

miscalculated levers and similar factors have been responsible for many disasters. In Mr. Le Van's work we have the full subject properly presented, calculations elucidated, the different constructions shown, and last, but not least, the ills that safety valves are heir to are described. The numerous illustrations are an excellent feature.

RECORD OF SCIENTIFIC PROGRESS FOR THE YEAR 1891. By Robert Grimshaw, M.E., Ph.D. New York: Cassell Publishing Co. Pp. vi, 372. Price \$1.50.

In brief form the entire field of scientific work is covered by the author. The mere recital of his headings would fill the space allotted for a review. The absence of illustrations and the necessarily short treatment allotted to so many subjects are the features of the work which we can least approve of. The volume will be found, however, of use and interest. An excellent index closes the work.

HOW TO MAKE INVENTIONS. By Edward P. Thompson. New York: D. Van Nostrand Co. No date. Pp. ii, 161. No index. Price \$1.

As this work covers the whole field of the arts it is certain that if reviewed carefully errors could be indicated. But in the main it is an excellent manual, and will be read by many desirous to become inventors. Considerable labor on the author's part must have been requisite to give so logical and clear an arrangement to such diversified material. As is always the case when a book of this type is well done, it is most interesting reading and can be commended to many others than inventors.

A CONCEPT OF POLITICAL JUSTICE. By J. W. Sullivan. New York: Twentieth Century Publishing Co. 1891. Pp. 58. Price 10 cents.

THE MODERN COOK BOOK. Springfield, O.: Mart, Crowell & Kirkpatrick. Pp. 320.

THE FORGING OF THE SWORD AND OTHER POEMS. By Juan Lewis. Illustrated by Charles Bradford Hudson. Pp. 103.

SCIENTIFIC AMERICAN BUILDING EDITION.

MAY NUMBER.—(No. 79.)

TABLE OF CONTENTS.

- 1. Elegant plate in colors of a very handsome residence erected at Sea Side Park, Bridgeport, Conn. Two perspective views, floor plans, etc. J. W. Northrop, architect. Cost \$17,000 complete.
2. Plate in colors of a summer cottage erected on Diamond Island, near Portland, Me. Perspective elevations and two floor plans, an excellent design. Cost \$2,500 complete.
3. A very attractive summer cottage recently erected at Great Diamond Island, near Portland, Me. Floor plans and perspective elevation. Cost \$2,000 complete.
4. A handsome residence in the colonial style of architecture, at Bridgeport, Conn., recently erected for W. F. Hobbs, Esq. Cost about \$7,500 complete. Perspective view and floor plans. J. W. Northrop, architect.
5. A one story brick cottage erected at Richmond, Mo. Perspective view and floor plans. Cost about \$2,300 complete.
6. Several photographic plates of handsome residences near New York.
7. A suburban residence of attractive design erected at Bensonhurst, Long Island, N. Y. Cost \$5,800 complete. Floor plans and perspective view.
8. A very tasteful design for a stair hall, for a residence in Cleveland, O.
9. Perspective view and ground plan of St. Andrew's Episcopal Church, at 127th Street and Fifth Avenue, New York. H. M. Congdon, architect, New York.
10. Sketch and plans of a convenient and economical house. Cost \$1,100.
11. A California residence. Perspective elevation and floor plans. A pleasing design.
12. Perspective and plans of the Manchester Palace of Varieties, Manchester.
13. Examples of English interior decorations and furnishings. An entrance hall. A Chippendale drawing room.
14. Miscellaneous contents: The white stain or efflorescence on bricks.—Household pests.—The keynote of an auditorium.—Curious foundations.—An Albany house.—To keep iron pipes from rusting.—The Senate chamber new decorations.—Don't turn the exhaust into the sewer.—Floors and their finish.—Bedroom furnishing.—Moderate price screens, illustrated.—Improved hot water heater, illustrated.—French observations on American constructions.—The compensation of architects.—A speaking tube and earphone, illustrated.—Diamond wall finish.—Fireproofing receipts.—An improved hot water heater, illustrated.

