intended for students who have considerable knowledge of chemistry already. The author states that the subject matter indicated in the present volume has to be covered in less than two terms by candidates for the Natural Science Tripos at Cambridge. In the two succeeding terms the work is completed along the same lines. The outlines of electrochemistry, thermal chemistry, and photochemistry are briefly introduced, and subjects such as diffusion, colloids, alloys, allotropy, and isomerism are also dealt with. The periodic classification is considered at some length, and a descriptive account of the elements and their more important compounds is incorporated with this part of the subject, so far as time allows. If it should happen that the present book is found to be of assistance to students, it is the author's intention to publish this later part of the course as a second volume. From what has been said, it will be seen that it is doubtful if the work will prove of a great deal of assistance as an enlarged textbook, as our methods of teaching are somewhat different from those in vogue at English universities. The book, however, is an excellent one for those who already have a considerable knowledge of chemistry.

MODERN HOMES. Selected Examples of Dwelling Houses. Described and illustrated by T. Raffles Davison. London: George Bell & Sons. New York: The Macmillan Company, 1909. 8vo.; 248 pp. Price, $5.25 net.

No one has seen more modern homes than Mr. Davison, and no one certainly knows better than he how to choose and present them to us. His architectural knowledge insures that the architecture is represented in such a manner as to satisfy the architect, while the artist in him insures that this shall not be emphasized at the expense of the general effect of his drawings. Here we have selected by one who knows, some of the best and most representative modern homes. Views of exteriors and interiors, stair cases, chimney corners, halls, and furniture are given, often accompanied by plans just sufficient to place them in their surroundings, and very often a sketch or two in the garden and sometimes a photograph. Drawings are accompanied by just enough letterpress to draw attention to the strong points of each design, with entire absence of any wearisome technical detail, which would be out of place in such a book. The book is beautifully illustrated and one which we can commend to all architects.

NOTES ON PRACTICAL MECHANICAL DRAWING. Written for the Use of Students. By Victor T. Wilson, M.E., and Carlos L. McMaster, M.E. Lansing, Mich.: Published by Wilson & McMaster, 1909. 8vo.; 186 pp.

This book is a collection of notes intended to furnish the basis for a course in elementary mechanical drawing, so arranged, it is thought, that the teacher may have the widest latitude in his choice of sequence of subjects. Since the first edition, two years ago, the book has been rearranged with this particular point in view. It has been thoroughly revised, and also enlarged by the addition of more explanatory matter and illustrations in autographic projection and a chapter on diametric and oblique drawing, and a number of chapters on working drawings and sketches. It is an excellent work.

THE ROMANCE OF MODERN CHEMISTRY. By James C. Phillips, D.Sc., Ph.D. Philadelphia: J. B. Lippincott & Co., 1909. 12mo.; 348 pp. Price, $1.50.

This book contains a description in non-technical language of the diverse and wonderful ways in which chemical forces are at work, and of their manifold applications in modern life. Probably most people, when they think of chemistry, suppose that its fascination and its practical bearing can be appreciated only by those who have access to some sequestered laboratory, the doors of which are closed to the uninitiated. This is a mistaken view, for in countless ways unknown to the general reader chemical science is supplying the ordinary needs and contributing to the conveniences of modern life. In the present volume an attempt has been made to deal with this aspect of the subject, and the points of view adopted are different from those of the ordinary textbook. The book is fascinating, and it can be read with profit by almost anyone.

TABLES AND DIAGRAMS OF THE THERMAL PROPERTIES OF SATURATED AND SUPERHEATED STEAM. By Lionel S. Marks, M.M.E., and Harvey N. Davis, Ph.D. New York: Longmans, Green & Co., 1909. 8vo.; 166 pp. Price, $1 net.

The tables of the properties of saturated steam which have appeared up to the present time have all been based upon the classic investigations of Regnalt, carried out more than sixty years ago. More recent investigations are the necessary basis for any determination of the properties of superheated steam. These investigations, it is suggested, are a careful analysis of the authors, both as to the probable errors resulting from the method of experimentation, and also as to the relation of the experimental results to the values deduced from the thermodynamic theory so far as the latter shows any light on the matter. Where the results of the separate investigations are not closely in accord, a critical estimate has been made of the relative values to be given to each in the region under consideration. This work will prove of great value to mechanical engineers.

THE METALLURGY OF THE COMMON METALS. Gold, Silver, Iron, Copper, Lead, and Zinc. By Leonard S. Austin. San Francisco: Mining and Scientific Press, 1909. 8vo.; 494 pp. Price, $4.

This is a second revised and enlarged edition which is embellished by 195 illustrations. This book discusses principles, and illustrates them from current practice. It is simple and concise. It includes the data essential to an understanding of the treatment of gold, silver, copper, iron, lead, and zinc ores. It affords a broad, solid foundation to the general student of metallurgy, and complete information regarding related lines of work to the specialist in any one branch. Some of the illustrations are a revelation as to the latest metallurgical processes. It shows that it is an eminently practical book.

ONE THOUSAND FORMULAS. By L. W. Marshall. Boston: The Spatula Publishing Company. 99 pp.

This compilation gives the practical working druggist full information about the making of the most common and salable preparations, as well as about many others whose formulas it would be difficult to find elsewhere. As the formulas are very recent, it would admirably supplement older receipt books.

THE GARDEN CALENDAR FOR 1910. By Ellen P. Williams. Philadelphia: Franklin Printing Company, 1909. Price, $1.

This is a wall calendar of 365 sheets, each one of which is embellished by an appropriate quotation or some practical hint for the garden. The charm of the Garden Calendar by Miss E. P. Williams is the practical advice for every day in the year, advice coming at just the time it is needed; thus, on the very day you should spray your rose bushes to prevent the rust from forming, it tells you to do it. If you want advice as to your pansies, your peonies, your larkspur, your violets, your fruit trees, or even your vegetables, you will have it when you want it. You do not have to dig this advice out of a mass of other information of no immediate value. It will make an excellent holiday gift.

RULES FOR RECOVERING COAL MINES AFTER EXPLOSIONS AND FIRES. By W. E. Garforth, Mem. Inst. C.E., F.G.S. London and New York: D. Van Nostrand & Co., 1909. 18mo.; 71 pp. Price, $1.50 net.

The subject is a most important one, and has attracted great attention in this country as well as in England.

Legal Notices

60 YEARS' EXPERIENCE

PATENTS

TRADE MARKS
DESIGNS
COPYRIGHTS &c.

INVENTORS are invited to communicate with **Munn & Co., 361 Broadway, New York,** or **625 F Street, Washington, D. C.,** in regard to securing valid patent protection for their **inventions. Trade-Marks** and **Copyrights** registered. **Design Patents** and **Foreign Patents** secured.

A Free Opinion as to the probable patentability of an invention will be readily given to any inventor furnishing us with a model or sketch and a brief description of the device in question. All communications are strictly confidential. Our **Hand-Book** on Patents will be sent free on request.

Ours is the **Oldest** agency for securing patents; it was established over sixty years ago.

MUNN & CO., 361 Broadway, New York
Branch Office, 625 F St., Washington, D. C.

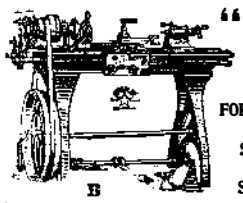
INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending December 14, 1909,

