

eries, not merely of books. A beautiful photogravure of Professor Schorlemmer is used as frontispiece. While chemistry is, in many ways, a disappointing, the present work will be found a most valuable contribution to chemistry from an almost new aspect.

THE TELEPHONE HANDBOOK. By Herbert Laws Webb. Chicago, Ill.: Electrician Publishing Company, 1894. Pp. 146. Price \$1.

This little book is quite clearly described by its title. It is compactly printed, adequately illustrated and contains an index. The subject is not very deeply gone into, and we believe its descriptions of telephone practice, with the accompanying diagrams, will be of interest and value to many.

MANUAL OF PHYSICO-CHEMICAL MEASUREMENTS. By Wilhelm Ostwald. Translated by James Walker. London and New York: Macmillan & Co., 1894. Pp. xii, 255. Price \$2.25.

This admirable work on measurements derives interest from being, in a great measure, a description of experiments. It is an excellent illustration of what we are growing to recognize as German thoroughness, all the minor points of the work being as closely considered as the other portions. It differs from recent works on the same subject that we have had to review in precisely this thoroughness and in the utilization of the best methods rather than the simplest methods, the latter attaining, to our minds, often an almost vicious importance in the American treatment of inductive work in science. In this work the author designs to tell how work can be well done, not merely how the mere forms of work can go through most readily.

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SCIENTIFIC AMERICAN BUILDING EDITION.

DECEMBER, 1894.—(No. 110.)

TABLE OF CONTENTS.

- 1. Plate in colors, showing a residence at Bronxwood Park, N. Y. Two perspective elevations and floor plans. Cost complete \$3,500. A picturesque design. Mr. Chas. N. Hoar, architect, New York City.
2. Elegant plate in colors, showing a residence at Chester Hill, Mt. Vernon, N. Y. Two perspective elevations and floor plans. An attractive design in the Colonial style. Messrs. Rossiter & Wright, architects, New York City.
3. A cottage at Mt. Vernon, N. Y., erected at a cost of \$4,500. Perspective elevations and floor plans. Mr. Walter F. Stickles, architect, Mt. Vernon, N. Y. An attractive design.
4. The handsome residence of W. K. Clarkson, Esq., Brooklyn, N. Y., erected at a cost of \$15,000. Two perspective elevations and floor plans. Messrs. J. C. Cady & Co., architects, New York City.
5. A residence of moderate cost at Bronxwood Park, N. Y. Perspective elevation and floor plans. Mr. A. F. Leicht, architect, New York City. A pleasing design.
6. The residence of W. D. Love, Esq., at Bronxwood Park, N. Y. Two perspective elevations and floor plans. Mr. W. H. Cable, architect, New York City. A neat design treated in the Queen Anne style.
7. A Colonial residence at Flatbush, L. I., erected at a cost of \$7,500. Two perspective elevations and floor plans. Mr. John J. Petit, architect, Brooklyn, N. Y.
8. A residence at Mt. Vernon, N. Y. Two perspective elevations and floor plans. A pleasing design in the Colonial style. Mr. Chas. E. Miller, architect, New York City.
9. A picturesque and well appointed residence at Belle Haven, Conn., recently erected for E. C. Converse, Esq. Four perspective elevations and floor plans. An excellent design. Mr. Bruce Price, architect, New York City.
10. A Colonial cottage at Bayonne, N. J., recently erected for Joseph Thomas, Esq., at a cost complete \$2,700. Perspective elevation and floor plan. Mr. A. C. Longyear, architect, New York City.
11. Miscellaneous contents.—Hints to readers.—The education of customers.—How to catch contracts.—The latest and best designs for houses.—Diamond cement plaster.—Preserving metals in roofs, bridges, etc.—A perfect roofing material.—Stamped metal ceilings, illustrated.—New wood stains.—Woodwork vs. flame.—Ebonizing wood.—A stove for heating water, illustrated.—Columbian Exposition award for copper and brass goods.—An improved band saw file, illustrated.—How to move large maps.—Value of coverings for steam pipes.—Watering garden plants.—Earthquake effect on brick buildings.—The trouble New York builders have.—Foothold on pavements.—Milwaukee water elevator, illustrated.
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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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Minerals sent for examination should be distinctly marked or labeled.

