

(20) F. O. asks: How can I dye feathers to a red color, to be waterproof, for fishing flies? A. Take 1 oz. Brazil wood in powder, $\frac{1}{2}$ oz. alum, $\frac{1}{4}$ oz. vermilion, and 1 pint of vinegar; boil them to a moderate thickness, and dip the feathers (they first having been soaked in hot water) into the mixture.

(21) C. D. asks: Can aluminum be worked? A. Yes, readily. In small quantities it costs as much as silver.

1. Will an engine of 2 inches stroke run a 6 inch turning lathe? A. Yes. 2. Should the engine be connected by a belt to the flywheel shaft of the lathe? A. You can use a belt from 1 to 2 inches wide, with a wheel on engine 8 inches in diameter, and another on lathe shaft of 6 inches.

Speaking of a 6 inch gear wheel, does it mean 6 inches in diameter over all, or from base of tooth to base of opposite tooth? A. It is the diameter of the pitch circle.

In what book can I find practical instruction for building model engines? A. We do not know of any that distinguishes a model steam engine from an ordinary one.

(22) N. J. J. asks: How many fish can be raised in a pond containing an acre of ground supplied with 100 gallons of water per minute? A. Try to raise as many as possible, and the principle of the survival of the fittest will regulate the matter.

(23) H. B. asks: 1. Will a cast iron shell turned down to the proper thickness do for a small boiler? A. It would be better, in most cases, not to turn it down at all. 2. What is used for packing the joints of a boiler three feet long? A. Rivet and caulk the joints. Ordinarily, no packing is used. 3. To what degree must iron be heated to melt common solder, and could soldering be used on boiler joints? A. To about 400° Fah. It could be used as suggested.

1. Is it possible to obtain good small sized castings of iron? A. Yes. You must have seen plenty, such as stove castings and the like. 2. Is copper cast? A. Yes. It is ordinarily sold in cast ingots.

(24) F. H. and others: It is always best to place the tightener on the slack side of the belt; and to get the greatest driving power, it should be placed close to the small pulley.

(25) J. B. P. asks: Does any harm arise from using, in the cylinder of a steam engine, a mixture of black lead, sulphur, and tallow, or black lead and tallow? A. With a surface condenser, the collection of the lubricant in the tubes sometimes causes trouble. Impure tallow frequently eats away the tallow. It is better to use good oil.

1. What is the best material for an idle pulley, used in a sawmill for transmitting motion to reverse the carriage? A. Cast iron. 2. What material is best for use in making a friction feed pulley in a sawmill? A. Cast iron. 3. Why do saws which have been worn down from 60 to 54 inches require hammering to make them run stiff enough to work? A. A saw is generally strained somewhat in the rim, and when run down it must be strained again.

I have a boiler, 14 feet long by 51 inches diameter, with 39 three inch tubes; outside diameter of tubes is 3 inches. The tubes are contained in that portion of the boiler below a line drawn 30 inches from bottom of boiler. How much water will it take to fill the boiler to a line drawn 2 inches above top row of tubes? A. You can readily calculate the volume of that part of the boiler diminished by volume of tubes.

(26) E. H. S. says: We have a schoolroom 31x23x about 14 feet. The acoustic properties of this room are very poor; at times it is hard for the teacher to make herself understood. What can we do to improve them? A. The echo has been destroyed or materially reduced in rooms of this kind by breaking up the reflex of sound, from the wall opposite the speaker, by wires. As has been explained in our previous issues, the manner of doing this, lately adopted in England, is to stretch the wires from floor to ceiling at about 6 inches apart, and, say, 6 inches out from the face of the wall. This may be tried at first for a space of about $\frac{1}{2}$ the width of the room, at the center of the wall, and if found beneficial, afterwards extended.

(27) H. L. H. asks: How can I plate with nickel? A. Use the chloride of nickel for a solution with a nickel positive pole, and proceed in the same way as with silver plating.

(28) T. D. M. asks: Where is meerschaum found? A friend says that it is a clay in the ocean, and is washed by the waves to shore and collected in dust-like form. I think it is dug out of the earth. Which is right? A. The word meerschaum is German for froth of the sea, in allusion to its lightness and whitish color. It is a hydrated silicate of magnesia, and occurs in Asia Minor, in stratified earthy or alluvial deposits at the plains of Eskihisher, where, according to Dr. J. Lawrence Smith, it has proceeded from the decomposition of carbonate of magnesia, which is imbedded in serpentine in the surrounding mountains. It is also found in Greece, at Hrubschitz in Moravia, in Morocco, and elsewhere.