AND EACH BEARING THAT DATE

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

Advertising apparatus, J. V. Casey 943,179
Aerial elevator, J. A. Scott 943,572
Aerial navigation, J. Means 943,120
Agar-agar-cascara product, A. Schmidt 943,163
Alarm apparatus, F. P. Moyer 943,440
Alfalfa cutter, J. Jorgensen 943,308
Alloy for electrical resistance, W. B. Driver 943,066
Alloys of copper, such as brass, production of, Peck & Hodgkinson 943,159
Alumino silicate or artificial zeolite, R. Gans 943,535
Ammonia, etc., making and recovering, W. J. Dunnachie 943,399
Amusement apparatus, mechanical, W. Harding 942,539
Animal trap, N. E. Austin 942,878
Annealing flats, F. H. Daniels 943,393
Annealing flats and other shapes, F. H. Daniels 943,392
Annealing flats and other shapes, apparatus for, F. H. Daniels 943,625, 943,626
Apparel, wearing, N. J. Roller 942,933
Automobile gear, Dodge & Foster 943,240
Automobile radiators, section for, H. Kurtzner 943,257
Automobile safety device, O. Karcher 943,227
Awning fixture, J. W. Bancroft 943,059
Bag fastener, F. J. Brown 943,175
Bag fastener, C. J. Lysaght 943,229
Bag machine, W. Liddell 943,427
Baking pan, G. Mueller 943,093
Ball, W. W. Wrather 942,952
Bangles, bracelets, and the like, attachment for, S. Mendel 943,031
Barn construction, J. R. Buckwalter 942,884
Battery element support, C. B. Schoenmehl 943,275
Battery tank, storage, T. A. Willard 942,990
Bearing, roller, W. Vanmanen 943,128
Bearing, roller, M. Schluss 943,570
Bed bottom, J. F. McClatchey 943,442
Bed, obstetrical, W. B. Peak 943,453
Beds, safety headboard for folding, J. H. Edmonds 943,594
Bedstead attachment, C. D. Clark 943,217
Bedstead, extension, H. B. Arnold 943,170
Bell, door, F. Sexauer 943,320
Belt, W. F. Lott 943,228
Berth for ships, swinging, V. Bridgman 943,380
Billiard cue tip and fastener, C. Marx 943,360
Bin. See Flour bin.
Binder, loose leaf, McMillan & Joslyn 943,156
Binder, loose leaf, J. M. Lull 943,431
Binder, temporary, Curry & Coppage 943,006
Binding machine, C. F. McBee 943,094
Binding nicking machine, E. E. Sanborn 942,934
Biscuit coating machine, H. Tietjens 943,284
Blade molding means, F. Hodgkinson 943,348
Blade mounting means, J. E. Snyder 943,480
Blind slat fastener, J. B. Riley 942,930
Blowpipe, E. Odam 943,043
Boat, submarine, R. D'Equevilley-Montjustin 943,604, 943,605
Boats, ship screw driving mechanism for submarine, W. Maier 943,434
Boiler cleaning device, Thomas & Thompson 942,982
Boiler flue expander, D. A. Lucas et al 943,117
Boiler tube expander, J. C. Tassey 943,579
Bolt header, J. R. Blakeslee 943,335
Book, blank, C.R. Fargo 943,595
Books and other articles, support for, G. J. Keene 943,255
Boring bar, A. F. Liden 943,088
Bottle cap, G. L. Best 943,510
Bottle closure, A. Adelson 943,231
Bottle, non-refillable, Anderson & Ash 943,331
Bottle, non-refillable, Birner & Heil 943,334
Bottle, non-refillable, A. La Rose 943,425
Bowling alley, H. V. Keefer 943,419
Bowling machine, J. & J. A. Venn 943,494
Brake beam, C. F. Huntoon 943,021
Brake beam hanger, S. S. Underwood 942,985
Bread, etc., machine for use in the manufacture of plain, McConnell & Wilson 943,364
Bread roll, P. S. Wood 943,586
Brick cutting machine, W. R. Hasselback 943,541
Broiler, M. M. Dresdner 943,593
Broom bridle, C. F. Schulz 943,319
Brush holder, tooth, O. E. Jones 943,415
Buckle, G. B. Adams 943,212
Building block, S. Butz 943,518
Building construction, T. McFeely 943,447
Burglar alarm and automatic camera, combined, J. C. Ashe 943,232
Burglar alarm screen, P. Orance 943,368
Butter making and packaging apparatus, J. De Lisle 943,603
Cabinet for drinking cups, sanitary, L. W. Farmer 943,241
Cabinet, metallic, G. Holden 943,350
Cableway, T. S. Miller 943,032
Calculating machine, J. Bricken 943,514
Camera, moving picture, H. Meredith-Jones 943,253
Can lacquering machine, F. W. Wild, Jr 942,951
Can marking machine, J. B. Conover 943,140
Can polishing machine, C. Hediger 943,247
Cane unloader, C. Bosse 943,591
Capsule forming apparatus, B. W. Scott 943,608
Car, Dahlin & Carlson 943,007
Car construction, steel, W. P. Bettendorf 942,997
Car coupling, J. E. Hudler 943,079
Car coupling, J. F. & V. S. Durbin 943,144
Car coupling, automatic, H. Leslie 943,116
Car door bracket, J. K. McGuire 943,039
Car door, grain, W. H. Ascue 942,994
Car, dumping, C. A. Lindstrom 943,259
Car fender, C. B. Albree 943,588
Car fender, J. Mylott 943,635
Car loading machine, box, A. J. Gurney 943,225
Car, steel, C. H. Anderson 943,213
Cars, strengthening device for the ends of railway box, G. L. Weiss 943,497
Carbonating liquids, J. Bienz 943,060
Carbureter, J. C. Simonsen 942,977
Carbureter, H. A. Miller 943,197
Carbureter, Fergusson & Sheppy 943,242
Card case, G. Jenner 943,553
Carpet seams, machine for removing nap from, S. Zwald 943,613
Carpet stretcher, G. L. Noll 943,199
Carriage foot brake, C. Strohkorb 943,104
Cart, J. J. Devine 943,064
Caster retaining socket, D. A. Maccuaig 943,432
Casting metallic members, H. M. Pflager 942,928
Casting operations, means for preparing core bars for the, M. H. Fletcher 943,303
Cement surfaces and product, treating Portland, M. Toch 943,327
Centering machine, W. T. Ruth 943,467
Centrifugal regulator, W. Jahns 943,600
Chandelier, L. B. Hornbeck 943,148
Chart, adjustable, F. D. Webster 943,130
Check, combination fluid and vacuum, H. T. Case 942,887
Chicken separator, E. Hill 942,902
Chocolate composition coatings, heating and storage system for, C. J. Dionne 943,239
Chuck, L. W. Holub 943,616
Chuck and tool holder, reversing, M. N. Jarvis 943,414
Churn, F. Peter 943,200
Churn motor, J. T. Walston 943,580
Clock, eight-day alarm, P. Lux 943,312
Clothes line support, window, T. A. Macdonald 943,433
Clothes pin, J. F. Norman 942,971
Clutch, T. White 943,208
Cock, angle, W. D. Kendrick 943,554
Cock, blow-off, J. B. Youngblood 943,056
Coffee puot, C. F. Blanke 943,512
Coffee roasting, E. & G. De Mattia 943,238
Coin paying machine, C. Menchen 943,030
Coking furnace, L. L. Summers 943,609, 943,610
Collapsible tube, R. Brooks 943,234
Columns, posts, and the like, metal reinforcement for metal reinforced, G. J. Schade 943,469
Combination wrench, L. V. Aronson 942,993
Composition of matter, J. F. Norman 943,157
Composing machine, mechanical controller, W. G. White 943,611
Concrete column, post, and the like, metal reinforced, G. J. Schade 943,468
Concrete construction, metal reinforcement for metal reinforced, W. S. Ferguson 943,402
Concrete reinforcing construction, J. W. Linzee, Jr. 943,310
Concrete tie and rail fastening, A. O. Coffin 943,519
Conduit cap for electric installation, W. H. Vibber 943,287
Converter, metallurgic, W. H. Peirce 942,973
Conveyer, endless chain, F. Merian 943,121
Conveyer, mangle, R. M. Boyce 943,297
Copper matte, Bessemerizing of, E. A. C. Smith 943,280
Corn husker, D. H. Tree 943,051
Corn shocking horse, W. H. Rice 943,462
Corner beads or strips, clip or anchor for, A. P. Diescher 943,590
Coupling, H. A. Tunis 943,052
Crate, W. J. Puckett 943,565
Crate, folding, W. H. Drake 943,525
Crate, knockdown, H. E. Clement 943,388
Crate, knockdown, E. B. Weston 943,500
Crimping machine, Dill & Marsh 942,890
Cue tip trimmer, P. Ansell 942,876
Cultivator attachment, E. L. Ross 943,316
Cupboard and wardrobe, knockdown, J. H. Hiscock 943,075
Curtain and shade fixture, combination, E. Gabel 943,222
Curtain support, E. F. Marceau 943,151
Cutter head, E. Harrold 943,540
Dental spittoon, C. E. Ritchey 942,931
Desk, knockdown, J. W. Campbell 943,236
Diamonds from settings, tool for removing, O. M. Farrand 943,530
Digitalis extract, R. Tambach 943,578
Dish, vegetable, L. Schlesinger 943,162
Dish washing machine, W. J. Paul 942,926
Display rack, F. Jaques 943,250
Door check, A. Brown 943,515
Door check and closer, J. A. Peterson 943,160
Door fastener, sliding, F. J. S. Miely 943,362
Door holder, T. Draper 943,143
Door lock, F. Assmann 943,133
Door stop, C. W. Ellerbe 942,893
Door stop and holder, D. A. Sox 942,943
Dough rolling device, Krapf & Sachs 943,423
Draft gear, T. H. Symington 942,948
Driving mechanism, variable speed, A. L. De Leeuw 943,142
Dust collector, O. M. Morse 943,439
Dust removing apparatus, wet separator for, R. F. Diserens 942,891
Dye and making same, red disazo, A. Schedler 943,470
Dye for lakes and making same, red azo, W. Konig 942,916
Dye, mordant dyeing azo, H. Geldermann 943,536
Dyeing with gallocyanin dyestuffs, vat, Bierer & Loretan 943,375
Dynamometer, A. E. S. Craig 943,391
Earring, M. L. J. Girdany 943,185, 943,186
Earthenware article, E. C. Stover 943,484
Edge setting machine, F. H. Warren 943,207
Electric controller, C. L. Taylor 942,981
Electric controlling apparatus, W. Schwagermann 943,166
Electric furnace, E. A. A. Gronwall et al 943,224
Electric furnace, C. E. Wilson 943,290
Electric heater, Farren & Clark 942,894
Electric heater, R. W. Brown 943,384
Electric light socket, R. A. Schoenberg 943,273
Electric lighting attachment for burglar alarm systems, M. F. Juruick 942,964
Electric machine, dynamo, J. B. Wiard 943,503
Electric motor, McCoubrie & Raydure 943,155
Electric sockets to fixtures, means for locking, H. Hubbell 943,078
Electric switch, M. Guett 943,016
Electric switch, Carrigan & Sangster 943,215
Electrical cableway system, O. Adam 943,509
Electrical contact device, J. M. Smith 943,281
Electricity meter, pendulum, C. Fery 943,531
Elevator. See Aerial elevator.
Elevator cupboard, C. H. Weller 943,498
Elevator safety device, J. A. Miller 942,968
Elevator safety gate mechanism, J. Cunningham 943,524
Elevator safety mechanisms, gravity speed governor for, J. Cunningham 943,523
Elevators, grain spout for portable, G. W. & C. D. Baier 943,214
Embalming instrument, T. F. Riley 943,464
Engine combustion chamber, gas, O. Kraus 943,082
Engine reversing mechanism, B. Breeck 942,998
Engine sparking device, gas or oil, W. M. Stempel 943,324
Engine starting device, internal combustion, P. G. Caspian 942,957
Envelop, E. Wachtermann 943,205
Envelop opener, H. A. Smith 943,103
Envelop, safety, W. E. Fisher 943,111
Exercising or massage apparatus, R. Reach 942,976
Explosive, Bent & Talley 943,589
Explosive in wells, apparatus for firing, L. H. Broadwater 943,383
Extension table, C. S. Burton 943,337
Eyelets, die for use in the manufacture of, G. E. Warren 942,989
Eyelets, making, G. E. Warren 942,988
Fabric for beds, couches, etc., C. H. Gail. 943,245
Fabrics with fluids, apparatus for treating, E. Gminder 943,632
Faucet, H. Forsman 943,346
Faucet, A. Engel 943,526
Faucet or valve device for washbasins and the like, T. A. Hasek 943,404
Fence machine, slat, J. M. Denning 943,008
Fence post, W. B. Hughes 943,550
Fertilizer, B. Reichelt 943,460
Fertilizer distributer, E. Dierks 943,065
Figure and skirt stand, lay, J. F. Gems 943,069
Filter and strainer, centrifugal pulp, H. T. & A. M. Sedgley 943,476
Filter, rain spout, J. E. Welling 943,106
Firearm, T. C. Johnson 943,251
Firearm sight, J. M. Stephens 942,946
Firearms, movement for, H. B. Febiger 943,344
Fishing bob, F. F. Wooton 943,506
Fishing float, A. A. Owens 943,450
Flash light apparatus, J. A. Smith 942,941
Flight extractor, O. Soles 943,322
Flour bin, H. E. McClure 943,443
Flour duster, Treischman & Ringstad 943,204
Flour shaker, G. A. Hoop 942,903
Flue cutter, J. P. Sorensen 943,323
Flushing apparatus, A. C. Snell 942,978
Flushing device, C. H. Zwermann 943,131
Flushing device, tank, W. W. Ellerbeck 943,145
Flying machine, T. F. Dunn 942,958
Footwear protecting device, T. W. Tucker. 942,983
Forging machine back stop, J. R. Blakeslee, Jr. 943,377
Fork and spoon holder, W. W. Butler 943,517
Form, garment, A. D. Smith 943,125
Form or center, collapsible, P. O. O'Connor 942,922
Frame joint and soldering the same, L. B. Prahar 943,370
Funnel, L. E. Edmunds 943,400
Furnace, M. Kelly 943,194
Furnace construction, blast, J. C. Barrett 843,374
Furnaces, melting hearth for electric induction, C. Greenwald 943,403
Furnaces, method of and apparatus for returning flue dust to blast, W. B. Hubbard 943,599
Furniture joint, P. G. Abrams 943,211
Fuse adjusting machine, W. Schwartz 943,474
Fuse making machine, C. E. Schmunk 942,938
Galvanizing apparatus, A. Niedringhaus 943,315
Game, P. V. Ericson 943,343
Game apparatus, Z. D. Underhill 942,984
Game apparatus, M. Maris 943,435
Game apparatus, Schreiber & Geisz 943,472
Game piece, E. W. Ashenden 943,058
Garbage or refuse receptacle, A. E. Lyman 943,089
Garment, adjustable, W. A. Dielhenn 942,889
Garment hanger, C. Clift 943,340
Garment, nether, W. P. McQuillen 943,366
Garment rack, extension, B. J. Buckingham 943,137
Garment supporter clamp, B. Lauckner 943,084
Gas apparatus, A. P. Rickmire 942,929
Gas, apparatus for the manufacture of producer, Crossley & Rigby 943,182
Gas burners, apparatus for electrically igniting, Hill & Mann 942,901
Gas for illuminating, heating, or power purposes, manufacture of, H. S. Elworthy. 943,627
Gas generator, J. H. Jourdan 943,601
Gas generator, hydrogen, G. F. Jaubert 943,022
Gas producer valve, B. M. Aslakson 943,332
Gases and separating smoke and dust therefrom, apparatus for treating, E. G. Knoepfel 943,422
Gases, apparatus for disposing of noxious, W. H. Sartain 942,935
Gases in the atmosphere, apparatus for detecting and indicating, T. Groesbeck 943,015
Gate, E. E. Cannon 943,387
Gear, friction draft, T. L. McKeen 943,314
Gearing, A. E. Newton 943,042
Gearing, change speed, Anderson & Murray 943,621
Gem cutting machine, C. G. Hull 943,191
Gold saving machine, J. Hamilton 942,962
Gold, treating, J. B. Rossman 943,317
Governor, centrifugal, C. P. Hall 942,900
Hair straightener, I. K. Shero 943,321
Handle. See Switch handle.
Harness, G. A. Humason 943,020
Harrow, J. C. Baumgarten 942,879
Harvesters, etc., supporting and moving device for, J. Macphail 943,090
Hasp lock, P. McMenamin 943,365
Hay fork, horse, M. D. Main 943,618
Hay gatherer, N. Fryman 943,533
Hay loader coupling, W. T. Jones 943,024
Hay rake, self dumping, G. G. Lowry 943,029
Heat retainer, W. T. Converse 943,004
Heating apparatus, gas, W. E. Lawson 943,617
Hinge holder, detachable, C. E. Morrison 943,363
Hoof parer, P. Broadbooks 943,382
Hoop heading machine, E. E. Slick 943,478
Horseshoe, H. J. Fillier 943,146
Hose coupling, C. E. Judkins 943,416
Hotbed, G. H. Barbour 943,373
Hub odometer, H. P. C. Browne 942,883
Ice cream cone holder, W. H. Haight 943,070
Ice cutting machine, I. G. Gillespie 942,898
Ice making apparatus, can, C. D. Havenstrite 943,226
Indicator coupling, L. B. Van Boven 943,127
Inhaling apparatus, P. H. Cherry 943,150



