hydrogen gas. Zinc dust in the presence of water and acid will sometimes ignite. If caustic soda or lime and water are boiled with phosphorus, phosphureted hydrogen gas is evolved, which spontaneously catches fire as each bubble escapes into the air.

(843) J. B. K.—The sample sent is crude bitumen or asphaltic deposit. It might have some value for gas making, tar roofing, or analogous uses.

(844) F. W. J. asks: 1. Is not the zinc in the Bunsen battery amalgamated? A. Yes. 2. Is the light, using a Bunsen battery, produced by heating platinum wire, or between two carbon points? A. You can make a light by heating the platinum wire by means of the current. As the platinum gives the best light when on the verge of fusion, there is great danger of fusing the wire, and it has been found impracticable to use it for this purpose. Carbon filaments are now used for incandescent lamps. With a sufficient number of cells you can produce an arc light between two carbon points. 3. What amount of gas, burning, would a sixteen candle power electric light equal? A. A 4 or 5 foot burner. 4. What would be a good design for a scarf pin, using a pocket battery, and would a silver quarter or half piece do for the silver or negative plate, and how large should the cell be to receive the carbon, silver, and solution? A. We cannot in the space at our disposal give you the information required. Consult Hospitalier's "Domestic Electricity." 5. Would it be cheaper to make the dynamo described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 161, or buy or make batteries, to produce light? I only wish to have one or two lamps. A. Probably the batteries would involve the smaller expense. You can buy the dynamo referred to for $50. If you have plenty of spare time it would be cheaper for you to make the dynamo than to buy it. 6. Which would be the cheapest for a motor, an electric motor or a water motor? A. The water motor, providing the water required to run it is not too expensive.

(845) S. K. L. asks: 1. Are type-written documents as permanently legible as those written with the inks commonly employed for pen work? A. If carbon ink is used they are more permanent than ordinary writing. If aniline inks are used they gradually fade. Carbon paper used for multiple type-written copies is often made with logwood extract and an iron salt, in which case the copy is liable to fade, but could be renewed by treatment with nutgalls solution. But a true carbon or lampblack ink is absolutely permanent. 2. If not so permanent, will you state, in a general way, how long such documents will remain legible when filed away? A. No time can be assigned. It may be several years. Much depends on the darkness of the place of deposit. 3. In the event of the ink fading, is there any method by which the writing can be restored? A. This is indicated in the first answer. For an aniline ink, nothing satisfactory can be done; for a spurious carbon ink, treatment with nutgalls may restore the writing. A true lampblack ink, such as printers use, should be employed for important work.

(846) C. B. J. asks: 1. How many pounds anthracite coal does it require to maintain steam of one horse power per hour? A. 1½ to 5 pounds, according to the economy of boiler and engine. 2. How many pounds bituminous? A. Bituminous and anthracite coal are very nearly equal for equal qualities. They both vary from 7 to 10 pounds of water evaporated per pound of coal from a temperature of 212°. 3. How many thousand feet of natural gas are equal in heat-creating power to one ton anthracite coal? A. About 40,000 cubic feet. See "American Steam Engineer" by Edwards, for table of values for various kinds of anthracite and bituminous coals and steam engine practice. We can mail it for $2.50.

(847) A. W. H. asks (1) how to hone a hollow ground razor, and keep it in good cutting order. A. You cannot make a poor razor keep its edge. Proper stropping each time is the only way to keep it in cutting order. Honing should be the exception, only done when the edge gets thick from stropping. 2. How to measure the pitch of a screw propeller wheel. A. To get the pitch of the screw, take the angle of the outer edge of the blade with the shaft axis. Multiply the diameter by 3,141 and lay this off in some convenient scale, say 1 inch to 1 foot, and raise a perpendicular line to represent the shaft axis. From the distance of the measurement of the circumference draw a diagonal line at the angle found on the blade. The perpendicular distance of intersection is the pitch.

(848) A. G. L. writes: I have a fine flute the ivory head of which is cracked its full length, leaving an opening of about one-fiftieth of an inch, which I desire to mend so as to be as nearly invisible as possible. Can I cement it together, and if so, what cement should be used, or must the crack be filled? What substance could be used for filling which would not discolor and would resemble the ivory? A. The flute head is supposed to be lined with a brass tube. The shrinkage of the ivory has caused the crack. You cannot close the crack nor cement it in a satisfactory manner. It may be filled with chalk made into a putty with mucilage or white glue. Magnesia and zinc white also makes a good putty for ivory cracks. Use as little mucilage or glue as possible in the putty.

(849) E. H. C.—The lenses of large telescopes should never be exposed to gather dust or moisture when not in use. The fouling of the surface while in use is very gradual, and should not be removed until found necessary by the thickening of the image of a star, when a soft clean linen handkerchief will readily remove the film by first breathing upon the glass and quickly and lightly wiping. No polishing material of any kind should ever be used by any but an expert or the maker.

(850) T. McC.—Pearl shell for inlaying should be sawed into pieces of the proper size for use, when the back can be split off or ground off on a stone, or the shell can be fastened to a block and the outside cut off with a sharp hard chisel and mallet.

(851) T. G. B.—1. The sandstone drillings are a very pure quartz. 2. The fossil is a shark's tooth. 3. The other sample is probably a quartzite or flint rock.

(852) A. C. S. asks: 1. Is it the electric arc or combustion of the heated ends that destroys carbons used in arc lamps? A. It is principally combustion of the carbon. 2. Can the electric arc be established between two diamonds? If so, how will they be affected by the arc? A. Diamonds are burned and vaporized in the electric arc. They will not act as arc electrodes because they are very poor conductors.

(853) G. E. asks: Which will deposit the most copper within a given time, a current of 10 amperes and 4 volts pressure or a current of 4 amperes with 4 volts pressure? A. The 10 ampere current will deposit most copper.

(854) E. D. P. asks if there is a preparation that can be put into stumps to keep them from sprouting and cause them to decay quickly. A. Bore a hole in the top and pour in a little nitric acid.

(855) N. L. R.—We do not advise you to equip a birch canoe with power. Boat propulsion by voltaic battery is not yet a success. Storage batteries have done fairly, but require an electric plant for renewal, which is not always convenient. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 430, 563, 623, 674.

(856) J. W. V. asks the best style of burners for melting steel in crucibles, and which makes the hottest fire, compressed air and oil, or steam and oil? A. The combined steam, oil, and air jet seems by late experiments to give the best results. You will find petroleum burners illustrated in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 623, 624, 592.

(857) H. J. B. writes: I wish to lay a water pipe from a spring a distance off. Will it be necessary to start with a large pipe at the head and taper smaller at other end, or will pipe the same size do all of the way? A. Lay one sized pipe the whole distance, unless there is a high head, say 100 feet, when economical practice suggests a larger pipe for the upper portion.

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AND EACH BEARING THAT DATE.

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