(29) O. asks: 1. Is there any known process by which cotton seed oil can be thoroughly and economically refined? A. In the strictest sense, what is called by the trade refined oil is more or less pure oleic acid. This so-called refining of the oil is the abstraction of the dark color, accompanied by improvement in flavor, and may be accomplished by washing the oil in a solution of caustic potash or soda; but in nearly every case it will be previously necessary to submit the oil to a thorough steaming and washing with hot water, so as to remove from the oil as much as possible of the mucilaginous and albuminous matters, met with in the crude oil sometimes to a very large amount; if this precaution is neglected, there will be more waste, that is to say, a larger amount of alkali will be necessary, and in consequence thereof a larger

proportion of the more solid fatty matter of the oil is abstracted. The mixed liquids—alkaline lye and oil—after having been beaten up together, separate in three distinct layers: on being left to repose: the upper one is nearly colorless, so-called refined oil; the middle layer is the still yet dark colored, saponified solid fat of the oil, while at the bottom is found the dark, almost black colored alkaline lye. Owing to the great discrepancy of impurity of the crude oil (some being evidently pressed from the damaged seed) it is impossible to state exactly what yield of purified oil may be obtained. It has been found that under the most favorable circumstances 100 parts of the previously steamed oil yielded from 85 to 88 parts of refined oil. It has been found, in practice, that potash for some reason or other answers the purpose of cutting down the oil much better than soda. 2. What are the uses to which thoroughly refined cotton seed oil could be put? A. The refined oil is notoriously exported for the adulteration of olive oil.

(30) I. J. S. asks: Is there anything which will effectually destroy magnetism in steel parts of watches, except passing them through the fire? A. No.

(31) C. A. asks: How can I smooth the surface of a glass eye, it having become rough by reason of the wear of the eyelid? A. Try rubbing with a little putty powder.

(32) J. S. asks: What is a good book on astronomy, in which I could find the names and positions of the principal stars, and also the focus and power of lenses for telescopes? A. Try the "Handbook of the Stars," in the Cambridge series.

What is an argand burner? A. This is an arrangement for increasing both the supply of air and the burning surface of the flame. In the candle flame and gas jet, combustion takes place only on the outside. The argand burner has a circular wick by which a second current of air is admitted to the interior of the flame, thus burning with a double surface. The effect is increased by a glass chimney contracted so as to deflect the ascending current of air strongly upon the flame. Your other question should be referred to a physician.

(33) E. T. C. asks: How can I make ordinary dry Venetian red into a cake or ball suitable for use on a striking line, as a carpenter uses chalk? A. Make it into a thick paste with water, and dry.

How can I stain and polish a violin? What kind of varnish is used? A. Boil together Brazil wood and alum, and before applying it to the wood add to it a little potash. A suitable varnish for wood thus tinged may be made by dissolving amber in oil of turpentine, mixed with a small portion of linseed oil.

I have heard that split timber, such as spokes, would season much faster if set up on end to season. Is it a fact? A. Probably, from the larger surface exposed to the air.

(34) A. M. asks: How can I color gelatin? A. The gelatin is either melted or dissolved in a limited quantity of water, and the tint desired is obtained by adding one of the aniline colors. It is then poured on to a smooth warm iron plate and immediately poured off again, leaving a thin film adhering to the plate. This is allowed to dry. It may then be cut into the required shape.

(35) S. F. B. asks: How shall I arrange to burn brimstone so as to whiten a hat by the fumes? A. Put a chafing dish with some lighted charcoal into a close room or large box, then strew one or two ounces of powdered brimstone on the hot coals, hang the articles in the room or box, make the door fast, and let them hang for some hours.

Is it not a good plan to hang the watch at night with the stem downwards, so that the bearings will wear on opposite side from where they do in the daytime while in the pocket? A. Possibly.

