

BOOT OR SHOE FOR ATHLETIC PURPOSES.—P. A. VALLE, Auckland, New Zealand. This article of footwear is intended to be worn by persons when engaged in physical-culture exercises or for other purposes and especially designed to develop the muscles of the legs, ankles, and feet. The leading feature resides in the application of a weight to the toe portion of a boot or shoe adapted to athletic purposes, the weight being disposed above the upper. Different weights are interchangeable to suit the strength and requirements of the user.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Business and Personal Wants.

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. In every case it is necessary to give the number of the inquiry.

MUNN & CO.

- Marine Iron Works, Chicago. Catalogue free.
- Inquiry No. 5487.—For makers of thinners and driers for tar paints.
- Autos.—Duryea Power Co., Reading, Pa.
- Inquiry No. 5488.—For parties to manufacture small cabinet or till locks.
- For logging engines, J. S. Mundy, Newark, N. J.
- Inquiry No. 5489.—For a machine that adds only one that adds column at a time and does not carry that is key-operated, having 9 or 10 keys, not a total add, but only to run up a long column of figures.
- "U. S." Metal Polish, Indianapolis. Samples free.
- Inquiry No. 5490.—For makers of special machinery for a large factory for cereal foods.
- Sawmill machinery and outfits manufactured by the Lane Mfg. Co., Box 13, Montpelier, Vt.
- Inquiry No. 5491.—For a hand machine for forming heavy wire eyes and hooks of 3 or 4 inches long.
- Profitable adding machine business for sale. Particulars 422 West Side Ave., Jersey City, N. J.
- Inquiry No. 5492.—For a toy hull in which can be placed a small electric motor, about 3 feet by 6 or 8 inches.
- American inventions negotiated in Europe. Wenzel & Hamburger, Equitable Building, Berlin, Germany.
- Inquiry No. 5493.—For the manufacturers of the rock well rotary furnaces.
- In buying or selling patents money may be saved and time gained by writing Chas. A. Scott, 340 Cutler Building, Rochester, New York.
- Inquiry No. 5494.—For manufacturers of philosophical instruments.
- Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway New York. Free on application.
- Inquiry No. 5495.—For a complete outfit for making horseshoes.
- The largest manufacturer in the world of merry-go-rounds, shooting galleries and hand organs. For prices and terms write to C. W. Parker, Abilene, Kan.
- Inquiry No. 5496.—For the address of a manufacturer of glass tanks for holding acids.

The celebrated "Hernsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 138th Street, New York.

Inquiry No. 5497.—For makers of electrical welding machinery, for welding small wires, No. 8 and finer; also for dynamos suitable for the above.

Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machinery and tools. Quadriga Manufacturing Company, 18 South Canal Street, Chicago.

Inquiry No. 5498.—For manufacturers of tools and materials for making rubber stamps.

Manufacturers: We can satisfactorily represent and handle your account. Correspondence invited. Welbener-Patrick Company, Manufacturers' Agents, 172 Washington Street, Chicago.

Inquiry No. 5499.—For makers of armature core punchings in sheet metal, of the ring type.

WANTED.—To manufacture on reasonable terms anything in wood or metal. First-class facilities for manufacturing and shipping. Satisfaction guaranteed. Send samples for estimate. Wayland Incubator & Manufacturing Co., Wayland, N. Y.

Inquiry No. 5500.—For clocks for a factory, which are electrically controlled from one master clock.

FOREMAN WANTED.—A thoroughly capable man to take charge of brass shop employing about fifteen men. Must be between 30 and 40 years of age, married. Reply by letter only, stating experience and references to Wm. H. Wilkinson Co., West Medway, Mass.

Inquiry No. 5501.—For the makers of the "Meritt" typewriter, or dealers in repair parts therefor.

Inquiry No. 5502.—For parties engaged in the manufacture or designing of clock cases.

Inquiry No. 5503.—For manufacturers of light wooden and metal specialties.

Inquiry No. 5504.—For manufacturers of vulcanized fiber specialties.

Inquiry No. 5505.—For manufacturers of machines for turning and boring hub blocks.

Inquiry No. 5506.—For manufacturers of balloons.

Inquiry No. 5507.—For woodworking machines for such work as dowels, skewers, etc.

Inquiry No. 5508.—For manufacturers of heavy corded webbing.

Inquiry No. 5509.—For machinery for making earthenware water pipes.

Inquiry No. 5510.—For the address of the Furber Patent Shoe Company.

Inquiry No. 5511.—For the address of the U. S. Silver Co., also of the Crown Silver Co.

Inquiry No. 5512.—For manufacturers of machinery for making tooth brushes.

Inquiry No. 5513.—For the address of the Pyle National Electric Headlight Co.

Inquiry No. 5514.—For makers of a bower-barfing equipment.



HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication. References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn. Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same. Special Written Information on matters of personal rather than general interest cannot be expected without remuneration. Scientific American Supplements referred to may be had at the office. Price 10 cents each. Books referred to promptly supplied on receipt of price. Minerals sent for examination should be distinctly marked or labeled.

(9390) D. M. S. asks: Certain makers of automobiles who use the "planetary" type of gearing in their machines state, as an important point in the construction of their particular gear, that no internal gears are used. Why is the internal gear objectionable? And cannot an internal gear, if properly designed, be successfully used in an automobile speed gear? A. There is no inherent objection to the use of internal gear wherever its special construction and application is desirable, for its use is a most important adjunct in many machines; possibly the necessary compactness of a speed gear makes the outside gear preferable.

(9391) W. B. asks: 1. Which is the cathode—the place where the electricity enters the vacuum tube, or where it leaves? A. The cathode in a vacuum tube is the place at which the electric current leaves the tube. 2. How do they make liquid air? A. The process by which the air is liquefied is in general as follows: The air is compressed and cooled, dust and other solid matter removed from it, then dried or deprived of its moisture, and then passed to the liquefying coils under a pressure of 2,500 to 3,000 pounds to the square inch. From a specially constructed valve the air is allowed to escape and expand. It passes back along the outside of the coil through which the compressed air has passed on its way to the expansion valve. By its expansion it is gradually cooled, and in turn cools the compressed air in the inner pipe. In this way the cooling proceeds by successive stages until the temperature of liquefaction is reached, and a portion of the air then collects in a liquid form in the bottom of the machine. You will find the process fully described in Sloane's "Liquid Air," which we can send you for \$2.50 postpaid.