The Scientific American Architects and Builders Edition is issued monthly. \$2.50 a year. Single copies, 25 cents. Forty large quarto pages, equal to about two hundred ordinary book pages; forming, practically, a large and splendid MAGAZINE OF ARCHITECTURE, richly adorned with elegant plates in colors and with fine engravings, illustrating the most interesting examples of Modern Architectural Construction and allied subjects.

The Fullness, Richness, Cheapness, and Convenience of this work have won for it the LARGEST CIRCULATION of any Architectural publication in the world. Sold by all newsdealers.

MUNN & CO., PUBLISHERS. 361 Broadway, New York.

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue

For Sale—One 15 H. P. double cylinder, double drum, friction horizontal hoisting engine, with boiler and fixtures. New. Address W. P. Davis, Rochester, N. Y.

Acme engine 1 to 5 H. P. See adv. next issue.

"U. S." metal polish. Indianapolis. Samples free. Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

6 Spindle Turret Drill Presses. A. D. Quint, Hartford, Ct.

For foundrymen's metallic pattern letters and figures send to H. W. Knight & Son, Seneca Falls, N. Y.

Universal and Plain Milling Machines. Pedrick & Ayer, Philadelphia, Pa.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Screw machines, milling machines, and drill presses. The Garvin Mach. Co., Light and Canal Sts., New York.

Centrifugal Pumps for paper and pulp mills. Irrigating and sand pumping plants. Irvin Van Wie, Syracuse, N. Y.

For Sale or Wanted Manufactured on Royalty—Wall and ceiling mops. Patent No. 465,183, issued Dec. 15, 1891. Address Chas. Moore, Visalia, Tulare Co., Cal.

For the original Bogardus Universal Eccentric Mill, Foot and Power Presses, Drills, Shears, etc., address J. S. & G. F. Simpson, 26 to 36 Rodney St., Brooklyn, N. Y.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4; Munn & Co., publishers, 361 Broadway, N. Y.

What do you want to buy? We will send without cost to you, catalogues, price lists, and information concerning anything you wish. Parot, Willey & Co., 265 Broadway, New York.

Competent persons who desire agencies for a new popular book, of ready sale, with handsome profit, may apply to Munn & Co., Scientific American office, 361 Broadway, New York.

Any one having a specialty of merit, and desiring to have it pushed on the Pacific coast by one who has some money and much energy, address B. C. B., 57 Nevada Block, San Francisco.

\$30,000 to \$40,000 capital is wanted to extend the manufacture of a product for which there is a very wide field in everyday usage. It is a purely commercial enterprise, in which a large sum has already been invested by New York merchants of the very best standing, for providing the plant and equipment. The practical adaptability of the product has been thoroughly tested and demonstrated, and it is to extend the field of its operations that additional capital is desired. The fullest opportunity will be given to bona fide investors to investigate the business. Address "Security," care Scientific American, New York.

Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.

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.

INDEX OF NOTES AND QUERIES.

Table with 2 columns: Description and Page No.
Dynamo and motor construction... 4326, 4347
Electric circuits... 4345
Fuses for electric circuits... 4325
Glass bottles, to cut... 4346
Glass, to drill... 4337
Induction coil... 4330, 4339
Invisible writing... 4325
Photographic... 4328, 4336
Silo, theory of... 4332

