#### is replete with two hundred illustrations, many of which are reproductions of the best work by prominent amateur and professional photographers. There are articles on the applications of photography to science, such as a photographic record of sound analysis by Professor William Hallock, astronomical photography and photogrammetry and telephotography by Albert Gleaves of the U.S. A., and descriptions, with illustrations, of many useful pieces of apparatus, besides an abundance of the latest formulas for developers and lenses. It is a book of much value to the photographer desirous of keeping up with the times.

THE WONDERS OF MODERN MECHANISM. A Resumé of Recent Progress in Me-chanical, Physical and Engineering Science. By Charles Henry Coch-rane. Philadelphia: J. B. Lippin-cott Company. 1896. Pp. 402. Price \$2. No index.

In this work we find presented in popular form the achievements of engineers in the many departments of science, such as building, manufacture of steel, electricity, artificial refrigerating and similar topics. Naturale subject is treated somewhat superficially, and perhaps for that reason is all the better adapted for the readers it is desired to reach. It is quite profusely illustrated and in many ways is really notable as being thoroughly up to date. Whatever serious value it has would have been immensely enhanced by an index.

The Scientific African.-The Scientific African is the name of a new journal, the first copy of which has just been received. Phonetically it might easily be confounded with the SCIENTIFIC AMERICAN, but the resemblance really ends there. Still this paper gives promise of a very useful existence as an exponent of South African science and technology. It is published monthly at Cape Town, Africa. The industries of South Africa are daily increasing in number and importance, and the new journal is pledged to foster these industries by illustrating and describing the various methods now in use, so as to increase the number and improve the quality of African manufactures. In addition to this, pure science is not to be neglected, as is seen by the notes on natural history, geology, anthropology, medicine and chemistry which appear in the first number. We welcome it to the brotherhood of scientific journalism.

# SCIENTIFIC AMERICAN BUILDING EDITION.

## JANUARY, 1896.-(No. 123.)

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- 1. A residence at Orange, N. J. Two perspective eleva tions and floor plans. also an interior view. Approximate cost \$12,000. Mr. Frank W. Beall, Chicago, Ill., architect. An imposing design, and one appropriate to the location.
- 2. A Colonial residence, at Springfield, Mass., recently erected for Mr. W. S. Scott. Two perspective elevations and floor plans. Cost \$6,000 complete. Architect, Mr. G. W. Taylor, Boston, Mass. An artistic design.
- 3. A residence recently erected for Rev. S. E. Smith, at Corcoran Manor, Mount Vernon, N. Y. Perspective elevation and floor plans. Cost \$7,500 complete. Mr. A. M. Jenks, Mount Vernon, N. Y., architect. An attractive design.
- 4. A dwelling at Hasbrouck Heights, N. J. Perspective elevation and floor plans. Cost complete \$3,500. S. A. Dennis, Arlington, N. J., architect, A modern and attractive design.
- 5. Two perspective elevations and floor plans of a country house, at Lawrence Park, Bronxville, N. Y., recently erected at a cost of \$10,000 com plete. Mr. Wm. A. Bates, New York City, architect. One of the most artistic and picturesque country houses in Westchester County.
- a cost of \$38,000 complete. Mr. Joseph Frank, Erie. Pa., architect. The design combines a striking exterior appearance and a convenient interior arrangement.
- erected at Glen Ridge, N. J. Architect, Mr. E. R. Tilton, New York City. A pleasing design.
- Designed by Mr. Stanford White, of the architectural firm of Messrs. McKim, Mead & White,

# Business and Personal.

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

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For Sale-75 H. P. engine, 16" x 30", automatic cut in good order. Can be seen running. Will be sold low Address A. P. W. Paper Company, Albany, N. Y.

"History of Cripple Creek." We have just issued in book form the only authentic and reliable bistory of Cripple Creek gold camp, the marvel of the mining world. The book contains numerous full page illustrations of gold mines true to life. With the sole object of introducing our big 8 page 56 column illustrated weekly paper (established 1890) we will send a copy of the above interesting book free to all who send us 25c. (stamps or silver) fora 3 months' (13 weeks') trial subscription to our big weekly, which contains the latest mining news and illustrations of Rocky Mountain scenery. Club of 5 and 5 books, \$1. Mention the SCIEN-TIFIC AMERICAN, and address Illustrated Weekly, Denver, Colorado.

