taches to this edition, from the fact of the author's death, in November last, after the completion of its thorough revision, with the design of giving a more comprehensive view of the chemistry of to-day. The work has been much enlarged, and the elementary knowledge of chemistry it is so important to possess in the prosecution of many of the industries is here presented in a form to be readily comprehended by those not specially trained to such study. One of the prime recommendations of this edition of the Messrs. Blakiston is its very complete index, while the type and printing are excellent.

THE FLOUR MANUFACTURE. By Friedrich Kick. Translated by H. H. P. Powles. London: Crosby, Lockwood & Co. Price $10.

This handsome volume, with 24 sheets of plates and 113 wood cuts, includes also a supplement by the same author, with four plates and 54 wood cuts, on recent progress in the flour manufacture. The first edition of the work was published in 1871, and it has since that period been accepted as a standard throughout Germany, and in Austria Hungary especially, where scientific milling was first brought to its present high state of development, the author taking particular pains to minutely describe the Austrian methods of high or middlings milling, which has since been largely adopted in England and this country. The book is primarily written for millers and milling engineers, and cannot fail to be valuable alike to the young miller and the most experienced, for the author is analytical in his methods of investigation, while setting forth only what has been acknowledged to be best in mechani al practice. The plates furnish detailed illustrations of a wide variety of machines, with plans for the construction of mills and arrangement of the machinery.

HUDSON'S TABLES. Vol. II. By John R. Hudson, C.E. New York: John Wiley & Sons. Price $1.

This is an engineer's manual for facilitating the calculation of the cubic contents of excavations and embankments, giving additional tables, and in some instances different methods of computation from those presented by the same author in the first volume, published in 1884.

The *Shoe and Leather Reporter Annual* for 1888 is the title of a neat octavo volume of more than 500 pages, nearly all of which are taken up by a directory of the shoe and leather trades and their collateral branches throughout the world. It is published by the paper whose name it bears, a journal which has unequaled facilities for attaining accuracy and completeness in such a volume.

☞Any of the above books may be purchased through this office. Send for new catalogue just published Address MUNN & Co., 361 Broadway, New York.

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) A. W. K. desires a harmless remedy which will prevent hair from turning prematurely gray. A. Nothing can prevent the hair from turning gray, any more than one can stop growing old. Sometimes, however, the following mixture is used, which acts for a time. Scald black tea 2 ounces with 1 gallon of boiling water, strain, and add 3 ounces glycerine, tincture cantharides ½ ounce, bay rum 1 quart. Mix well and perfume.

(2) F. M. D. asks: 1. What is used for putting on the bronzes that come in powder form? A. Copal varnish is good. 2. What for applying gold leaf? A. Gold size. Both of these articles can be purchased of any dealer in paints.

(3) J. T. D. asks for a comprehensive work on navigation, comprising both ordinary compass and log navigation, and also by means of sextants, etc.? A. We can supply you with Navigation and Nautical Astronomy, prepared for the use of the U. S. Naval Academy by Professor J. H. Coffin, 52 illustrations, $3.50.

(4) S. W. desires a recipe for making a good cement for fixing rubber tires on bicycle wheels. A. Use a mixture of asphalt and gutta percha melted together. See formulas for cements in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.

(5) W. W. G. asks the relative cost of fuel for 12 horse boiler, figuring coal $5.50 per ton, and kerosene oil 120° test at 8 cents per gallon. A. Your coal is less than ¼ cent per pound, and the oil costs 1¼ cents per pound. The evaporative power of oil is ⅛ greater than coal.

(6) W. M. F. asks: 1. Will ordinary pig iron remelt, in ordinary foundry cupolas, stronger than the original pig? If so, why? A. In remelting iron, some of the gases that are combined or mechanically mixed with new iron are given off, making the iron more compact and stronger than in new iron or from the previous melting. 2. Very often, in tapping iron from the cupola into the reservoir, and even after the iron is lying in it or being handled, numerous sparks are thrown off quite high in the air, which burst and fall in showers. A. The sparks are minute particles of iron thrown from the surface of the fluid metal by the liberation or bursting of gas bubbles from below the surface. They are ignited and burn by coming in contact with air in their flight. The gas bubbles may be carbonic oxide, hydrogen, or other gases, and probably some air carried into the metal by the stream of molten metal from the furnace. The nature of the gases contained in and liberated from metals in a fluid condition is a somewhat disputed point among chemists.

