described, including clocks, telephones, lighting apparatus, signaling appliances, telegraphy, measuring apparatus, etc. As the chronological order followed causes the apparatus to be described without any reference to a general plan, a table of contents is given, in which the whole body of material is systematized and the different subjects are referred to by page number. A portrait of the author is also given.

DIE ERZEUGUNG UND VERTEILUNG DER ELEKTRIZITAT IN ZENTRAL-STATIONEN. Von Dr. Martin Krieg. Band II. Magdeburg, 1888. Pp. xvi, 376.

Central station plants, with details for wiring districts, the use of accumulators, systems of regulating the current, and all practical details which come under this subject, are very fully treated in this work. It is illustrated by 141 cuts, and numbers of formulæ are given throughout the work for calculating the working of different types of apparatus. The illustrations are both diagrammatic and perspective, and the entire work gives a very full view of the subject of electric lighting plant.

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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 This is for our information, and not for publication.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.

(98) S. S. B. writes: Please give directions for ventilating a dry room. I want to know the correct method of removing vapor or dampened air from a room artificially heated room used for drying fabrics, yarns, fibers, etc. Where should fresh air be let in, if at all, and where let out, or should the damp air be removed by exhaust from floor? If so located, at what height from floor? A. Drying rooms should have a fresh air inlet immediately beneath the source of heat. If a stove is used, it should be so arranged that the air shall enter and surround the stove and receive its heat before spreading into the room. If steam coils are used, they should be placed or spread a few inches above the floor, with the fresh air entering and spreading under the pipes. The amount of air passing through a drying room should not be so great as to depress the temperature to a degree that will lessen the time of drying, which should always be regulated to suit the amount of heat and the proportion of water to be evaporated. Very wet goods require strong heat as well as rapid circulation. The exit holes should be so distributed as to force the current through all parts of the room alike, especial attention being given to induce circulation of air in the corners. For goods that have passed through a wringer or centrifugal, the room should have a temperature of from 130° to 140°, with vent openings of one square foot to a thousand cubic feet of space, with natural draught due to the height of the room only. This can be increased by a flue or fan if enough heat is developed to keep up the temperature and thus expedite the work. The practice with some establishments is to close the room entirely with a full charge and heat the contents up to 175° and then ventilate, when the goods apparently steam themselves dry. This cannot be done if goods are required to be constantly fed to and withdrawn, as in the laundry business.

(99) F. H. P.—"Harden and temper" is the proper phrase to use in speaking of preparing steel tools. Tempering only refers to the reduction of the hardness to the required temper, which is generally regulated by the color of oxidation. The words "temper" and "tempering" as translated from the Odyssey and Pliny's works, and as used by writers in the middle ages, are used to mean the two operations of hardening and drawing to a temper, which is only a condition of hardness; so that, in this light, its use may by custom make it proper, but among those using technical distinctions for special operations the words harden and temper, or drawing the temper, have distinct meanings. The word temper is also applied to many mechanical operations that signify alloying or modifying.

(100) W. R. writes: In answer to query in the SCIENTIFIC AMERICAN, of September 1, 1888, query No. 18, concerning the relative power of engines, you state that one engine, 15¼ inches by 17 inches stroke, will produce 25 per cent more power than two engines, 12 inches by 12 inches, all conditions being equal. I differ from you in that respect, as the combined areas of the two 12-inch cylinders exceed the one 15¼-inch cylinder. Please explain why the indicated horse power is not greatest in the two 12-inch engines. A. The areas alone do not make a proper comparison between the two engines 12×12 and one engine 15¼×17. It is the volume or contents of the cylinders that should be compared at the same number of revolutions. The indicated horse power of the larger engine is 15 per cent greater than the two small ones. The difference in friction and loss by clearance, leakage, etc., will add about 10 per cent in favor of the large engine, making really an economy of 25 per cent.

