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F. O. B. should consult a physician .--R. J W. will find directions for gilding on furniture on p. 347, vol. 31.-S. A. T. will find directions for frosting glass on p. 264, vol. 30. Canvas can be pre-served from mildew by the method described on p. 90, vol. 31. A black dressing for leather is de-scribed on p. 171, vol. 32.-W. S. O. will find a recipe for walnut stain on p. 90, vol. 32. Nickel plating is fully detailed on p. 171, vol.30.-C. A. H. will find that a method of casting iron free from air holes was described on p. 409, vol. 31.-Y. will find directions for making concrete gravel walks on p. 50, vol. 32.-A. B. M. will find that the induction coil and its operation have been fully describedon p. 362, vol. 31.-E. B. M. will find a description of the type writer on p. 79, vol. 27. Shaving soap is described on p. 251, vol. 32. For gold ink, see p. 21, vol. 26.-W. M. W. will find recipes for hair wash on pp. 267, 363, vol. 31.-T. B. S. will find directions for preserving natural flowers on p. 266, vol. 31. M.T. D. will find directions for removing hair from the face on p. 229, vol. 28.-8. E. will find directions for casehardening iron on p. 69, vol. 31 .-D. P. will find details of a remedy for foul water in wells on p. 59, vol. 32 .- M. F. will find recipes for Worcestershire sauce on pp. 241,281,vol. 28.—R.O.B. can mold rubber by following the directions on p. 363, vol. 30.

(1) G. A. W. says: I noticed in your issue of March 27 a method for marking out ovals, which is good as far as the description goes, but a great many mechanics do not know how to set the two pins to put the string around tomake the oval of a given length and width. The following rule will be found simple and correct: If you wish to mark out an oval 4 inches in length, and 24 inches in width, mark out the length and width thus:



Take one half the length (2inches) and measure from A, 2 inches, striking the line of the length at Band C; then set pins at A.B.and C. tle yourstring.b. around them; then pull up pins at a', and use the pencil as you describe.

(2) L. A. W. asks: 1. What is magnetism A. Magnetism is the power which certain bodies called magnets have to attract iron. Magnets are of two kinds, natural and artificial. Natural magnets consist of the ore of iron called magnetio or lodestone. Artificial magnets are made generally of steel, and are magnetized by rubbing against other magnets. No substance is indifferent to the magnet, though iron is most of all affected by it. 2. What is the difference between animal magnetism and electricity? A.There is no known connection between animal magnetism and electricity.

If any exists, it has yet to be proved. (3) I. H. asks: 1. How can I obtain the different colors of gold in electroplating? A. Make a mixture composed of 3 parts nitrate of potash. 11% alum, 11% sulphate of zinc, 11% common salt. Add enough water to form a paste, which is put on the articles to be colored. Place them on an iron plate over a clear fire until they attain a nearly black heat, and then plunge them in cold water. Different hues may be had by varying the mixture. 2. Is there anything I can put in my silver solution that will prevent it from stripping A. Clean the articles well and electroplate then slowly; and then the silver will not strip off. (4) M. A. G. asks: Is there any kind of lamp in which I can burn kerosene oil, that will be safe if left to burn ina shop all night? A. Use a large lamp of glass, having a proportionally small burner, and good kerosene oil, and you will have no difficulty. (5) A. H. H. asks: 1. What is the principle of the lightning arresters used on telegraph lines A. A metallic plate is connected to the line and another to the earth, the two plates being separated by a thin insulating material. The principle upon which the arrester works is that the tension of the atmospheric electricity is so high that it will leap across the insulating substance between the two plates, and then pass off to the ground, while the regular current will stick to the wire. 2. Can you give your readers a table showing the electro-

motive force of the principal forms of battery now in use on telegraph lines? A. The electromotive forces of the various batteries are as follows: Daniells', Minotti's, Callaud's, Gianty's, and Hill's 1079 volts; Marie-Davy, 1.524 volts; Léclanché, 148 volts. Faure's carbon battery, 1765; Grove, 1.812; Bunsen, 1.964; electropoin fluid (bichromate of potash), 2.028 volts. Grenet (chromate of potash) single element, 1.015 volts.

(6) M. W. M. asks: How can I magnetize a steel tack hammer? A. Draw it across the face of a strong electro-magnet in one direction.

(7) N. A. B. asks: How many methods are there of obtaining pure silver from silver coin, and what are they? I want the silver to plate with. A. Perhaps the best method for operations of this character on a small scale is the following: First dissolve your coins in nitric acid, and add muriatic until no further precipitate forms. Remove the liquid by filtration and wash the precipitate several times with hot water. Place the filtrate in a flask with some small pieces of zinc, and cover them with dilute sulphuricacid (1 to 4). When the zinc is completely dissolved, the metallic silver will be found in the bottom of the flask as a grayish black mass. The color is due to the fact of the silver being in a very finely divided condition. If

you desire to use the silver in the metallic form (as an anode), all that is necessary is to melt it in a small black lead crucible, with a small amount of carbonate of soda.

(8) E. asks: What makes the wet end of a wel darker in color than the dry end? A. Less of the light is reflected from the wet towel, and nore transmitted.

(9) G. W. H. asks: Are there any chemicals that change color in coming in contact with magnetized steel or other magnetized substance? A. We do not know of any.