(9392) I. B. R. asks: Since in an ordinary electric railway system with an overhead trolley wire the circuit is completed through the rails, why is there not the same danger from contact with them as from the third rail in the three-rail system? A. The third rail in an electric system is insulated from the earth, and if one comes in contact with it while he is still in contact with the ground, he will receive the shock due to the current which passes through him from the rail to the earth, just as he would if he could make contact between the trolley wire and the ground, the trolley wire carrying a current of the same voltage as the third rail. Now with reference to the other part of your inquiry: There is not the same danger of a shock by coming in contact with the rails of the track while standing upon the earth, as you must know, because everyone is continually stepping upon the rails as they cross the tracks of an electric line. The reason is not far to seek. The rails are bound together by strips of metal to furnish an easy path for the current back to the power house, and are also in contact with the earth during the whole of the distance; therefore, if one who is standing upon the earth steps upon the rail also, both the earth and the rail must be at the same voltage, since they are in contact with each other, and no current can flow from one point to another when both points are at the same voltage, any more than water can flow from one point to another when both points are at the same level. This is the reason why no shock can be received by a person who is standing upon the ground, and who touches the rails of the track through which at the moment the current may be returning to the power house.

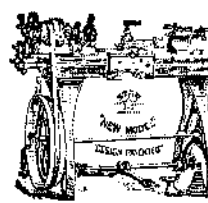
INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending May 3, 1904.

AND EACH BEARING THAT DATE [See note at end of list about copies of these patents.]