(4325) N. S. P. asks (1) for a receipt for an invisible ink which can be made visible by blowing the breath on the paper containing it, and which afterward returns to its invisible state. A. Writing made with a weak solution of chloride of cobalt is blue when dry and pink when moist, therefore, if you write with this ink upon blue paper, by breathing upon it you will produce a pink color. By writing on glass with very dilute hydrofluoric acid, an invisible etching is made, which stands out clearly when the glass is breathed upon. See SUPPLEMENT, No. 373, for the full process of making magic pictures. 2. What is the metal used in the plugs connected in an electric current, and what are all of the reasons for its being used in preference to other metals? A. Tin is often used for the fusible plugs, and some of the fusible alloys are also used. The main requirements are a metal not easily oxidizable, which will fuse at a heat below that required to char wood or burn the insulation of wires. 3. Has it much resistance, and why do the plugs blow out? A. The resistance is considerably above that of copper. The plugs do not in reality blow out, but melt. 4. If two wires carrying a current of electricity are put into a bucket of water, the wires touching nothing but the water, does any current pass? If so, what per cent of the current used? A. With a low E. M. F. a very small percentage of the current will pass, and this percentage increases as the E. M. F. increases. The amount of current will of course depend upon the surfaces exposed to the water. 5. While an electric street car is running, could it be stopped quickly by reversing the motor, or would it damage it to do so? A. In most motors, if reversed quickly, there will be danger of burning out the armature. 6. While examining the bell in a telephone I noticed that the two coils

were both on the same circuit and that the circuit was not broken in any way, yet the armature, which is pivoted in the middle, has each end alternately attracted. Not understanding the reason for this, will you please explain it thoroughly? It was an old telephone not in use, and I don't know whether the bell is just like the ones in use now or not? A. The bell you examined was a polarized bell, and the current which operates it is an alternating current. The armature of the bell is magnetized, and the reversals of the current cause the armature to be alternately attracted and repelled. 7. Could you tell me of a way by which the gloss or shine can be removed from clothes? A. It is said that sponging with a solution formed by dissolving 1 ounce of ammonium bicarbonate in 1 quart of water will remove the gloss from clothes.

(4326) W. T. B. asks: 1. If a motor wound to have a resistance of 3 ohms be connected to a battery having E=5 and C=10, what is the strength of C in the motor, and what is the E? A. If your E.M.F. is 5 volts and your current is 10 amperes, the resistance of your battery must be (according to E = C R) 1/2 ohm.

1/2 + 3 = 3 1/2. This is, according to the same formula, 5 + 3 1/2 = 1 1/2 3/4 amperes. 2. Is watts = C E correct for motor? A. Yes. 3. By what rule or formula can one determine as to what the E, C, and internal resistance of a battery must be, to be most efficient to drive a motor having a known resistance? A. The resistance of the battery should be equal to that of the external circuit. 4. For a plunge battery what should be the proportion of water, sulphuric acid and bichromate of potash, by weight and by measure? A. Make a saturated solution of bichromate of potash and water; to this slowly add one-fifth its weight of commercial sulphuric acid. 5. Which is the best way to connect the cells of such a battery to run a motor—in series, multiple arc, or multiple series? A. It depends upon the resistance of the motor; if its resistance is low, the cells may be connected in parallel; if it is very high, they must be connected in series. A little experiment will soon determine the best arrangement of batteries for a given motor. 6. Is the efficiency of a plunge battery impaired by the fact that the carbon plates are only one-half the thickness of the zinc one, although there are two carbons to one zinc, the other dimensions being the same? A. The thickness of the carbon plates is not very material, although those of medium thickness are preferable to very thin ones.

(4327) G. L. B. asks: Are there any means by which the time required for the sun to radiate all of its heat can be computed? A. There is no certainty in any computations in regard to the time that the sun will continue to give light enough to sustain life upon the earth. The temperature of the internal mass of the sun is only a conjecture. The temperature of the photosphere has been estimated by various observers at from 3000° to several millions. Professor Young estimates that 18,000° Fah. is probably nearer the truth than the extremes. From the radiant heat of the sun as observed on a given surface of the earth is computed the radiation in all directions throughout the sun's sphere. With this as a divisor, and the assumed units of heat held in the sun at some assumed temperature with the sun's mass as a dividend, the time is obtained. According to Newcomb, this is about 10,000,000 years, in which to wind up the age of life on the earth.