(6317) W. S. asks: 1. What is the horse power of a cylinder of steel 3 inches long, 3 1/2 inches wide, revolving at the speed of 15,000 revolutions a minute on a 3/4 inch shaft? What must the speed of the cylinder be to generate 1 horse power? Is it true that the higher the speed, the less power you get? If it is true, how is it that the De Laval steam turbine generates 20 horse power at 30,000 revolutions a minute? A. The solid cylinder while revolving at the high velocity stated would have 2 1/4 horse power by its momentum alone, which would diminish to 0 in a few moments by the giving out of its unsustained power. A little less than one-half the speed will be equal to one horse power under the same conditions. The power derived from momentum of a mass or weighty body increases with velocity, and when the velocity is sustained by a power, as in an electric motor, steam turbine, or impact water wheel, the power is also sustained in terms of the factors of momentum and velocity.

(6318) M. H. J. writes: Will you please inform me what will be the effect of loose steam turned in one of the patent drying kilns in case of a fire? I refer to drying kilns such as are built by the Sturtevant Dry Kiln Company, the Reliance Patent Dry Kiln Company, and the Standard Dry Kiln Company. A. Steam is an extinguisher of flame, and if turned into a drying kiln on fire, will extinguish the flame, and finally extinguish the ignited wood, if kept on long enough, and the kiln thoroughly saturated with wet steam. The only difficulty that might arise will be in turning off steam before the ignited wood is cooled, when the admission of air may again start the flame.

(6319) E. R. asks: Why is it that brick chimneys always lean toward the north after they have been several years built? Also, how to find the length of the outside line of a segment of a circle when the length of the chord and rise of arc are known. A. Mortar in walls and chimneys is subject to change of constituents by the presence of moisture and carbonic acid gas in the atmosphere. The mortar, which at first is a hydrate of lime and sand, gradually changes to a carbonate in its lime element; thereby increasing its bulk to a small extent. On the storm-wet sides of chimneys subject to repeated changes of temperature by sunshine, the process of the elemental change probably goes on somewhat faster than on the shady side; which, with the additional change due to a slight disintegration of the mortar by the continual change of temperature on the sunny side, gradually lifts one side faster than the other, producing the observed cant in chimneys and columns. The internal heat of a chimney cannot be assigned as a cause of unequal expansion of the sides, because it is of equal effect on all sides. For length of arc, multiply square

root of sum of square of chord and four times square of versed sine by ten times square of versed sine; divide this product by sum of fifteen times square of chord and thirty-three times square of versed sine; and then add this quotient to twice chord of half arc, and sum will give length of arc very nearly. This rule is worked out with an example in Haswell's "Engineer's Pocket Book," chapter on mensuration, \$4 by mail.

(6320) G. W. asks: How long would a tank containing ten cubic feet of compressed air, at a pressure of two hundred pounds, run a one-half horse power motor? What would be the most suitable motor to use in this connection? What power would a twelve foot windmill develop at 50 revolutions per minute? A. At 200 lb. pressure the cylinder will contain 14 1/2 volumes or 143 cubic feet of free air. It requires 12 to 14 cubic feet of free air per horse power in small engines, so that the time could not exceed a 10 minute run, unless the air can be heated before entering the engine to about 300° Fah., when the time could be extended to 15 minutes. The most economical form of steam engine is the best air motor. A well designed windmill of the size and at the speed named should develop 1/4 horse power.

(6321) G. W. P. writes: My line wire terminates at each end in a tensional diaphragm of raw hide for signaling purposes, the wire being suspended from loops of hemp cord, instead of using the usual insulators, the insulation being secured by the perfect dryness of everything in this climate for most of the year. 1. Would such an arrangement hinder the working of the telephone over the same wire? A. Your line will answer, we think, for electric telephoning. 2. Does an iron pump stock furnish an efficient grounding medium, the supply pipe of course ending in water? A. Yes.

(6322) F. C. W. asks: How can I change the shape of a piece of aluminum? Can it be melted and cast in moulds the same as lead, or will it have to be worked the same as wrought iron? A. Aluminum can be hammered, rolled, and drawn the same as brass, only requiring more frequent annealing, which should be at low temperatures, 400° Fah. makes it soft enough for ordinary working. It can be easily cast in iron moulds for ingots, and in sand moulds with patterns; an ordinary plumbago crucible is used; flux is not needed, but common salt only is used when scrap metal is to be melted.