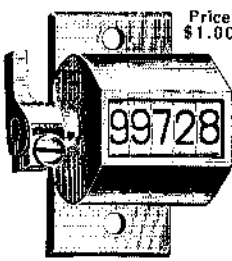
Ash pans, automatic sprinkler for, E. M. Thompson	759,203	Dental lamp, H. E. Dunn	758,741
Automobile, C. G. Ristic	758,695	Dental or surgical chair, L. T. Parsons	759,189
Automobile, F. A. Gardner	759,091	Denture artificial, O. C. & J. R. Haddock	758,750
Automobile steering device, F. A. Gardner	759,090	Derailer and rearer, combined, G. L. Mansfield	758,994
Axle, dust proof, J. L. Freasier	759,088	Detergent compound, J. K. Helkes	759,103
Backing strip applying machine, W. L. Jacobie	758,657	Direct current generator, W. H. Foot	758,935
Baling press, W. C. Key	759,182	Dish cover holder, table, P. T. B. Evans	759,066
Banding making machine, G. Frost, Jr.	759,089	Display and advertising stand, combined, J. K. Patton	758,682
Barrel and finishing mechanism, Lancey & Smith	759,125	Display device, Edgworth & M. Ries	758,479
Basin, foldable, J. W. McCann	758,770	Display rack, D. S. Campbell	759,075
Bed riser, sheet metal, J. M. & F. Holland	758,917	Door attachment, Taylor & Holle	758,942
Beds, wire fabric for folding, O. R. Hunt	758,920	Door check, H. W. La Muynon	759,010
Bedstead, foldable, C. P. Brown	759,073	Door check, automatic, S. J. Rawlings	759,913
Bell, revolving, J. P. McCann	759,003	Door or shutter, J. Dierickx	759,163
Bending machine, S. L. Budd	758,897	Door stop, C. W. Miller	758,998
Bicyclist's globe, A. Rosenthal	759,130	Devetail cutting machine, E. Jackson	758,839
Binding press, W. Stringer	758,871	Draft hook, locking, G. M. Atall	758,699
Binocular, folding, G. Fournier	759,170	Draft rigging, Krakau & Pope	758,973
Blind can, C. G. Bluff	758,734	Drawing garment patterns, E. J. Curran	758,820
Bit extender, W. B. Swan	759,042	Drilling machine, W. Wallin	759,020
Blank, statement, G. W. Denning	759,215	Drinking cup, aseptic, J. J. Shea	759,829
Blanking machine, H. L. Bradley	759,070	Driving mechanism, friction, A. C. Eastwood	759,167
Block, See Building block.		Drying house, A. A. Scott	759,135
Bobbin, W. I. Stimpson	758,715	Dye and making same, glucoside, F. J. Oakes	759,008
Boiler cleaner, steam, C. J. A. Grille	758,835	Dynamo testing machine, J. J. Wood	758,880
Boiler flue, A. Taggart, Jr.	759,043	Dynamometer, indicating or recording, Weston & Bencke	758,726
Bolting machine, sieve, Fraser & Mather	758,907	Ear hood, gas, C. Otte	758,879
Book holder, S. H. Law	758,924	Ear ring, J. Fejchar	758,848
Book holder, manifold, C. S. Binner	758,813	Egg coating compound, W. Sanders	758,936
Book support, E. R. Stern	758,868	Electric dynamo, R. M. Newbold	759,122
Boot polisher, F. L. Ralph	759,015	Electric generator, frictional, G. Gernakian	759,096
Bottle, G. Rebatzek	759,014	Electric inductive conductor, P. A. McGeorge	759,120
Bottle for the storage and transportation of liquids, H. C. Stever	758,869	Electric motor controller, T. E. Barnum	758,610
Bottle, non-refillable, L. Hofmann	758,178	Electrical conductor, P. A. McGeorge	759,119
Bottle stopper, G. Miller	759,185	Electrical distributing system, J. S. Peck	758,683
Box, J. P. Baird	758,887	Electrical energy, accumulating and using, A. G. Bettou	759,065
Box lid holder, C. S. Christianson	759,076	Electrical machine brush holder, B. G. Lamme	758,669
Brace and tightener, Grattelo & Woodmanse	758,910	Electrode for vapor electric apparatus, P. C. Hewitt	758,650
Brick, tile, etc., glass faced, E. Kaye	758,973	Electroheater, E. R. Waterman	758,946
Bricks, plastering, etc., compound for coating, C. Jacobs	758,658	Elevator, P. F. Foley	759,087
Bridle attachment, R. H. Rawlings	758,688	Engine cut off mechanism, reversing, B. C. Ball	758,950
Bristle combing machine, P. Trepanier	758,876	Engine vaporizer, explosive, F. Dickinson	758,902
Brush, cleaner, or polisher, Burt & Harris	759,155	Engines, gas generator for explosive, F. E. Pfister	759,011
Brush, tooth, W. A. Macleod	758,764	Equalizer or tripletree, D. J. Shanc	758,788
Bucket and suction dredge, combined, R. Anderson	758,668	Evener, three horse, J. W. Gamble	758,745
Building block hollow, H. S. Palmer	759,010	Excavating and sluicing gravel, etc., apparatus for, Hoover & Mason	759,108
Building section, S. Hansen	758,645	Excavating machine, W. J. Roclafson	758,781
Bundle carrier, W. H. Woodman	759,056	Extension table, G. G. Johnson	758,755
Burglar and fire alarm, electric, S. Schwarzschild	758,701	Eye-glasses, Rouquin & Wilson	758,815
Bushing, bung hole, Pfuger & Christensen	759,126	Fare indicator and protector for street car registers, auxiliary, F. Paduveni	758,846
Bushing, Pulley, W. A. Clark	758,821	Farm gate, C. U. & J. L. Reims	758,691
Butter or cakes of other material, machine for forming pats of, A. Lutze	758,763	Feed cutter, W. Houghton	759,109
Butter printing machine, L. A. Sheldon	758,760	Feed water heater, A. J. Sweet	758,718
Buttons, collar, Eberhart	758,742	Feed water regulator, A. W. Rowinsky	759,131
Cable system chart, underground, W. E. Rundle	759,020	Fence locking plate, wire, W. G. Renaker	758,663
Cables, carriage for overhead, T. Alexander	759,207	Fence or gate, Hood, J. J. Johnson	758,668
Calendar, G. B. Keplinger	758,758	Fence post, J. P. Plattenberger	758,773
Camera, photographic, E. Kronke	759,114	Fence, wire, J. S. Martin	758,766
Cane sling, sugar, O. Crosby	759,059	Fibrous material, feeding mechanism for machines for treating, W. A. & A. M. Shely	759,199
Cap, A. Wolfgang	759,206	Fibrous material, machine for breaking and cleaning, W. A. & A. M. Shely	759,197
Car driving mechanism, motor, H. J. Fisher	758,634	Fibrous material, machine for breaking and scutching, W. A. & A. M. Shely	759,198
Car lock and sealing device, combined, W. H. Deater, et al.	759,079	Field winding support, B. A. Behrend	759,210
Car tandem spring draft rigging, railway, W. H. Miner	758,677	Fifth wheel, J. S. Barnette	758,951
Car vestibules, etc., diaphragm for, W. M. Salisbury	758,697	Floor and building same, Wight & Townsend	758,928
Carburetor, H. G. Slings	758,789	Flour into barrels or sacks, machine for packing, L. Van Vette	759,204
Carburetor, L. C. Snell	758,790	Flower pot, F. A. Muller	758,678
Carburetor, hydrocarbon engine, C. M. Mehler	759,001	Fluids, air or gas lift for, W. B. Harris	759,100
Card feeding and positioning device, G. W. Denning	759,214	Folding box, Z. B. Webb, reissue	12,217
Cardboard creasing machine, L. A. Mayall	758,672	Folding machine, R. C. Seymour	758,704
Carrier, See Bundle carrier.		Folding machine, material, R. B. Friend	758,902
Carton, C. H. Seegmiller	759,027	Fumes, device for distributing noxious, L. M. Beckes	759,062
Carton, A. C. Smith	759,032	Furnace, J. Murphy	759,002
Carving machine, automatic, F. P. Burkhardt	758,616	Furnace door, reversible, I. R. Davis	758,622
Castings, apparatus for making, W. T. James	758,660	Furnace draft regulating mechanism, steam boiler, J. E. Gerould	758,749
Cattle guard, J. Clarke	759,156	Furnaces, hot blast apparatus for metallurgical, A. P. Gaines	759,171
Cement can, W. W. Hall	758,960	Furnaces, etc., joint for brickwork of, F. C. Roberts	758,852
Chain, detachable link, C. G. Hampton	758,707	Furniture, combination, K. A. Ruethin	758,782
Chain link, W. E. Williams	758,802	Fuse block, J. A. Heany	758,646
Chair, C. Arnold	759,059	Fuse or cut out, electric safety, J. A. Heaney	758,647
Chair electric attachment, rocking, Allen & Cawker	759,148	Gage, See Gauge.	
Churn, W. L. Goodwin	758,641	Gage glass protector, T. Mirk	758,749
Churn, W. A. Cross	758,737	Game apparatus, A. G. P. Ebert	758,630
Chute, C. K. Baldwin	758,809	Game apparatus, J. A. McKenzie	759,174
Circuit breaker, automatic magnetic, W. M. Scott	758,938	Garment supporter loop, J. H. Pilkington	758,686
Circuit breaker, high tension, H. P. Davis	758,621	Gas, apparatus for manufacturing carbureted water, W. R. Addicks	758,882
Clamping dog, C. A. Yost	758,881	Gas engine, F. A. Gardner	759,803
Cleaning, oiling, or polishing compound, W. E. Tyler	758,944	Gas engine, balanced valveless two cycle, Thompson & Koeb	758,943
Clock electric, Scott & Loeb	759,026	Gas producer, water seal, W. H. Holcroft	759,179
Closet cistern and valve therefor, F. Jackson	758,970	Gases, apparatus for the treatment of, H. Pauling	758,775
Clutch head, rock drill, J. E. Littleton	758,761	Gaseous mediums from air, apparatus for generating, J. N. Alsop	758,884
Coal bucket releaser, A. R. Bissett	758,893	Gate, J. Scheperle	759,024
Cock, basin, Davy & White	759,169	Gear and clutch mechanism, reversing, H. J. Mohlenberg	758,768
Coin and ticket holder, H. Pavol	758,776	Gear, change speed, P. Gries	759,174
Coin counting, registering, and wrapping machine, C. S. Batdorf	758,733	Gear for motor driven lathes or other tools, variable speed, I. H. Johnson, Jr.	759,111
Coin receptacle, Bishop & Down	759,067	Gearing, variable transmission, B. M. Coffee	759,157
Collector rings and brush holders, K. F. Elers	758,631	Glass articles, apparatus for drawing, J. H. Lubbers	758,988
Combustion, controlling, H. F. Smith	759,038	Glass drawing machine, H. Crlmmel	759,159
Computing machine, Draper & Robertson	759,104	Glassware annealing lecr, C. A. Dunbar	759,167
Concentrating and amalgamating machine, J. Bonington	759,153	Glove, W. Lebl	759,117
Concrete wall mold, C. E. Shrawway	759,031	Grinding machine, C. Kech	759,112
Condenser system, W. C. Brown	758,615	Grinding machine for railway hand cars, tool, J. Grassmann	758,833
Confector's cooler, G. S. Culham	758,823	Grinding or polishing machine, C. F. & C. H. J. Dilg	758,828
Controller regulator, V. J. Van Horn	758,722	Guitar attachment, L. P. Halladay	758,912
Conveyor, W. T. James	758,662	Hair retainer, W. S. Bechtold	758,953
Conveyor bucket, W. T. James	758,661	Hammer, G. H. Rowe	759,019
Conveying apparatus tripper or deliverer, Baldwin & Tickner	758,810	Hammer nail holding attachment, E. H. Platner	759,012
Conveying apparatus tripper or deliverer, Tickle & Baldwin	758,875	Hand, artificial, E. T. Forrester	759,169
Cooking apparatus, Fred C. L. Plumer	759,128	Harness draft attachment, J. Bloedel	759,133
Copper bearing ores with cyanid solutions, treating, L. E. Porter	759,220	Harvester, beet, J. B. Struble	759,138
Copper ores, treating, C. H. Rider	759,191	Harvester, corn, G. W. Culp	758,738
Copying bath, letter, R. Spurgin	758,711	Hat and hat shield, W. J. Anderson	758,806
Corn husker, M. Mattes	759,118	Hay loader, H. A. Adams	758,805
Corn husking machine, J. H. Reigle	759,129	Hay loader and raker, A. Rowan	759,018
Corn sheck binding machine, McCaulley & Frantz	759,219	Headlight, W. I. Walsh	758,723
Corn shecking machine, W. H. Gernand	758,748	Hinge gage, B. Frazier	756,637
Coset, W. F. Brooks	759,072	Hod, J. White	758,727
Cotton handling apparatus, seed, C. B. Benefield	759,151	Hoisting apparatus, H. D. Stratton	759,201
Cotton nicker and opener, I. N. Stewart	758,793	Hoop, J. P. Chaplin	758,820
Cotton thinner, G. L. Green	759,173	Hop, N. F. Faltner	758,681
Cover, corrugated self opening bellows fold, R. Gair	758,908	Horse releaser, G. H. Slattery	759,200
Crate, A. V. Thomas	758,202	Hose coupling, T. F. Dawning	758,627
Crane, folding, O. W. Easton	758,961	Hose coupling, G. B. M. Buzzell	758,956
Crisper, J. P. Beliveau	758,735	Hose coupling, W. Liebl	758,965
Cultivating implement, J. T. Jordan	758,971	Hydrocarbon engine, multiple cylinder, E. L. Russell	758,854
Current distributing system, alternating, C. F. Scott	758,702	Ice cream freezer, Stern & McLean	758,791
Current energy, utilizing single phase alternating, B. G. Lamme	759,183	Ice cream freezer, H. J. Gerner	759,497
Current motor, alternating, B. McCollum	759,0		