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

Whereas, the copartnership beretofore existing in the City and State of New York between Orson D. Munn and Alfred E Beach, under the copartnership name of Munn & Co., and baving its principal place of business at No. 361 Broadway, in the City and State of New York, has been dissolved by the death or Alfred E. Beach on January 1, 1896; and

Whereas the said copartnership had business relations with foreign countries and transacted business in the State of New York for a period of five years and upward; and

Whereas, I, Orson D. Munn, the surviving copartner am desirous to continue the business conducted by the said copartnership and to continue the use of the name of Munn & Co.

Now, I, Orson D. Munn, do hereby certify and declare bat I am the person dealing under such name of & Co., and that my place of abode is 14 East Twentysecond Street, City of New York, and that my principal place of business is at No. 361 Broadway, in the City and State of New York,

(Signed) ORSON D. MUNN. [L.S.] In presence of

A. A. HOPKINS.

[L.S.]

City and County of New York, ss: On this 6th day of January, in the year 1896, before me personally came Orson D. Munn, to me known to be the individual described in and who executed the foregoing nstrument and acknowledged to me that be executed the same for the purposes therein mentioned.

## (Signed) A. A. HOPKINS Notary Public,

Kings County, New York. Certificate filed in New York County.

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



#### HINTS TO CORRESPONDENTS.

(6711) F. W. B. asks for directions for 8. A view of the Washington Arch, New York City ciently to steady the cutter. Lay the glass plate horizonnaking an ever-ready pad for rubber stamps : A. The tally, and work the drill perpendicularly with the bow, following is said to be a cushion that will give color perusing one hand to steady the upper end of the drill stock. manently. It consists of a box filled with an elastic New York City. Feed emery (about No. 90) and water into the open end composition, saturated with a suitable color. The cushof the tube as fast as required. In a very short time you 9. View of the new Surety Building, New York City. of the tube as fast as required. In a very short time you will cut ad isk out of the plate. Another plan is to heat the drill to a low cherry red and plunge in a solution of chloride of zinc (soldering fluid). This gives the drill an exceedingly hard edge; grinding removes the hard por-tion. Therefore, the drill must behardened aftergrinding. (6716) C. J. M. asks how to make leaf photographs. A. Pass the paper first through a solution of gelatin, 1 part in 20 parts of hot water, and use a strong solution of potassium bichromate; or the gelatin and bichromate may be used together. Wash with hot water. A strong blue blackground may be produced as follows: Dissolve in 2 oz. of pure water 120 grn. of red prussite of potash (potassium ferrocyanide), and sepa-rately 140 grn. double citrate of iron and ammonium in 2 oz. of water; mix the solutions, filter, float the paper for a few minutes on the filtrate; print from the dried paper as before, and wash thoroughly in water. By ad-ding a little phosphoric acid to the bichromate solution and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print before washing to the vapor of and exposing the print befo ion fulfills its purpose for years without being renewed, will cut adisk out of the plate. Another plan is to heat Total height from curbstone to coping, 314 feet, ways contains sufficient moisture, which is drawn from being the loftiest inhabited building in the world. the atmosphere, and conti to act as a color stamp 10. Miscellaneous Contents: A great bell.-CalvertVaux. cushion so long as a remnant of the mass or composition -The world's tallest structures.-Powerful dredge remains in the box or receptacle. This cushion or pad is too soft to be self-supporting, but should be held in a for the Mississippi River .- The centenary of the low, flat pan, and have a permanent cloth cover. 'Th Institute of France.- A new corner grate, illus trated.-The "American Trackless" sliding door composition consists preferably of 1 part gelatine, 1 part hanger .- The Handco "straight flush" closet, iiwater. 6 parts glycerine, and 6 parts coloring matter. A lustrated.-A simple and efficient pump, illustrated. suitable black color can be made from the following ma Staining wood.-Artificial fuel.-Ancient glass terials : 1 part gelatine glue, 3 parts lampblack, aniline makers -- House numbering .-- Fires in "sky black, or a suitable quantity of logwood extract, 10 parts of glycerine, part absolute alcohol, 2 parts water, 1 part scrapers."-Non-heat conducting coverings, illus trated. - Improved wood. working machinery, illus-Venetian soap, 1-5 part salicylic acid. For red, blue or trated. violet, 1 part gelatine glue, 2 parts aniline of desired olor, 1 part absolute alcohol, 10 parts glycerine, 1 part The Scientific American Building Edition is issued Venetian soap, and 1-5 part salicylic acid. The followmonthly. \$2.50 a year. Single copies, 25 cents. Thirtying are two additional receipts used for this purpose two large quarto pages, forming a large and splendid 1. Mix and dissolve 2 to 4 drm. aniline violet, 15 oz, al-553,580 553,755 553,630 553,805 553,623 MAGAZINE OF ARCHITECTURE. richly adorned with Containent bolder, J. Frye. Cooker, coffee, W. B. Lancaster. Copying device, E. Terrell. Copying machine. J. O. Deckert. Cordage machine. interlocked, G. McKay. Corsectelasp protector, J. C. Gilroy. Cotton gin, saw, J. Rice. Coupling. See Car coupling. Crucible, C. Capper Cultivator. F. E. Davis. Cultivator. trip ebank, M. Sattley. Cutter. See Cheese cutter. Jowel cutter. Pipe cutter. cohor, 15 oz. glycerine. The solution is poured on the cushion and rubbed in with a brush. The general method elegant plates and fine engravings, illustrating the most hot solution of aniline in alcohol, a blackish-green or interesting examples of Modern Architectural Construcof preparing the pad is to swell the gelatine with cold red positive is obtained. Or, prepare the paper with sotion and allied subjects. 553,611 553.597 water, then boil and add the glycerine, etc. lution of iron sesanichloride, and develop after exposure The Fullness, Richness, Cheapness, and Convenienc with a very dilute solution of silver nitrate. Use plain 553,702 553,704 553,691 (6712) F. W. writes: I would like to of this work have won for it the LARGEST CIRCULATION photographic paper. of any Architectural Publication in the world. Sold by ask a few questions concerning an acetylene gas plant MUNN & CO., PUBLISHERS, arranged on the principle of the one described on page 8 (6717) G. D. H. says: Can you give me all newsdealers. 