(10) T. says: The accepted theory is that our earth was once a molten, incandescent mass. In support of this theory, among other phenomena, it is urged that the deeper the earth's crust is penetrated, vertically, the greater the degree of heat is developed. Now why is it that the further we penetrate the ocean, the less is the degree of heat attained? Will it be urged that the lower the temperature of water, the greater is its gravity? This is true down to 89°, but water at the bottom of the ocean, at the extreme depths that have been reached, shows a lower temperature than 39° Fah. A. What is urged is no objection to the theory of central heat, because the heat penetrates by conduction through the materials of the solid crust But in the waters of the ocean this could not take place, owing to the free motion of its particles.

(11) E. E. M. asks: 1. Can an electro-magnet be constructed that will sustain a weight of 100 lbs., with one cell of a powerful bichromate battery? A Yes. 2. How far will it attract a weight of 10 lbs. if it moved without friction? A. The attraction decreases as the square of the distance.

(12) D. McK. says: I want to make a small galvanic battery which, when I take hold of the wire, will give a considerable shock? What is the best method? A. You cannot get a considerable shock from a small battery except by passing the current through an induction coil. See p.362, vol. 81.

(13) T. W. D. asks: 1. How is phosphide of lime made? A. Phosphide of calcium, commonlyknown as phosphide of lime, is obtained by the action of the vapor of phosphorus upon caustic lime at a high temperature.

1. How is balloon gas made? A. Either pure hydrogen, made by acting upon zinc or iron scrap with dilute sulphuric acid, or common illuminating gas (coal gas) is used for this purpose. 2. Will the gas from a kerosene lamp do? A. No. 8. How many square feet of gas will it take to raise a five lb. balloon? A. It will require about 140 cubic fectof coal gas, or about one half that volume of pure hydrogen.

How is gunpowder made? A. Saltpeter, sulphur, and charcoal are ground separately to powder, mixed, made into a paste with water, dried, and reground.

(14) H. S. asks: Would it improve the illuminating qualities of coal oil to mix a portion of sperm, lard, or other similar fixed oil with it? A. No. Use a better kerosene. It should not be volatile, and should have a high burning point.

(15) A. C. C. asks: Will you tell me what to put on glass so that I can take a photograph directly on it? A. The plate is first coated with an even film of photographic collodion, and is then placed in a bath of nitrate of silver for a short time. It is then transferred to the camera, and after exposure is washed, first with a solution of ulphate of iron, and then with a solution of hyposulphite of soda. It may be mentioned that it is utterly useless for one to attempt photography who has not devoted some time to the practical study of it. We would refer you to some work on the subject. If the back of the negative, obtained by the method as above described, be blackened, it will give to the plate, when looked at, the appearance of a positive picture.

(18) G. A. W. says: I have read the follow ing directions for drawing an octagon in a given square: Make A C equal A B; then draw the square



CEFD, and line from D to E will be one side of the octagon. Proceed in the same manner in the other angles of the square A B FG. Is this a correct method? A. Yes.

(19) F. D. S. asks: Is there any chemical which I can mix with lard oil so as to retard or prevent oxidation when exposed to the air? A. No.

(20) P.S. G. asks: Is there any kind of coating suitable for umbrellas that will make the alpaca or gingham tops waterproof? A. Try the following: First sponge the cloth on both sides with a solution of 1 part sulphate of alumina in 10 parts water, then with a solution of soap, which is prepared by boiling 1 part light colored resin and one of crystallized carbonate of soda with 10 parts water, until the resin is dissolved. The resin soap thus formed is to be separated by the addition of common salt. This soap is then dissolved together with 1 part soda soap, by boiling in 30 parts water. After this last sponging, sinse in the rain.

(21) P. P. W. asks: How can I take the printed heads off an account book, so as to beable to write others in theirstead? A. We do not know of any method by which this can be accomplished.

(22) J. G. C. asks: Is there any simple method by which an amateur in chemistry may ascertain the strength of a given sample of native black oxide of manganese? A. The commercial value of black oxide of manganese depends upon the proportion of chlorine which a given weight of it will liberate when it is heated with hydrochloric acid. This quantity of chlorine varies much in different samples, and is dependent upon the proportion of oxygen which the oxide of manganese contains in excess of that which is necessary to its existence as protoxide.

(23) J. E. C. asks: 1. Is there a liquid that will erase ink marks from paper, and leave the surface in a smooth state? A. Wash by means of camel's hair pencils, dipped alternately in solutions of cyanide of potassium and oxalicacid. 2. Is there any substance that will resist the action of mucilage when dry, except hard and vul-canized rubber? A. Yes. Most metals will do this.

(24) S. H D. says: Located near Titusville, Pa., is an immense gas well, struck nearly 4 years ago by parties who were drilling for oil. When first struck, it was accompanied by a curious phenomena. The gas was led away from the mouth of the well by 4 pieces of tubing, and this tubing was coated with ice from $\frac{1}{16}$ to $\frac{1}{4}$ of an inch in thickness. This was with an August sun beating down on the pipes; small pieces of ice were also thrown out of the well with considerable force. Of course the pressure on the pipes must have been very great with such an immense volume of gas passing through them, and I should have thought the friction would have caused heat in-stead of the reverse. A. It is a well known fact that.when a gas is allowed to escape from where it has been under pressure, it absorbs heat rapidly from surrounding bodies, and that this chilling effect is proportional to the pressure from which the ras is liberated.

(25) A. S. asks: How can I restore the polish to a nickel-plated stove which has been discolored by heat? A. Use chalk and chamois skin.

