

a very exhaustive manner on the special construction and arrangement of photographers' studios, their dark rooms, washing arrangements, etc., and other furnishings and utensils necessary for proper working.

PHOTOGRAPHISCHES TASCHEN LEXIKON. By Dr. Julius Schnauss. Halle a. S., Germany: Wilhelm Knapp. 1893. Pp. 157.

This valuable pocket dictionary gives the technical terms used in photography in German, English, French, and Latin. The explanation of the terms is in German, is concise and correct.

THE BOOK OF THE FAIR. Chicago and San Francisco: Bancroft & Co.

Those who desire to crystallize their recollections of the Columbian Exposition will be interested in this publication, which, from an artistic point of view, is of high order.

AN ELEMENTARY TREATISE ON THEORETICAL MECHANICS. By Alexander Ziwet. New York: Macmillan & Co. 1893. 8vo. cloth. Pp. 181, 76 diagrams. Price \$2.25.

The present work owes its existence mainly to the difficulty of finding a good modern text book suited to the requirements of the American student.

Any of the above books may be purchased through this office. Send for new book catalogue just published.

SCIENTIFIC AMERICAN BUILDING EDITION. NOVEMBER, 1893.—(No. 97.)

TABLE OF CONTENTS. 1. Elegant plate in colors showing a residence at Bridgeport, Conn., recently erected for Mr. Thos. C. Woodin, at a cost of \$4,600 complete.

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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 This is for our information and not for publication.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.

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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.

(5461) B. A. C. writes: Encircling the sun this morning is one of those rings which I believe are called sun dogs. I believe they are said to foretell a storm, and in fact I have noticed that storms develop after one of these dogs appears.

(5462) W. R. S. writes: I would like to know the best and most durable cement that will stick to iron or steel? A. Much depends upon the use that the cement is required for and the condition of the surface of iron or steel.

(5463) L. H. D. asks: What thickness should the ice be to move a frame cottage 23x27, three rooms on lower floor, two rooms upstairs, thoroughly built, braced, plastered and finished, shingle roof, chimney 25 inches by 32 inches, across a lake about one-third of a mile wide? What is the cheapest way and the best

to prevent a 2 inch plank, Michigan pine tank 6 feet high 9 feet diameter, from freezing in a barn 35 x 75 where only three cows are kept? The tank is under the roof, on the east end of it, supplied by a windmill. Would simply banking up hay around and underneath be sufficient? What is the best packing to use on a windmill force pump? Is Selden piston rod packing good for that purpose? Ordinary cotton packing requires too much attention. A. The ice should be not less than 12 inches thick, with means provided for keeping the house moving on a large base or bearing upon the ice.

(5464) M. T. W. asks what the difference is between a square foot and a foot square. A. There is no difference in the superficial area of the two expressions. A square foot may be of any form of surface, provided it contains an area of one square foot. A foot square is of the same area, but must be one foot in length on each of its four sides, or in other words, a square foot is a unit of area, while a foot square is a unit of fixed dimensions.

(5465) O. B. asks the best oil to use in a trainman's lamp, as it requires to stand unlimited shaking without going out, and not form a crust on the wick, or as little as possible, and also an oil that will not freeze. A. The best oil will not fill all the requirements of our correspondent, but a very good oil for lamps may be made from pure sweet lard oil mixed with 10 per cent of astral oil.

(5466) A. P. J. says: I have some squashes in fine condition and would like to preserve them as long as possible. I am told to heat them for a few seconds in an oven at a high temperature, also that varnishing serves to keep them longer. Please state if either treatment is a benefit and the best way to preserve them. A. Varnish might flavor the squashes unfavorably unless melted paraffine is used. Whitewashing has been used with good results.

(5467) W. R. J. asks how phosphide of tin is made. How is the phosphorus kept in the tin while cooling down? A. The following process is given: Precipitate tin by placing a bar of zinc in a solution of tin chloride. Remove the metallic tin and place it in a crucible while still moist, along with some sticks of phosphorus. Expose to a gentle heat until flames no longer appear. The phosphide of tin remains as a crystalline mass at the bottom of the crucible. All operations connected with phosphorus are very dangerous.