(101) D. H. C. asks: How can I make a gold bronze solution? One of such a color as hardware trimmings are finished in. I have tried innumerable proportions of copper and zinc salts and also with the muriate of tin. The color runs direct from the red copper to the yellow brass, and I obtain no intermediate shades. A. The shading of the color in bronze mixtures of the salts of copper and zinc or tin is rather a delicate and difficult matter. It is done by touching the articles in solution with a stick of zinc to start a galvanic action, when by varying the quantities of the salts in the mixture a desired color may be had. See a most interesting and valuable article on the bronzing and coloring of metals in "The Techno-Chemical Receipt Book," which we can mail for $2.

(102) E. W. E. and L. T. & S.—To make printers' rollers, use:

Best glue	10½	lb.
Black molasses or honey	2½	gals.
India rubber, dissolved in alcohol	1	lb.
Venice turpentine	2	oz.
Glycerine	12	"
Vinegar	4	"

The above formula is given for the mysterious "black composition," so durable and elastic, and known but to very few persons until recently. Purified India rubber only is used. To recast add 20 per cent new material. The old home receipt is, 2 pounds best glue, soaked over night, to 1 gallon of New Orleans molasses. Will not recast.

(103) E. B. writes: Can you give me any information regarding an invention for producing power from sound? I have read of such a discovery having been made, but I cannot obtain any information as to whom the inventor is or what the invention consists of. Can you enlighten me? A. You probably refer to Edison's motophone. This is fully described and illustrated in the SCIENTIFIC AMERICAN of July 27, 1878, page 51. The motions of a diaphragm carrying a ratchet and pawl or claw, and spoken against, cause a wheel to rotate. It is only a scientific curiosity.

(104) G. H. writes: I would ask if there are sea-going steamships that have propellers forward and aft. If not, would it not be practical to have propellers in both ends of sea going steamships? A. No such steamer is now running. It would seem quite practical to build one. The long shaft would, however, occupy valuable room. A ferryboat is devoted to deck accommodation, and an ocean steamer to hull accommodation, hence the double screw is better adapted to the former.

(105) J. McJ. & B.—In article on page 356, referring to manufacture of wine, to reduce figures given to American weights and measures make following substitutions. For liters read 0·88 quart, for kilogramme read 2·02 pounds, For hectoliters read 88 quarts. For 15° C. read 59° Fah. (common thermometer), for 20° C. read 68° Fah., for 30° C. read 86° Fah.

(106) Inquirer asks for a recipe for koumiss. A. Consult SCIENTIFIC AMERICAN SUPPLEMENT, No. 130. Also SCIENTIFIC AMERICAN, vol. 51, pages 3 and 225.

(107) W. W. C.—Small streams that have not been used by the public, or made navigable by special act, can be fenced by owners of property through which they run. Having been so fenced for a time without objection from others interested in keeping the stream free, the title becomes legal as against the right of breakage, but does not bar a legislative act making the steam a navigable one in law.

(108) J. J. C. writes: I would like to know from you what illuminating gas will dissolve. A. Nothing under ordinary conditions. It will attack gradually hydrocarbons, and soft India rubber, but no true solution in the gas occurs.

(109) H. A. G. asks: What would be proper speed for line shaft in machine shop, doing light work? A. For light shafting, 175 revolutions per minute is a convenient and medium speed. Circumstances may require more or less, from 150 to 250 revolutions. The higher speeds are generally used for wood-working machinery.

(110) J. J. T. asks: How many heat units are there in one pound of (*a*) good coal. Also of (*b*) average coal. A. (*a*) 7,760; (*b*) 7,500.

(111) J. P. E. asks if the battery described in SCIENTIFIC AMERICAN reference book will do for electro-plating; if so, how large should it be made to run a vat containing one gallon of nickel solution? A. The battery is too small; the plates should be held in a jar six or eight inches deep and four inches apart. Three or four such would answer for a gallon bath. We advise you to study our SUPPLEMENT on electroplating before trying it practically.

(112) E. C. B.—There are many ores of copper—malachite or carbonate, oxides, sulphides, etc., and finally native copper. The latter may be nearly pure metal, and some of the low grade ores may run below ten per cent of metallic copper.

