

Very little progress has been made in tempering copper equal to the asserted claims referred to the prehistoric Egyptians. Although parties in the United States claim to have hardening processes for copper, there appear to be no claims for making copper edge tools that will compare with steel. We have made bronze compositions of pure copper and tin that made fair cutting tools, such as knives and cold chisels, that would cut wood, marble, and the softer metals, but when you come to strike into a granite or syenite block, the chisel is not there. We shall be pleased to have a specimen of your hard bronze that is a cutting tool.

(5547) T. T. H. says: Will you please let me know what horse power I can get 80 feet from the boiler through a 1/4 inch pipe with 5 ell on in the length with 60 pounds pressure at the boiler? A. You should be able to obtain from 8 to 10 indicated horse power with the pipe as stated, if well felted.

(5548) A. G.—Compressed air jets have been proposed for propelling boats.

(5549) T. H. M., Jr., says: 1. I want to know if one force pump will pump water out of three wells. The water is supposed to be 10 feet from the surface, also 10 feet from the pump cylinder. The above pump is only to have one standard and one cylinder. Will the above pump draw water out of all the wells? A. The pump will draw from the three wells if the water stands at the same height in all of them. A dozen drive wells are sometimes connected to one pump. 2. What causes natural gas? A. Natural gas is supposed to be the product of the decomposition of petroleum.

(5550) J. L. asks: 1. Would gas-house tar, applied warm with a brush, have a greater tendency to clog the latter when it cools than when used cold? A. The hot tar dries quicker than cold tar and would be more apt to clog the brush. 2. Would it be practicable to pass the tar through a coil pipe, contained in a cylinder and heated by steam, and is there any danger of the tar choking the coil when it cools? A. If the tar is fluid when cold, it would not choke the coil. Passing through a coil heated by steam would not change its drying quality and it would still be fluid after passage. 3. Will tar dry quicker, applied hot to a cold surface or applied cold to a hot surface? A. Tar dries quickest applied to a hot surface.

(5551) C.—The loss of power in steam engines from back pressure in the exhaust is very trifling. No engine, if properly piped, should have more than one-quarter pound back pressure per square inch, which would be but one-half per cent at 50 pounds mean pressure.

(5552) J. A. W. says: A river 14 feet deep flows past our dock with a velocity of 3 miles an hour. What horse power can I derive from the river with a paddle wheel 6 feet broad and 34 feet in diameter, extending 12 feet down into the water, the shaft of which would therefore be 5 feet above the water, and therefore above the level of the dock? If the paddle wheel is not the best device for utilizing the force of the current, what other device is? A. You may obtain about 8 horse power from the paddle wheel, which is probably the best for the purpose.

(5553) J. McB. asks how to purify sperm oil for lubricating. I have a quantity which has become gummy. How can I treat it to remove gum? A. Add to each gallon of gummy oil, 1 ounce, each of chalk and slaked lime and 3/4 of a pint of water; stir the mixture thoroughly, let it stand for a few days, and then add 3/4 of a pint of water and 3 ounces potash; stir and heat to nearly the boiling point. Then add a solution of 1 ounce salt to 3/4 pint of water, and slowly boil the mass for a half hour and pour into a vessel to settle, when the clear oil may be decanted, or you may simply expose to the sun for a few days, putting the oil in a lead tray.

(5554) L. A. H. says: 1. Will you kindly tell me how copper oxide is made? A. Copper monoxide (cupric oxide) is made by calcining metallic copper at a red heat with full exposure to the air. Red oxide of copper or cuprous oxide is made by heating in a covered crucible a mixture of 5 parts black oxide of copper and 4 parts of fine copper filings. 2. Also of some solution which is rubbed on copper which causes the same to turn a beautiful highly colored polished red. A. The red copper surface is made by dipping the articles in a solution of 2 drachms sulphate of antimony and 1 ounce pearlsh, dissolved in 1 pint of water. 3. Tell me how iron scroll work is made a dead black? A. For a black polish on iron boil together oil of turpentine 15 parts and sulphur 1 1/2 parts. Put a thin coat on the iron and burn off with an alcohol lamp. 4. Also can silver nitrate be changed into chloride of silver, or can it be changed so that it can be used in an electrolyzing solution where chloride of silver is used? A. For the silver bath use 5 1/4 ounces nitrate of silver to 1 gallon soft water. Then add 8 ounces cyanide of potassium. You can precipitate silver chloride from a solution of the nitrate by adding hydrochloric acid. Then filter and wash and you have silver chloride ready for use in any formula calling for it. Do the work by gas light or in a dark room.

(5555) M. H. S.—The Campania, like all the great ocean steamers, is flat on the bottom through the midship section.

(5556) A. G. G. asks: 1. On a clock circuit is a relay of 20 ohms resistance; this relay has under it a resistance coil of German silver wire connected on shunt. What is the resistance coil on there for? A. The resistance coil is designed to prevent sparking at the relay; it provides a path for the extra current. 2. I have a 20 ohms relay. If I add a resistance of 130 ohms on shunt, will this bring relay to 150 ohms, so it will work on main line where 150 ohms relays are used? A. This depends upon the connections. We presume that the resistance should be comprised in the coils of the magnet, yet it is not at all certain that this is necessary in your case. Fuller details must be given to obtain a definite solution. 3. How is ferric ammonium citrate prepared? A. Dissolve 29 parts iron tersulphate in water, precipitate with excess of ammonia, filter, wash, and dissolve the filtrate with 30 parts citric acid, evaporate to 100 parts. To above add 33 1/2 parts solution of ammonia (10 per cent or sp. gr. 0.95 at 59° Fah.), mix, and evaporate to a sirup, pour on glass and allow to

solidify. Use no heat exceeding 140° Fah. in any part of the process.

(5557) H. B. writes: I have a lot of scrap rubber; can I use that for making hard rubber for electric purposes? Can you give me a good receipt for a substitute? A. There is no good substitute for hard rubber. Fiber is sometimes used. On an emergency use pasteboard soaked in hot paraffine. You can do nothing with the old scrap. 2. What size wire should I use on a telephone line 1/2 mile long? A. Use copper No. 18 or iron wire No. 12.

(5558) J. R. D. writes: How can I best magnetize a circular disk of iron or steel? I have tried numerous devices, but have been unsuccessful. A. It depends on how you want the magnetism distributed. By placing it within a coil and passing a strong current through the coil it will become magnetized in a general sense diametrically. By rotating it over the poles of a horseshoe magnet, keeping its center over one pole and its periphery moving over the other, it may be magnetized radially. By spinning it horizontally in front of a strong pole, circular polarization may be produced. Any method may give only partial success, as consequent poles will probably be produced.

TO INVENTORS.

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