"Star" Lathes
Foot and Power Screw Cutting
Automatic Cross Feed
FOR FINE, ACCURATE WORK
Send for Catalogue E.
SENECA FALLS MFG. CO.
695 Water Street,
Seneca Falls, N. Y., U. S. A.




ENGINE & FOOT LATHES
MACHINE SHOP OUTFITS
TOOLS & SUPPLIES
SEBASTIAN LATHE CO. CHICAGO, ILL.

Veeder Counters
to register reciprocating movements or revolutions. Cut full size.
Booklet Free
VEEDER MFG. CO.
Hartford, Conn.
Cyclometers, Odometers, Tachometers, Counters and Fine Castings.



Angle Benders
We make hand-power benders for forming angles in stock 1 in. thick and under. Light stock can be bent cold.



WALLACE SUPPLY COMPANY
910 Royal Insurance Building, CHICAGO

FOR TOWN OR COUNTRY USE
There is no more serviceable or simpler outfit than the **WEBER JUNIOR** for a single person. It is suitable for a building, office, pumping water, shelling corn, etc., or for mounting fans, presses, chains, belt-drives, etc. Complete with water and cast-iron tank, and pipes. (Others also all ready for business. Heavy tanks, pumps, one-gallon capacity, etc.)
Webber Gas & Engine Co.
Engine Co.
Box 1114, Kansas City, Mo.
Essex Street, New York City.

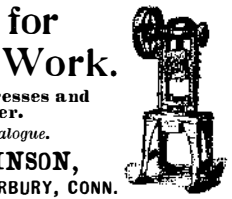


HIGHEST GRADE GREY IRON CASTINGS
For Gasoline Engines and Cylinders
All kinds of Automobile Castings.
FRONTIER IRON WORKS, 2 Auburn Ave., Buffalo, N. Y.

Traveling Electric HOISTS
Rapid and Positive Handling of Materials in Shops, Factories, Stores, Warehouses fully met by our
Full Details in Bulletin No. 13M.
PAWLING @ HARNISCHFEGER
162 Clinton St., Milwaukee, Wis.



Presses for Sub-Press Work.
Five sizes. Sub-Presses and Tools to order.
Send for Catalogue.
BLAKE & JOHNSON,
P. O. Box 7, WATERBURY, CONN.



MIND the MICROBES!
You get them in all ordinary drinking water. Before drinking purify it. You can transform it into pure water in the surest and quickest way by using the well-known
Berkefeld Filter
which is so constructed as to eliminate from the water all foreign bodies. One gallon of pure water in 4 minutes. Easy to clean, easy to care for.
BERKEFELD FILTER CO., 4 Cedar Street, New York



Gas Engine IGNITER
Complete with spark coil \$12.00.
The Best Thing on the market. Latest and most improved model.
Send for Circular.
Carlisle & Finch Co., 233 E. Clifton Av., Cincinnati, O.