(7) J. M. S. writes: I have a razor the steel of which is quite soft. It can be quickly honed, but loses its edge with very little use. Can you suggest anything that will harden it so that it will retain its edge? A. We cannot. Razors are hardened thick and ground thin, and cannot be rehardened.

(8) W. D. E. asks when the circular saw was first used in America for sawing lumber. A. About 1802 such saws were first made here. They were adopted by the British Admiralty Board in 1804, having been previously used by Brunel for making ships' blocks, but circular saws were in use in 1790 and before that time for cutting the teeth of clock wheels.

(9) F. P. H. asks: What will prevent iron or steel which is constantly submerged in water from rusting? A. There is nothing lasting but good galvanizing. Asphalt varnish will be only a temporary protection. Boiled linseed oil and Prince's metallic paint, or red oxide of iron as a paint, well dried, make a fair preservative of iron surface under water. This is much used on ship work outside and inside.

(10) H. R. S. asks: About what would be the daily expense of a yacht, say one like Jay Gould's Atlanta? A. About $110 per day and upward, apart from owner's private expense in entertaining guests and luxurious living.

(11) W. W. P.—Your skate runner cannot be cemented or soldered to be reliable. A skillful workman might braze the parts together with copper or brass, but such joint would be of little value.

(12) H.—There was an error in the diagram of the simple electric motor described in No. 11 of current volume of SCIENTIFIC AMERICAN. The

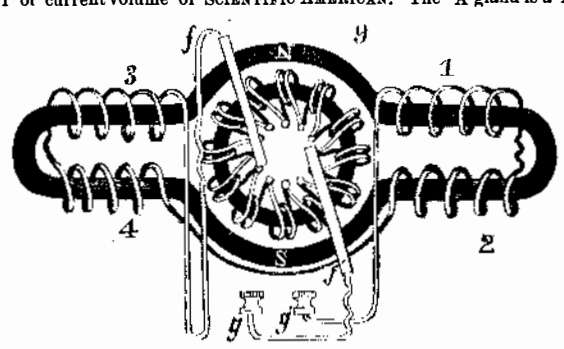

diagram is here reproduced with corrections. Complete working drawings of the motor will be given in SUPPLEMENT, No. 641.

(13) L. W. C. writes: I recently saw a frame maker working upon so-called bronze picture frames, by dipping the finger into a powder and rubbing it into the moulding, and after drying burnishing out certain portions with the common agate. What was the powder used and how prepared, and how was the moulding prepared to receive the bronze? A. The frames are painted with a thin coat of isinglass size or thin white glue. When dry a thin coat of gold size is applied with a camel's hair brush and dried, so as to be slightly tacky to the touch. Then rub gold bronze powder over the surface with a small piece of fur or a camel's hair brush, or the finger as you saw, which is very crude. Possibly the workman was only adding a little dry powder to facilitate the burnishing. The bronze can be purchased through the paint trade, as also the gold size, or you may make the gold size by mixing 1 part finely ground ocher, 2 parts copal varnish, 3 parts linseed oil (raw) 4 parts turpentine, 5 parts boiled linseed oil, all by weight. If too strong to flow thin, add more turpentine.

(14) C. A. E. D. asks: 1. What is the amount of wire in weight of primary and secondary in the induction coil described in No. 160, SCIENTIFIC AMERICAN SUPPLEMENT? A. About 2 pounds in the secondary and ¼ pound in the primary. 2. What is required size of battery to give the full spark, the surface of carbon and zinc in inches? A. You may use as many as six bichromate cells, each having 36 square inches of opposing faces of zinc and carbon. 3. Is the spark increased by the greater quantity of tin foil in the condenser? A. As soon as sufficient tin foil is introduced, there is no use in employing more.

(15) E. F. F. and H. L. W. desire (1) a recipe for type writer ribbon ink. A. Take vaseline of high boiling point, melt it in a water bath or slow fire, and incorporate by constant stirring as much lamp black as it will take up without becoming granular. Remove the mixture from the fire, and while it is cooling mix equal parts of petroleum benzine and rectified oil of turpentine, in which dissolve the fatty ink introduced in small portions by constant agitation. 2. The way in which carbon paper is manufactured. A. Mix lard to a paste with lamp black, rub this upon thin tissue or post paper, remove the excess with a rag, and dry the paper.