(26) C.A.B. asks: 1. What can I put in wa to soften it? I have used sal soda, but it will color the clothes yellow. A. This may be acc.ymplished either by boiling the water for some time, or by the addition of the proper quantity of clear lime water. 2. What is used to bleach clothes in a short time without injury? A. In bleaching cotton goods, the first operation consists in scouring them in a slightly alkaline solution, or, what is bet ter, by exposure to steam. They are afterwards put into a basket and rinsed in running water. The immersion of cotton in an alkaline ley, however it may be rinsed, always leaves with it an earthy deposit. It is well known that cotton bears the action of acids better than hemp or flax; that time is even necessary before the action of them can be prejudicial to it; and by taking advantage of this valuable property in regard to bleaching, means have been found to free it from the earthy deposit by pressing down the cotton goods in a very weak solution of sulphuric acid, and afterwards removing the acid by washing, lest too long remaining in it should destroy the cotton. 3. Is there any way of polishing shirts, collars, etc., besides the ordinary irons? A. Put a bit of paraffin, the size of a hazel nut, in each bowl of starch. (27) D. A. D. asks: Can you give me the method by which Berthelot was able to obtain alcohol by synthesis? A. By the formation of a solution of olefant gas in oil of vitriol. which dissolves about 120 times its bulk of the gas, then diluting the mixture and submitting itto distillation. Small quantities of dilute alcohol are thus obtained with facility. Tritylic alcohol has been obtained by acting on tritylene in a similar manner.

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For Solid Emery Wheels and Machinery, send to the Union Stone Co., Boston, Mass., for circular.

Hydraulio Presses and Jacks, new and second and. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon, 470 Grand Street New York.

(16) J. R. L. says: I want to make a preparation to use on black tobacco to prevent one lump from sticking to the other, and at the same time give the topacco a good gloss. A. Try plumbago. Tinfoil cannot be dissolved so as to make it possible to add it to a mixture of oil and glycerin.

(17) C. G. D. says: I am manufacturing black writing ink from extract of logwood, bichromate of potash, prussiate of potash, powdered gum arabic, and water. After the ink is first bottled, there is a scum formed at the mouth of the bottle; but when this is removed there is no more formed. What is the cause of this? A. It is probably due to impurities in the materials used. Allow the ink to stand some time before bottling. Sulphate of quinine is sometimes used as a remedy.

(28) H. W.says: In your answer to A.C.R. you say that, if the first flooris set high up from the ground and is ventilated, the probabilities as to health are in favor of the house with no cellar. The fact is that a great many dwellings are built on solid and close foundations and without ventilation, and the real question is: Are they healthy? I think not. In Illinois, there were three settlements within visiting distance of each other, altogether containing about 30 families. One fall every family of the three settlements (with one exception) was sick with the prevailing fever of theseason. The excepted household had an upper floor to their house (a half story) which was used for sleeping in by all the family, consisting of parents, 3 children, and a workman, and they all es-caped the fever. All the rest of the inhabitants lived in one story houses, and of course slept and kept all the stores on one floor. In a house with a close solid foundation, we found that things would moldif left standing for a few days. Preserves, placed upon a top shelf, in a short time became moldy; out when placed in the second story, they all kept well. A barrel of flour was kept standing on the floor; when abouttwo thirds used, thesponge failed to rise, and as a consequence we lost two bakings of bread, it not being fit to eat. The barrel and flour were then taken out of doors and placed in the sun, so that the air could circulate freely around and under it, and after standing thus about 6 hours, it was replaced on the floor and set on two strips of board one inch thick. By this means the flour was wholly restored and rendered good to the last. I could cite many other instances. A. All receptacles for foul air under or near a dwelling should be very closely attended to, and so opened as to be thoroughly ventilated, as the instances cited by our correspondent very fully illustrate.

(29) S. V. C. asks: If a student learns telegraphy on a Tom Thumb electric instrument, will he be able to work an ordinary railroad office in-strument correctly? A. If a student learns to read well by sound, he can operate in any office where sound instruments are used.

(30) A. K. asks: Is the beech tree a nega tive or a positive pole, or is it a conductor of electricity? I lived for 25 years where one fourth of the timber was beech, and never saw one that was injured by lightning. A. The beech tree has no polarity; but it is a good conductor when green and full of sap.

(31) F. C. B. asks: How are those batteries made in which lead is one of the elements, and what is the solution? A. Similar to the Callaud, using sulphate of copper solution.

(32) C J. M. asks: 1. Can you give me directions for making a constant battery for ringing an electric bell occasionally on a circuit of 350 feet? A. Use any form of a sulphate of copper battery. 2. What size of wire, and how much, shall I use on the poles of an electro-magnet. to be operated with the above battery and circuit? A. Use 200 feet of No. 24 insulated copper

(33) E. A. D. says: I wish to deposit copper on a very frail non-metallic substance. I cannot apply plumbago, nor use any composition in which phosphorus occurs. The application to render the article a conductor must be in a liquid state. Is there such an article? A. Have you tried soaking your model in melted paraffin, and then applying plumbago?

(34) A. F. B. asks: 1. What size of insulated wire will give the best effect on an electromag net, with an iron core 34 of an inch in diameter A. It all depends upon what use you wish to put it to. 2. Would an electromagnet made of one bar, bent in the form of a U, be more powerful than one made of two bars, and the ends connected by an armature, other things being equal? A. No.

(35) J. E. M. says: 1. If I have two pairs of magnets, and one pair, placed at a distance of 34 inch apart, will be drawn together, and the other pair will be drawn together if placed 1 inch apart: If both pairs were placed an equal distance spart, say 1/2 inch, would not the weaker magnets be drawn together with as great rapidity as the stronger? A. No. 2. If I were to place permanent steel magnet without a keeper inside a hollow glass globe, and then exhaust the air from the globe, would the attractive power of the magnet remain exactly the same? A. Yes.

