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W. A. A. will find directions for molding rubber on p. 283, vol. 29.—R. T. T. will find full directions for lacquering on p. 364, vol. 30.—D. T. is informed that we have repeatedly cautioned our readers against being deceived by mineral rod men.—B. F. T. will find directions for enameling cooking utensils on p. 187, vol. 27.—D. S. Jr. will find a full description of an induction coil on p. 261, vol. 25.—W. U. L. will find an explanation of an ice boat sailing faster than the wind on p. 43, vol. 28.—J. M. will find rules for proportioning safety valves on p. 368, vol. 29.—G. W. B. will find directions for repairing meerschaum on p. 202, vol. 27.—J. McD., who asks as to fulminating powder, must send his address.—C. H. C. will find an answer as to transparent colors on p. 390 of this issue.—W. C. will find directions for cleaning brass on p. 102, vol. 25. For dyeing cotton goods, see p. 405, vol. 29. O. C. on the circle squaring question is right, and the "Professor" wrong.—J. B. H. will find a recipe for grafting wax on p. 348, vol. 24.

J. A. L. says: I have an engine of 24 inches stroke, with a direct acting slide valve, which cuts off at 16 inches. I wish to change it so as to make it cut off at 20 inches or at full stroke. How can I do it? A. More data would be required to enable us to answer this question. Your best plan will be to refer the matter to an engineer.

H. G. D. asks: 1. Have tubular grates, carrying a current of water from the pump to boiler through them, ever been in use or been patented? A. Yes. 2. If a tube carries a current of water from the pump of an engine through the firebox to the boiler, and the current should cease by stopping the pump, would the water divide or be driven out of the tube by the great heat, the pressure of the boiler being on the tube to the check valve below the fire? A. The tubes would soon be filled with steam.

D. asks: Why does chloral hydrate decompose the cork of the bottle? A. We have kept a large quantity of chloral for several years in a glass-stoppered bottle, which is the proper plan. With cork, it forms by decomposition certain substitution products which gradually destroy the cork.

J. B. R. asks: 1. Is there any practical method of getting an electric light of even moderate intensity without using carbon points? If there be, will you tell me where I can find a description of it? A. See description of Mr. A. Ladignin's electric lamp, p. 387, vol. 29. 2. Can frictional electricity be induced in sufficient quantity to create light? A. Yes, but only with considerable expense and complicated apparatus, and even then the experiment is not free from danger.

A. A. asks: 1. When a person is poisoned by arsenic, what parts of the body are first and most affected, and how does this poison operate? A. It first affects the stomach, producing nausea, pain, burnings, vomiting, etc. Besides these local effects, there are others of a general character, such as general suffering, heat, and effect upon the pulse and respiration. 2. Does arsenic operate on the body in the same way that quicksilver does? A. Quicksilver is not a poison at all. It was formerly frequently administered as a purge.

J. O. R. asks: Is there any mode of intensifying one pole of a battery in relation to the other? For example, I would like to increase the attraction of the negative pole, without changing the positive. A. This cannot be done.

Y. L. asks: How can I distill water for making sensitized paper with? A. The water derived from melted ice will be sufficiently pure if you filter it.

C. S. P. says: 1. I tried making ink as per formula on p. 160, vol. 27. A druggist tells me there is no such thing as sulphate of indigo: so I dissolved indigo with sulphuric acid. Although I have used much more indigo than recommended and as little acid as possible, my ink is very pale when first used. What can I do to bring up the color? A. Your mistake was in the character and amount of the acid which you employed. Run up in a porcelain mortar 1 oz. of indigo with 6 ozs. of fuming oil of vitriol. Ordinary oil of vitriol may also be employed to dissolve indigo, but more than double the quantity of such acid is required, and it must be heated to 130° or 140°. If a sufficient amount of acid be employed, almost the whole of the indigo may be dissolved; and if the liquid be allowed to stand for a few hours, it will remain clear on being diluted. It is then filtered, and the filtrate will be an intense blue. 2. What is white copperas, as per p. 203, vol. 29? A. Copperas, when heated moderately, parts with six sevenths of its water of crystallization and becomes grayish white. This is probably what you mean, and is the ferrisulphate esiccata of the pharmacopœia.

R. L. asks: 1. What amount of water must I put in aquafortis for washing down brick walls? A. Four gallons of water to one of aquafortis. 2. How can I color cement to make it black? A. Try lampblack. As to power of engine, see our recent issues.

J. E. B. says: I have a small stationary engine, 2 1/2 inches. The cylinder heads are 1/4 inch thick, and the crank shaft is 1/4 and 1-16 inch in diameter. The steam chest and cover are held on by four 1/4 inch bolts. The steam chest is about 2x3 inches, the cover being 3-16 inch thick. Would the above engine bear 120 lbs. steam and give power enough to drive a small road steamer by gearing from crank shaft to driving shaft? A. The engine is rather light for such work; but if its well built, it might answer.