(16) W. B. B. asks (1) a receipt for making a copper dip such as is used in coating electric light carbons. A. They are coated electrically with a thin film of copper. Use a solution of sulphate of copper for the bath. 2. How are black lead crucibles made, and the proportions of the different ingredients used? A. They are moulded and baked, being made of poorer qualities of graphite with 10 per cent China clay, or more and poorer clay for the cheaper grades for base metals. 3. How to silver plate by battery, also kind of battery necessary, and how to make same? A. For silver plating see SUPPLEMENT No. 310, or an excellent work on the whole subject, Fontaine's Electrolysis, which we mail for $3.50. All kinds of batteries are described in SUPPLEMENT, Nos. 157, 158, and 159. 4. The name and address of paper wholly treating on machinery. A. We do not know of any paper treating of a wider variety of machinery than the SCIENTIFIC AMERICAN.

(17) C. E. P. asks: 1. Is there any metal easier to work than iron that could be used as parts of electrical apparatus to contain mercury, liable to be heated considerably by strong currents? Could not brass be used, and if the mercury corrodes it, be electroplated with nickel, or if necessary iron? Would this protect it? As the mercury expands by heat generated by strong currents, and this must be taken into calculation, can you give any rule to find the amount of expansion for say a rise of 25° or 50°, supposing temperature on starting to be about 75°, or that of an ordinary room warmed? Will the mercury evaporate or become less in time under above conditions? A. Platinum and iron are the best metals we can recommend. Brass, even if plated, will be liable from the least imperfection in the coating to be attacked by mercury. You will find tables of the coefficient of expansion of mercury given in manuals of physics. The trouble is that practically the coefficient varies with the nature of the inclosing vessel, as this also expands and contracts. Mercury slowly evaporates at summer temperatures.

(18) M. G. asks: 1. What would be the preservative effect of coal oil applied to wood, as pine posts in the ground dipped or soaked in petroleum? A. Coal oil would not operate as well as distillatory or tar products. It is not held in very high esteem as a preservative. 2. Is there any cheap substitute for white lead? That is, a light colored earth paint equivalent to the dark red and brown earths or mineral paint? How would white cement or lime work in oil? A. Sulphate of baryta, or the mineral barytes, is the favorite white lead substitute. Lime would decompose the oil.

(19) W. A. asks: What paste is used in mounting a map on canvas? A. Any good flour paste will answer, after which it is generally customary, but not necessary, to varnish the surface of the map.

(20) T. B. asks: 1. What is a gland? How do you pack one, and with what material? A. A gland is a flanged follower inserted in the stuffing box on the heads of engines, pumps, and other machinery that have piston rods or other sliding parts that require to be kept tight. The box is packed with various kinds of material furnished by dealers in supplies, woven or braided into yarn of square or round form, suitable in size for the open space under the gland; otherwise use twisted or braided flax or cotton, of the proper size. Wind it round the piston rod loosely, pushing into the stuffing box until it is full, then push down the gland and tighten with the screw nuts. Grease the packing before putting it in. 2. What is the difference between an automatic cut-off and a plain cut-off? A. An automatic cut-off is operated by the governor. Others are connected directly with the cam, and the governor throttles the steam. 3. What is meant by lead? A. Lead is the width of opening of a steam port for the admission of steam at the beginning of the stroke.

(21) C. H. B. desires a method of bleaching sponges after being used in surgical operations. A. Soak in diluted hydrochloric acid 10 or 12 hours, then wash with water and immerse in a solution of hyposulphite of soda to which a small quantity of diluted hydrochloric acid has been added.

(22) F. W. desires a recipe for making a paste polish that will clean and polish brass, nickel plate, copper, or any kind of metals. A. Take of oxalic acid 1 part, iron peroxide 15 parts, powdered rotten stone 20 parts, palm oil 60 parts, and vaseline 4 parts. Pulverize the oxalic acid and rouge and rotten stone, mixing thoroughly, and sift to remove all grit, then add gradually the palm oil and vaseline, incorporating thoroughly.

(23) G.—Engines are rated and sold by their nominal horse power, which does not designate their real or indicated horse power. The latter may be double the nominal horse power.

(24) W. H. S. writes: You state that carbonate of potash prevents rust on iron or steel. Will it injure the metal or not? I have never found anything that will prevent a gun from rusting in our climate, long at a time. A. It is not injurious to the metal. It is of no value for a gun that is handled or exposed to the weather, but only suited to finished work, as cutlery papered in a store.