(36) J. W. McM. says: I have an electromagnetic machine. The battery consists of two zinc plates with a thin platinum plate between them, and the platinum plate has been destroyed by theacid. Would not a copper plate answer the same purpose? If so, should it be the same thickness as the plathnum one, or thicker? The acid is will not

Scientific American.

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tery? A, Slightly. 3. How long will one of Grove's cells last without being renewed? A. That de-pends upon how much it is used. 4. What is about the cost of a Rhumkorff's coil and condenser? A. From \$300 to \$500. 5. Can I make one myself without machinery to coil the wire on the core? A. Possibly, but it requires a good deal of skill and knowledge to make one, and you would probably find more economical to buy it.

(40) I. M. L. says: 1. I have a line 650 feet long of No. 12 galvanized wire, with 3 relays of 55 ohms each on the line. How many Hill's jars will be needed? A. Three. 2. With a line of a given length, with 3 relays of 55 ohms each, if I replace the relays with 3 of 10C ohms each, will it require more or less battery? A. Less.

(41) W. D. says: A fair trial of galvanized iron for roofs has had very unsatisfactory results in Canada. Under the contracting and expanding 2. I No influence of heat and cold, the cross joints open, and leakage on the first thaw is the result. Even 12... the gutters on mansard roofs part at all the joints, 11... and have utterly failed for the purpose intended, 10.. to the great annoyance of those who have either recommended or used this material. One method 8. . has been to solder and rivet the joints, the rivets being about $\frac{3}{2}$ or 1 inch apart, but in spite of this the seam opens visibly. What is the remedy? A. In this vicinity, tin in small sheets is almost universally used for the purpose. The tin is clinched and soldered in the usual way. The smaller the sheets, the less the effect of the contraction and expansion on the joints. Galvanized iron is used for cornices and other molded work.

(42) A. M. S. says: I have a large New foundland dog who has a constant disagreeable smell. Can you tell me how to remove it? A. Wash him with carbolic soap.

(43) C. W. H. says: We have a copper tank and an ordinary brick and cement cistern for holding water. The water in the copper tank is much softer than that in the cistern. The water in the cistern probably takes up some of the lime from the sides and bottom of the cistern. Can a cistern be covered with silicate of soda or with paraffin, and thus avoid the trouble? A. A coat of hydrau lic cement will be the best remedy for the difficulty.

(44) H. F. N. asks: Is there any substitute for oil for drilling cast steel and wrought iron? A. Soapy water is sometimes used.

1. Is it an established fact that there should be no oil used it, the steam chest or cylinder of an engine? A. No. 2. If grease is needed, which is the est, oil or tallow? A. Tallow.

(45) C. T. asks: Would any mechanical contrivance which supplied the power which kept it in motion be deemed perpetual? A. Yes.

(46) F. W. J. asks: What will weld iron and steel together without the aid of sand or borax? A. Brush clean with a wire brush frequently while heating, and when taken out to weld.

(47) J. P. says: 1.I have an engine of 3 inch es bore by 4 inches stroke and I am thinking of making a boat, 25 feet long x 41% or 5 feet beam, with 2 feet depth of hull. I propose to make a boiler 4 feet long by 22 inches diameter, with a 13 inch flue running the whole length. I set my grate inside the flue to run about 16 inchesback. Shelland flue are of $\frac{1}{16}$ inch, heads of $\frac{1}{2}$ inch, charcoal iron. What steam pressure can I carry? A. You can carry 75 lbs. of steam. 2. At what speed (in still water) can I run? A. Probably 6 or 8 miles per The other engines you describe may answer hour. for a boat 14 to 16 feet long. The inclination of shaftand position of propeller depend greatly on the design of the hull.

(48) W. H. S. asks: 1. In making hydrogen from sulphuric acid and zinc, for an oxybydrogen light, will a plain bottle do for a vessel? A. Yes. 2. What is the proportion of commercial acid to water? A. About 18.5 per cent water.

(49) B. J. says: Please state the diameter of eccentric of engine described on p. 37, vol.32. A. Five inches.

(50) W. W. D. asks: How large a boat could run with side wheels3 feet in diameter, and an engine of 8 inchesstroke by 4 inches bore, with 60 lbs. of steam? A. From 25 to 30 feet long.

(51) W. F. H. asks: 1. How high can wa ter be raised in a cast iron pipe, a vacuum being produced in top of pipe by the escape of steam, as in an ordinary steam siphon? A. From 20 to 25 feet. 2. What length of time is required to raise water to any given hight by such means, steam being at 75 lbs. pressure in boiler, and the pipe, es diameter? A. Less than a minute, with plenty of steam. 3. Is this way of producing a vacuum economical? A. Not yery.

(55) J. J. H. asks: 1. By what standard are shotgunsgaged? A.

No. of gage.	Diam.of box in inches	No. of gage	box i	am. of n inches.
5	0.98	19		0.62+
6	0.92+	20		0.63+
7	0.89	21		0.63
8	0.84+	22		0.62+
9	0.80+	23		0.61+
10	0.79	24		0.61
11	0.76	25		0.60+
12	0.75+	26		0.59+
13	073+	27		059
14	071+	28		0.28+
15	070+	29		0.22+
16	0.68+	30		0.57
17	0.67+	81		0.56+
18	0.66	32		0.55+
2. By what	standard are	shot numbe	red?	А.
No. Diam	eter No.	Diameter 1	No.	Diameter

in inches.	ininches.	in inches.
0.05	5	B B0·18
0.06	40.13	B B B
	8	T0*29
	20.15	T T 0.21
	1	F0.22
0.16	B0.17	F F0.23
0.11		

3. How are the qualities of gunpowder numbered? A. Each maker has his own standard. The United States standard is as follows: Musket, grains between 0.03 and 0.06 inches. Mortar, grains between 0.06 and 0.10 inches. Cannon, grains between 0.25 and 0.35 inches. Mammoth, grains between 0.60 and 0.90 inches.