(113) O. G. writes: In melting granulated sugar, a blue scum rises on the top. Is it injurious? A. No; from the description it is impossible to say what it is.

(114) The writer is seventy years of age, and has been a constant reader of your paper since the issue of its first number, and I have a number of the paper by Porter that preceded its issue. I think I have perused the columns of every copy of the SCIENTIFIC AMERICAN, and a large part of the SUPPLEMENT. I have a fine specimen of a bolide or meteorite, and all the phenomena of their passage through our atmosphere are explained in scientific writings except their explosion, which sometimes occurs. I have witnessed the explosion and heard the report of one that passed over the city of St. Louis many years since. My inquiry is, what is the cause of their explosion, or how does it occur? I think a correct explanation in the SCIENTIFIC AMERICAN would be read with interest by others than myself. R. F. STEVENS, M.D.

A. As to the cause of the explosion of the meteorite, Haidinger suggested that it was not due to the breaking of the meteoric mass, but rather to the sudden rush of air into a vacuum which is so quickly left behind in the early part of its course. Perhaps of considerable interest in this line is Maskelyne's reference to the three explosions of the meteor which fell at Butsura, India, on May 12, 1861. They were heard at Goruckpur, 60 miles distant. Fragments of the stone were picked up three or four miles apart, and, strange to say, it was possible to reconstruct with considerable certainty portions of the meteorite of which they were a part. In this case two of the fragments found some miles apart fitted perfectly, and were not incrusted at the surface of the fracture, indicating a second explosion or rupture of the time when the velocity of the meteorite had been so far reduced that the material of the new pieces was not melted to the generation of heat. Of the meteoric stone which fell on May 13, 1864, at Orgueil, France, fragments reached the ground before the sound of the explosion was heard, proving that the fracture had taken place at a period of its course when the velocity was greater than that of the sound vibrations, which travel 1,100 feet per second. Hence it is believed that the sudden generation of heat resulting in the expansion of the outer shells accounts not only for the breaking of the meteorite into fragments, but also for the crash like that of thunder which is the usual accompaniment of the fall of the meteorite. After the explosion sounds are generally heard which have been likened to the flapping of the wings of wild geese, roaring of fire in the chimney, and rumbling of the vehicles over the pavement, tearing of calico or the bellowing of cattle, which are evidently due to the whirling of the fragments in the air in the vicinity of the observers. GEORGE F. KUNZ.

(115) J. J. asks how to reduce objects to microscopic size by photography. A. Place along side of the object to be reduced a large hand bill with big printed letters thereon. Then carry the camera far enough away until the print is just clearly discernible on the ground glass, or, in photographic terms, is accurately sharp. The image of the object to be copied will then probably appear too small to be seen by the naked eye. Make the exposure in the regular way. By examining the resulting negative with a microscope, the details of the object should appear distinct and clear. From the negative, positives on glass are readily made.

(116) G. J. H. asks for a platinum toning solution. A. The following is recommended as a good platinum toning solution:

Chloride platinum	1 grain.
Nitric acid	1 minim.
Water	4 oz.

(117) F. W. A. asks how to save the silver from dry plates that have been carelessly exposed to white light. A. Prepare a strong bath of hyposulphite soda and water (4 oz. of water to one ounce of soda), put the plates in this until the film is cleared. When all of the silver in the plates has thus been dissolved out, immerse in the solution three or four strips of bright fresh zinc about two inches wide by six inches long. After standing about a week, the silver will collect upon the surface of the zinc. In lieu of this, the silver may be thrown down by a solution of sulphuret of potash in the form of a black sulphide. It is dried and submitted to further processes until it is refined. This is better done by a refiner. 2. How may a camera bellows full of pin holes be repaired? A. The best way is to remove it and make a new bellows out of paper, as described in SCIENTIFIC AMERICAN SUPPLEMENT, 625. A coating of an alcoholic solution of shellac and lamp black on the outside might stop the pin holes, but a new bellows is preferable.