J. J. asks: Can two boilers of different size and style be set beside each other, connected by the water pipe and steam pipe, and have the water always at the same level in each? For instance, take one boiler of 30 inches diameter with 30 three inch tubes, and one boiler 4 inches diameter with 2 ten inch flues. Will the boiler which generates steam most rapidly force the water from itself to the other? A. The arrangement might possibly be made by very careful management, but it would be very dangerous, and should on no account be permitted.

B. R. asks: How can I propel a boat for hunting wild geese (boat is 12 feet long) without causing disturbance enough to scare the geese before getting within gunshot? A. Use a propeller about 10 inches in diameter at least. It would be necessary to bang it under the boat, so as to get sufficient immersion. If you build such a boat, we are sure that our readers will be interested in hearing of the result.

S. H. P. says: 1. Two locomotives that will pull 20,000 lbs. each are hitched together and started in opposite directions. What is the strain on the shackle between them? A. 20,000 lbs. 2. Which engine will pull the greatest load, one with 4 drivers with 18 tons on drivers, or one with the 18 tons on 2 drivers? A. If the weight is properly distributed in each case, there will be no difference in the tractive force. 3. Will an engine weigh any more pulling than not pulling, providing she pulls on an exact level with her cylinders? A. No.

R. & W. T. asks: Is there any way to render paper permanently translucent or transparent without the use of grease or acid? A. We know of no way of doing this.

T. asks for a recipe for covering the inside of iron water pan in a house furnace. By the evaporation of water by heated air, oxidation is carried on very rapidly, and the pan becomes caked and filled with rust, which, if the water happens to be impure, emits a foul odor. A preparation that could be laid on the inside of the iron pan, and not be itself affected by the action of heat or water, would be of widespread benefit. A. The lining which is generally used and answers these requirements is a lining of porcelain. See p. 187, vol. 27.

M. says: In your answer to R. J. H., No. 21, you say: "Electricity is a motion transmitted from particle to particle of the wire." This might seem probable where only an ordinary Morse circuit is worked, but when a wire is duplexed, that is, worked with Stearn's duplex instruments, in opposite directions at same time, how is it possible? A. Various theories have been advanced; but the fact of the matter is that until the exact nature of electricity is known, all such questions as yours will have to remain unanswered.

C. E. T. says: A mirror displayed one morning an unusual phenomenon. Its surface was embellished with a crystallization of some volatile substance, which was deposited on over half its area, and which resembled the frost on the window panes. There are no sinks or drains from which gases might arise in the room. Several rooms in the building contain similar mirrors, but only mine shows signs of the deposit. A. The surfaces of some specimens of glass are more hygroscopic than others, and it might have been due to the condensation upon such a surface, the form of the apparent crystallization having been determined by some structural peculiarity of the glass.

E. J. W. asks: 1. In your opinion how long would a plate of pure cast zinc, one fourth inch thick, last if exposed to the elements? A. Very many years. 2. Is the coating of oxide formed by the atmosphere a perfect protection from the elements? A. It is generally regarded as excellent, but we have no authority for stating that it is perfect. 3. Is the oxide soluble or insoluble in water? If insoluble, will it oxidize deeper after the coating has once formed? A. Some samples of oxide of zinc are sensibly soluble in water, others are not, according to the method of their production. However, water never dissolves more than a millionth part of its weight. 4. Has pure zinc ever been known to rust? A. It oxidizes when exposed to a moist atmosphere. 5. When exposed to the elements, which is the most enduring, silver or zinc? A. Silver is not oxidized at any temperature either in a dry or moist atmosphere; zinc is. 6. Will pure zinc ever change in color after it has become exposed to the atmosphere and become fully oxidized? A. It should not do so.

H. L. asks: What is indigo, chemically? A. Indigo consists of a number of substances: 1st, mineral matters of various percentages; 2d, indigo glue; 3d, indigo brown; 4th, indigo red; 5th, indigo blue, or indigotine, C₁₆H₁₀N₂O₂, the peculiar dye material for which the indigo is valued.

E. asks: What is the best battery for using on the animal organism, as in cases of poisoning? A. Batteries alone are not used for medical purposes. You had better use a small coil.

J. A. R. asks: Will the lye from wood ashes lose any of its soap-making properties if left several days before using? A. No, especially if not exposed to the air.

T. O. T. asks: Can you tell me of some simple method of exhausting the air in a small chamber 6 inches by 6, fitted with two airtight faucets, one on each side? How can I compress into the same chamber two or more atmospheres? A. There is no simpler method than that of using an exhausting and condensing air syringe.

W. P. B. asks: 1. Where can I send and get samples of the different woods? A. Not offered for sale; collected and prepared by private collectors. 2. Can you tell me a good work on fossils? A. Dana's "Manual of Geology" contains the best general account of fossils, and the volumes devoted to palæontology, of the various geological surveys of the States and Territories, the best particular descriptions. 3. Can you name any work on derivative woods? A. None having this title. 4. Can you give me the address of Dr. I. I. Hayes, the arctic explorer? A. We believe it is Philadelphia, Pa. 5. For what and how is gun cotton used? A. Gun cotton is advantageously used in blasting, being exploded by the electric spark. Also as a substitute in some cases for fulminating mercury in gun caps, when mixed with chlorate of potassa. 6. Was the steamship President, which was wrecked in 1841, an American or an English vessel? A. American. 7. Are the lumps and bogs in wet places the result of deposit? If not, what causes produce such formations? A. Deposition of silt, and the accumulation of vegetable growth in suitable places. 8. Can you name a work on the stuffing of birds and animals? A. See the instructions published by Smithsonian Institution. 9. In putting up alcoholic specimens, is pure alcohol used? A. Yes.