"Star" Foot and Power Screw Cutting Automatic Cross Feed Lathe

FOR FINE, ACCURATE WORK

Send for Catalogue B.

SENECA FALLS MFG. CO.
695 Water Street,
Seneca Falls, N. Y., U. S. A.

Engine and Foot Lathes

MACHINE SHOP OUTFITS, TOOLS AND SUPPLIES. BEST MATERIALS. BEST WORKMANSHIP. CATALOGUE FREE.

SEBASTIAN LATHE CO., 120 Culvert St., Cincinnati, O.

Foot and Power and Turret Lathes, Planers, Shapers, and Drill Presses.
SHEPARD LATHE CO., 133 W. 2d St. Cincinnati, O.

Incorporate Your PATENTS and BUSINESS in ARIZONA

Laws the most liberal. Expense the least. Hold meetings, transact business anywhere. Blanks, By-Laws and forms for making stock full-paid for cash, property or services, free. President Stoddard, FORMER SECRETARY OF ARIZONA, resident agent for many thousand companies. Reference: Any bank in Arizona

STODDARD INCORPORATING COMPANY, Box 8000
PHOENIX, ARIZONA

THE "BARNES"
Positive Feed **Upright Drills**
10 to 50-inch Swing
Send for Drill Catalogue.
W. F. & JNO. BARNES CO.
(Established 1872)
1999 Ruby St., Rockford, Ill.

Concrete
Reinforced Concrete
—AND—
Concrete Building Blocks

Scientific American Supplement 1543 contains an article on Concrete, by Brysson Cunningham. The article clearly describes the proper composition and mixture of concrete and gives results of elaborate tests.

Scientific American Supplement 1538 gives the proportion of gravel and sand to be used in concrete.

Scientific American Supplements 1567, 1568, 1569, 1570, and 1571 contain an elaborate discussion by Lieut. Henry J. Jones of the various systems of reinforcing concrete, concrete construction, and their applications. These articles constitute a splendid text book on the subject of reinforced concrete. Nothing better has been published.

Scientific American Supplement 997 contains an article by Spencer Newberry in which practical notes on the proper preparation of concrete are given.

Scientific American Supplements 1568 and 1569 present a helpful account of the making of concrete blocks by Spencer Newberry.

Scientific American Supplement 1534 gives a critical review of the engineering value of reinforced concrete.

Scientific American Supplements 1547 and 1548 give a resume in which the various systems of reinforced concrete construction are discussed and illustrated.

Scientific American Supplement 1564 contains an article by Lewis A. Hicks, in which the merits and defects of reinforced concrete are analyzed.

Scientific American Supplement 1551 contains the principles of reinforced concrete with some practical illustrations by Walter Loring Webb.

Scientific American Supplement 1573 contains an article by Louis H. Gibson on the principles of success in concrete block manufacture, illustrated.

Scientific American Supplement 1574 discusses steel for reinforced concrete.

Scientific American Supplements 1575, 1576, and 1577 contain a paper by Philip L. Wormley, Jr., on cement mortar and concrete, their preparation and use for farm purposes. The paper exhaustively discusses the making of mortar and concrete, depositing of concrete, facing concrete, wood forms, concrete sidewalks, details of construction of reinforced concrete posts.

Each number of the Supplement costs 10 cents.

A set of papers containing all the articles above mentioned will be mailed for $1.80.

Order from your newsdealer or from

MUNN & CO., Inc.
361 Broadway, New York City

Free Catalogue of Scientific and Technical Books **Free**

We have just issued a new edition of our Catalogue of Scientific and Technical Books, which contains 144 pages, and a copy will be mailed free to any address on application.

MUNN & CO., Inc., Publishers of Scientific American
361 Broadway, New York

PHOTOGRAPHING A STAR SPECTRUM.

(*Continued from page 485.*)

of Lake Geneva, the summer home of many of the Windy City's millionaires. On high ground to the north of the lake, the observatory presents a fine appearance with its great dome to the west and two smaller domes to the east of the buildings. Passing through the main doors, one enters a fine rotunda, and going up a flight of marble steps comes into the great dome, 90 feet in diameter, and gazes on the great telescope towering aloft. One beholds a massive iron stand supporting an immense steel tube of boiler plate sixty-two feet in length, five feet in diameter at the middle, tapering to three and a half feet at either end. At the upper end of the tube is the object glass, with a clear aperture of forty inches; at the other end the eyepiece and micrometer, for viewing and measuring the planets and stars, or these may be replaced by a camera attachment for photography, or by a spectrograph for obtaining the spectra of stars, planets, or sun. The telescope tube is so long that the eye end is about thirty feet higher when an object is viewed near the horizon, than when looking at a star directly overhead. To use such a telescope, requiring as it would a long system of ladders, would be well nigh impossible, were it not for an invention of Sir Howard Grubb in making the whole observing floor an elevator. The front page illustration shows the floor at its lowest point, while another view shows the floor raised as high as possible. At Yerkes the floor, seventy-five feet in diameter, big enough to seat six hundred people, can be raised and lowered through a distance of twenty-three feet, and thus the observer when working with the telescope may keep the floor at a convenient distance below the end of the telescope, the operating power being electricity. In the front-page illustration are shown two of the four counterweights that balance the floor. An idea of the size will be obtained by remembering that the dome is ninety feet in diameter. When the astronomer wishes to observe a particular star, it is necessary to turn the slit of the dome in the direction of the star, and hence the dome must be revolved. This is ninety feet in diameter and weighs one hundred and forty tons, but again by the aid of electric motors it can be rotated at will by turning on the electric current from the rising floor.