(118) J. H. B. asks: What power would an overshot water wheel develop that is eighteen feet diameter, four feet buckets, with cogs screwed to spokes four feet from hub? Flume twelve inches square, pinion ten inches. A. With a 12 inch square open flume or a 12 inch square weir, which is indicated by your letter, with 18 feet fall the whole value will be 9 n. p.; with a well constructed overshot wheel you may realize 7½ effective horse power. If the flume is under pressure, we must know the head and length for a correct answer.

(119) W. W. S. asks how the soap composition used by painters as a vehicle is made. A. Slice 2½ lb. yellow soap and dissolve in 1½ gallons boiling water, and while hot mix and grind with 3½ gallons of oil paint of the desired color. This makes a flexible paint, suitable for canvas.

(120) J. M. W. asks: Which is the best engine for pleasure yachts, say 27 ft. over all, 6½ ft. beam, also the best motive power—steam, electricity, or compressed air; the best fuel, coal or oil or naphtha? What are the names of the different marine engines and companies who deal in them? A. There is quite a variety of engines for small yachts or launches, with steam boilers using coal, crude and refined petroleum, and naphtha. We cannot undertake to particularize in these columns as to which would be best for special uses, but advise you to write to some of our advertisers for their catalogues. Electricity has not yet been made practically available for such purposes except in an experimental way, and compressed air, we believe, not at all.

(121) S. B. D. L. asks us to publish instructions how to set the valve of a plain slide valve engine. Also how the cam on engine shaft should be set. A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 13, which we mail for 10 cents.

(122) J. C. T. asks: What kind of oil should be used for drawing the temper of steel, the oil to be heated to 500° or 600°? An oil that will not take fire, heats readily, and does not evaporate too fast is what is wanted. A. There is no oil that does not take fire at some temperature. Linseed oil boils at 597°, whale oil at 630°. Whale oil is the best to temper with.

(123) G. V. asks: 1. How do you account for the so-called Northern Lights and the Dipper stars, being seen toward the south when observed from positions north of the 78th degree? A. The Dipper stars have a less latitude than 78°. The Aurora or Northern Lights are supposed to have a focal point around the magnetic pole, which is in latitude 70° in North America. Hence observers at the north of the magnetic pole will often see the Aurora at the south, though not always. 2. How is it that the sun in the neighborhood of Behring's Strait can be seen due north on the night of June 21? A. Because it is in sight for 24 hours during the long summer daylight, and hence is during part of its course due north. 3. If Keely's motor is a humbug, as you have often published, then why did the chief justice put him in jail? A. Keely was imprisoned for contempt of court-mandamus.

(124) W. O. suggests that lamp chimeys at the bottom should be made large enough to get the hand in for cleaning purposes, and that a diameter of four inches would answer. This would also give a broader base for the chimney, and make it safer.

MINERALS, ETC.—A specimen has been received from the following correspondent and examined with the results stated.

C. E. H.—The mineral is iron pyrites, of no value. Many species oxidize and go to pieces in the air.

Enquiries to be Answered.

The following enquiries have been sent in by some of our subscribers, and doubtless others of our readers will take pleasure in answering them. The *number* of the enquiry should head the reply.

(125) I have been staining ivory with a solution of nitrate of silver. After remaining in the light a few minutes it turns black, but after being excluded from the light awhile it turns to a pale yellow. On being exposed to light again, it turns black again. Can you inform me of anything that will keep it a permanent black, or of anything in place of it?—E. J. D.

(126) In a discussion with a gentleman widely noted for his good judgment on certain scientific questions, I could not agree with him on the question of heating a room, and appeal to the SCIENTIFIC AMERICAN as referee. We are heating with overhead steam pipes, and he claims that a ventilating grate at the bottom of a flue would assist in heating the room—would suck out the cold air at the bottom and pull down the hot air from above. I claim the only effect of the grate would be better ventilation at the expense of heating, as cold air must come in from outside the room if any is led away up the flue from the inside. 2. Can an air-tight room be heated with a coal or wood stove within it? And if not, why? 3. Do you accept the theory of direct heat rays from any heated surface? My disputant claims heat is only conveyed by air next an object becoming heated and in turn heating contiguous objects.—B. L. A.