(4328) H. B. C. asks how kodak cameras are made to load and unload the sensitive film by daylight without injury. A. The roll of sensitive film has attached to its inner and outer ends a strip of black paper about a foot long. The roll comes in square shaped cardboard boxes with a slit in one corner through which the paper passes. To load the camera you simply drop the square box into the compartment in the camera, then draw the outer black paper across the stage to the wind-up roller. Attach the paper to the latter, put on the roll holder to the camera, and wind off the black paper until the sensitive film is brought into the focal plane. A certain number of revolutions tells you when the sensitive film is in place. When the exposures are made, the black paper on the inner end of the roll now surrounds the outside by continuous winding and protects it from light. The film is made of celluloid by the Eastman Co., Rochester, N. Y.

(4329) W. McC. asks: 1. A railway company in this vicinity have a pump to fill a tank for engine use; the pump and tank are one-half mile apart, and an electrical alarm is used to signal the engineer at pump when tank is full. Six cells of Leclanche battery are used, and a float closes its circuit. In very hot weather the alarm will not work, but in cold or wet weather it works well. What is the trouble and what will remedy it? A. Possibly the expansion of the wire at one or more of the joints may affect the resistance of the line, but if a ground is used, the trouble is probably due to the dryness of the earth surrounding the ground plates. The remedy is obviously to place the ground plates at a lower level, where they will be surrounded by moist earth. 2. Have you any books that you could recommend to show the manner of cutting in wires on a switchboard, especially a loop? Also any on the setting up of telegraph instruments, both the ordinary and "quad"? A. For answers to these queries consult Prescott's "Electricity and the Electric Telegraph," price by mail \$7.

(4330) E. S. A. inquires in regard to the feasibility of constructing a large induction coil under the following data. Coil heads of black rubber 1/2 inch by 6 inches square, length between heads 20 inches, rubber tube one-sixteenth inch rubber on a side 1 inch internal diameter, in which the laminated core (which is movable) will be placed. Core of charcoal iron very thin with paper laminae between. Two layers of No. 12 double-covered magnet wire, B and S gauge, for primary, 20 pounds .011 inch or No. 29 B and S gauge for secondary. The question is, will the amount and gauge of the secondary wire compensate me, considering the previous data? Of course, extraordinary pains will be exercised in insulation, and a condenser will be placed in primary circuit. Can you inform me as to the length of spark, or an approximate idea of the coil's efficiency. A. We think the length of your coil is too great for its diameter; that you would succeed better by reduc-

ing the length to 12 inches and increasing the diameter correspondingly. Instead of using two layers of No. 12 wire in the primary coil, we would suggest the use of four layers of No. 16, with the ends brought out, so that you can use the several convolutions in series, or 2 in series and 2 in parallel, or all in parallel, to adapt the coil to different currents. The secondary wire is rather large for long sparks; however, it ought to give sparks of great intensity. The secondary coil should be made up in sections according to the method of Ritchie. You will probably succeed in producing a 4 or 5 inch spark.

(4331) W. S. asks (1) what to put in whitewash to keep flies out? A. We know of nothing that can be used for the purpose that will not be offensive and injurious to the occupants of the room. Dalmatian insect powder blown around the room occasionally is effective. 2. What chemical is put in a retort and then heated to make oxygen gas? A. Potassium chlorate and black oxide of manganese mixed are used for producing oxygen. 3. What makes the magnetized sewing needle described in SCIENTIFIC AMERICAN Reference Book, page 101, point north and south? A. The earth has magnetic poles like a magnet, which correspond approximately with the earth's axis. This polarity is now supposed to be due to electric currents circulating in the earth in planes approximately parallel with the equator.

(4332) N. C. H. asks: 1. Will you please explain to me the philosophy of the silo? Why is it the ensilage does not spoil? A. The preservation of food in the silo depends mainly on the exclusion of air. This is accomplished by placing over the ensilage a movable close-fitting cover and weighting it heavily. 2. Will you tell me of a good confectioner's receipt book and where to get it? A. The following are good books on confectionery: "Confectioner's Hand Book," price \$3; "Complete Practical Confectioner," price \$4; "Ornamental Confectionery," price \$2. We can send you either of these books on receipt of price.