Turning to the telescope, we find a machine of fifty-three tons in weight, wherein the movable parts weigh twenty tons. This weight the astronomer has to put in motion when he turns the telescope, yet ball bearings and the refinements of modern engineering permit him to move the great machine, using only his own physical strength. For quickly turning the telescope, electric motors are used. The telescope is set up by what is known technically as the equatorial mounting, one axis, the polar axis, in the meridian parallel to the earth's axis of rotation, the other, the declination axis, at right angles to it. Circles on these two axes give the astronomer the means of locating the star by its hour angle and declination. When the star is once in the field of the telescope, it is kept there by a clockwork mechanism driving the telescope about the polar axis at a speed exactly equal and opposite to the earth's rotation. The writer of this article has used the telescope when the thermometer stood at 26 deg. below zero Fahrenheit, and yet at this temperature the mechanism worked to perfection, which speaks wonders for the excellence of this mounting made by the well-known firm of Warner & Swasey. Indeed the professional astronomer has a hard life of it, which requires a great amount of physical endurance. In the summer nights when the temperature renders life comfortable, the nights are short, the astronomer might then be permitted to join a labor union; for he can

(*Concluded on page 496.*)

Important Books

Industrial Alcohol

ITS MANUFACTURE AND USES

A Practical Treatise based on Dr. MAX MAERCKER'S "Introduction to Distillation" as revised by Drs. DELBRÜCK and LANGE. Comprising Raw Materials, Malting, Mashing and Yeast Preparation, Fermentation, Distillation, Rectification and Purification of Alcohol, Alcoholometry, the Value and Significance of a Tax-Free Alcohol, Methods of Denaturing, Its Utilization for Light, Heat and Power Production, a Statistical Review and the United States Law.

By JOHN K. BRACHVOGEL, M.E.

528 Pages 105 Illustrations Price $4.00

Experimental Science

By GEORGE M. HOPKINS

Revised and Greatly Enlarged. 2 Octavo Volumes. 1,100 Pages. 900 Illustrations Cloth Bound. Postpaid, $5.00

Owing to the amount of new matter added the book is now published in two volumes, handsomely bound in buckram. Of the additions which have been made, among the most important are: A full illustrated description of ¼ H. P. Electric Motor, prepared expressly for this edition of "Experimental Science"; chapters on Alternating-current Machinery, and clear, concise Explanations of Wireless Telegraphy and Telephony, Electrical Measuring Instruments, the Electric Clock, the Telegraphone. High Tension Currents, the Nernst Lamp, and methods of measuring the heat of the stars No other work contains such a fund of trustworthy up-to-date scientific information, presented in a clear and simple style. Send for descriptive circular.

The Scientific American Cyclopedia of Receipts, Notes and Queries

15,000 RECEIPTS 734 PAGES

Price $5.00 in cloth

This splendid work contains a careful compilation of the most useful Receipts and Replies given in the Notes and Queries of correspondents as published in the SCIENTIFIC AMERICAN during the past sixty years together with many valuable and important additions.

Over Fifteen Thousand selected receipts are here collected, nearly every branch of the useful arts being represented. It is by far the most comprehensive volume of the kind ever placed before the public.

Modern Plumbing Illustrated

By R. M. STARBUCK

Price $4.00

A COMPREHENSIVE and up-to-date work illustrating and describing the Drainage and Ventilation of Dwellings, Apartments, and Public Buildings, etc. The very latest and most approved methods in all branches of sanitary installation are given. Adopted by the United States Government in its sanitary work in Cuba, Porto Rico, and the Philippines, and by the principal boards of health of the United States and Canada. 300 pages; 55 full-page illustrations.

Modern American Lathe Practice

By OSCAR E. PERRIGO, M.E.

Price $2.50

A COMPLETE book of 400 pages on The Modern American Lathe. Its development from the earliest times up to the present day; its modern form as constructed by up-to-date builders; its general and special classes of work; the quantity of its output, and its marvelous accuracy.

Modern Steam Engineering
in Theory and Practice

By GARDNER D. HISCOX, M.E.

Price $3.00

THIS is a complete and practical work of 487 pages, dealing with the care and management of Boilers, Engines, Pumps, Superheated Steam, Refrigerating Machinery, Dynamos, Motors, Elevators, Air-Compressors, and all other branches with which the modern Engineer must be familiar.

Nearly Two Hundred Questions with their Answers on Steam and Electrical Engineering likely to be asked by the Examining Board are included. These if studied by you will help you to procure a license. It is fully illustrated with detail engravings, not to be found elsewhere.

Punches, Dies and Tools for Manufacturing in Presses

By JOSEPH V. WOODWORTH

Price $4.00

A PRACTICAL work of 500 pages fully illustrated by nearly 700 engravings, being an encyclopedia of Die Making, Punch Making, Die Sinking, Sheet Metal Working, and Making of Special Tools, Sub-Presses, Devices and Mechanical Combinations for Punching, Cutting, Bending, Forming, Piercing, Drawing, Compressing and Assembling Sheet Metal Parts, and also Articles of other Materials in Machine Tools. Two Hundred and Ten Processes are clearly described and fully illustrated.

☞ *A special circular describing these books sent on request.*

☞ *Any of these books sent prepaid on receipt of price.*

MUNN & COMPANY, Inc.
Publishers, 361 Broadway, New York

(*Continued from page 494.*)

Initiation device, U. S. De Moulin	943,219
Insole, O. F. Fogelsong	943,243
Internal combustion engine, F. & E. Carter	942,886
Internal combustion engine, C. O. Hedstrom	943,072
Internal combustion engine, J. O. Heinze	943,408
Internal combustion engine, I. Hovey	943,598
Internal combustion engine, double acting, Horner & Boyland	943,597
Invalid handling device, E. Cleaves	943,003
Iron and steel, metallurgy of, Simpson & Oviatt	943,574
Ironing board, L. Stowe	943,485
Jar or receptacle, R. H. Wolff	943,585
Jewelry, L. Adler	943,291
Keyless socket, H. Hubbell	943,076
Knife, T. C. Fradsham	943,184
Knitting machine, A. M. Pigeon	943,230
Lace and the like, shoe, H. F. Schelling	943,607
Ladder, extension step, Binger & Burgstaller	943,511
Lamp, berth, Hamm & Legge	942,963
Lamps, carriage for electric, R. S. Beard	943,174
Lamps, pressure controlling valve for automobile, F. C. Bargar	942,995
Land drainer, mechanical, J. Scott	943,571
Land roller, W. J. Dunham	942,892
Lap fastener, F. A. Boyer	943,135
Latch lock for swinging doors, Buetikofer & Hoffman	943,615
Latch, night, R. A. Chase	943,216
Laundry marking machine, T. L. Taylor	943,203
Lavatory, W. Podmore	943,458
Lawn sprinkler, C. Ballreich	943,172
Lens drilling device, L. Wilhelm	943,289
Lenses for spectacles or eyeglasses, manufacture of, H. Orford	943,449
Light extinguisher, J. H. Burdock	943,176
Link, detachable, J. Dufour	943,220
Liquid fuel burner, A. E. Stevens	943,482
Liquid indicator, E. E. Hans	943,596
Loader, foldable, C. A. Radcliff	943,099
Lock, R. Schoell	943,471, 943,637
Locking mechanism, combination, H. Van Hoevenberg	943,493
Loom, L. H. Landry	943,028
Loom for weaving tufted fabric, H. Wyman	942,953
Loom harness motion, D. D. Miller	943,262
Loom, shuttle changing, B. F. McGuiness	943,038
Loom temPlet L. H. Landry	943,150
Loom thread guide, J. Robinson	943,270
Loom, wire fence, V. Hoxie	943,412
Looms, pick counter for, M. L. Stone	943,049
Looms, tulf yarn carrier for pile fabric, C. C. Brinton	942,999
Magazine, F. Smithson	943,479
Magneto motor, C. S. Kershner	943,420
Mail bag catching and delivering apparatus, H. J. Hansen	943,071
Mail carrier, Buck & Willis	943,136
Mail catcher, A. M. Bridgewater	943,336
Mail chute, J. W. Cutler	943,183
Manifolding apparatus, A. Lewis	943,195
Mantle, incandescent, T. Terrell	943,488
Marking board, upholstery goods, Hulse & Schramm	942,908
Match boxes, machine for pasting the inner boxes or slides of, C. S. Nyberg	943,158
Match safe, E. & D. C. Pooler	943,098
Matrix retainer, J. W. Ivory	943,353
Measuring device, skirt, C. W. Smith	943,278
Measuring granular materials, device for, O. D. Havard	943,405
Mechanical movement, R. A. Schoenberg	943,274
Megaphone, H. Meredith-Jones	943,252
Merry-go-round, G. Schmid	942,937
Merry-go-round, J. & J. Setecka	943,276
Metal, forming ribbed expanded, J. Kahn	943,417
Metal, reclamation of purified, W. C. Hyzer	943,248
Metals, protecting molten, Rockey & Eldridge	943,161, 943,639
Mine ventilating system, M. Ward	942,950
Mineral classifying apparatus, R. H. Richards	943,101
Mirror, hat, C. L. Cruver	943,005
Moistener and sealer, envelop, F. Roth	943,318
Moistening apparatus, air, W. H. Webb et al.	943,638
Mold. See Vulcanizing mold.	
Molding press, E. C. Williams	943,504
Motor control system, electric, A. C. Eastwood	943,011
Motor starting and stopping apparatus, electric, C. Spannagel	943,047
Motor starting switch, electric, E. Garside	942,960
Mouth brace, C. Mayer	943,361
Moving implement, J. H. Fichter	943,013
Mower starting device, J. C. Oliva	943,044
Mowing machine, W. Crain	943,181
Mowing machine, C. H. Pelton	943,266
Muffler, exhaust, J. Boyle	943,233
Muffler, exhaust, C. L. Hensley	943,544
Music leaf turner, R. J. Trice	942,949
Music rack, R. W. Mills	943,091
Music sheet guiding mechanism, T. P. Brown	942,956
Musical instrument, pneumatic, P. B. Klugh	942,915
Nailing machine, H. W. Morgan	943,035
Ne le feed mechanism, A. G. Fenn	942,895
Needle guide, A. Leach	942,919
Nipple flange, Reynolds & Smith	943,123
Nitrids, producing, C. E. Acker	943,132
Numbering machine, F. Wosinski	943,210
Oil burning and steam generating apparatus, J. W. Spurrier	943,481
Oil from wax, process and apparatus for the extracting of, J. C. Kuebler	942,917
Ore cooler, F. D. Baker	943,294
Ore grinding machine, J. C. Tatman	943,486
Oven, baker's, W. D. De Vaughn	943,395
Oven door, E. H. Huenefeld	943,546 to 943,549
Overshoe holder, Wessels & Ingraham	943,582
Oxygen with other gases, process and apparatus for burning, A. R. Bullock	943,385
Packing case, A. T. Kruse	942,966
Packing for piston rods and the like, G. Huhn	943,019
Packing for stuffing boxes, G. Strance et al.	943,169
Packing, pneumatic, E. S. Johnson	943,023
Padlock, I. M. Bremer	943,379
Paper bag, J. Sofge	943,126
Paper bag machine, W. Liddell	943,428
Paper bag machine, W. C. Fuller	943,534
Paper box and making the same, B. S. Morgan	943,034
Paper cutting machine, E. A. La Due	943,258
Paper feed mechanism, P. J. Meahl	943,261
Paper feed mechanism, W. Benjaminovitsch	943,622
Paper holder, E. C. Smith	943,279
Paper package closure, C. F. Jenkins	943,307
Paper receptacle, B. C. Cockrell	943,389
Paper slitter, S. M. Langston	943,357
Paring machine, G. Jahansan	943,249
Paring machine, vegetable, H. Robinson	942,932
Peach pitter and slicer, W. I. Irwin	943,193
Pencil sharpener, A. W. Gifford	943,223
Percolator, coffee, Mowbray & Geist	943,036
Phonograph, H. S. Mills	943,313
Phonograph horns, means for supporting, Turner & Glover	943,492
Phonograph records, mandrel for, W. C. Runge	943,568
Photographic pictures, projecting continuous, L. L. Thurstone	943,326
Picking motion, L. H. Landry	943,027
Picture frame, E. Oldenbusch	943,367
Pipe coupling, J. C. Yearke	943,330
Pipe coupling, G. H. Reynolds	943,461
Pipe joint molding apparatus, J. F. Milam	943,558
Pipe joint, rotary stand, W. S. Phelps	943,267
Pipes, removable cap for, Carter & Houle	943,338
Plane, combination wood working, M. L. Carter	943,178
Planer tool, A. F. Liden	943,086
Planter, corn, E. H. Snyder	943,283
Planter valve mechanism, corn, F. P. Murphey	943,634
Planters, valve mechanism for corn, F. P. Murphey	943,441
Pliers, P. Broadbooks	943,381
Plow, C. W. & A. W. Landers	942,918
Plow, H. Moore	943,092
Plow, C. C. Whittington	943,584
Plow point attachment, W. L. Camp	943,001
Plow, reversible moldboard, J. W. Buchanan	943,516
Plow scraper, reversible disk, H. S. Austin	943,372
Pneumatic despatch tube system, F. H. Wolever	943,329
Post or telegraph and telephone pole, H. E. Atchison	943,134
Potato cutter, seed, L. F. Miller	942,969
Potato digger, H. P. Stewart	943,325