(6323) I. S. asks: I have four storage cells, each having 72 square inches positive plate. What is the best kind of battery, and how many would it take to charge them? I have used gravity battery and found it very unsatisfactory. A. You will require a current of 3 amperes to charge your battery. You may use a bichromate battery for the purpose. It is better to use a mechanically generated current for economical reasons. The gravity battery is cheaper than the bichromate, but is much slower.

(6324) G. A. W. F. asks: How many and what gases enter into the composition of air? Is there any truth in the alleged discovery of a third gas as a component part of air, in addition to those now recognized, viz., oxygen and nitrogen? A. We refer you to our SUPPLEMENT, No. 977, "Chemistry at the British Association," for some notes on the new gas, one of the most interesting discoveries of the year.

TO INVENTORS. An experience of nearly fifty 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. A synopsis of the patent laws of the United States and all foreign countries may be had 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 extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS

Table listing inventions with names and dates. Includes: Filter barrel, N. H. Cone; Fire extinguishing apparatus, H. D. Kramer; Fire extinguishing apparatus, C. E. Manning; Fish or crab net, Becker & Lind; Flouring machine, W. M. McKenzie; Flouring machine, A. Smith; Forging metals, etc., hydraulic apparatus for, Tyler & De Vesian; Frame, See Mosquito net frame; Furnace, automatic, H. I. Keiner; Furnace, See Boiler furnace; Soldering iron furnace; Furnace, G. Maag; Furnaces, means for promoting combustion in, B. Davids; Furnaces, stoker for engine, E. T. McWhorter; Gauge, See Rain gauge; Gauge, L. O. Barrett; Galvanizing apparatus, G. G. McDermott; Garbage and similar waste products, utilizing, N. B. Power; Gas engine, T. H. & J. T. H. Paul; Gas holder, H. Muller; Gate, See Bridge gate; Generator, See Oxygen generator; Glass, producing flat objects of, P. Sievert; Grain binder knotted mechanism, Fairbank & Meach; Grain elevator, Hendricks & Forsythe; Grain separator, P. R. Lanier; Grinding machine, C. H. Trask; Grip wheel, A. J. Beer; Guard, See Car safety guard; Keyhole guard; Lathe guard; Gun, breakdown, A. Balensiefer; Gun, breakdown, M. S. Barker; Gutter forming machine, F. A. Juergens; Hanger, See Door hanger; Harness, J. Paszkowski; Harness, W. H. Sanborn; Harvester attachment, self-binding, W. A. Wilson; Harvester, corn, A. E. Ellinwood; Harvester, corn, J. H. Newell; Harvester, corn, C. Schaefer; Harvester, grain binding, I. Miller; Harvester, potato, C. Christianson; Hay elevator, W. Loulen; Hay tedder, W. N. Whiteley; Heater, See Lumber heater; Heating boiler, S. Bartley; Heating device, A. Burka-Stauder; Heel stiffer machine, N. J. Stinson; Hinge, combination lock, E. Lundgren; Hinge, lock, J. Ashton; Hitching strap, F. Sweetland; Horses, hot water bandages for treating, R. Bush; Hose in towers, means for suspending, L. W. Hayes; Household or kitchen implement, O. A. Hensel.