(5468) L. C. S. writes: I have two barrels of strong red wine vinegar; how can I change the color and make it a white or light vinegar without injuring it? A. Filtering through bone black may effect your purpose. There is danger of impairing its flavor. Try on a small sample.

(5469) W. H. B. asks: Can I magnetize short steel bars, suitable for telephones, at power generator of electric street car or electric light plants? If so, how is it done? A. Simply touch one end to a pole of the dynamo when in action.

(5470) C. H. McD. asks if white cotton cloth will in any way be injurious to the plates of a storage battery, or would it be better to remove same after forming, or still better not to use it at all? A. It is better to remove the cloth after forming. It may tend to clog up the cell, and will in any case soon decay.

(5471) M. B. says: Can you give me a receipt for bluing gun barrels other than heating and pouring oil on? Please tell how to clean leather belts that have become soiled by handling? How can I take rust from a polished steel surface without scratching it? A. The bluing of gun barrels, with many useful points in regard to guns, are described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 830, article "Gun Wrinkles." Leather belts may be cleaned with Castile soap and water or benzine, dried and softened by working in the hands. Rust on polished steel should be polished off with wet rouge on a buff stick; finish with dry rouge.

(5472) A. M. B. asks for the proper size of wire to use in winding an Edison dynamo about one-half size of the one in SCIENTIFIC AMERICAN SUPPLEMENT, No. 844. A. The size of wire depends on the voltage and amperage desired. You might use wire of one-half the sectional area of that specified.

(5473) J. G. asks the origin of the center board or sliding keel as used on American yachts. Is it an American idea or simply an adoption? A. The center board was derived from the old Dutch side board or lee board. The center board is an American invention, as far as our record goes.

(5474) T. S. H. says: It may not be generally known that glycerine is the best for the oil stone for sharpening edge tools. It does not dry into the stone as do other oils and harden the surface. The stone is easily cleaned with water.

(5475) A. J. H. asks: 1. I have an 8 light 16 candle power dynamo, shunt wound, which I wish to use as a motor for running a 9 inch by 25 inch foot lathe, and what I wish to know is if it is practicable to cut out part of the wire in field magnets and armature so that it will not require so much current to operate it, as I shall not need quite 1/4 horse power? A. We advise you not to alter your dynamo if its winding suits the potential of your circuit. An excess of size is a good error. 2. What would be the best form of primary battery to use, how large a one should I require, and would it cost much to run it say 2 hours a day? A. We do not advise primary batteries. A simple bichromate plungebattery, such as described in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 792, is about the best. It will be rather expensive and troublesome to run. 3. I wish to make a small vapor engine of about 1/4 horse power, and should be pleased if you would tell me if there has ever been a paper published in SCIENTIFIC AMERICAN SUPPLEMENT on how to make one. What I wish to know is how to make an electrical coil to produce the necessary spark to explode the charge, how it should be connected, and

what should be the proper quantity of air and vapor for a charge. A. For gas engines we refer you to the following books: "Clerk on the Gas Engine," \$2; Robinson's "Gas and Petroleum Engines," \$5.50, which we can supply by mail. A simple spark coil of five pounds No. 18 or 20 wire, wound on a core of soft iron wire and actuated by 4 or 5 cells, is enough. It is very difficult to determine the design for a new engine.