(*Continued on page 496.*)

Classified Advertisements

Advertising in this column is 75 cents a line. No less than four nor more than 10 lines accepted. Count seven words to the line. All orders must be accompanied by a remittance. Further information sent on request.

READ THIS COLUMN CAREFULLY,—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. There is no charge for this service. **In every case it is necessary to give the number of the inquiry.** Where manufacturers do not respond promptly the inquiry may be repeated.

MUNN & CO., Inc.

BUSINESS OPPORTUNITIES.

LOCAL REPRESENTATIVE WANTED.—Splendid income assured right man to act as our representative after learning our business thoroughly by mail. Former experience unnecessary. All we require is honesty, ability, ambition and willingness to learn a lucrative business. No soliciting or traveling. This is an exceptional opportunity for a man in your section to get into a big paying business without capital and become independent for life. Write at once for full particulars. Address E. R. Marden, Pres., The Nat'l Co-op. Real Estate Co., Suite 378, Marden Bldg., Washington, D. C.

Inquiry No. 8918.—For manufacturers of "Wydt's Electro-Catalytic Sparking Plug."

ITALY.—Important technical office, having widest connection in Italy, is prepared to treat with a first-class Machine-manufacturing firm. For full information and particulars, write to Ing. Michele S. Foa, Turin (Italy), Corso Oporto 31bis.

Inquiry No. 8987.—Wanted, the manufacturers of the Van Winkle Woods & Sons, and the Weber power meters.

EDUCATIONAL.

CIVIL SERVICE EMPLOYEES are paid well for easy work; examinations of all kinds soon; expert advice, sample questions and Booklet 40 describing positions and telling easiest and quickest way to secure them free. Washington Civil Service School, Washington, D. C.

Inquiry No. 8990.—For information regarding shoes not made of leather but similar to the same and are as durable.

PATENTS FOR SALE.

PATENT FOR SALE.—Something New, Automobile Automatic Drop Brake. For further particulars, address Box 45, W. Enfield, Maine.

Inquiry No. 8996.—Wanted addresses of manufacturers of machinery for working orange wood manicure sticks.

FOR SALE.—States' rights or outright, Patent 937,891 for Safety Gas Hose Connection. Instantly and absolutely seals hose on detachment from stove. Can't suicide by Safety Hose. Dennis Tangney, 213 So. 6th St., Philadelphia, Pa.

Inquiry No. 9014.—For manufacturers of machinery, supplies, etc., to equip a small plant for the manufacture of iridium-tipped gold nib making for fountain pens.

FOR SALE.

FOR SALE.—Engine lathe, swings 9½ in., takes 25 in. between centers. Complete with full set change gears to cut all size threads, 3 to 40 in. Price only $43.50. Address L. F. Grammes & Sons, Allentown, Pa.

Inquiry No. 9016.—Wanted, machinery necessary for an installation of a plant for refining salt by a modification of the Bessemer process.

WANTED.

WANTED TO BUY Water Cooled Stationary Gasoline Engines, from 1 to 10 h. p. from manufacturers of same willing to furnish under our own name, in carload lots, or large quantities, for cash. Manufacturers state full particulars to Water Works, Box 773, New York.

Inquiry No. 9023.—Wanted, to buy silk machines from re-reeling, twisting, doubling, to the final process of making it into clothes.

LISTS OF MANUFACTURERS.

COMPLETE LISTS of manufacturers in all lines supplied at short notice at moderate rates. Small and special lists compiled to order at various prices. Estimates should be obtained in advance. Address Munn & Co., Inc., List Department, Box 773, New York.

Inquiry No. 9025.—Wanted, address of rubber manufacturers in Germany.

A LIST OF 1,500 mining and consulting engineers on cards. A very valuable list for circularizing, etc. Price $15.00. Address Munn & Co., Inc., List Department, Box 773, New York.

Inquiry No. 9029.—Wanted, catalogues and all information on machinery for braiding straw in manufacturing straw hats.

Inquiry No. 9034.—For manufacturers of machinery that could reduce stumps to kindling wood.

Inquiry No. 9036.—Wanted, the address of the manufacturers of "Cycle Ball Bearing Suspenders."

Inquiry No. 9038.—Wanted, the address of the Chipman Electric Purifying Co.

Inquiry No. 9042.—Wanted the address of Farney Safety Razor Co.

Inquiry No. 9044.—Wanted to buy outfits necessary for agate polishing.

Inquiry No. 9046.—Wanted, machinery used for the manufacture of all kinds of fruit boxes, baskets and crates.

Inquiry No. 9048.—Wanted, address of manufacturers of metal table slides for extension tables.

Inquiry No. 9049.—Wanted, to buy rotary brushes suitable for a shoe shining machine.

Inquiry No. 9052.—Wanted, to buy machinery, etc., for a beer plant, that manufactures beer by means of glucose.

Inquiry No. 9053.—Wanted, address of firms who install plants to manufacture nitrogen.

Inquiry No. 9054.—Wanted, address of manufacturers of articles made from mica.

Inquiry No. 9055.—Wanted, address of parties interested in Log Cleaning Machines.

Inquiry No. 9056.—For manufacturers of window shades.

Inquiry No. 9057.—For manufacturers of glass and china balls, used as fixtures or ornaments on lightning rod equipment, also weather vanes for same purpose.

Inquiry No. 9058.—Wanted, firms who make machinery used for pulverizing soap-stone.

Inquiry No. 9059.—For manufacturers of flexible steel chain mail.

FLY PAPERS.—FORMULAS FOR Sticky Fly Papers are contained in SCIENTIFIC AMERICAN SUPPLEMENT Nos. 1057 and 1324. Each issue contains several recipes. Price 10 cents each, from this office, and from all newsdealers.

(Concluded from page 495.)

work but eight hours. But he would be obliged to resign from the union in the winter time; for observing starts at five in the evening and continues till seven the next morning, fourteen hours without a break. And how pleasant this is with the thermometer twenty-six degrees below zero! It needs quite a deal of enthusiasm to keep one from freezing to death!

To photograph the spectrum of a star, a spectroscope or rather spectrograph is attached to the eye end of the telescope. The object glass focuses the star's light on a fine slip not more than one hundredth of an inch in width and one-eighth of an inch in length. After the light passes through this slit it passes through the collimating telescope, then through the prism or prisms which break the star's light up into its component colors or spectrum, then through the camera lens and is finally brought to a focus on the photographic plate where is obtained a photograph of the star's spectrum. Much careful thought and many refinements were necessary before the spectroscope was brought to its present great degree of precision. To mention a few of them. How is it possible to keep the great telescope tube so accurately directed to the star that its light is focused on the center of the slit one-hundredth of an inch wide, for if the light does not pass through the slit it will not fall on the photographic plate. This was made possible by making the slit jaws of polished silver, and watching the stray light reflected from the silver jaws by combining prisms and lenses in a rather curious fashion. The observer keeps his eye at an eyepiece where he can see the star image on the slit, and causes the star image to remain centered there by using the slow motions of the telescope. The exposure necessary to make a photograph depends on the brightness of the star and may last from a few minutes to two, three, or five hours, or in some few cases to eight or ten hours. During this long exposure the temperature has probably fallen a number of degrees, and the instrument has been affected by all its parts contracting. This might result in a change in the prisms with the consequence that the photographed spectrum will not be sharp and in as good definition as it might be. To overcome these difficulties, the whole spectrograph was inclosed in a tight aluminium case lined with glass work so as to be non-conducting. Fine wires were placed inside this case. While the exposure was being made a thermometer inside the case was watched through a glass window, and if the temperature dropped, a current of electricity was turned through the wires inside the case, and kept turned on till the proper temperature was reached. Within the past year a thermostat has been introduced and the temperature is automatically kept constant. And hence while the exposure is being made the spectrograph is kept at a constant temperature, there is no change in its several parts and a sharply-defined spectrum will result. A wonderfully accurate instrument this makes leading to results of the highest degree of precision.