THIS GRINDER
Has no pumps, no valves. No piping required to supply it with water. Always ready for use. Simplest in construction, most efficient in operation. Price will interest you.
W. F. & JNO. BARNES CO.,
Established 1872.
1999 Ruby St., Rockford, Ill.



WELL DRILLING Machines
Over 70 sizes and styles, for drilling either deep or shallow wells in any kind of soil or rock. Mounted on wheels or on skids. With engines or horse powers. Strong, simple and durable. Any mechanic can operate them easily. Send for catalog.
WILLIAMS BROS., Ithaca, N. Y.

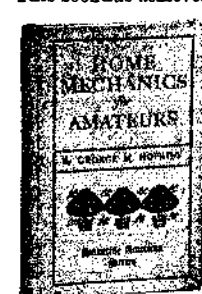


Jar closure, W. B. Fenn	759,168
Jewelry, J. Pejchar	758,847
Joint, W. N. Barrett	758,888
Knitting machine, G. W. Ruth	758,740
Knitting machine, straight, G. A. Landenberger	758,671
Knob attachment, S. Fader	758,743
Lacing hook, J. V. Washburne	759,046
Ladder, J. A. Jaeger-Rainer	758,659
Ladder, step, A. Hartzler	759,176
Lamp, H. F. Smith	759,037
Lamp chimney or globe, L. F. Bergman	758,955
Lamp, electric, Wurts & Bennett	758,730
Lamp, electric arc, T. Hamilton-Adams	758,644
Lamp globe or shade, mica, A. P. Stiers	758,716
Lamp governor, vapor, H. F. Smith	759,036
Lamps, fluid regulator or governor for vapor, H. F. Smith	759,035
Land roller and pulverizer, F. Schinbeckler	759,132
Lap ring, F. Wenke	758,809
Latch, J. P. Owens	759,009
Lathe, P. J. & R. L. Cahill	759,074
Lathe engine, E. Barle	758,928
Leaching apparatus, G. W. Stead	758,713
Lead boring ores, treating, C. H. Rider	759,192
Ledger, J. A. Kramer	758,976
Ledger binder, L. E. Schoch	759,333
Lifting apparatus, Parker & Ginter	758,773
Lifting jack, D. Donald	758,903
Lightning arrester, L. R. Gaw	758,638
Lineum, machine for the manufacture of	759,108
Insaid, H. V. Holland	759,136
Liquid separator, centrifugal, T. H. Springer	758,676
Lock, A. Meyers	758,849
Lock, S. W. Peregrine	758,941
Locking mechanism, N. B. Stone	758,895
Loom, automatic, Brink & Christensen	759,146
Loom filling feeder, automatic, E. S. Wood	758,932
Loom shedding mechanism, R. G. Pratt	758,783
Loom shuttle, C. E. Sackett	758,783
Loom shuttle box, C. E. Sackett	758,783
Looms, loop cutting mechanism for pile	758,968
Lubricator, G. F. Hutzsch	758,640
Lumber loading device, A. F. Lucas	758,989
Mail crane, A. F. Finch	758,830
Mantle support, W. E. Blair	758,814
Massage instrument, J. A. Howell	758,653
Match box, M. Neumerkel	758,771
Match making machinery, A. B. Calkins	758,617
Mathematical instrument case, G. Schoener	758,700
Mattress, L. N. Bachand	758,744
Mattress roller, wire, W. E. Fisher	759,200
Measuring apparatus, liquid, J. B. Beam	758,827
Measuring box, drawer, N. W. Davis	759,099
Meat tray, butcher's, T. F. Graham	758,914
Mechanical movement, W. Hansen	758,935
Mechanical movement, J. F. Siems	759,217
Metal bending machine, E. P. Holden	758,923
Mitering and joining machine, J. B. Saunders, Jr.	758,746
Mixer, J. F. Gaudin	758,684
Moisture proof case or receptacle, Peck & Zwanick	758,753
Mop and wringer, combined, E. Hilker	759,150
Motor starter, W. Baxter, Jr.	759,127
Mowing machine, W. M. Platt	759,048
Music holder, J. P. Walter	758,850
Music leaf turner, Peyton & Bedson	759,022
Music leaf turner, W. H. Safford, Jr.	759,860
Musical instrument and note sheet therefor, self playing, C. A. Shaffer	758,666
Musical instrument valve, pneumatic, E. de Kleist	758,870
Musical instruments, bridge and binder for stringed, C. S. Weber	758,861
Musical instruments, note sheet for self playing, C. A. Shaffer	758,774
Nitric dioxide and nitric acid, manufacturing, G. Pauling	758,947
Nose guard, G. W. Wells	759,033
Nut cracker, C. E. Smith	759,039
Nut lock, W. M. Smith	758,762
Oil can, G. Lund	758,655
Ore separator, magnetic, W. L. Imlay	758,899
Oven, knockdown, W. H. Dahman	758,957
Package, knockdown, J. M. & J. J. Callaway	758,905
Packing, H. T. Evans	758,991
Packing box, F. M. Lum	758,975
Packing, metallic, Meuser & Arthur	758,949
Packing stand, W. G. Bond	758,831
Pail protector, milk, I. R. C. Fleming	759,085
Paper roll core, T. Elixman et al.	759,005
Paring knife, G. W. McLeod	758,624
Peat harvesting machine, A. Dolsen	758,930
Pen, fountain, G. S. Parker	758,934
Pen, fountain, J. S. Purdy	759,054
Pen point, C. J. Wilson	758,786
Perambulator, A. T. Sheare	759,071
Perforating machine, R. T. Brooks	758,751
Photographic plate and film holder, L. M. Hanks	758,654
Piano action, R. M. Hutchinson	758,894
Piano action pianissimo device, E. Bernhoeft	758,629
Piano construction, R. W. Gertz	759,040
Piano mirror attachment, M. M. Stahl	758,694
Piano tone deflector, F. G. Riggins	758,915
Pick, J. Hartshorn	758,949
Pictures, treating, W. B. Tyler	758,687
Pigment and producing it from ferrous liquors, A. S. Ramage	758,798
Pigment applying apparatus, C. A. Tripp	758,656
Pile, Jackson & Hogan	758,841
Pile, protected, C. W. Kennon	758,874
Pine needles, treating, C. M. & O. C. Terrell	758,870
Pipe collar or ring, J. Strand	759,081
Pipe sealing cap, soil, W. E. Delehanty	759,050
Pipes, combined for soil and vent, E. G. Watrous	758,698
Plane, A. F. Schadic	758,948
Plane, H. M. Wood	758,966
Planter, plow, etc., attachment, S. Her-	758,987
Plaster, treating wood fiber for use in, M. E. Loose	758,972
Plastic material, machine for molding, M. Kammerer	758,851
Playing ball, F. H. Richards	759,086
Plow, W. Fletcher	758,981
Plow, T. J. Hubbell	757,121
Plow attachment, E. M. Landis	758,979
Pole changer, R. M. Newbold	759,093
Pole check device, vehicle, G. A. Lambert	759,115
Post and base therefor, A. D. Benham	759,092
Potatoes, desiccating, T. Lackovic	759,166
Power mechanism, F. A. Gardner	758,680
Power transmitter, G. M. Eames	758,816
Printing machine, G. F. Read	758,858
Printing machine, coin controlled, A. J. Briggs	758,997
Printing machine, tripping mechanism, G. F. Read	758,625
Printing press, Schmidt & Gebler	758,583
Printing press dropping sheet delivery mechanism, R. Miehle	759,139
Printing surfaces, producing, O. Dodge	759,000
Propelling mechanism, beat, B. J. Lavign	759,145
Pulley, expansion, R. Temple	758,801
Pump, F. H. Deis	759,193
Pump, F. J. Hing	759,025
Pump, condensing air, J. Wilhelm	759,052
Pump, liquid fuel, O. J. Root	759,051
Rack or holder, A. M. Schiele	759,113
Radiator air valve, T. Wheatley	758,961
Rail joint, Z. E. Fiveash	759,161
Rail joint connection, M. N. Webber	758,851
Railway bumper, G. H. Kimball	758,820
Railway crossing, H. E. Green	759,098
Railway frog and switch foot guard, P. F. Bay	
Railway rail, compound three part, W. J. Holman	
Railway rail, continuous, Cunningham & Jenkin	
Railway rail stay, Laas & Sponenberg	
Railway safety device, electric, G. Gibbs	

