thoughts are at onceprinted by types on a piece of paper. The keys actuate machinery which is put in motion by electricity. 5. Is there any method by which a shortsighted person could restore his sight to its original quality? A. The only remedy we know of for shortsightedness is to wear speciacles of the proper curvature.

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G. F. D. can clean his old files by the process described on n. 263, vol. 28-G. McL can utilize his old rubber by following the directions on p. 349, vol. 26. -B.J.L. should read the instructions on p. 379, vol. 26, for polishing walnut wood.-W. F. will find directions for mending rubber boots on p. 208, vol. 30.

A. A. says: In the SCIENTIFIC AMERICAN of August 16, 1873 (editorial on lightning rods), it is stated that the gas and water pipes ought to be connec ted with the rod : because if not, there is danger that persons may receive shocks from such pipes by the in duced electricity developed in them. Now.asthe roo and the pipes all extend into the ground, are they no all substantially connected? If the water and gas pipes of a dwelling communicate with the ground, and through it with the rod, is any further connection necessary in order to prevent injury by induced electricity? A. The connection with the ground is good, but at th wrong end. The upper ends must be connected or the resistance of the pipes etc., themselves will cause the trouble mentioned; and also as regards the induction this is an action in which the end of the rod nearest the cloud is charged and not the other end in the ground These are a few points, but one must study the mean-All Fruit-can Tools, Ferracute, Bridgeton, N.J. etc., to see the whole thing clearly.