AN AERIAL PASSENGER RAILWAY.

(Continued from page 488.)

haulage. From the haulage cable, which is one and one-half inches in diameter, the buckets are suspended, their entire weight being sustained by two steel four-inch flanged wheels running over the stationary cable.

These buckets are constructed of heavy wrought iron, six feet long and four wide, with a door opening on the right side, which door is securely bolted when the bucket is *en route*. There are twenty-six buckets on the line, carried by the haul-

(Concluded on page 499.)

Aeroplanes and Motors

We are building monoplanes of the Bleriot cross-channel type. Delivery 3 weeks after receipt of order. Flight guaranteed. Price $5,000; one-third cash with order.
We also build several kinds of light-weight aeronautic motors and propellers. Particulars and prices furnished upon application.
SCIENTIFIC AEROPLANE AND AIRSHIP CO.
Box 773, New York.

DIE MODELS SPECIAL WORK TOOLS MACHINERY
NATIONAL STAMPING AND ELECTRIC WORKS
216-220 S. Jefferson Street, Chicago, Ill.

CONSULTING ENGINEER.
ERNEST L. RANSOME
Reinforced Concrete
11 Broadway, New York

SOUTHERN STAMPING & MFG. CO.
Manufacturers of special and patented articles.
R. S., Nashville, Tenn.

ICE MACHINES Corliss Engines, Brewers and Bottlers' Machinery. THE VILTER MFG. CO., 899 Clinton St., Milwaukee, Wis

MODELS & EXPERIMENTAL WORK. Inventions developed. Special Machinery.
E. V. BAILLARD CO., 24 Frankfort Street, New York.

RUBBER Expert Manufacturers Fine Jobbing Work
PARKER, STEARNS & CO., 288-290 Sheffield Av., B'klyn, N. Y.

MOORE & CO. Builders of Special Machinery to Order. Inventions perfected. Models. Indiana and Franklin Streets, Chicago, U.S.A.

MASON'S NEW PAT. WHIP HOIST
for Outrigger hoists. Fasterthan Elevators, and hoist direct from teams. Saves handling at less expense.
Manfd. by VOLNEY W. MASON & CO., Inc.
Providence, R. I., U. S. A.

MORE FUN than a barrel of MONKEYS.
"Alpha" RUBBER TACKS. All dealers or Pkge by mail 5c U. S. Stamps.
PARKER, STEARNS & CO., 288 Sheffield Ave., Brooklyn, N. Y.

THE SCHWERDTLE STAMP CO.
STEEL STAMPS, LETTERS & FIGURES
BRIDGEPORT CONN

Experimental & Model Work
Cir. & advice free. Wm. Gardam & Son, 221 Fulton St, NY

MODELS CHICAGO MODEL WORKS
ESTABLISHED 1867 179 E. MADISON ST. CHICAGO, ILL.

MODELS & EXPERIMENTAL WORK, Gears, Dies, Tools, Novelties manufact'd.
M. P. SCHELL, 1759 Union Street, San Francisco

A MACHINE SHOP E. D'AMOUR 80 Cortlandt Street
Good Work—Fair Prices New York

Magical Apparatus.
Grand Book Catalogue. Over 700 engravings
25c, Parlor Tricks Catalogue, free.
MARTINKA & CO., Mfrs., 493 Sixth Ave., New York

INCORPORATE.—Arizona Laws most liberal and cheapest in U. S. No tax. No liability. Hold meetings, do business anywhere. Cost very small. We furnish complete Corporate Record, Management, By-Laws and all forms free. Write for free "Book of Information," blanks, etc. Southwestern Sec. & Inv. Co., Box H488, Phoenix, Ariz.

Instructive Scientific Papers
ON TIMELY TOPICS
Price 10 Cents each by mail

ARTIFICIAL STONE. By L. P. Ford. A paper of immense practical value to the architect and builder. SCIENTIFIC AMERICAN SUPPLEMENT 1500.

THE SHRINKAGE AND WARPING OF TIMBER. By Harold Busbridge. An excellent presentation of modern views; fully illustrated. SCIENTIFIC AMERICAN SUPPLEMENT 1500.

CONSTRUCTION OF AN INDICATING OR RECORDING TIN PLATE ANEROID BAROMETER. By N. Monroe Hopkins. Fully illustrated. SCIENTIFIC AMERICAN SUPPLEMENT 1500.

DIRECT-VISION SPECTROSCOPES. By T. H. Blakesley, M.A. An admirably written, instructive and copiously illustrated article. SCIENTIFIC AMERICAN SUPPLEMENT No. 1493.

HOME MADE DYNAMOS. SCIENTIFIC AMERICAN SUPPLEMENTS 161 and 600 contain excellent articles with full drawings.

PLATING DYNAMOS. SCIENTIFIC AMERICAN SUPPLEMENTS 720 and 793 describe their construction so clearly that any amateur can make them.

DYNAMO AND MOTOR COMBINED. Fully described and illustrated in SCIENTIFIC AMERICAN SUPPLEMENTS 844 and 865. The machines can be run either as dynamos or motors.

ELECTRICAL MOTORS. Their Construction at Home. SCIENTIFIC AMERICAN SUPPLEMENTS 759, 761, 767, 641.

Price 10 Cents each, by mail

Order through your newsdealer or from
MUNN & COMPANY, Inc.
361 Broadway New York

(Continued from page 495.)

Potato sorter, W. Pertzsch	943,097
Power transmission mechanism, E. E. Keller	942,913
Printing machine, L. W. Southgate	942,980
Printing press, G. E. Pancoast	942,923
Printing press, W. F. S. Ferry	943,629
Printing press brake, C. A. Wright	943,507
Printing press ink fountain, A. M. Cottrell	943,218
Propeller, marine, D. Urch	942,986
Propeller, vibrating, E. Hildebrandt	943,074
Pulp digesters, charging, E. F. Parker	942,924
Pulp feed regulator, A. Schultz	943,165
Pulp, machine for saving waste, E. F. Parker	942,925
Pulverizer, land, L. Traub	943,490
Pump attachment, oil, Aggas & Rabbitt	942,954
Pump, double acting, R. G. Holekamp	943,018
Pump, governed, N. McCarty	943,095
Pump rod coupling, C. L. Kenyon	943,080
Pump, vacuum, T. W. Lowden	943 556
Pumps, automatic device for controlling the operation of, W. F. Otto	943,369
Pumps, operating mechanism for double-acting, C. F. Preslar	943,201
Puzzle, J. F. Collins	943,390
Puzzle, A. Weigt	943,496
Rack. See Display rack.	
Rail bonds, manufacture of, G. A. Mead	943,438
Rail chair, A. Wardle	943,206
Rail clamp, guard, M. Burpee	943,138
Rail frog, continuous, Suverkrup & Owens	942,947
Rail joint, Deer & Smith	943,394
Rails, step joint for, J. H. Allen	943,057
Railway construction, E. D. McDonald	943,198
Railway crossing gate, H. J. Richendrfer	943,566
Railway crossing gate, electrically operated, T. Hummel	943,352
Railway fastener, C. H. Cornell....943,520,	943,521
Railway fastening, C. H. Cornell	943,522
Railway lining block, A. Barnhard	943,295
Railway rail splice, I. N. Prenovich	943,619
Railway rails, nut holder and joint supporter for, G. W. Henry, Sr.	943,543
Railway switch, F. Bayless	942,996
Railway switch, P. E. Vail	943,053
Railway switch, Reinoehl & Weaver	943,269
Railway switch mechanism, F. P. Perkins	942,927
Railway system, electric, G. H. Maire	943,196
Railway tie, C. A. Reed	943,268
Railway tie, H. L. Hollis.....943,409,	943,410
Railway tie, metal, L. J. Sparks	943,048
Railway tie plate, T. A. J. Hendricks	943,073
Railways, junction signal for mining, W. Kleman	943,114
Range finders, means for supporting and working heads of, Barr & Stroud	943,296
Razor blade stropping device, O. Kampfe	943,355
Razor stropping device, C. F. Benedict	942,880
Refrigerating apparatus, ammonia, T. C. McKee	943,040
Registers, wall frame for air, R. O. Brown	943,298
Rein holder, A. Bing	943,376
Rein holder, H. Green	943,537
Resizer, F. W. Moore	942,921
Ribbon feeding mechanism, Craig & Coffman	943,624
Rifle rear sight, W. R. Hatfield	943,542
Road-bed cutting apparatus, L. D. Craig, reissue	13,055
Rock crusher, E. S. Philips	943,455
Rolling mill, H. Grey	943,633
Rope coupling, Shufflebottom & Kenworthy	943,168
Rotary gasoline engine, T. E. Braley	943,592
Ruling device, E. A. Auerbach	942,877
Sad iron, J. Kadiera	943,254
Sad iron, F. W. Emerson	943,302
Safe, protecting, Martin & Smith	943,437
Sardine tins and the like, key for removing lids from, Read & Miles	943,459
Sash and door check, combined, G. F. Ehemann	943,401
Sash balance, window, Greear & Cox	943,014
Sash fastener, J. A. Dillow	943,301
Saw blade, R. E. Martin	942,920
Sawmill stock lifter, E. J. Gibson	943,304
Scaffold, flying, Martens & Schulz	943,436
Scale, D. C. Stauffer	942,945
Seeding device, combined disk and shoe, N. L. Heckman	943,406
Self-adjusting wrench, R. H. Anderson	942,992
Sewing machine, C. F. & M. T. Goforth	942,899
Sewing machine structure, V. Bloom	943,623
Shade machine knife, window, E. O. Engberg	943,221
Shade supporting device, E. H. Lunken	942,967
Shaft or pulley coupling, T. White	943,209
Shaft reversing means, H. F. Seybert	943,477
Shaft support, Stansbury & Hutchison	943,576
Sharpener, knife, B. F. Emery	942,959
Sheet metal culvert, corrugated, H. W. Harry	943,306
Sheet metal, galvanizing, A. Niedringhaus	943,264
Sheet metal wiring machine, W. R. Magie	943,118
Shock absorber, J. H. Friedenwald	942,896
Shock deadener, Mayesky & Boileau	943,119
Shock loader, J. B. Schuman	943,473
Shoe tree, A. H. Taft, reissue	13,057
Shoe trimming machine, A. Vose	942,987
Sifter, ash, S. J. Phreaner	943,457
Sign, electrically illuminated, J. H. Goehst	943,246
Signal light apparatus, G. Dalen	943,300
Signal system, automatic, P. O. Adams	943,587
Signaling apparatus, selective, O. M. Leich	943,115
Siphon for dispensing liquids, A. Kleinfeldt	943,421
Sled, resilient, F. G. McPherson	943,448
Sled runner, D. L. Blocher	943,513
Slime separator, centrifugal, O. M. Kuchs	943,083
Snow sweeper, W. J. Cooke	942,888
Sockets, detachable chain guide for pull, H. Hubbell	943,077
Sound box, W. A. Chapman	943,339
Sound reproducing machine records, manufacture of, R. L. Gibson	943,631
Sounds, apparatus for receiving submarine, Garrett & Lucas	942,897
Spectacles, eyeglasses, and the like, S. S. Lawrence	943,085
Speed mechanism, E. E. Keller, 942,910 to 942,912,	942,914
Spittoon, J. Escuder	943,527
Sprag remover and retainer, J. T. Harcarik	943,538
Spray burner, A. Rohrbach et al	943,567
Spring. See Window spring.	
Spring wheel, J. A. Dieterich	943,397
Square, T. C. Howland	943,351
Stair tread, R. T. Kanski	943,418
Stall, cow, C. S. Torrey	943,489
Stamping devices, cushioned support for, J. Dubisee	943,342
Staple forming and discharging mechanism, V. Hoxie .....942,904 to	942,906
Staple machine, J. Buckley	943,235
Steam boiler, J. C. Parker	943,452
Steam generator, B. F. Silliman	943,277
Steam generator for submarine boats, R. D. Montjustin	943,153
Steam generator, superheater, and feed water heater, F. A. Haughton	943,189
Steel, making, L. M. Atha	943,171
Steel, refining, E. Humbert	943,192
Stool and foot rest, combined, M. L. Porter	942,975
Stool, shoe fitting, H. H. Kramer	942,965
Stop mechanism, automatic, V. Hoxie	943,411
Storage battery, L. H. Flanders	943,345
Stove, pocket, B. Scamardi	943,569
Stovepipe anchor, J. Murchie	943,037
Street sweeper, J. R. Pollock	943,122
Stropping machine, J. Lorenzen	943,311
Stuffing box bland, F. Keeler	943,356
Suction apparatus, M. Lebenberg	943,426
Suit case, B. F. Becker	943,333
Superheat gage, Lothrop & Bradshaw	943,260
Superheater, F. D. Potter	943,606
Support or bracket, J. H. Cook	943,237
Surface gage for parallel lining, C. O. Dost	943,010
Surgical forceps, E. Moraweck	943,263
Sweeping machine, Nathan & Heuser	942,970
Switch handle, C. Schuster	943,124
Swivel, detachable, Carson & Gilkerson	943,299
Tapping and drilling tool, J. H. Dorman	943,009
Tar and debris trap, G. R. Evans	943,628
Tarsia work, manufacturing, F. Kohn	943,309