(56) F. H. F. asks: Please give me a rule describing a heart cam that will give a perfectly uniform motion and at the same time be easily driven? A. Divide the length of stroke, A B, into any number of equal parts, and describe circles through the points of division, from C, the center



on which the cam turns. Divide the outer circle into twice as many equal parts as A B was divided into, and draw radii from the points of division. The points in which these radii cut the corresponding circles are points of the cam.

(57) A. L. F. asks: How many horse power will an engine of 18 inches cylinder by 3 feet stroke at 60 turns a minute, with steam cut-off at 34 stroke, and pressure at 60 lbs. per square inch, give? This question can only be answered definitely by experiment. All we could do from the data sent would be to guess at the mean effective pressure. You can do this if you like, thus: Product of mean effective pressure in pounds per square inch×area of piston in square inches×speed of piston in feet per minute+33,000 will give the horse power.

(58) J. H. K. asks: How can I find the logarithm of a number, say 25, without using a book of tables? A. Theformula is as follows: Let a=

any number. Then
$$\log\left(\frac{a}{a-1}\right) = 0.868589 \times \left\{\frac{1}{2a-1} + \frac{1}{2a-1} + \frac{1}{2a-1} + \frac{1}{2a-1}\right\}$$

+ $\frac{1}{3\times(2a-1)^3}$ + $\frac{1}{5\times(2a-1)^6}$ + $\frac{1}{7\times(2a-1)^7}$ + etc. the particular case mentioned, log. 25=0.868589>

 $\left\{\frac{12}{13} + \frac{1}{3} \times \left(\frac{12}{13}\right)^3 + \frac{1}{5} \times \left(\frac{12}{13}\right)^6 + \frac{1}{7} \times \left(\frac{1}{13}\right)^7 + \text{etc.}\right\}$ You can work this out if you feel inclined; but we imagine that you will not care to use this for mula for finding the logarithms of many numbers.

(59) A. L. K. says: 1. There is a sawmill with two engines and two sets of bollers, each set having an iron smoke stack 65 feet high x 56 inches diameter. One set of boilers have two flues in each the other set are plain cylinders. All burn saw dust. The latter have good draft, but the other in heavy weather, will not keep up steam well. The question is whether, if one of the exhaust pipes (7 inches in diameter) is inserted in the flue boiler stack, the draft will be improved. A. It is black on the inside, in an aperture in the top of very probable that the change will improve the draft 2. If so, at what distance from bottom should the exhaust enter the stack? A. Insert the pipeso that it discharges a little above the top of the boilers. (60) F. J. asks: 1. What is the best size, form, and material for a boiler for an engine with cylinder ¾ inch diameter by 1¼ inches stroke? A. Make it of copper, upright, with a flue in the center. 2. What is the best manner of heating? A Use charcoal for fuel.

(63) O. P. says: Two pipes, the shells of which are of equal thickness, the diameter of one being one foot, the other one hundred feet, the pipes being filled from the top by forcing water in: which will burst first, and at what hight? A. If the material in the pipes is of equal strength throughout, the largest pipe will burst first, as the strength of a pipe to resist rupture varies inversely as the diameter; and it will burst at the bot-tom, as the pressure is greatest there.

(64) C. P. W. asks: Having had a controversy about balanced slide valves, I write for your opinion. If we place one valve, as usually used, over the ports of an engine, and make an exact duplicate and attach it to the other, the two valves being back to back, so that one will make a steam joint on the cover of the steam chest while the other makes a similar joint over the ports, will we have a balanced port? A. We think not, if you mean a perfectly balanced one.

(65) E. M. says: I have an engine with a 21/2x5 inches cylinder, capable of running from 400 to 500 revolutions per minute. What should be the diameter and pitch of screw, and the length and width of a boat, for such an engine, and how much water ought she to draw? A. You can make the boat from 15 to 18 feet long, 5 to 51/2 feet beam. Propeller, 22 inches diameter, with 21/2 feet pitch. Boiler, 2 feet diameter, 3 feet high.

(66) W. S. asks: Can water be injected in to a boiler above the water line? A. Yes. 2. And what is the lowest pressure by which an injector may be worked? A. This will depend upon the construction of the injector, several forms being in use.

(67) H. W. S. asks: 1. I am about to put in a turbine water wheel, using 75 inches waterin a circular sawmill, under 16 feet head; the wheel will be 40 feet from the dam, and the water conducted to the wheel through a round tube of 3 feet internal diameter, the tube sloping down to the wheel. In closing the gate of the wheel suddenly, will the momentum or shock, caused by the sudden stoppage of the flow of water, strain or injure the tube, and will a safety valve be necessary near the wheel? A. In closing the gate with moderate speed, no safety valve will be necessary; but when the closure takes place instantaneously, you can provide a stand pipe, three or four feet high, containing air, which will act as a cushion. 2. Would the 3 feet diameter tube be large enough for a wheel using 75 inches water, under 16 feet head? A. Yes. 3. Would friction gear answer well to run an edging saw for edging stuff from 1 to 4 inches thick? A. Yes. 4. My neighbor has a turbine wheel 4 feet in diameter, venting 200 inches of water, under 17 feet head, taking the water through an incline tube of 3 feet internal clameter and 200 feet long; the wheel under this head is rated by the builder at 70 horse power, but with the gate wide open it will not run one run of stones. What is the matter with it? A. The wheel may be choked, or some of the parts jammed.