(4333) N. L. writes: Will you kindly inform me, through your columns of inquiry, the voltage of a magneto-electric machine, the fields of which are composed of six 6 inch permanent magnets? The armature of one pair electro-magnets 2x1 inch, with 9-16 inch cores, wound with about No. 25 wire. A. It is impossible from the above data to estimate the voltage of the magneto-electric machine. Probably the only method of measuring the current would be by the decomposition of water and the measurement of the resulting mixed gas.

(4334) C. D. B. asks: 1. Will you state the E. M. F. of an ordinary gravity cell, and could the motor described on page 497 of "Experimental Science" be run with gravity cells? If so, how many are required? A. The E. M. F. of a gravity cell is practically 1 volt. The gravity cell is not adapted to running motors, on account of its high resistance, but with a sufficient number made up in series of six to secure the proper voltage, you can run the motor. It would probably require 60 or more cells to run it properly. 2. Will you also state the horse power of the motor? A. With a proper battery the motor will generate one horse power.

(4335) W. P. says: What is the composition of the artificial flowers and fruit used on millinery? A. Mix bread crumbs, magnesia, and finely powdered starch. When fermented, it can be formed and colored to any pattern. Use the lakes to color, and a solution of gamboge in alcohol for a varnish. From the "Scientific American Encyclopedia of Receipts, Notes and Queries."

(4336) O. D.—With gelatine bromide paper, C brand, made by the Eastman Company, Rochester, New York, and the eikonogen developer you can make prints by lamp light with the greatest ease. You should use Saxe or Rives photographic paper for blue prints. Probably the iron salts affected your paper.

(4337) F. W. D. asks: 1. Are street car motors run by the use of only one wire? A. The cars propelled by the trolley system are supplied with a current by a single wire suspended overhead, the current being returned by the track rails or by the ground, or both. See SUPPLEMENT, Nos. 707, 708, 709. 2. How can I drill plate glass? A. Make your drill of new tool steel. Do not heat it above a low red. Sharpen it, and afterward temper it by heating it to a low red and plunging it in a solution of chloride of zinc, this solution being made by dissolving the zinc in muriatic acid until it will take no more. 3. Which is the cheapest light and power? A. A steam or gas engine. 4. Describe electric welding and forging of metals. A. Electric welding is accomplished by passing a very heavy current through the pieces to be welded. You will find a full description of electric welding in SUPPLEMENT, Nos. 592, 682, 582, and 785. 5. Has anything been made to lift itself into the air? Has it wings or wheels? Describe its power. A. Up to the present time no aerial machine has been made that will lift itself and its motive power. For information on aeronautics see SCIENTIFIC AMERICAN, No. 7, Vol. 66, and SUPPLEMENT, Nos. 738, 739. 6. What dynamo will heat a bar one inch diameter to a welding heat, and at what cost? A. Write the makers of electric welding machinery for this information. 7. For experimenting purposes would you advise the purchase of a good lathe instead of having my work done by some one else? A. If you are a good workman and have plenty of time, you will probably derive more satisfaction from doing your own work. 8. Can noiseless powder be used in guns? A. We know of no noiseless powder. 9. What SUPPLEMENT tells how to make a water motor? A. You will find articles on water motors in SUPPLEMENT, Nos. 611, 617, 455, 463, 10. Will 80 lb. pressure from hydrant give eight sixteen-candle power lights with dynamo? A. With sufficient volume, yes.

(4338) J. W. S. asks: Would it be practical to propel a small boat by means of a force pump operated by foot power? The pump to take water through a tube at the bow of the boat and discharge at the stern. A. Yes. It would be practical, but a pair of oars would give you better speed and be easier.