(36) S. S. W. asks: 1. Can neatsfoot oil be extracted from leather so as to be used again? A. Try boiling with water for a long time. The oil will be found on the surface of the water. 2. Can soap be made from the oil? A. Yes, with an alkali. 3. What is the mode of bleaching oil, and purifying it from foreign particles? A. By straining or filtering, and heating several times with equal quantities of rose water, with constant agitation.

(37) M. K. W. asks: We cannot make a portable gas machine work, as we do not know what proportions of sulphuric acid to use to a gallon of water. A. One part of acid is diluted with four or five parts of water. 2. What is carbon oil (used in the bottom as a purifier)? A. We do not know of any oil by this name. Benzine, naphtha, or gasoline will answer the purpose. See answer on p. 379, vol. 30.

(38) G. D. asks: If I place a lighted alcohol lamp under a glass receiver, it will burn a moment or two until the oxygen is exhausted; what is the difference in pressure per square inch of the air outside, and the air, minus oxygen, inside? A. The difference is proportional to the difference in volume; but what that difference is will depend upon the temperature, barometric pressure, etc. Alcohol is C_2H_5O , the carbon burning to form its volume of CO_2 , equal to the volume of the 8 atoms of oxygen with which the carbon combines. The hydrogen in excess of $2H_2O$ forms vapor of water, which when condensed produces the diminution of volume noticed.

(39) J. S. P.—See the books on water colors and water color painting by Rowbotham, Findley, and Barnard.

(40) J. C. & Co. ask: Do you know of any method of keeping scales from the bottom of a boiler? A. We can recommend nothing better than a good feed water heater.

1. How much lower should the tail end of a 20 feet bolting reel be than the head for wheat flour? There is considerable difference of practice among millers, but one foot fall will answer very well. 2. Why do some millers steam the wheat before grinding? A. We would be glad to hear something about this from millers who practise it. Your question as to power of engine is too indefinite.

(41) J. B. asks: How do worms get into apples? A. They eat their way in.

(42) O. P. asks: 1. What power is required to raise 100 lbs. 40 feet high in 4 minutes? A. $\frac{1}{3}$ of a horse power. 2. What power is required to raise 100 lbs. 40 feet high in one minute? A. $\frac{4}{3}$ of a horse power. 3. A balance (or any heavy wheel) starts slowly. What laws govern this force? A. The same laws as govern the raising of a weight equal to the resistance of the wheel.

(43) W. H. asks: How can I melt sandarac for making the polish for black walnut wood described by you on p. 315, vol. 30? A. Gum sandarac melts readily on the application of a moderate heat.

(44) M. T. asks: How is gun cotton made? A. Pour equal parts of strong concentrated sulphuric acid, of specific gravity 1.84, and fuming nitric acid into a porcelain basin; as much cotton wool is steeped in the fluid as the acid is capable of thoroughly moistening, and the vessel covered with a glass plate, and left for a few minutes. The cotton wool is then removed from the acid, immediately transferred to a vessel containing a large quantity of water, and washed with care, the water being renewed until no more acid adheres to the gun cotton, which is next dried in a current of warm air, and finally combed to remove all lumps. The cotton should not be left too long in the acid, as it becomes entirely dissolved.

(45) M. E. P. asks: Will it add to the power of an engine to increase the length of cylinder and of course proportion all other parts to the increased length of cylinder, the number of revolutions and the pressure of steam remaining the same? A. Yes.

(46) C. E. S. asks: 1. Can a young man of 3 years' experience in the engineering and draftsman's business, not a graduate of any college, enter the navy to work under some engineer in that business? A. We think it quite likely. Address a letter of inquiry to the Chief of the Bureau of Steam Engineering, at Washington. 2. How can he become a member of the Mechanical Engineers' Association? A. We do not know of any such association in this country.

(47) S. M. W. says: I am very desirous of having an electric light for use in illuminating a magic lantern and illustrating other objects in a schoolroom. What apparatus shall I require? Will a battery or an electro-magnet be best? How long will the battery run without being renewed, and what form of battery would be best? A. You require two pencils of charcoal or baked carbon, and a battery of 50 carbon cells. The battery will cost about \$150. The length of time that the battery would last and cost of running it would depend upon its use. If you used it every evening for several hours, the battery would require to be renewed every day, at an expense of about \$3.