(127) Is there any process by which the green and blue stains found in rock can be produced permanently by artificial means, that is, by chemicals or heat?—H. W.

(128) Please to inform me how to make violin bow resin.—O. S.

(129) I would like to know if the aldermen of a city have the legal right to grant privileges to individuals or corporations in the public highway, that are detrimental to the traveling interest, and if they can, is there any limit to their power?—E. R.

(130) I have a military uniform that is trimmed with gilt braid. The braid has become dirty looking. Can you please inform me how I can brighten the braid without injuring the cloth?—P. C. W.

(131) Two pulleys exactly alike and each doing the same work in the same time, say, for instance, lifting a load of 1,000 pounds; in one case the pulley does the work directly, in the other case a countershaft is used and geared two to one, one pulley of course running twice as fast as the other one; S claims that the pulley running fastest will require less set

screw power to do the work than the pulley which runs slower and does the work direct. P claims that there will be no difference of set screw power required, or, if any, the slower pulley would require less on account of having no countershaft to drive. Which is right?—S. B.

(132) How would I proceed to harden a razor which is hollow ground and quite soft, so much so that it requires honing every three or four weeks. It will not hold an edge. Are there any chemicals that I could use without resorting to tempering in the forge? —W. H. M.

(133) I want to transform a current of carbon monoxide (CO) into carbon dioxide (CO_2) by other means excepting combustion. Will you kindly show me a solid substance, cheap and abundant, that contains oxygen in such statethat, on passing by it, the carbon monoxide takes oxygen, and therefore turns into carbon dioxide?—J. A. M.

(134) If one has a 20 horse power engine, is it more economical (leaving first cost out of the question) to have a 20, 30, or a 40 horse power boiler?—C.

(135) Inform me through your columns how I can make and use a preparation for silver plating and one for gold plating.—A. A.

(136) 1. My neighbor owns a thrashing outfit, in which the power is conveyed from the horse power to the separator by means of a tumbling rod, in four sections, connected by four knuckle joints. The total deflection of the tumbling rod is about 40°. What percentage of the power is absorbed by the knuckles? 2. What course would you advise a young man to pursue who desires to become an electrical engineer? He has a good common school education. 3. As a profession, how will electrical engineering compare with civil engineering, during the next twenty-five years?—C. B. S.

(137) Please tell me what it would cost to make an induction coil as that described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 161. Please tell me if aniline green contains any copper in solution. If not, what gives it the copper appearance when in a liquid state?—Wm. R.

(138) Will you kindly inform me the initial electro-motive force and the strength of current of the following batteries: 1. The Disque Leclanche. 2. The Fuller mercury bichromate battery. 3. The perforated cup battery, size 4 in. square. 4. The Bunsen battery spoken of in correspondence No. 34 of SCIENTIFIC AMERICAN of December 1, 1888. Which is desirable for electric bells, a battery of high E. M. F. or one of considerable strength of current? For miniature incandescent lamps? What kind of iron is the best to use in a casting of the field magnet of the simple electric motor? If this motor be used as a dynamo, what current will it produce?—J. G. P.

(139) I want to make a cold box in an ice house, but without altering the ice house very much. It keeps ice all right, but my cold box inside of the ice house I can't get below 50°.—A. G. D.

(140) In a family of sixty, we use between 500 and 1,000 bushels of apples. Apple sauce is on the table three times a day, and the same with tomato sauce. We want vessels to cook these in, that will not poison us. Have tried the best we could find in market—copper washed with tin, agate, marbleized iron, etc., but all fail to give satisfaction; we are poisoned. If you can help us in this dilemma, it will be an act of humanity. The sisters want something light to handle.—F. W. E.