(Concluded on page 499.)

DON'T BUY GASOLINE ENGINES UNTIL YOU INVESTIGATE "THE MASTER WORKMAN," a two-cylinder gasoline, kerosene or alcohol engine, superior to any one-cylinder engine; revolutionizing power. Its weight and bulk are half that of single cylinder engines, with greater durability. Costs Less to Buy—Less to Run. Quickly, easily started. Vibration practically overcome. Cheaply mounted on any wagon. It is a combination portable, stationary or traction engine. SEND FOR CATALOGUE. THE TEMPLE ENGINE MFG. CO., 498 West 15th St., Chicago. THIS IS OUR FIFTY SIXTH YEAR.

(Concluded from page 496.)

age cable, spaced at equal distances of 485 feet apart. These buckets are held to the runners by a one-half by two-inch steel frame, allowing it to swing freely on an axle between the flanged wheels. The seating capacity of each bucket is four.

In the entire distance there are fifty towers, built of eight by eight timbers, most of which were cut within a mile of the road. Over these towers run the cables. The stationary cable is the higher one, the haulage cable being two feet below and carried midway in the frame that supports the buckets. This haulage cable is endless, winding about a huge drum at either terminal. The towers are not placed an equal distance apart, but according to the slope and the contour of the ground. On the longer stretches they are frequently two hundred feet between, while at the base and summit they are within a few feet of one another. Perhaps the best example of the entire simple working plan may be found in the large stores of a city, where package carriers are in use. The little wire baskets that carry your purchases from the clerk to the wrapper are in miniature duplicates of these huge, man-carrying buckets, save where the former are operated by springs, the latter are moved by electric power.

The entire distance covered, from base to summit, is one and one-half miles, and in traveling this you are raised from nine thousand feet at Silver Plume to something greater than twelve thousand five hundred feet at the summit. This is, approximately, one foot lift for every two feet covered. In order to attain the same elevation, any road in the world—Pike's Peak cog road a possible exception—would have to traverse several times the distance. The time is thirty minutes each way.

The motive power is electric, the current being transmitted from Georgetown, four miles distant. Two motors are used, both of thirty-five horse-power each, and both located at the upper terminal. One motor is sufficient to operate the endless cables on an average haul, but on other occasions, where the buckets are filled, both are thrown in.

The entire road is equipped with electric signals and telephones. In its length are five stations, built about the towers, each with its watchman. The slightest accident is promptly telephoned to the engineer, and the buckets stopped.

The plans were first drawn up late in 1905, and the construction commenced the year following. It was not until the summer of 1908, however, that the road was in full running order. The total cost was slightly in excess of $70,000.

A MACHINE FOR SIMULTANEOUSLY FIRING MANY BLASTS.

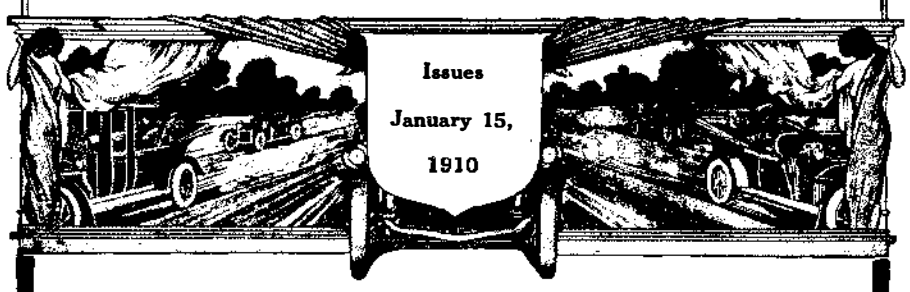
(Concluded from page 484.)

by the shaft. When the switch is thrown to the lower contact, the fuse circuit receives the whole current from the electric generator.

All of the fuses are melted instantly by the heavy rush of current accentuated by the inductive kick of the coil, thus producing a simultaneous firing of all the charges of explosives used. In deepening the river at Sault Ste. Marie for the United States government, the contracting firm used three similar machines, but larger and more powerful, operated by compressed-air engines. These machines were perfectly automatic and unfailing in operation. In all cases the fuses were arranged in parallel circuit between the two mains of the dynamos, the pressure being 12 volts. It is stated that these devices operated so simply that it required only the opening of an air valve to fire three hundred charges of dynamite at one time.

Oleat Maury.—A preparation for greasing wool, according to a French patent, is made by the saponification of mixtures of mineral oils and vegetable oils by alkaline carbonates.

THE AUTOMOBILE NUMBER of the SCIENTIFIC AMERICAN



THIS year bigger and even better than it ever was. It has been our purpose in publishing this annual review to give the automobile owner and the prospective purchaser truly helpful information, and to that end the number will contain the following articles:

1. ***The Automobile and the Farmer.***
2. ***How to Overhaul Your Car.***
3. ***The Automobile Fire Engine.***
   All the latest automobile pumping engines, chemical cars, hook and ladder trucks, and hose carts are described.
4. ***The Automobile and the Road.***
   The automobile has presented to the road engineer new problems for solution. He must render his roads impervious to water and practically proof against the destructive effect of tires. The United States Government through the Office of Public Road Inquiry is now studying this subject. The article written by Mr. Page, Director of the Office of Public Roads, describes what has been done.
5. ***Anti "Joy Ride" Devices.***
   This article is a complete description of devices which have been invented for the purpose of preventing chauffeurs from taking out their owners' machines.
6. ***The Modern Electric Automobile.***
7. ***Making Your Own Repairs.***
8. ***The Cars of 1910.***
9. ***Automobile Identification Chart.***
   Sometimes you have wondered what make of car was that which skimmed past your admiring eyes. The 1910 Automobile Number will enable you to identify any car by its radiator and engine bonnet. About thirty-five automobiles are thus illustrated for identification in a sketchy, artistic way.
10. ***The Inexpensive Car.***
    Any man with a good salary can now afford to own some kind of an automobile. How the machines are constructed and what may be expected of them is lucidly set forth.
11. ***The Wonderful Rise of the Automobile Industry.***
12. ***Automobile Novelties.***

Order from your newsdealer or from

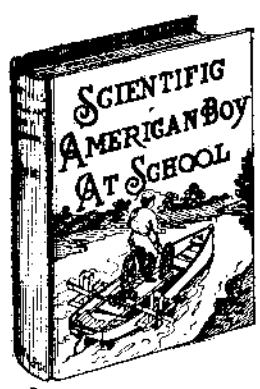
MUNN & COMPANY, Inc., 361 Broadway, New York.

