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 This is for our information, and not for publication.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 electro-plating 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