(68) F.W. asks: I am about to put up a reenhouse; and in constructing the sides and ends I propose to place, on the outside of the posts and studding, one inch plank, to this put on a sheeting of tar paper, and on this ordinary flooring. Will this answer the same purpose, in every espect, as putting the inch boards on the inside of the posts, the flooring on the outside, and fill in the space, of say 4 inches, with sawdust? A. The sawdust filling is likely to be the warmer of the

(69) L. R. B. asks: What power does the ngine whose pitman is below the center of the axles exert on a locomotive? I claim that the engine whose piston is moving ahead and whose crank wrist is above the center of axles is the only one which is doing any service. A. The effect is the same, whether the crank is above or below the center.

(70) E. R. M. asks: 1. How can I make a battery that will last a good while without needing renewing, and be always ready for use? A. The Minotti is one of the best forms of battery for this purpose. 2. Of the ordinaryliquid batteries, which is the most powerful? A. The Grove or Bunsen is the strongest.

(71) C. L. T. asks: How are letters placed on glass in street advertising by the calcium light? A. The plain letterings are painted or written, and the more elaborate ones are photographed, on the 218.88.

(72) T. A. P. asks: How can I construct a mall and cheap camera obscura for sketching objects at short distances? I have a common two inch burning lens, and a plane reflector,4 by 6 inches. Will these answer? A. These will answer the purposevery well. Take a small close box painted

thin plate of silver.

(37) J. E. L. says: I have a hot air furnace which warms 16 rooms. It is set in brick double walls, the inside wall being 16 inches from radiator. I would like to sometimes draw the hot air from the hall : so I put a 10x14 register and a 9inch tin pipe down to the bottom of the outside wall, and a damper in the outdoor cold air box. I closed the damper to see if it worked, but it did not then I closed the registers, but I left 3 openings, and it will draw the air from the hall through one of the hot air registers. A. It is necessary to keep a free circulation of air between the rooms and hall; the air will then descend through the lowest register.

(33) C. W. E. asks: What substance is the best non-conductor of magnetism? A.We do not know of any.

(39) A. N. W. asks: 1. What is the most lasting and cheapest battery that I can work an alarm bell with, with No. 20 fine copper wire in a circuit of about 100 feet? A. Smee's or Léclanché's. 2. In using one of Grove's cells, if I take out the platinum plate and amalgamated zinc, will themixture of the two acids impair the strength of bat | y of the compressing pumps.

(52) J. M. savs: 1. I intend building a scow 90 feet long x 20 feetwide, with stern wheel. What size of engine would you advise me to get? A. An engine with cylinder 15x15 will do. 2. What size of stern wheel will be necessary, the above mentioned scow drawing 4 feet when light, and running at 6 miles per hour? A. One of from 8 to 10 feet diameter.

(53) C. D. P. asks: We wish to warm a church, 40 feet by 70 feet by 18 feet high, with a furnace in the basement. The smoke flue will run nearly horizontally for about 20 feet from the hull.

furnace, where it enters the perpendicular flue. What should be the dimensions of the horizontal smoke pipe and of the chimney? A. The smoke pipe may be 10 inches in diameter, and the chimney flue 12 by 12 inches.

(54) J. W. W. asks: To what depth can a diver descend in the Atlantic Ocean, using a diving bell? A. We could not fix the limit. It would depend on the weight of the bells and the capaci-

(61) J. P. asks: Will it require more power to drive a paddle boat, of two hulls, like the Castalia, than one large hull of the same draft and beam? A. It will take more power for the double

(62) J. M. asks: 1. About what length, when folded up, would Peaucellier's parallel motion have to be to describe an arc of a circle of 5 feet radius? A. Between 7 and 8 feet long. 2. In what work are quarter twist bells illustrated? A. In Rankine's "Machinery and Millwork." 3. Are Rankine's works of any use to any one except those who understand algebra? A. In "Rules and Tables" scarcely any of the rules are expressed algebraically.

which place your lens, and over this your reflector at an angle of 45°.

What is the best recipe for green ink? A. Digest 1 part of gamboge with from 7 to 10 parts of blue ink.

(73) J. E. B. asks: Where oils, reduced or cut with alcohol, are added to plain sirup, how can I prevent the mixture from becoming cloudy? A. The sirup does not dissolve freely in your oil and alcohol, and the remedy is not to add them.

(74) G. B. A. asks: What is the best prepa ration for rendering cotton fireproof? A. A solution of tungstate of soda is highly recommended.

(75) D. B. B. says, h reply to J. G. R., who sks how to construct a cheap oxyhydrogen blow pipe: Take a round piece of wood about 4 inches long and 1 inch thick, and two brass tubes about 6 inches long; to an end of each of the tubes attach a gun nipple. Bore holes in the wood obliquely, and of such a diameter that the brass tubes, when inserted, do not move easily. Bring the gun nipples to about three eighths of an inch apart. The bore of the gun nipple of the hvdrogen tube must be the larger, so as to allow twice as much gas as comes from the oxygen tube to escape.

(76) A. W. L. says, in reply to W. S., who asks how to kill or drive off fleas and sand flies: Let him procure crude petroleum, just as it comes out of the wells, and apply it to those parts of the body which are exposed to the attacks; and he will not be much troubled by them, if he is even so much as molested. On Lake Superior, mosquitoes and sand flies (the latter so diminutive that they are scarcely visible) will not bite us when we have black oil, as it is termed, on our hands and faces; and it is a never failing remedy for the extermination (after one or two applications) of bugs from household furniture. Of course when used on the person the odor is not very pleasant; butin furniture it is not noticed after a few days have passed.