(141) Would you kindly inform me of any publication treating about the different trials in the United States of explosives, such as robinite, melinite, bellite, carbo-dynamite, graydonite, smolianoff, snyder, and where such works or publications may be had?—H. B.

(142) I have a quantity of pure chloride of silver, and would like to know how to convert it into pure nitrate of silver.—G. O.

(143) I have made the electro motor described by you some time since, with some slight variations, the principal one being cast iron field magnets, and have had quite good success. I now wish a machine to run as a dynamo to light an Edison 20 C. spiral lamp, which requires 30 to 38 volts, 1 to 1·5 amperes, and has a resistance of about 0·34 ohms. Can I make an armature which will take the place of the motor armature and give the required current? If not, can magnets and armature both be wound so as to produce the required current? If the resistance of machine cannot be kept low enough, will not a slightly increased voltage answer to produce required current? Lastly, if machine can be made, at about what speed should it be run?—H. M. P.

(144) Please inform me whether there are any chemicals, when put into a quantity of water (a tub of water for example), which will cause it to freeze, and what they are? What is the process for making ice? I am trying an experiment for keeping apples. I am going to make double wall building out of concrete, with about 18 inches space between the walls, and then fill the space full of water. And then I want to freeze the water in a body. Will I be able to accomplish it? How would fruit keep with just water alone in the space? Would it keep the temperature inside as low as 36 degrees? Would the water be liable to leak through the concrete walls? Apples will not keep well in California, in cellars under ground. They seem to keep better in double wall buildings above ground. Now I want to try and make a fruit house after the principles of these cold storage companies, so as to be able to preserve fruit perfectly for four or five months. Now can you give me any light on the subject?—H. W. C.

(145) How much power does it take to run a coffee mill, grinding 1 lb. of coffee? Height of mill is 2½ ft. It has two flywheels of 2 ft. in diameter, made by Enterprise Co., of Philadelphia, No. 12. A boy of 16 can easily grind 1 lb. of coffee without stopping. Will a C. C. ⅛ h. p. battery motor run it? Battery has E. M. F. of 12½ volts.; internal resistance, 1 ohm. Motor has resistance of 1·7 ohm. Will a ⅜ round belt transmit power?—A. M.

(146) What will make a durable ebony finish for a Georgia pine soda water counter? Please answer through the columns of the SCIENTIFIC AMERICAN. —F. McD.

(147) Can you tell us how to make stamping powder, such as is used with perforated paper patterns for stamping fancy designs on cloth, etc.? Something that will not rub off from handling while working the pattern.—F. P.

(148) I am going to make a photographic camera as described in SCIENTIFIC AMERICAN October 13, 1888, page 231. Instead of a spherical wide angle lens, I bought a 75-cent microscope or magnifying glass, brass mounted, with two adjustable lenses, focal length a little more than an inch. In order to get a fixed focus for all distances, a diaphragm probably has to be used, but I don't know the size of the opening for making instantaneous photographs. Would you please inform me whether the diaphragm should be placed between the two lenses or in front of them? Can such a microscope or a 75-cent reading glass be used in the construction of a lantern for enlarging small negatives?—W. L. W.

(149) Can a horse do as much work on a tread power as on a common circular horse power with the same exertion?—J. I.

(150) I owned a locomotive steam boiler three years ago, and it is still in use, that was built before 1854, and has had very little repairs? Are there many older boilers in use in this country? She has copper fire box and brass tubes.—J. E. E.

(151) I would like to know the composition of the varnish used upon canvas boats, to keep them from leaking. Also if said varnish will exclude air or common coal gas?—J. A. W.

(152) Is there a process by which crude oil, say the Lima crude oil, can be used as a fuel in kitchen stoves or parlor stoves? Or is there a burner made using crude oil for fuel for household purposes?—P. F. B.

(153) The mixture of salt with mortar has been spoken of recently as an effectual prevention of the crumbling of the mortar from frost. Will you please inform me the quantity and mode of admixture, and oblige a constant and attentive reader?—J. A.