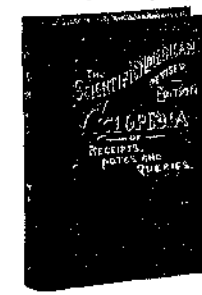
THE B. F. BARNES WATER EMERY TOOL GRINDER
Swings a 24x2-inch Wheel.
It has no pump but a simple trough uniquely arranged for supplying water to the wheel. Easily manipulated and cannot get out of order. Without question it is the most practical and durable wet tool grinder on the market. Details on request.
B. F. BARNES COMPANY, Rockford, Ill.



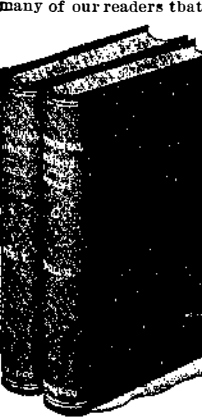
Valuable Books Home Mechanics for Amateurs
This book has achieved an unparalleled success in one of the most popular Special Editions of 4,000 copies has been ordered. It is by far the largest and best book on the subject ever offered at such a low price. It tells how to make things the right way—the "only way"—at small expense. It will prove of value to you—much more than you realize. Do things with your hands. Send for a circular giving contents—the circulars cost only a cent—the book \$1.50 postpaid. If the book could meet you face to face you would be the first to purchase. The first large edition is almost gone, order to-day.



370 Pages 326 Engravings Price \$1.50
REVISED and ENLARGED EDITION
The Scientific American Cyclopedia Of Receipts, Notes and Queries.
15,000 Receipts. 734 Pages.
Price, \$5.00 in Cloth. \$6.00 in Sheep. \$6.50 in Half Morocco. Post Free.
This work has been revised and enlarged.
900 New Formulas.
The work is so arranged as to be of use not only to the specialist, but to the general reader. It should have a place in every home and workshop. A circular containing full Table of Contents will be sent on application. Those who already have the Cyclopedia may obtain the
1901 APPENDIX.
Price, bound in cloth, \$1.00 postpaid.



TWENTY-THIRD EDITION EXPERIMENTAL SCIENCE.
By GEORGE N. HOPKINS
Revised and Greatly Enlarged. 2 Octavo Volumes. 1,100 Pages. 300 Illustrations. Cloth Bound, Postpaid, \$5.00. Half Morocco, Postpaid, \$7.00. Or Volumes Sold Separately: Cloth, \$3.00 per Volume; Half Morocco, \$4.00 per Volume.
EXPERIMENTAL SCIENCE is so well known to many of our readers that it is hardly necessary now to give a description of this work. Mr. Hopkins decided some months ago that it would be necessary to prepare a new edition of this work in order that the many wonderful discoveries of modern times might be fully described in its pages. Since the last edition was published, wonderful developments in wireless telegraphy, for example, have been made. It was therefore, therefore, that a good deal of new matter should be added to the work in order to make it thoroughly up-to-date, and with this object in view some 200 pages have been added. On account of the increased size of the work, it has been necessary to divide it into two volumes handsomely bound in buckram.



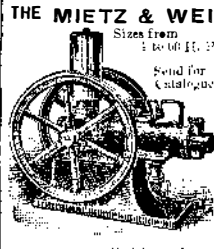
A Complete Electrical Library.
By PROF. T. O'CONNOR SLOANE.
An inexpensive library of the best books on Electricity. Put up in a neat folding box, as shown in cut. For the student, the amateur, the worker, the electrical engineer, schools and colleges. Comprising five books, as follows:
Arithmetic of Electricity 138 pages, \$1.00
Electric Toy Making 140 pages, \$1.00
How to Become a Successful Electrician, 189 pages, \$1.00
Standard Electrical Dictionary, 682 pages, \$3.00
Electricity Simplified, 158 pages, \$1.00
A valuable and indispensable addition to every library.
Our Great Special Offer.—We will send prepaid the above five volumes, handsomely bound in blue cloth with silver lettering, and inclosed in a neat folding box as shown in the illustration, at the Special Reduced Price of \$5.00 for the complete set. The regular price of the five volumes is \$7.00.
Full descriptive circulars of above books will be mailed free on application.
MUNN & CO.,
Publishers, 361 Broadway, New York.




