alum, and whiting. The best of flour and starch are to be used. These foregoing articles, excepting the whiting, are thoroughly mixed, and heated by steam. When the mass is thoroughly homogeneous, sufficient whiting is added to give stiffness. 2. Some preparation that will fasten celluloid to iron or wood. A. Take of:

Gum shellac	1 ounce.
Camphor	1 "
Alcohol	4 "

Dissolve and filter.

(24) G. O. asks whether there is any difference in the pressure on the slides of an engine whether the engine runs over or under. A. When the engine runs over (as it is called), or the upper half crank stroke is from the cylinder, the whole pressure is down, while in the opposite direction it is upward. If the slides are over and under the rod, as in a locomotive, the pressure is against the upper slide in running ahead, and *vice versa*.

(25) F. A. G. asks the most practical way of driving a countershaft at right angle with main line, and on same level. A. Use a belt held at the desired angle by two idler pulleys on vertical shaft. They are sold by machinery dealers. Bevel friction pulleys are not reliable.

(26) E. E. R.—There is no blacking you can put on a stove to keep it blacked that will not burn off if the stove gets red hot.

(27) J. D. B.—The refractive index of a few liquids is as follows: Water 1·336, alcohol 1·372, muriatic acid 1·410, nitric acid 1·4?10, sulphuric acid 1·434, olive oil 1·470, oil of turpentine 1·475, cajeput oil 1·483, castor oil 1·490, beech nut oil 1·500, balsam copivi 1·528, Canada balsam 1·549, oil of cloves 1·535, oil of aniseseed 1·601, balsam of tolu 1·628, oil of cassia 1·641, sulphuret of carbon 1·768.

(28) H. E. H. asks: 1. Can a spring motor like those described in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 142, 146, 147, 148, and 150, be made to propel a small boat (a Barnegat sneak boat about 10 or 12 feet long)? A. Probably a spring motor could be arranged to drive a small boat for a short distauce; but we think it would be easier to row the boat than to wind the motor. 2. Can you give me the address of any one that could make them for me? A. We do not know of any one regularly engaged in the manufacture of spring motors. 3. Do you think the motor advertised by the Electro-Dynamic Company of Philadelphia in SCIENTIFIC AMERICAN EXPORT EDITION for September, 1885, page 206, would do? I want to use this boat for fishing and hunting. A. It is hardly large enough for your purpose, but possibly the same company can provide you with an electric motor which would answer.

(29) E. G. H. asks: 1. What will be the result if a rubber balloon is partly filled with air, and a vacuum produced around it? A. The air in the bag will expand. 2. A recipe for a good liquid glue for small woodwork, inlaid work, etc. A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 14.

(30) J. G. writes: 1. Can you give me usual proportions of each article used in compounding benzine drier, also of turpentine drier? A. The addition of certain chemical substances rich in oxygen, such as borate of manganese, litharge, minium, etc., with turpentine constitutes driers. The benzine is said to be used in partially replacing the turpentine when the so-called benzine drier is made. The proportions vary with different manufacturers, and it is impossible to obtain exact formulas. See Condit's Painting and Painters' Materials. 2. What is the simplest and cheapest method you know of for lighting gas by electricity for family use on small scale, say 4 to 8 burners? What appliances do you know of for facilitating use of personal electricity in lighting gas with the finger after collecting electricity by friction of feet on a carpet? A. We know of no simple electric lighter as asked for; the ordinary electric lighter is covered by numerous patents. No appliances are used for facilitating use of personal electricity; shuffling the feet over a woolen carpet will enable any one to thus light a gas burner.

(31) P. H.—Chimneys with draught elbow on top draw only when the wind blows; at other times the draught elbow is of no value. Chimneys may be in height from 20 to 100 times their interior diameter, and should ordinarily be of equal interior size throughout.

(32) G. B. C. asks the best way to harden large steel plates, so as to keep them from springing. A. We know of no way of hardening large plates without warping. The usual way is to draw the temper and straighten with the hammer.

(33) C. E. K. writes: Can telegraph operator's paralysis, in any stage, be remedied or permanently cured by any doctor, or can it be done with gymnastic exercises in any form? A. What your arm needs is rest of its muscles. There is an incipient paralysis, caused by long and over-fatiguing use. This almost surely will increase if the same use is continued. Medicine can be of but little service. Your right hand and arm must have rest. You can do this by learning to use the left; it takes time and patience, but it can be done, and is well worth the doing, for it will free you from your trouble.

(34) C. R. W. asks information with regard to the curing of hickory, oak, and ash timber, to keep it free from the worms. A. Your cheapest method is to saturate the timber with a solution of bichloride of mercury (corrosive sublimate). Make a tight box of sufficient size, pack in the timber, and pour in the solution so as to cover all several inches deep. Let it remain twenty-four hours, and remove it. You will find that no worms will touch it. The expense is not great, for one part of the bichloride in a thousand of water is sufficient. The solution is of course poisonous, and must be kept with care, but the timber when dried is not in any way injurious to workmen or others.

(35) J. R. asks: 1. What is iron sponge, and how is it made? A. See SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 87 and 125, for spongy iron. 2. What is the temperature at which water dissociates in iron pipes? A. Water does not dissociate in this way, but is chemically decomposed, giving up its oxygen to the iron at a red heat. The temperature at which water can be dissociated has been variously placed at between 4,000° and 7,000° Fah.