(77) D. R. K. says: H S. C. asks how much fuel is required to melt 1 tun of iron. You an-swer: "Probably 2 or 2½ times the iron." We have an ordinary cupola, and we can melt 2 tuns iron with 800 lbs. Lehigh coal.

(78) M. W. M. says, in reply to H. B, who ashe: Does the hair grow after death? Steele's "Physiology" says that the hair is said to grow after death. This is due to the fact that, by the shrinking of the skin, the part below the surface is caused to project, which is especially noticeable in the beard.

MINERALS, ETC.-Specimens have been re ceived from the following correspondents, and examined, with the results stated:

C. D. H.-It is an impure quartz sand.-L. J. S. It is similar in composition and properties to full-er's earth. Your clay was probably not of the same character as ordinary clay, which is a hydrated silica of alumina containing some oxide of iron. Other substances were most likely present. Lime could be mixed with clay so as to be impervious. But the hydraulic lime will only be of good quality when the lime and clay are mixed in proper proportions and calcined at a proper temperature. The wet soil you mention became pulverized owing to the loss of water on drying, which is taken up aga'n on wetting, the cohesion of the substance being at the same time destroyed.-G.D. M.-It is partly decomposed muscovite, a variety of mica.-F. McC -As to your specimen of cheese and the poisoning resulting therefrom, similar cases have been brought to our notice where persons have become sick after eating cheese, and pieces of cheese in character similar to that forwarded have been examined without yielding traces of ordinary poisonous bodies. It would facilitate an explanation of the unwholesome char acter of such cheeses if it were known whether the milk was of proper kind, or whether there was anything unusual in the processof cheese making. In some cases persons have been poisoned by drinking milk from a oow which had eaten plants capable of yielding poisonous principles, the animal itself being unaffected.-W. J. L.-No. 1 contained oxide of iron, alumina, and ellica, with a small amount of carbonate of lime. Also lime, potash, and soda saits. The solubility of these saits imparts a saline taste to the powder. No. 2 differs from No. 1 in the absence of lime and alumina, and contains a trace of oxide of iron. It has a considerable amount of soda and potash salts, and also baryta. They exist partly in combination with sulphuric acid, as sulphates.

J. E. M. asks: What do cake bakers put in their icing to make it hold the shape?-J. S. B. asks; Is there a good recipe for the cure of chicken cholera?-J. A. Jr. asks: How do the English prepare and finish bone, producing a beautifully smooth surface?-J. R. S. asks: Can blindness in a horse, caused by having blind teeth, be cured?-H. E. W. asks: Is lime a year old asgood for tanning as that made three months ago ?-S. D. P. Jr. says: I have a new carriage from which mud has taken off the varnish in places. Can I restore the work to its original appearance without rubbing down and revarnishing?

COMMUNICATIONS RECEIVED.

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

On the Earth and the Moon. By M. D. H. On Botanical Classification. By J. W. On Kaolin in America. By F. L. J. On Frozen Water Pipes. By H. S. C. & Co., and by T. G. B. On the Age of the World. By D. C. T. On the Sun's Orbit and Rate of Motion. By J. H. G.

On the Flight of Birds. By R. O. D., and by F. G. F.

Scientific American.

the best hydraulic elevators? Who makes a rellable rain gage? Who makes an effective caloric engine? Who sells milk-condensing apparatus? All such personal inquiries are printed, as will be observed, in the column of "Business and Pe-sonal," which is specially set apart for that furpose, subject to the charge mentioned at the bead of that solumn. Almost any desired information can in this way be expeditioualy obtained.

[OFFICIAL.]

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Rocker, child's, B. E. Merembeck 161,537	On filingeach application for a Patent (17 years)
Koller, Beld, A. Hilts	On issuing each original Patent
Roofing tile, S. Mills	Un appeal to Examiners-in-Chief
Sait brine, concentrating, W. Harrison 161,412 Sash weight, E. J. Sprague	Un application for Release
Saw gummer, D. Sattler 16, 557	(In filing a Disclaimer
Saw, jig, G. S. Williams	On application for Design (7 years)
Sawingmachine, scroll, G. S. Young	Un application for Design (14 years)
Scale beam, T. Tebow	CANADIAN DATENTS
Screw, wood, A. Cummings 161,539 Screw, wood, Litchfield and Boeklen161,528, 161.529	LIST OF PATENTS (BRANTED IN CANADA
Screws of rolls, operating, J. S. Worth 161,465	Manor 00 to Amore 1 1000
Seal, metallic, E. J. Brooks 161,473 Sewing machine, H. A. Blanchard. 161,471, 161,473	MARCH 25 10 APRIL 1, 1870.
Sewing machine, J. H. Burr 161,47	4.536J. A. Pease, Boston, Mass., U. S. Lamp. March
Sewing machine, L. Chevallier 161,483 Sewing machine, O. Farrar 161,993	28, 1875.
Sewing machine attachment, D. M. Mellox 161,550	graph. March 27, 1975.
Sewing machine button hole, J. McCloskey 161,58 Sewing machine fast guide C. Mingont	4,538J. A. McMartin, Montreal, P. Q. Pump. March
Sheet metal die, N. C. Stiles 161,45	4,539Wm. Bell et al., Guelph, Ont. Tubes for reed
Shoe, C. Perley (r)	organe. March 29, 1875.
Shoes, exhibiting, R. T. Leaverton	4,540J. H. Bardarick, Caxo, Me., U. S. Slate. March 5. 81. 1875.
Shoemakers, awl for, S. A. Smith 161,56	4,541E. W. Phelps et al., Newark, Ohio, U. S. Har.
Shutter and blind fastening, C. H. Craig 161,32	4.542J. Sugden et al., Lawrence, Mass. II. 8. Horse
Shutter fastener, C. Russell	check. March 31, 1875.