How large would generator bottle and receiver have to be to supply two jets that have been used for coal gas (ordinary dwelling house size). Can acetylene gas be used in such fixtures? A. You cannot use ordinary burners for acetylene. Use 1/2 foot burners. A 1 cubic foot gasholder and a 2 quart generating jar will supply them nicely. It is well to have separate inlet and outlet pipes for the holder. 2. Are the chemicals employed very corrosive? Can iron or brass connections and stopcocks be used where flexibility is not essential? A. Use ordinary small amount of it)? A. Address Eimer & Amend, 305

(6713) G. H. DeL. asks: 1. On a 500 volt street railway circuit, how much cnrrent does any one car take at full load ? A. At 50 horse power 75 amperes could be taken. 2. I have a small bipolar shuttle armature motor, capable of driving a twelve inch fan with six small cells of plunge battery. Is there any possible way of altering the winding so as to have it act as a small generator producing enough current to light one or more miniature incandescent lights of 1, 2, 3, etc., candle power. Could you; refer me to some SUPPLEMENT describing a small dynamo ? A. You will have probably very little satisfaction in making the change, unless the field is of cast iron, so as to possess residual magnetism. For small dynamos we refer you to our SUPPLEMENT, Nos. 161, 599, 600. and 844. No. 599 describes a drum armature, much the book for No. 161. 3. Having the voltage and am perage given, how can the resistance be found? The am perage and resistance to find the voltage? And the resistance and voltage to find the amperage ? A. Let C =

imperes, E = volts and R = ohms. Then  $C = \frac{L}{R}$ ;

E = CR;  $R = \frac{2}{C}$ . 4. What is fastest rate of speed ever attained by a locomotive in the United States ? A. We

refer you for items on recent railway speeds to the Sci-ENTIFIC AMERICAN, vol. 68, No. 20; vol. 72, No. 22; vol. 74; No. 1.