(48) O. H. asks: 1. The weight of a pile driver is 100 lbs., falling 20 feet; what is the force of the blow? A. We do not know of any rules by which it could be calculated. 2. Would a weight of 500 lbs. increase the force to five times? A. Yes.

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

A. R. C.—Quartz rock.—R. M. K.—It is black oxide of iron.—W. F. B.—It is iron pyrites.—J. B. T.—It is called iron pyrites, and is composed of iron 46.7 per cent, and sulphur 53.3 per cent.—R. W. T.—No. 1 is datolite or borate of lime with native copper. No. 2, 3, and 4 are calamine or silicate of zinc. No. 4 is micaceous schist. No. 5 is siderite or carbonate of iron with red oxide of iron. No. 6 is conglomerate rock.—D. W. D.—No. 1 is clay mixed with scales of mica and impregnated with oxide of iron. No. 2 is sulphide of lead or lead ore. No. 3 is striped jasper. No. 4 is black marble.—A. H. C.—It is not, as you suggest, either tourmaline, sphene, or zircon. It is pyroxene.—J. K.—The sample contained very few entire specimens of *pinularia*, and it was much more difficult to obtain perfect specimens of *navicula*, which were also present. The amount of fine sand and grit present requires that the earth be treated with extreme delicacy and caution, for which reason we consider the deposit of little value.—A. W. H.—Chemical analysis of your specimen of soil shows the presence of common salt or chloride of sodium and traces of other chlorides. Along with these are the sulphates of soda and lime, also a small amount of alumina and oxide of iron. Particles of quartz, both white and colored, are mixed up with the powder, and shreds formerly belonging to plants and probably marine animals also.—The large beetle received some time ago without name or address is the *scarabaeus tityris*, and the curious spider belongs to the genus *galathea*.

H. P. asks: How can I imitate twist on the barrel of a gun?—G. F. C. asks: Can rosin be removed from varnish after it has settled and hardened upon it without injuring the varnish, for instance, from a violin that is varnished?—W. S. B. asks: 1. Has it ever been discovered whether there is an open polar sea at the south pole? 2. Did Captain Ross ever make any northern explorations?—L. McB. asks: What kind of varnish is the best for a violin? Should the violin be oiled before applying the varnish?—J. H. F. asks: Who was the discoverer of the method of manufacturing tinfoil used in America?—J. D. H. asks: 1. What can I put in aniline dye for coloring wood, so as to enable it to take a bright polish after being dried? 2. How can I stripe wooden balls in different colors, so that the colors will not run together, and will dry quickly?—H. P. L. asks: How can I make paper pulp from old scraps of paper?—F. W. D. asks: How are violins stained?—W. H. A. asks: 1. I want to make some piano wires. How is it done, and how are they tempered? 2. How can I plate steel wire?—F. N. D. asks: What is the rule by which paper can be cut so as to cover a globe?

COMMUNICATIONS RECEIVED.

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

On Shoddy. By J. L. N.
On Blast Furnaces. By E. J. H.
On Drawing in Education. By G. R. D.
On a Magneto-Electric Machine. By E. G. W.
On Cable Telegraphy. By G. L.
On Double Entry Bookkeeping. By S. G.
On a Wonderful Mechanism. By G. B. K.
On a Flying Machine. By T. H. C.
On Cast Iron in Boilers. By J. W. H.
On Curious Apples. By E. L. E., and by C. L. S.
On Zinc in Boilers. By J. W. C., and by L. T. W.
On Machine Belts. By J. R. P.
On Removing Snow. By —
On Boiler Explosions. By R. D. W.
On Modern Spiritualism. By S.

Also enquiries and answers from the following:

W. W.—M. C. G.—J. B.—J. K.—E. L. E.—A. H. M.—S. L. G.—P. H. B.—V. W.—F. B. M.—F. W. P.—J. M.

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.

Enquiries 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 enquiries analogous to the following are sent: "Who sells books on watch and clock making? Whose is the best work on oil painting as a fine art? Who sells double-barreled breech-loading hunting rifles? Where can chrome steel be obtained? Who makes the best lime kiln? Why do not manufacturers of explosives advertise in the SCIENTIFIC AMERICAN? Whose is the best rock drill?" All such personal enquiries 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 expeditiously obtained.

[OFFICIAL.]

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