(36) L. J. P. asks: 1. How many pounds will one gallon of air sustain in water? A. About 8⅓ pounds, or the weight of a gallon of water less the weight of a gallon of air. 2. Can a cord belt be manufactured so that it will be endless and have no lumps, where it is connected, to throb in passing over small pulleys? A. There are no such cords in market, but the splicing should be done so neatly that there is no perceptible throb.

(37) K. F. writes: 1. Can you tell me how to raise Canary birds? Should the male bird be kept in the same cage until the young birds are ready to fly, or should it be separated when the female is ready to sit? A. It is not necessary to separate the birds. The male generally waits on the hen bird while she is sitting. There are several books on the care of Canary birds, such as "Canary Birds; a Manual of Useful and Practical Information for Bird Fanciers," price $1.00.

(38) G. H. C. desires a positive cure for "Fetter's salt rheum." A. Wash the parts affected with Castile soap and water; dry with a soft cloth; then wet with tincture of iodine, and let it dry; after which apply citrine ointment, made by dissolving 1½ ounces mercury in 3½ ounces nitric acid. Stir till effervescence ceases. Heat 16½ ounces lard to 200° Fah. in an earthen vessel, and add the solution, stirring constantly until thoroughly amalgamated.

(39) C. E. M. asks: 1. Is there any rule for finding the proportion between the pressure required to crush or collapse a boiler and the pressure required to burst it? A. No. The form, size, and thickness of metal determine this. 2. Has there been an engine made using the electric magnet as a motive power? A. Yes; many. 3. What is the general plan of compressed air engines, and what pressure is usually used? A. Similar to steam engines. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 309. 4. What is the condition of the United States navy now? A. A great many officers, but a very poor show of vessels. See report of Secretary of the Navy. Your question on bookkeeping is too vague for answer.

(40) M. A. M. asks: 1. Why does the water of Lake Geneva, Switzerland, rise and fall so suddenly? A. From unequal barometric pressure and local winds. 2. If a piece of ice containing a large air bubble be allowed to thaw rapidly, will it thaw a particle inside so long as the walls remain intact? A. It will not. 3. At about what date in the earth's existence did the glacial period begin? A. Several million years ago. 4. Was it a sudden transition from heat to cold? A. Probably not. 5. What is supposed to have been the cause? A. Possibly and probably a change in the position of the earth's axis. 6. Has there been more than one such period? A. Supposed to have been two. 7. What book will give me the most information on the formation, changes, etc., of the earth up to the present time, in simple language, easily understood? "The whole thing in a nutshell." A. The whole thing cannot be put in a nutshell. See Dana's Geology, which we can send for $5.00, and SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 1, 268, 427, 400, 419, 398, on glacial period.

(41) H. C. F. desires a method of preserving natural flowers. See answer to query 32 in SCIENTIFIC AMERICAN for October 24, 1885.

(42) C. W. McC. asks rules for centering the large speculum of a Newtonian reflector on a star. A. For centering the large mirror, remove the eyepiece, and look into the small mirror with the telescope turned to the light of the sky. Adjust the mirror so that the edge of the mouth of the tube will correspond with the edge of the mirror and the field appears round, with the small mirror in the center. 2. Do you know of any substance except selenium which, when placed in the sunlight, the light will be changed to electricity? A. Selenium does not change sunlight into electricity. Sunlight simply affects its conductivity for electricity. A thermo-electric pile, described in any work on physics, converts radiant heat, of which light is probably a modification, into electricity. It is constructed of various substances, sometimes of alternate bars of bismuth and antimony.

(43) A. B. C.—The same weight of metal forms a stronger column when hollow than when solid. If of the same diameter, the solid is the stronger under all conditions. The thinner metal of a hollow column would be more quickly affected by direct exposure to a high heat.

(44) W. D. V. B. asks: How many feet of gasoline gas is equal to 1 ton of coal for cooking purposes? A. It is very hard to get at any practical ratio, as the economy of gas in cooking arises from the ease of extinguishing it when not being used. With coal gas for each pot hole, allow eight feet per hour in burning; for each oven, double the amount. Pure gasoline gas would be consumed in smaller quantities, about one-eighth to one-tenth the above amount.

(45) T. R. G. asks: Does the stern or bow swing around when a sail boat is brought about? A. Both swing around, the boat going in a curve, and its keel keeping pretty closely to the series of chords of the curve.

(46) S. J. asks: 1. How many volumes of air are required for the complete combustion of one volume of illuminating gas in an inclosed chamber? A. It depends on the composition of the gas. For pure hydrogen, two and a half volumes; from that up to ten or fifteen for a pretty wide range of illuminating power may be taken. Ten volumes would be a good basis for coal gas. 2. What is the increased volume of air for every degree of heat added? A. None. 3. What is the proportion of air and gas used in gas engines? A. About 1 to 10. 4. Is it necessary that the mixture of gas and air should be compressed before it is exploded? A. No. 5. Will not a gas engine work with mixture of gas and air exploded without compressing? A. Yes; but not so well in engines of the present construction.

(47) H. B. N. asks: What wire and cores and how many layers of wire will make the strongest electro magnet, using six or eight cells Bunsen battery? Also, how many feet of wire it will take? A. In general terms, the larger the core, with wire correspondingly heavy, the greater would be its power. The wire should be of length sufficient to produce three or four ohms resistance. Hence its size and length would depend on the core.

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

B. B.—The specimen appears to be a piece of micaceous iron ore. The value of the ore can only be determined by an assay, costing from $12.00 upward according to number of constituents determined.

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