BELT ELEVATORS US. SPROCKET CHAIN
EIGHT TIMES AS MUCH
Here is what a glass manufacturer says:
"We have been using your eight-inch, eight-ply 'Leviathan' belting for three years. We elevate wet glass sand to the height of twenty feet. We formerly used a sprocket chain elevator, and we find by experience that one 'Leviathan' belt will elevate eight times as much sand as a sprocket chain will before it wears out. The ten and twenty-inch driving belts have given good satisfaction."
This statement refers to "Leviathan" Belt. The history of what this accomplishes under adverse conditions is remarkable. If you want a belt that "makes good" every time, write us about it. It will pay you.
MAIN BELTING CO.
1223 Carpenter Street, Philadelphia, Pa
CHICAGO BOSTON NEW YORK BUFFALO



THE MIETZ & WEISS KEROSENE and GAS ENGINE
burns KEROSENE cheaper and safer than gasoline. Automatic, simple, reliable. No electric battery or lamp used. Perfect regulation. Belted or directly coupled to dynamo for electric lighting, charging storage batteries, pumping and all power purposes.
A. MIETZ,
128-138 Myrtle St., New York.
ADOPTED BY
U. S. GOVERNMENT,
Highest Award, direct coupled Generator Set, Paris Exposition, 1900, Gold Medal, Pan American Exposition, 1902, Charleston, S. C., Exposition, 1902.



STIMULATION without IRRITATION Means New Life to the Scalp.
The Evans Vacuum Cap gives the scalp a thorough massage and encourages a free and healthful circulation without rubbing and without the use of drugs or irritants. It will stop hair from falling out and restore a normal growth where live follicles exist. The Cap is used about ten minutes twice a day and its effects are pleasant from the very beginning. We will refund your money in full if results are not satisfactory after a thirty days' use. Call on or address
EVANS VACUUM CAP CO.
St. Louis (Mo.), Fullerton Building,
New York Office, 1500 Broadway.



RADIUM AND RADIO-ACTIVITY
The SCIENTIFIC AMERICAN SUPPLEMENT has published the most complete information on the subject of Radium and Radio-activity that has thus far appeared.
The following articles, written by men who have played a prominent part in the discovery of the marvelous properties of radium, should be read by every student of chemistry and physics:
RADIO-ACTIVITY AND THE ELECTRON THEORY. By SIR WILLIAM CROOKES. SCIENTIFIC AMERICAN SUPPLEMENT 1402.
THE RADIO-ACTIVITY OF MATTER. By PROFESSOR HENRI BECUQUEREL. SCIENTIFIC AMERICAN SUPPLEMENT 1379.
SOME PROPERTIES OF THE RADIO-ACTIVE SUBSTANCES. By PROFESSOR HENRI BECUQUEREL. SCIENTIFIC AMERICAN SUPPLEMENT 1427.
PRODUCTION OF HELIUM FROM RADIUM. By SIR WILLIAM RAMSAY. SCIENTIFIC AMERICAN SUPPLEMENT 1444.
THORIUM: A RADIO-ACTIVE SUBSTANCE WITH THERAPEUTICAL POSSIBILITIES. By DR. SAMUEL G. TRACY. SCIENTIFIC AMERICAN SUPPLEMENT 1470.
RADIUM IN MEDICINE. By DR. SAMUEL G. TRACY. SCIENTIFIC AMERICAN SUPPLEMENT 1455.
A RESUME OF RECENT SPECIAL STUDIES OF RADIUM AND RADIO-ACTIVITY. SCIENTIFIC AMERICAN SUPPLEMENTS 1468, 1471, 1479.
RADIUM AND RADIO-ACTIVE SUBSTANCES. By WILLIAM J. HAMMER. SCIENTIFIC AMERICAN SUPPLEMENT 1429.
A COMPLETE MANUAL OF RADIUM TECHNOLOGY, clearly explaining the methods of obtaining radium, conducting experiments with the substance and measuring its radio-active force will be found in SCIENTIFIC AMERICAN SUPPLEMENTS 1475, 1476, 1477.
These SCIENTIFIC AMERICAN SUPPLEMENTS comprise what may well be considered an admirable text-book on the subject of radio-activity.
Price of Scientific American Supplements **TEN CENTS BY MAIL** for each number mentioned. Order through your newsdealer or from
MUNN & CO., 361 Broadway, New York

Put Your Money in Upper Peninsula Land
\$10.00 down and \$10.00 per month will buy you 40 acres of good farming land in the Upper Peninsula of Michigan. This land is close to markets, good towns and railroads. Hundreds of settlers will go to this country this spring and land values will increase. NOW is your time to make a safe, permanent, profitable investment. No if's or an's about it. Write to us to-day—now.
UPPER PENINSULA LAND CO., Ltd., 846 Washington Arcade, Detroit, Mich.
F. J. MERRIAM, GEN. MGR.
REFERENCES—ILLINOIS TRUST & SAVINGS BANK, Chicago, Illinois; COLONIAL TRUST COMPANY, New York, N. Y.; CLEVELAND CLIFFS IRON COMPANY, Cleveland, Ohio.



Put Your Money in Upper Peninsula Land
\$10.00 down and \$10.00 per month will buy you 40 acres of good farming land in the Upper Peninsula of Michigan. This land is close to markets, good towns and railroads. Hundreds of settlers will go to this country this spring and land values will increase. NOW is your time to make a safe, permanent, profitable investment. No if's or an's about it. Write to us to-day—now.
UPPER PENINSULA LAND CO., Ltd., 846 Washington Arcade, Detroit, Mich.
F. J. MERRIAM, GEN. MGR.
REFERENCES—ILLINOIS TRUST & SAVINGS BANK, Chicago, Illinois; COLONIAL TRUST COMPANY, New York, N. Y.; CLEVELAND CLIFFS IRON COMPANY, Cleveland, Ohio.