N. A. S. asks: How can I bleach wood tar? A. Wash repeatedly with caustic soda, water, and oil of vitriol.

M. F. J. asks: Can you give me a recipe for dissolving copper wire in some kind of acid? A. Dissolve 1 lb. of copper in 2 1/2 lbs. of strong nitric acid, which has been previously mixed with 3 1/2 lbs. of water. On crystallizing out the resulting body, you should obtain nearly 3 lbs. of nitrate of copper.

C. M. asks: Is there any substance which can be poured into a type metal mold, get hard, and have the same color as ivory? A. Tolluichloride of zinc of 50° to 60° Baumé, add 3 percent of esaluminac then add zinc white until the mass is of proper consistency. This cement may be run into molds, and when hard becomes as firm as marble.

J. F. B. says: 1. I have contended with many friends in Nevada that the ability to frost at any time during summer, near the streams, is mainly due to the lands being saturated with snow water, and not unfrequently overflowed. I find by experiment that the water flowing down these valleys always maintains its level from one side of the valley to the other, no matter how wide; and I also find that there are veins below the surface of the lowlands which convey the water from the streams or main channels to all points in the valleys, according to its level in the streams. If we dig for water, a half mile or more from the stream, we are always sure to find it when reaching the level with the main stream, and this water will rise and fall as the stream rises and falls; and these streams are exceedingly crooked, consequently the water passes off slowly, very frequently overflowing its banks. Now I argue that, if these streams are straightened, the water would pass off more rapidly and not fill their channels by four or five feet, thus leaving the lands high and dry, allowing them to become naturally warmed by the heat of the summer's sun; while the frosts, with the damp and chilly nights, would disappear, and the lands become more adapted to the cultivation of tender plants; but at present, these lands, rich with alluvium, are always during the summer months saturated to their surfaces with snow water, and farming is not a success in consequence of frosts. I am speaking more particularly of the valley of the Humboldt; and I also maintain that these lands, drained as aforesaid and warmed by the general rays of the sun, would not be frozen by the influence of the surface irrigation. Are those ideas in accordance with scientific principles? A. Your ideas seem entirely reasonable. 2. In drinking anything hot, we naturally suck wind into the mouth and swallow; does this wind assist in filling the stomach? If so, then we cheat ourselves of half our meals. A. The wind goes into the trachea, not into the œsophagus. 3. If the dead were each incased in an airtight sarcophagus, and buried, would not the process meet the demands of those who are becoming alarmed at the present system of burial? A. No. 4. Is there any book or series of books published which contains the constitution and codes of all the different States in the Union? A. We know of no book of this kind.

B. L. asks: What ingredients shall I use with lime to color a new brick wall before tuckpointing it? I want the color of the best red brick, to retain its color and not wash off in a wet climate. Can such a composition be made without lime? A. Take a light colored cement and stain it with Spanish brown or Venetian red, or with a little of each, to produce a color to suit; if too dark, mix with lime to make it lighter, and apply as a wash. But this will give a rough appearance suitable for rear or side walls only, and hardly fine enough for front.

J. P. S. says: 1. I am running light machinery with rented power; the main shaft is driven by a 40 horse engine and makes two hundred revolutions per minute. I use a three inch belt from a 20 inch pulley or main shaft to a 15 inch on my countershaft, and I have plenty of power. What size of engine would I require to drive my countershaft? A. If you are using all the power transmitted by the belt, it would be well to put in at least a three horse engine; an answer to the kind must, however, be very indefinite, as an actual test is the only sure guide. 2. What is the new steam hammer at Woolwich, England, used for? A. For forging guns and armor plates. 3. Is there any kind of acid that I could soak garden peas in to kill the bugs and not destroy the growth of the peas? A. We do not know of any. 4. How can I soften bone so as to cut it easily, and so that it will get hard again? A. We do not think that it can be done with ordinary bones.

R. D. B. asks: 1. Is there a saving of steam by just opening the throttle valve enough to let the engine run at full speed, or is it better to open it wide? The engine has a governor. A. If the governor controls the speed of the engine just as well with the throttle wide open, there will be little, if any, difference. 2. How can I make a red or brown paint for steam pipes, that will not burn off? A. There is a very good material for such purposes called black varnish, made from petroleum, which can be purchased ready for use.

B. asks: What is the cost of building a first class Pullman palace car? Has a car already been built at a cost exceeding \$50,000? A. We believe the average price ranges from \$30,000 to \$35,000. The most expensive car of which we have heard costs about \$50,000.