

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question. **Inquiries** not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(1) C. F. W. D.—Rubber has been suggested before as a defensive armor. It is too costly and ineffectual. Modern projectiles will pass through it.

(2) H. T. asks: 1. Is it practicable to punch a one-eighth inch hole in three-eighths inch half round iron three-eighths inch thick? I have tried to do it, but the punches break off in coming up. A. The hole may be punched in soft three-eighths inch iron, but the work is tedious and uncertain. Have you tried lubrication with oil and a die hole three-sixteenths inch diameter? This gives relief. 2. A receipt for coloring a double-barreled shot gun? A. For browning and bluing gun barrels, see note and query No. 18, Dec. 5, 1885. 3. Which is the best steel in use for dies used for drop forgings? A. You require what is called a low steel, Sanders No. 4, Sanders Steel Works, Syracuse, N. Y., or the Midvale mild steel, Midvale Steel Co., Philadelphia, Pa. Double shear is also good.

(3) J. R. asks: 1. What will prevent specimens from the dissecting room shrinking when dried—a larynx, for instance? A. It cannot be done. When the watery constituents are withdrawn, the specimen necessarily shrinks. If it is thoroughly soaked in glycerine, the shrinking will be less, for the drying is less complete. 2. What coloring matter (red preferred) will stain the muscular tissue of the larynx, without staining the cartilaginous portions, when the whole is dipped in? A. Aniline red dyes the muscular parts more deeply than the cartilaginous, but both are colored. Picro-carmin dyes the cartilage yellow, and the muscle red.

(4) J. M. asks the cause and the cure of something which causes the trembling of the lips, and which prevents a free and composed manner when attempting public speaking, and sometimes when in conversation, if one feels he is the center of interest and attraction? A. This is a matter for discipline, and not for medicine. All that can be done in the way of general invigoration of the system will be of some service, but it will be only partial. The relief and the victory must come by personal effort at self-control and by perseverance and practice. It is not "weakness of the nerves," it is a habit of yielding to mental timidity. Patient effort will surely overcome the evil eventually.

(5) C. H. N. writes: I hold that the king, when moved to a square adjoining the adverse queen, which is pinned by a bishop, is not in check from queen. A. The queen always retains her powers, whether pinned or not. On this fact have been founded some brilliant problems. The rule of chess is strict in all cases, namely, the king cannot move *into* check.

(6) E. S. D. asks how many gallons per day (24 hours) will be required to supply the evaporation from an acre of land while it is covered with water 12 in. deep? A. The rate of evaporation depends upon the temperature of the water and the dryness, temperature, and velocity of the air. The published tables give as the average of fresh water evaporation in a calm 0.225 of an inch hourly, at a water temperature of 65° F.

(7) A. G. A., Jr., asks why the smoothing iron is called a "sad iron"? A. Because the original first meaning of the word sad was heavy, weighty, ponderous, a sense in which the word has now become obsolete.

(8) C. I. J. asks (1) a receipt for making a good face powder, and perfume to mix with it. A. Take of wheat starch 12 pounds, powdered orris 2 pounds. Mix together, and add attar of lemons ½ ounce, attar of bergamot and cloves each 2 drachms. 2. How to dry and mix the powder, so that when dry it will not be lumpy. A. See "A Comprehensive Treatise on Perfumery," with thorough practical instructions and careful formulas, by R. S. Cristiani, price \$5.00.

(9) G. C. asks: 1. Is the pressure of the explosive used in a gun as great against its breech as is the impact of the projectile upon the object shot at? A. The impact is measured by mechanical energy; the powder force by pressure. The two cannot be compared. 2. Does the ball increase in velocity after leaving the muzzle? A. No. It decreases from the moment of leaving the muzzle. 3. Is the undulatory theory of sound still unquestioned in the world of science? A. The "undulatory theory" was inaccurately named. Vibratory theory is nearer truth, and this is generally received.

(10) W. W. S.—It is extremely doubtful if your form of multicharge cartridge could be made practicable. Dynamite is too quick for such a cartridge. Diamonds can be easily broken with a hammer and pulverized. They are ground into shape by diamond dust on an iron disk, sometimes by direct friction against another diamond; sometimes the first rough shaping is done by cleaving with a hammer and chisel, or by cutting with an iron wire and diamond dust. Vegetable oil is used with the dust to make it adhere.

(11) W. A. B. asks: 1. Is there any difference in the power required to drive a crank or an

eccentric, they being of equal stroke? A. The crank has the least friction. 2. Will a crank transmit as much power, placed say two feet from the driving pulley on a 2½ inch shaft, as it would were it placed within six inches of the pulley? A. There is no perceptible difference.

(12) R. G. W. asks: 1. What are the most accurate timepieces made? A. Astronomical clocks and chronometers. 2. How accurate will they run? A. Within one second a month. 3. How accurate will the best watches run? A. 2 to 5 seconds per week.

(13) J. H. G. asks which will retain heat the longest—a solid, square piece of iron or a hollow piece of the same size filled with water, both being heated to the same temperature; and will the bottom of the piece filled with water be as hot as any other portion of it? A. The specific heat of iron is 0.1138 that of water. Its sp. gr. is 7.786 that of water. Therefore its specific heat per unit of volume is nearly 0.9 that of water, so that if nothing but radiation took place the vessel of water would cool a very little quicker. If convection and evaporation came into play, the water vessel would cool still quicker. The bottom of a vessel of hot water will cool fastest if the sides are exposed.

(14) W. H. B. asks: What chemicals or acids are used to stain glass windows, and for other purposes indelibly? A. The coloring used in producing glass consists of ordinary metallic oxides mixed with oil of lavender or oil of turpentine and afterward baked on. Preparations of paper are used, which are applied directly to the glass. See Miller's Art of Glass Painting, which we can mail for \$2.35.