(5476) W. J. M. asks: 1. How to tell the positive or negative pole of a storage battery by looking at it. A. The positive or oxidized plates have a reddish brown color, the negative or reduced plates have a gray color. The latter correspond to the zinc plates of a primary battery. 2. How often does the solution require to be renewed? A. No time can be stated. Water has to be added from time to time to keep the plates covered, and sometimes, if the specific gravity falls, sulphuric acid of 1.140 (about) specific gravity is used instead of water as above. 3. What precautions are necessary when plates become buckled? A. Introduce glass strips or rods to prevent the plates from touching. You may be able to straighten them by hand. 4. What is the life of storage batteries when carefully handled? A. No limit can be assigned? They may last many years. 5. Is there a mechanical device to indicate when a battery is sufficiently charged? A. The hydrometer. They should be charged until gas is evolved. 6. How should four such cells be coupled up—all positive poles together or vice versa? A. The positive plate of one to the negative of the next, and so all through as a rule. 7. How to detect sulphating? A. By the color of the positive plates. These show white patches if sulphated. 8. In setting up with fresh solution, should the solution be allowed to cool before the charging current is put on? A. Yes. 9. How often should a battery of four cells be charged when used heavily 10 hours a week (on an electric organ), and how long should the charging current be left on? A. Do not let it E. M. F. fall below 2 volts per cell. Charge until the solution bubbles. 10. Can you inform me how to solder aluminum, also what flux is used? A. For working aluminum see our SUPPLEMENT, No. 602, also SCIENTIFIC AMERICAN, vol. 65, No. 2, and vol. 62, No. 26. 11. What transparent solution is used in tube pole indicators? A. Use potassium iodide. 12. What metal are the thin springs in the Blake transmitter made of? A. Watch spring. 13. How are the faces of the carbon buttons hardened? A. If French carbon of fine quality is used, hardening is unnecessary. To harden, soak in a hot solution of ammonium carbonate, dry, and recarbonize. Repeat several times. This formula is given by one of our large electrical companies. You may also boil in sirup, wash the surface off, and recarbonize under charcoal dust in a tightly closed vessel. 14. How many volts are in an ampere? A. None; they are separate and distinct units. 15. What is meant by ampere turns? Does it mean one turn of a certain size of wire? A. The product of amperes of current by the net number of convolutions in one direction in the conductor. We recommend and can supply you with the following books relating especially, the subject you refer to: Reynier's "Voltaic Accumulator," price \$3; Salomon's "Electric Light Installations and Management of Accumulator," price \$2; Niblett's "Secondary Batteries," price \$1.50.

Answer to E. J. P., No. 5407, contained an error as to distance. The answer should have been 11' 17 feet.

TO INVENTORS. An experience of forty-four years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere.

INDEX OF INVENTIONS For which Letters Patent of the United States were Granted October 31, 1893, AND EACH BEARING THAT DATE.

Table listing inventions and their patent numbers. Includes entries like Acid, manufacture of acetic, J. Farmer; Adding machine, W. S. Gubelmann; Air purifier, J. S. Dodge; Air ship, navigable, C. F. Billwiler; Alarm, See burglar alarm; Overflow alarm; Antifriction composition, J. B. Cleaver; Ash pan and sieve, combined, I. M. Levy; Ash shovel, W. T. Miller; Asphalt purifying apparatus, A. S. Cooper; Atomizer, F. B. Gessler; Atomizer, B. Stern; Automatic register, J. Shoup; Automatic elevator, J. P. Lybarger; Awning frame, Keers & McLaughlin; Axle washer, vehicle, A. W. Woodward; Bag holder, G. Hunt; Bale ties, device for forming wire, A. S. Allen; Ball, See Pool ball; Band cutter and feeder, W. P. Burke; Bathometer and shoal water indicator, automatic, N. Potsebinsky; Battery, See Galvanic battery; Bearing, shaft thrust, S. Ingersoll; Bed and sofa, folding, G. Zilsberger; Bed, time alarm, E. C. Barnes, Jr.; Bedstead, chicken, J. C. Denham; Bell, bicycle, S. Goulden; Bell hammer, rotary, S. Goulden; Belt fastener, G. P. Kenaban; Belt tightener, G. Lindsay; Billiard table adjuster and leveler, W. D. Little; Blast holes, apparatus for forming leaders in, J. Seitz; Blind apparatus, window, Nisbet & McLaren; Boiler, See Ironing board; Boiler brace jaws, machine for making, C. E. Brown; Boiler cleaning apparatus, Horton & Fitch; Boiler feeder, automatic, J. H. Johnson; Boiler feeder, steam, J. Morehead; Boiler furnace, steam, H. Sieben; Bolting flour, meal, etc., method of and apparatus for, G. W. Combs; Book account, W. H. Smith; Book finishing machine, T. S. Murphy, Jr.; Boot or shoe and making same, G. W. Young; Boot or shoe dresser, S. A. Richards; Bottle labeling machine, C. Campini; Bottle stopper fastening and extractor, combined, G. F. Atwood; Bottles, stopping wine, W. Watson.