(6714) R. N. T. says: Will you give me formulas for computing the elements of a safety valve :



L = distance between center of weight and fulcrum in inches.

- Let w = weight of lever in pounds.
- Let g = distance between center of gravity of lever and fulcrum in inches. Let 1 = distance between center of valve and fulcrum
- in inches.
- Let V = weight of valve and spindle. Let A = area of valve in square inches
- $\operatorname{Cet} P = \operatorname{pressure} at$  which the valve is to blow off, per

square inch. Then the weight required to balance a given pressure at any given distance on the lever will be by the formula :

$$W = \left\{ (P \times A) - \left( V + \frac{(w \times g)}{1} \right) \right\} \times \frac{1}{L}$$

When the weight is at hand and known, and the disance is required, then

$$\mathbf{L} = \left\{ (\mathbf{P} \times \mathbf{A}) - \left( \mathbf{V} + \frac{(\mathbf{w} \times \mathbf{g})}{1} \right) \right\} \times \frac{1}{\mathbf{W}}$$

The elements between the brackets to be computed first. To obtain the area of the valve, multiply the square of the diameter by 0.7854.

 HIN'IS 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 be ar 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.
Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.
Special Written Information on matters of personal rather than general interest cannot be expected without renuneration. (6715) D. P. D. says: Please let me know, through the SCIENTIFIC AMERICAN, how to put a 1/4 in, hole through a heavy glass bar ? A. This can be done with a hard drill and spirits of thrpentine-a to dious and uncertain process, and only for small holes. A diamond drill is much better and cheaper, if there are 6. Public school No. 9, of Erie, Pa., recently erected at many holes to drill. If large holes are wanted, from 1/4 in. to 1 in, or larger, prepare a piece of thin tubing of scientific American Supplements referred to may be had at the office. Price 10 cents each. Books referred to promptly supplied on receipt of brass or copper, of the required size of hole, of 1 or 2 in. in length, with small spindle and grooved pulley attached, something after the style of the watch maker's Minerals sent for examination should be distinctly marked or labeled. 7. A half-timbered cottage of moderate cost recently pow drill. Fasten upon the plate of glass, at the point to he drilled, a ring of metal or wood for a guide to keep the tubular drill in its place, until the cut is started suffi-

The diameter of the driven being given, to find its num ber of revolutions

Rule.-Multiply the diameter of the driver by its number of revolutions and divide the product by the diameter of the driven; the quotient will be the number of revolutions of the driven.

Ex.—Twenty-four in. diameter of driver  $\times$  150, number of revolutions. = 3.600 + 12 in. diameter of driven = 300.

The diameter and revolutions of the driver being given, to find the diameter of the driven, that shall make any given number of revolutions in the same time.

Rule.-Multiply the diameter of the driver by its number of revolutions, and divide the product by the number of required revolutions of the driven ; the quotient wiil be its diameter.

Ex.-Diameter of driver (as before) 24 in.  $\times$  revolutions 150 = 3.600. Number of revolutions of driven required = 300. Then  $3,600 \div 300 = 12$  in.

The rules following are but changes of the same, and will readily understood from the foregoing examples :

To ascertain the size of the driver.

Rule.-Multiply the diameter of the driven by the number of revolutions you wish to make, and divide the product by the required revolutions of the driver ; the quotient will be the size of the driver.

To ascertain the size of pulleys for given speed.

Rule .- Multiply all the diameters of the drivers together and all the diameters of the driven together; divide the drivers by the driven ; the answer multiply by the known revolutions of the main shaft.

#### TO INVENTORS.

IU INVENTORS. An experience of nearly fifty years, and the preparation of more than one hundred thousand applications for pa-tencs as home and abroad, enable us to understand the laws and practice on both continents, and to possess un-equaled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be bad on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our ex-ensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broad-way, New York.

## INDEX OF INVENTIONS

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United States were Granted

## January 28, 1896, AND EACH BEARING THAT DATE.

## [See note at end of list about copies of these patents.]

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fittings, avoiding brass and copper. 3. Where can calcium carbide be obtained (that is, where could I get a Third Avenue, New York, N. Y. 4. Is there any more danger of explosion in acetylene gas than in coal gas A. Not so much.