(15) M. N. L. asks: 1. Is there any advantage or gain in steam jacketing the cylinder of an engine with live steam from the common supply? A. This is a mooted question among engineers. The present practice is against it thus far, the waste of heat by jacketing being considered more than the power gained. Thorough lagging—with mineral wool under the lagging—and the later valve and clearance improvements, seem to have cast the steam jacket entirely into the shade. 2. How does the tensile strength and the resistance of crushing strain of different metals compare? A. The comparative tensile and crushing strength varies very much in different kinds of metals, as well as in different conditions of the same metal. See tables of strength of materials in engineering works, Haswell, Nystrom, and others, which we can furnish. 3. What is the tensile strength of phosphor bronze? A. 40,000 to 50,000 pounds per square inch.

(16) J. S. H. asks how to make a paint or varnish to render wood waterproof, and that will resist ordinary lye. Something that can be applied cold and dries quickly preferred. A. We know of nothing that will quite do what is asked. Try paraffine, melted into the wood surface with a hot iron.

(17) A. C. G. asks how the product from a ton of bituminous coal, in the form of ordinary coal gas used for heat, would compare with the ton of coal utilized in the ordinary way; that is, if 1¼ tons of coal will produce 1 ton of pig iron, how nearly would the amount of gas ordinarily obtained from the same amount of coal produce the same amount of iron? A. Under ordinary circumstances, the amount obtained is from 15 to 25 per cent, but it varies widely, according to the nature of the coal and the rapidity of the distillation of the gas. The fact that gas can often be burned more economically than solid fuel adds another factor to the commercial statement of the problem.

(18) C. M. B. writes: We have two dams across the Androscoggin River at this place, and when the water is at a certain pitch the sheet of falling water on the Topsham end of the lower dam presents a peculiar wavy appearance, and then a rattling of doors and windows occurs. Is it caused by the concussion of the air, or by the vibration of the ground? A. What you mention is a common phenomenon wherever there are wide sheet spill dams. The vibration of the water causes the air to vibrate, which is transmitted to considerable distance. The vibration of the air also extends to the ground, and sets buildings to vibrating. It can be stopped by breaking up the sheet of water into irregular divisions, or notching the dam so as to have thick and thin sheets in different sections. This breaks up the synchronism of the vibration.

(19) W. E. asks: What proportions of gas and air would explode with the most economy in a cylinder? Also would six cells of telegraphic gravity batteries be sufficient to ignite the gas in said cylinders? And if not, what would be required to do so? A. Mix one volume of gas with from seven to twelve volumes of air. The battery mentioned would, in connection with a spark coil or induction coil, be enough. Usually the gases are ignited by a small flame kept constantly burning and at intervals aspirated into the cylinder.

(20) Subscriber asks: Is there any substance I may add to water that will prevent white silks and satins from turning slightly yellow, as is the case when washing them in pure water? A. Use sulphuric acid if you wish a bleaching action; or as a coloring agent use a little litmus or indigo. The latter, by imparting a slight bluish tinge, tends to overcome the effects of the yellow coloration.

(21) M. F. T. asks: 1. What chemicals of moderate cost will generate the most carbonic acid gas and do it most quickly? A. Sulphuric acid and pulverized marble are generally used, as being, under ordinary conditions, the cheapest and best. 2. What amount of material will it take to generate 1,000 cubic feet of carbonic acid gas? A. For 1,000 cubic feet of carbonic acid gas, 212 pounds of limestone and 259 pounds of sulphuric acid would be required. 3. Supposing that a tank was placed in the generator containing sulphuric acid, would heat enough arise to boil the acid while generating, providing there was a free escape of the gas? A. Enough heat would not be generated. 4. How long will a magnetized cast-steel bar of 75 pounds weight retain its magnetism, and from what distance would it lift a ten pound weight of wrought iron placed beneath it? A. Magnetism may be retained for years. But as your bar would be a single one, and no

keepers could be employed, it would gradually weaken. The distance from which it could lift a ten pound weight would be very small, not over an inch or less.

5. How low is it possible to get the melting point of a solder or metallic composition for fire plugs? A. It may be as low as 150° to 160° Fah. (22) F. B. asks: 1. If two feet of air at 60° temperature be compressed to one foot, what will be the increase of temperature, and will the increase always be in the same proportion for every time the pressure is doubled? Will there be the same number of degrees of heat absorbed while expanding that was given off while compressing? A. Two cubic feet at 32° compressed without loss of heat (adiabatically) to one cubic foot will rise in temperature 161° F.; for compression to one-half a cubic foot, 214° additional; for the next compression to one-quarter of a cubic foot, 284° additional—a total of 659° F. The exact reverse takes place in expanding. 2. In using salt water in a marine boiler, what is the limit of density in general practice, by the salinometer? A. Two thirty-seconds density, or blow off one-half the water in the boiler when it gets above that.

(23) A. C. E. writes that a substitute for meerschaum and ivory has been discovered, and is being manufactured in France, and asks the process. A. An imitation of meerschaum for common pipes is made of hardened plaster of Paris, treated with paraffine and colored by gamboge and dragon's blood. A peculiar preparation, into which potato largely enters, is said to have been employed as an imitation in France, but of this we have not the particulars. The imitations of ivory are probably celluloid, concerning which see the articles contained in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 227 and 263.

(24) H. H. W. asks: Can weight be displaced by means of electricity? A. Weight cannot be displaced by means of electricity. It can only be sustained by its agency, as it can be supported by a rope.

TO INVENTORS.

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INDEX OF INVENTIONS

For which Letters Patent of the

United States were Granted

August 10, 1886,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

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