(154) Please tell me what kind of acids I can use to remove the sand and hard crust from the castings, so as to leave them a bright brassy color and take the grit, so as not to wear the edge off the tools, also is there any chemicals that I can use in a steel ball, 1 3-16 in., that the loadstone will not have any affect when it drops into its seat as to hold the two together, as I wish to use a steel ball and seat? I wish to use them in oil wells, where the magnets or loadstone is bothersome. Also would you please tell me how I can make my brass moulder's sand tough, so as it will hold together?—W. H. W.

(155) Will you please answer through the question column of the SCIENTIFIC AMERICAN whether it is possible to run three circular saws through a log at the same time on one saw kerf? Please let me know if it has ever been done, and how. It is reported by some men from Washington Territory that there are some mills there that have such machinery for cutting up the large timber of that Territory. Some have disputed the possibility of it, and we have agreed to submit the question to you for settlement.—W. W. Y.

(156) Will you kindly inform me how the acoustic properties of a hall can be improved, the dimensions of which are 46 × 60 feet, and whose ceiling is oval-shaped? It is 12 feet to beginning of the curve of ceiling, and about 22 feet to top of same.—G. A. C.

(157) Which of the two boilers would be the more economical, using wood for fuel: No. 1, shell 5 ft. × 12 ft. with 86 three-inch tubes; No. 2, shell 5 ft. × 12 ft. with 150 two-inch tubes? Also which would last the longer? What per cent saving in fuel is there between a common slide valve and an automatic cut-off engine of 40 horse power?—W. McV.

Replies to Enquiries.

The following replies relate to enquiries recently published in SCIENTIFIC AMERICAN, and to the numbers therein given:

(52) Polishing Wire by Pickling or Galvanizing.—Neither of the processes you name will polish wire. The proper treatment depends on its material and how badly corroded it is. Rust may be removed from iron wire by soaking in solution of chloride of tin. Emery of increasing degrees of fineness, followed by rouge, putty powder, whiting, or rotten stone will polish metal.

(53) For Enamels for Clay Goods consult Spon's Encyclopedia of Industrial Arts, part 25. Also SCIENTIFIC AMERICAN SUPPLEMENT, 387 and 402.

(54) 1. Making Small Flat Springs.—Cut them off a watch or clock spring. To perforate, punch an indentation with a sharp-pointed punch and file off the projection or drill it. It may be necessary to draw the temper for this. If so, reharden again and draw to a blue color. 2. Printing Name on Velvet in Gold.—Dust with finely powdered resin or mastic and stamp with hot metal type. Afterward wipe off excess of gold. Or paint the letters with gold size and apply with cold type.

(55) Large and Small Hose Nozzles.—Other things being equal, a large nozzle will throw a jet of water higher than a small one. If the supply is insufficient, the small nozzle may throw the highest. The stream of water should not be "wire drawn" or throttled for either nozzle to work well.

(56) Horse Power Transmitted by Compressed Air.—A pipe 5 feet diameter and 1 mile long at 100 pounds pressure at inlet would transmit about 55,000 horse power; at 200 pounds pressure about 82,000 horse power. If 30 miles long, about one-fifth as much.

(57) Horse Power required to heat Iron Plates.—I have calculated this according to one formula with the following results: In heating a round iron plate 2 inches thick and 6 inches diameter to 1,000° Fah., about 160 electrical horse power would be absorbed. To heat it twice as hot, about 320 electrical horse power would be required. Allowing for conversion loss, etc., these figures might safely be increased to 200 horse power and 400 horse power respectively as giving the power of the engine. To heat a plate 4 inches thick and 8 inches in diameter to 2,000° Fah. would require about four times as much as for the smaller plates. No allowance is made for loss by conduction.—S. V.

(58) Tests for China Clay.—The quality may be judged by observing its whiteness and freedom from grit. It may bring from $10 a ton upward.

☞ Books or other publications referred to above can, in most cases, be promptly obtained through the SCIENTIFIC AMERICAN office, Munn & Co., 361 Broadway, New York.

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