On a Sunset in Florida. By T.A

A iso enquiries an danswers from the following

F. A. L. Jr.-J. N. Q.-O. A. F.-S. T. W.-F. C.-G. A. B.-N. D.-S. P. W.-L. V. R.-E. C. T.-J. H. -E.A.M.-G.W.M.-H.F.J.-P.S.-A.V R. S. R.-C. S. P.-E. P. L.-M. B.-S. A. H.-C.F.H.

File

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Gas

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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 al ways be given.

Enquiries relating to patents, or to the patents-b'lity of inventions, sasignments, 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: "Whose feed water heater is the best? Whomakes transparent rubber, for toy balloons, Gat etc.? Who sells talking machines? Whose is the best method of shorthand writing? Who makes | Gen

Excavator, M. E. Lasher 161.524	Snutter lastener, C. Russell	check. March 31, 1875,
Faucet, beer, Miller and Powell 161,427	Shuttle box mechanism, G. Crompton 161,487	4,543T. Hodgson, Amherst, Nova Scotia. Circular saw
Feed cutter, J. A. Schwerdt	Shuttle mechanism, G. Crompton 161,488	guard. March 29, 1875.
Fenders, etc , feet for, F. S. Bissell 161,470	Slicer and corer, apple, Siler & Brooks 161,359	4,544J. Smith, Brantford, Ont. Stove and grate heat-
File wrapper, Grinsted and Da ling 161.506	Spinning ring die, Forehand & Wadsworth 161,834	er. April 1, 1875.
Finger ring box cushion, B. L. Dennison 161,498	Stamp, hand, J. Sigwalt, Jr 161,450	4,545E. A. Hornbastel et al., Guelph, Ont. Wood and
Fire arm. breech-loading, W. M. Scott 161,559	Steel, manufacture of, J. Evquem 161,396	metal tap. April 1, 1875.
Fire arm. magazine, R. S. Chaffee 161.480	Stereotype block register, A. J. O'Shea 161,542	4,546F.Marsh, Montreal, P. Q. Stop and waste cock.
Firearms, lock for, J. H. Lester 161.343	Stove, E. Smith (r) 6,363	April 1, 1875.
Fire box door ring, G. F. Chalender 161.481	Stove, magazine, E. Bussey 161,479	4,547G. Morgan, Andover, N. H., U. S. Wedge cut-
Fire extinguisher, chemical, A. Grav	Stump extractor, W. H. Fulton 161,500	ter. April 1, 1875.
Fire extinguishing apparatus, J. H. Connelly 161.388	Sugar, manufacturing oard, F. O. Mathiessen 161,424	4,548G. B. Dixwell, Boston, Mass., U. S. Steam en-
Floorand ceilings, fire-proof, L. T. Scofield 161,356, 161,:57	Table, convertible, F. A. Gilbert 161 502	gine and boiler. Aj ril 1, 1875.
Flowers, artificial, S. Orth 161,850	Table, folding extension, A. W. Fay 161,497	4,549I. Bridgman, Toronto, Ont. Railway cars. Ap-
Forge blower, L. H. Watson 161.581	Table implement. O. W. Taft 161,573	ril 1, 1875.
Fork, horse hay, E. V. R. Gardner 161,404	Thill coupling, A. W. Forwood 161,402	4,550D. D. McMillan, La Crosse, Wis. Self-regulating
Fracture splint, Brown and Davis 161.323	Thill coupling, J. Walker 161,366	gas burner. April 1, 1875.
Fruit gatherer, N. Lash 161.523	Thread, twine, etc., making, Sutherland et al 161,453	4,551J. W. West, Boston, Mass., U. S. Spooling ma-
Fulling mill, R. Eickemeyer (r) 6.358	Tile molding machine, C. Diebold 161,391	chine. April 1, 1875.
Furnace for steam generators. H. M. Smith 161,961	Tippet and muff, combined, J. Engel 161,882	4,552 - J. Porth et al., New York city, U.S. Nail ma-
Furnace, hot air, W. McFarland 161,535	Tobacco machine, lump, D. W. De Forest 161,331	chine. April 1, 1875.
Furnace of bakers' ovens, Crumbie and Donald 161,489	Towel rack, folding, J. T. Sherwin 161,560	4,553H. Bland, Liston, Eng. Sewing machine and ac-
Furnace, pipe welding, J. Fieldhouse 161,401	Toy block, C. M. Crandall (r) 6,356	cessories. April 1, 1875.
Fuse primings, electric, G. M. Mowbray. 161,840, 161,841	Toy pistol, T. Case 161,826	4,554 -W. A. Holwell, Montreal, P. Q. Sash regulator.
Gasretort, W. Harkness 161,410	Trap, fly, H. B. Earing 161,44	April 1, 1875.
Gasretort, W. F. Weible 161,869	Trap, fly, D. E. Roe 161,854	4,555F. Cuny et al., Ottawa City, Ont. Scrubbin
Gate, farm, S. R. Holt 161,887	Trimming, J. T. Ross 161,552	brush. April 1, 1875.
Generator, steam, S. R. Mathewson 161,423	Truck, hand, H. Parker 161,486	4,556 and 4,657I. De Witt, Grand Ledge, Mich, U.
Concretene fusible pin stonates T. F. Mahones 161 493	Truss. J. L. Rowe	Washing machine. April 1, 1825.