Ice, apparatus for subdividing blocks of, L. Pusey.	530,127
Ice making apparatus, Church & Reeve.	530,494
Ice rink, F. Unsold.	530,397
Illusion apparatus, F. Rosenzwey.	530,128
Incubator, A. Apperly.	530,163
Indicator. See Engine indicator. Train, time indicator.	
Inhaler, Boesger & Dotterweich.	530,321
Injector, W. E. Dodge.	530,476
Insulating covering for refrigerative purposes, G. T. Voorhees.	530,214
Insulator, electric conductor, Croskey & Locke.	530,399
Jack. See Bootjack. Carriage or wagon jack.	
Jar closure, C. E. Long.	530,190
Joint. See Draw joint. Tie joint.	
Joints, tube for use in expansion, B. Hall.	530,305
Journal bearing, J. L. Jonsson.	530,274
Key. See Telegraph key.	
Keyhole guard, G. W. Schumacher.	530,206
Kilns, rack for decorating, C. S. Maddock.	530,233
Knife sections or other articles, apparatus for barthening, Johnston & Gray.	530,183
Ladder attachment, T. Wilkins.	530,374
Lamp, Doelle & Von Glaz.	530,402
Lamp, mining, C. Wolf.	530,217
Lamp suspending device, F. Rind.	530,459
Lathe carrier, B. C. Esmarch.	530,303
Lathe guard, R. S. Peabody.	530,238
Lathe, polishing device for spoke, W. H. J. Oslin.	530,110
Limmen's use, tool for, Smith & Mishler.	530,361
Loading apparatus, H. Aiken.	530,286
Lock, A. M. Conroy.	530,336
Lock. See Bicycle lantern lock. Nut lock. Nut or bolt lock.	
Locks, mechanism for detecting opening of, C. Smyth.	530,133
Loom picker, check, R. Mathews.	530,438
Loom, self-threading, L. B. Daudelin.	530,329
Luggage carrier, G. F. Hall.	530,104
Lunch heater, A. L. White.	530,146
Matches, tooth picks, etc., machine for making splints for, Benham & Barlow.	530,352
Matrix making machine, M. Lane.	530,111
Measure and level tape, A. E. Krebs.	530,385
Measuring machine, cordage, J. D. Boatwright.	530,240
Metal bars, machine for bending flanged, W. Pfefferkorn.	530,240
Metal bars, machine for bending flanged, A. J. Moxham.	530,196
Metal bars, machine for bending flanged, W. Raymond.	530,203
Metal means for joining edges of sheet, strip, and plate, F. A. Williams.	530,314
Metal plates, feeding device for apparatus for coating, S. Y. Buckman.	530,323
Metals in imitation of falience, finishing, J. Hopson, Jr.	530,342
Meter. See Electric meter.	
Mill. See Rolling mill. Rubber mixing mill.	
Milling cutters, manufacture of, C. C. Tyler.	530,213
Milling cutters, method of and apparatus for making, C. C. Tyler.	530,212
Mines, preventing draught in coal, E. A. Tiffany.	530,463
Moulder's apparatus, A. K. Beckwith.	530,319
Mordant, R. H. Pickles.	530,262
Mosquito net frame, C. P. Dieco.	530,164
Motor. See Current motor. Electric motor. Rotary motor. Steam motor.	
Mowers, for cutting, A. Bubier.	530,084
Musical instrument attachment, L. Utt.	530,330
Nail set, C. G. White.	530,332
Nut lock, N. D. Stanley.	530,336
Nut or bolt lock, F. H. Bradley.	530,193
Nut, vehicle axle, F. E. Boss.	530,387
Oil can, F. B. Smith.	530,433
Oxygen generator, heater, G. R. Prowse.	530,453
Oyster tongs, E. E. Leary.	530,346
Packing, piston rod, A. B. Kay.	530,423
Packing, piston rod, T. Keene.	530,426
Padlock, F. Raymond.	530,456
Pantaloons protector, T. Arcourt.	530,475
Paper box, J. Feister.	530,334
Paper box, J. Feister.	530,339
Paper feeding machine, H. B. Cooley et al.	530,325
Parcel carrier, L. Weiss.	530,215
Pasting machine, G. A. T. Spooner.	530,312
Pavement of plastic composition, J. H. Amies.	530,077
Pencil sharpener, B. Ramsay.	530,404
Petroleum, all grades, L. C. Gibbs.	530,181
Pianos, repeating mechanism for, F. Lindner.	530,453
Planter, check row corn, J. F. De Jarnatt.	530,259
Planter, corn, G. W. Campbell.	530,326
Planter, corn or cotton, M. Brown.	530,256
Plate holder, M. Flammann.	530,100
Plow point, F. B. Smith.	530,452
Plow points, mechanism for snapping the welding edges of, H. G. Sawyer.	530,204
Post. See Directory post.	
Potato digger, T. Donoho.	530,263