The Scientific American Boy at School

By A. RUSSELL BOND

12mo. 338 Pages. 314 Illustrations.

Price $2.00 postpaid.



THIS book is a sequel to "The Scientific American Boy," many thousand copies of which have been sold, and has proven very popular with the boys. The main object of the book is to instruct how to build various devices and apparatus, particularly for outdoor use. The construction of the apparatus, which is fully within the scope of the average boy, is fully described and the instructions are interwoven in an interesting story, a feature which has assisted in making the "Scientific American Boy" so popular with the boys.

It takes up the story of "Bill" and several of his companions at boarding school. They form a mysterious Egyptian society, whose object is to emulate the resourcefulness of the ancients. Their Chief Astrologer and Priest of the Sacred Scarabeus is gifted with unusual powers, but his magic is explained so that others can copy it. Under the directions of the Chief Engineer, dams, bridges, and canal-locks are constructed. The Chief Admiral and Naval Constructor builds many types of boats, some of which are entirely new. The Chief Craftsman and the Chief Artist also have their parts in the work done by the Society, over which Pharaoh and his Grand Vizier have charge. Following is a list of the chapters:

Chapter I, Initiation; Chapter II, Building a Dam; Chapter III, The Skiff; Chapter IV, The Lake House; Chapter V, A Midnight Surprise; Chapter VI, The Modern Order of Ancient Engineers; Chapter VII, A "Pedal Paddle-Boat"; Chapter VIII, Surveying; Chapter IX, Sounding the Lake; Chapter X, Signaling Systems; Chapter XI, The Howe Truss Bridge; Chapter XII, The Seismograph, Chapter XIII, The Canal Lock; Chapter XIV, Hunting with a Camera; Chapter XV, The Gliding Machine; Chapter XVI, Camping Ideas; Chapter XVII, The Haunted House; Chapter XVIII, Sun Dials and Clepsydras; Chapter XIX, The Fish-Tail Boat; Chapter XX, Kite Photography; Chapter XXI, Water-Kites and Current Sailing; Chapter XXII, The Wooden Canoe; Chapter XXIII, The Bicycle Sled; Chapter XXIV, Magic; Chapter XXV, The Sailboat; Chapter XXVI, Water Sports, and Chapter XXVII, A Geyser Fountain. Index.

MUNN & COMPANY, Inc., 361 Broadway, NEW YORK

(Concluded from page 496.)

Teeth, mounting for artificial, E. J. Greenfield 943,113
Telemeter, O. Eppenstein 943,109
Teleobjective, E. Wandersleb 943,105
Telephone call registering system, W. J. Kibbe 943,081
Telephone currents, method of and apparatus for repeating, P. A. Campbell... 942,885
Telephone dial, illuminated, R. B. Hallock 943,305
Telephone receiver support, W. J. Mogridge 943,033
Telephone transmitter mouthpiece, J. A. Jamieson 943,169
Telephone transmitter, sanitary, M. Y. Calcutt 943,386
Tempering furnace, electric, V. & V. E. Royle 943,272
Test indicator, R. L. Smith 943,282
Textile machinery, cloth clamp for, T. W. France 943,067
Theodolite, etc., L. H. Cooke 943,063
Thiosalicylic compound and making same, E. Munch 943,560, 943,561
Timing and ignition device, W. H. Saunders 942,936
Tin scraps and producing tin compounds, detinning, O. K. Zwingenberger 943,508
Tire, P. W. Litchfield 943,358
Tire armor, S. S. Childs 943,002
Tire, automobile, I. B. Kempshall 943,025
Tire, automobile, W. G. Dicker 943,396
Tire, automobile, C. E. W. Woodward..... 943,505
Tire, elastic, A. Bonnaz 942,881
Tire, pneumatic, A. F. Angelicola 943,371
Tire, pneumatic, A. Latimer 943,640
Tire protector, C. E. King 943,026
Tire protector, J. Richardson 943,463
Tire supporter, Coate & Saris..... 943,341
Tire, vehicle, T. H. Banks..... 943,173
Tire, vehicle, T. W. Lucke..... 943,430
Tire, wheel, H. L. McDuffee 943,446
Tires, apparatus for manufacturing wheel, J. K. Williams 943,054
Tires, woven wrapper for, J. Marcet y Marti 943,557
Toaster, H. P. Knoblock 943,555
Tool, electrically heated, G. E. Stevens.... 943,483
Tool holder, A. F. Liden 943,087
Tool holder, C. B. Wells 943,499
Tooth, artificial, J. W. Ivory 943,354
Toy, P. Phillips et al..... 943,456
Toy, B. B. Exline et al..... 943,528
Toy, J. G. Sinclair 943,575
Toy, basket ball, E. S. Staples..... 942,944
Toy, mechanical, E. J. Pearce..... 943,096
Toy, sounding, M. P. Exline et al..... 943,529
Track sander, H. Vissering 943,288
Track sander, D. Tauriello 943,487
Transformer furnace, E. A. A. Gronwall et al. 942,961
Transmission mechanism, E. Bonneau..... 942,882
Trestle, folding, E. F. Whitehead..... 943,328
Triangles, apparatus for solving spherical, French & Frederick 943,532
Truck, hand, G. D. Parker..... 943,265
Trunks, skirt supporting attachment for wardrobe, A. M. Moorman..... 943,154
Truss frames and the like, cushioning device for, J. S. E. Freel..... 943,244
Tube. See Collapsible tube.
Turbine blading, F. Hodgkinson 943,347
Turbine, elastic fluid, F. Hodgkinson..... 943,349
Turbine, elastic fluid, W. J. A. London.... 943,359
Turbine, elastic fluid, C. Roth..... 943,465
Turn table, G. A. True..... 943,491
Turpentine hack, N. B. Stone..... 943,050
Type casting and composing machine, W. G. White 943,612
Type, plates, etc., machine for sawing and trimming, G. H. Vining 943,129
Typewriter, justifying, W. G. White 943,502
Typewriter keyboard, S. W. Rowell..... 943,466
Typewriter touch key finder, G. A. Cage.. 943,108
Typewriting machine, T. J. Coo..... 943,141
Typewriting machine, H. G. McCoe..... 943,444
Typewriting machine, H. S. McCormack.. 943,445
Typograph apparatus, C. F. Blackledge.... 943,614
Umbrella and the like, A. Friedlaender.... 943,068
Universal joint device, J. Simon..... 943,573
Vacuum cleaner, J. N. Whitehouse..... 943,583
Vacuum cleaning apparatus, J. F. Lacock. 943,424
Valve, automatic air brake retaining and release, D. F. Knerr 943,602
Valve, automatic cut-off, J. Miller 943,559
Valve, car sprinkler, E. C. Perry..... 942,974
Valve, check, J. G. Parker..... 943,451
Valve, drain, E. S. Stotts 943,577
Valve, regulating, S. A. Palmer..... 942,972
Valves, push button mechanism for flush, W. J. Frost 943,630
Vehicle attachment for detaining draft animals, C. Reiger 943,100
Vehicle wheel, E. J. Selley 942,939
Vehicle wheel, A. Graff 943,112
Vehicle wheel, H. O. Peck.....943,563, 943,564
Vehicles, gasoline tank for motor, R. Huff. 942,907
Velvets and like pile fabrics, machine for pegging, F. Shaw 943,167
Vending machine, coin controlled, A. Jacobs 943,552
Vending machine coin controlled mechanism, A. Jacobs 943,551
Vending machine coin switch, O. Oehring, 943,562, 943,636
Vending machine, stamp, C. W. Timmons. 943,285
Vermin-destroying apparatus, L. Kreft..... 943,256
Vibrator, A. J. Stecker 943,620
Vote registering machine, automatic, E. Boggiano 943,378
Voting machine, E. E. Wolf..... 942,991
Voting machine, A. McKenzie..... 943,041
Voting machine lock-out, L. T. Harkness. 943,017
Vulcanizing mold, J. K. Willliams..... 943,055
Waffle machine, cone, A. G. & M. Andalaft. 943,293
Waffle packing case, cone, A. G. & M. Andalaft 943,292
Wagon bolster, log, J. T. Warren..... 943,495
Washing, fruit canning, and cooking machine, combined, M. W. Miracle..... 943,152
Washing machine, G. A. Carlson..... 943,177
Washing machine, E. C. Waring..... 943,581
Watch guard, S. Rosofsky 943,271
Water curb box lid, J. J. Heimbuecher.... 943,407
Water electrolytically, purifying, H. B. Hartman 943,188
Water motor, W. J. White 943,501
Water purifying apparatus, electrolytic, H. B. Hartman 943,187
Water tube boiler, E. W. Clark..... 943,139
Wave breaker, J. A. Rosvold, reissue..... 13,056
Weed eradicating means, B. F. & J. A. Scott 943,475
Weighing apparatus, automatic, A. Sonander 942,942
Weighing machine, automatic, P. Edtbauer 943,012
Welding apparatus, electric chain link, C. L. Hoff 943,190
Welding compound, M. U. Schoop..... 943,164
Wheel rim, emergency, W. F. & R. L. Jenkins 942,909
Wheel rim, vehicle, P. W. Litchfield..... 943,029
Whip and robe lock, combination, W. York 943,107
Windmill power, system of utilization of, H. C. Busby 943,000
Window bead fastener, C. Cassleman..... 943,062
Window fastener, N. Dion 943,398
Window glasses, safeguard for, E. B. Bave 942,955
Window kitchen, A. Soper 942,979
Window spring, J. Hagerty 943,147
Window, swinging, C. Cassleman..... 943,061
Wire, barbed, V. Hoxie 943,413
Wire chain making machine, M. Fessler... 943,110
Wire package, H. W. Struss 943,202
Wire staple forming and setting machine, W. C. Osterholm 943,045
Wood, etc., machine for dressing and finishing, J. W. Schleicher 943,046, 943,102
Woodworking machine, E. P. Shank..... 942,940
Work box and stand, S. Pecoy..... 943,454
Wrench, C. E. Townsend..... 943,286
Wrench, S. A. Holman 943,545

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1863, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., Inc., 361 Broadway, New York.

Canadian patents may now be obtained by the inventors for any of the inventions named in the foregoing list. For terms and further particulars address Munn & Co., Inc., 361 Broadway, New York.