(25) H. B. asks: When a cannon would shoot a ball 15 miles distance, how high would the ball go if fired up straight in the air, with the same amount of powder? A. The elevation of the gun to make a 15 mile range is necessary to a solution of this problem. Probably about 9 miles.

(26) H. O. D. asks: What flux can I use to obtain a clean, perfect weld in copper, and at what heat must it be worked? A. 3 parts phosphate sodium, 1 part boracic acid; pulverize and mix. Sprinkle on metal at red heat.

(27) W. A. M. asks whether a current water wheel could be successfully used or operated in the Missouri River. A. Current water wheels are only makeshifts, to be used when no other form can be operated. They require floats anchored or other devices to keep them at a proper immersion at all stages of the water. They are an ancient device, successful only on streams of little variation in flood level.

(28) J. L. C. asks: 1. Does a fatal shock of electricity produce rupture of physical tissue? A. A fatal shock of electricity is generally accompanied by some physical effect upon the animal tissues, yet there seems to be no reason why it should not kill by a purely nervous shock without any physical injury. 2. Does electricity travel upon the external surface or through the internal body of a conductor, such as a copper wire for instance? A. The entire substance of a conductor conducts electricity.

(29) S. C.—You cannot braze a lug on the double-barrel gun without injury to the gun. You can solder it with pure tin and make a good job. Tin the cleaned surfaces with a copper, put them together, and heat the parts until the tin melts, putting a little tin on the edge of the joint to make a perfect filling. If you are near a tinsmith, you should get him to do the tinning. Hard solder is brass, and requires a high heat to melt it.

(30) D. H. S. asks: If a ball falls from a certain point down on a spring, how far back will it rebound, and what is the best spring to use to throw the ball the highest? A. A rubber spring is probably the cheapest. A coiled steel spring is good, but difficult to guide without friction. A volute spring of steel, with a center pad of steel for the ball to strike upon, is probably the most efficient. The ball may return within from seven to nine tenths of the distance fallen through, according to the conditions of friction of the air, friction of impact upon the spring and perfection of contact between ball and spring.

(31) F. B. W. asks: 1. What is the most practical compound for safety match? A. Dip the splints in a paste composed of chlorate of potash 6 parts, sulphide of antimony 2 to 3, glue weighed dry 1. The paste for the rubbing surface is amorphous phosphorus 10 parts, oxide of manganese or sulphide of antimony 8, glue 3 to 6 weighed dry. The ingredients must be thoroughly mixed, and care must be taken not to mix the chlorate of potash in the dry state with the other materials; it should be mixed first with glue dissolved in warm water. The paste for the rubbing surface may be spread with a brush or spatula on the side of the box. 2. Is there any chemical that takes fire by blowing the breath on it? A. None that are practicable or serviceable in the ordinary way.

(32) W. P. asks (1) how the cheaper kinds of mucilage are made by compounding starch with sulphuric acid. A. The starch is first converted into dextrine or British gum, which is then soluble in water. The method is as follows: One part of starch is acted upon by ¼ part sulphuric acid and 2·8 parts water. The acid is mixed with part of the water, and the starch stirred up with the rest; the diluted acid is gradually poured upon the starch, and the mixture is kept for some time at 90° C. The dextrine is then precipitated by alcohol from the clarified solution. 2. There is an imported mucilage here containing a great quantity of lime or other alkali. Can you give its formula? A. You will have to have it analyzed. We do not know its composition. 3. I find it stated that a solution of silicate of potash will make a very strongly sticking mucilage. Can you tell me how the solution is made? A. Silicate of potash alone would be useless. See the article on "Water Glass," in SCIENTIFIC AMERICAN SUPPLEMENT, No. 317.

(33) S. M. McK. asks how to make good first class printer's inking rollers. A. Take of Cooper's best glue 8½ pounds, extra sirup or New Orleans molasses 2 gallons, glycerine 1 pint, Venice turpentine 2 ounces. Steep the glue in rain water until pliant and drain it well. Then melt it, but do not cook it, the glue pot being held in an outside pot in which water is kept boiling. Next put in the sirup and boil ¾ of an hour, stirring it occasionally, and skimming off impurities arising to the surface. Add the glycerine and turpentine a few minutes before removing from the fire and pour slowly. Reduce or increase the glue as the weather becomes colder or warmer.

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