Potato separating and cleaning machine, Butler & Shepard.	530,086
Power. See Water power.	
Pressure regulator, fluid, J. Olson.	530,200
Primary battery, C. W. De Mott.	530,260
Primary battery, C. J. Hubbell.	530,485
Printer's make-ready, C. Sears.	530,310
Printer's quoin, J. F. Perry.	530,124
Printing device, Fowler & Whitcomb.	530,304
Printing machine, bed and cylinder, W. Scott.	530,357
Printing machine feeder, G. R. Clarke.	530,089
Printing machines, stretching apparatus for calico block, W. Westwell.	530,373
Printing plate and base, A. G. Wade.	530,371
Protector. See Pantaloons protector.	
Pulling bearings, Deinger & Metzger.	530,221
Pulley, M. B. Lorah.	530,282
Pulley clutch and shaft coupling, automatic, L. W. Elliott.	530,301
Pump, air, A. Heller.	530,106
Pump attachment, A. Meuser.	530,193
Pump, gas compressing, T. Farnsworth.	530,087
Pump, oil well, A. Rosenkranz.	530,350
Pumpvalve, T. C. Munger.	530,442
Purifier and aerator, J. & T. F. Newby.	530,445
Radiator, steam or hot water, J. D. Young.	530,317
Railway block signal, C. H. Sherwood.	530,311
Railway control, electric, M. I. Martin.	530,283
Railway crossing, J. Moxham.	530,197
Railway head and drawing frame, Sharples & Snell.	530,358
Railway rail, A. Schwarzschild.	530,131
Railway ship, Sebillot & Weidnecht.	530,245
Railway signals, mechanical trip for, C. A. Hammond.	530,414
Railway signaling, electric, W. Davies.	530,093
Railway supply system, electric, J. J. Green.	530,482
Railway switch, C. H. Eimke.	530,404
Railway system, electric, D. Mason.	530,182
Railway track, A. C. Malher.	530,113
Rain gages, self-recording, A. J. Grover.	530,416
Receptacle and adjustable seat, combined, J. Boyd.	530,469
Recorder. See Signal recorder. Time recorder.	
Regulator. See Dynamo regulator. Feedwater regulator. Pressure regulator.	
Rein supporter, R. Stanhops.	530,134
Ribbon reverse, automatic, F. P. Stiles.	530,365
Ring. See Thread cutting ring.	
Riveting machine, P. A. Cuenot.	530,162
Rock or ore crusher, R. D. & P. W. Gates.	530,102
Roll holders, tension spool for, T. M. Clark.	530,327
Rolls, driving, W. M. Gardner.	530,220
Rolling mill, plate, W. H. Maddock.	530,112
Rolling sheet metal, method of and apparatus for, S. A. Davis.	530,094
Roofs, crapping device for, D. J. Donovan.	530,185
Rotary bulb, T. Stevens.	530,364
Rotary motor, Delatre & Bruckert.	530,220
Rubber mixing mill, E. F. Brues.	530,157
Sash fastener, J. G. Fox.	530,266
Sash holder and fastener, C. W. Ammerman.	530,078
Saw blades, machine for cutting tooth recesses in, F. J. G. Fromholt.	530,407
Scapold, painter's, S. A. Brooks.	530,389
Scale, spring, C. S. Maddock.	530,362
Screen. See Window screen.	
Screening apparatus, Distl & Sussky.	530,261
Screw cutting die, separable, R. Dost.	530,190
Screw making machine, R. Hakewesell.	530,179
Screw making machine, E. C. Henn.	530,180
Seam fabric, W. F. Beardslee.	530,218
Self-fastening box, G. Heinrich.	530,225
Separator. See Grain separator.	
Sewing machine, J. E. Bertrand.	530,297
Sewing machine, P. L. Cox.	530,471
Sewing machine guide, C. H. Foster.	530,173
Sewing machine shuttle, F. Diebl.	530,095
Sewing machines, automatic stopaction for, J. Faust.	530,244
Shaft attachment for buggies, H. G. Vaughan.	530,251
Shafts, device for securing cutters or other articles to rotary, W. D. Orcutt.	530,285
Shears. See Pruning shears.	
Sheet metal plates, machine for cutting, S. Y. Buckman.	530,322
Shelf, folding, H. A. Payne.	530,349
Shovel. See Excavator shovel.	
Shutter fastening, E. Wegmann, Jr.	530,144
Signal. See Railway block signal.	
Signal apparatus, C. E. Oprely.	530,122
Signal recorder, whistle, C. E. Onglely.	530,121
Signaling apparatus, B. J. Noyes.	530,236
Signs, manufacturing, B. Schlegel.	530,354

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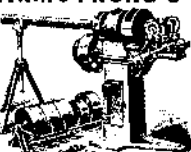
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