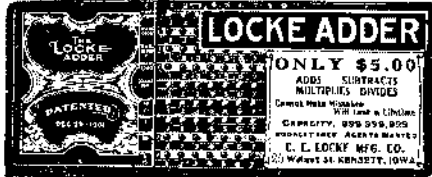


IF YOU SHOOT A RIFLE
Pistol or Shotgun, you'll make a **Bull's Eye** by sending three 2c. stamps for the **Hand-Book "A,"** 126 pages **FREE.** The latest Encyclopedia of **Arms, Powders, Shot and Bullets.** Mention **SCIENTIFIC AMERICAN** Address: **IDEAL MFG. CO., 26 U. S. St., NEW HAVEN, CONN., U.S.A.**

"Globe"
GASOLINE
Marine Engines

Improved. Simple. Reliable, Economical, Substantial. Prices Right. Guaranteed. Write for Catalogue. Built by....

PENNSYLVANIA IRON WORKS CO., Philadelphia, Pa. and 136 Liberty St., New York, U. S. A.



TAKE THE NICKEL PLATE ROAD FOR THE ST. LOUIS FAIR.

Lowest Rates and many unusual privileges. Special \$15.00 rate on certain dates. Full information on application to local Agents, or R. E. Payne, General Agent, 231 Main St., Buffalo, N. Y., or A. W. Ecclestone, D. F. A., 385 Broadway, New York.

WE SHIP ON APPROVAL

without a cent deposit and allow 10 DAYS FREE TRIAL on every bicycle. Any wheel not satisfactory returned at our expense. Highest Grade **\$8.75 to \$17** 1904 Models. Coaster Brakes. Hedge thorn puncture proof tires and best equipment. 1902 & 1903 Models **\$7 to \$12** 500 Second-Hand Wheels. All makes & models good as new **\$3 to \$8** Great Factory Clearing Sale at half factory cost. **EARN A BICYCLE** taking orders from sample wheel furnished by us. Our agents are large dealers. We do not move for extra profits and our special offer. **AUTOMOBILES, TIRES, Sewing Machines, Sundries, etc.,** at lowest prices. **MEAD CYCLE CO., Dept. 59 C, Chicago**

TOOLS
For the Intimate Details of the Tool Business of the **GOODSELL-PRATT COMPANY,** Send for Catalogue No. 6, 1903. It contains particular descriptions and clear illustrations of nearly 300 tools and accessories. A perfect exposition of perfect articles and points on warranty, weights, shipping, orders, and list prices. **G. R. FIELD, MASS.**

"Nothing Good Which Only Tells One Story"
This is good for four. Screw Driver, Bottle Cap Remover, Paper Cutter, Key Holder combined. **THE TRIPLET**, an emergency tool for the pocket. Sample list and prices furnished upon application to the manufacturers and patentees. **G. P. COATES CO., Uncasville, Conn., U. S. A.**

Squabs Pay Best
Easier, need attention only part of time, being big prices. Raised in one month. Attractive for poultrymen, farmers, women. Send for **FREE BOOKLET** and learn this immensely rich home industry. **PLYMOUTH ROCK SQUAB CO., 249 Atlantic Ave., Boston, Mass.**

The Franklin Dynamo
50 Watts, 10 Volts, 5 Amperes. 3000 to 4000 revolutions. Sets of material, finished parts, complete machines. For amateur construction, very efficient. Will drive a dental engine, sewing-machine or small lathe; run as a generator to give light, or for six 6-candle lamps. Parts \$3.50, \$3.10, \$3.50. Complete \$13.50. Write for circular 9. **Parsell & Weed, 129-131 W. 31st St., N. Y.**

THE OBER LATHES
For Turning Axe, Adze, Pick, Sledge, Hatchet, Hammer, Auger, File, Knife and Chisel Handles, Whiffletrees, Yokes, Spokes, Porch Spindles, Stair Balusters Table and Chair Legs and other irregular work. **Send for Circular A.** The Ober Mfg. Co., 10 Bell St., Chagrin Falls, O., U.S.A.

A Handy Book To Have
Montgomery & Co.'s Tool Catalogue. It is illustrated throughout and describes and prices Tools. 704 pages, 4 1/2 x 4 1/2 ins. The latest edition, with discount sheet by mail for 25 cents. **MONTGOMERY & CO., 105 Fulton St., New York City.**

Edison Carnegie, Thomas A. Edison and many other successful men began their careers at Telegraph Operating. Why don't you learn? For \$1.75 we will send you a complete N. D. outfit with book of instructions, by express (not prepaid). Send for catalogue of electric apparatus, supplies and novelties. **J. M. BUNNELL & CO., Inc., 20 Park Place New York**

Buffalo Marine Motors
20 H. P. Highest Awards. Noted for **SPEED** Economy and Endurance. **BUFFALO GASOLINE MOTOR CO., Buffalo, N. Y.**

Railway signal, Ryman & Stevenson	758,855
Railway switch, Kleinhaus & Balzell	758,974
Railway switch point and operating means therefor, electric, A. J. Backer	759,040
Railway tie, Delano & Cartilage	758,900
Railway tie, J. Murphy	758,927
Railway tie, F. M. Hiatt	759,105
Railway tie, S. Hartenstein	759,175
Railway tie, concrete, L. & M. J. Beezer	758,612, 758,613, 758,993
Railway tie, metal, J. Mallat	759,147
Railways, guard covering for third rails of electric, J. Kress	758,977
Range oven, G. Ott	759,158
Razor stopping machine, A. W. Scheuber	758,699
Reaper, mower, etc., H. T. Harper	758,967
Recorder. See Time recorder.	
Recording device, electrical, J. H. Johnson	758,756
Refrigerator, C. Shamboe	759,028
Renovator, pneumatic, J. S. Thurman	759,141
Rice, hulling, R. E. Kimball	758,682
Rice, hulling apparatus, R. E. Kimball	758,685
Roller coaster carriage, O. R. Whittemore	759,053
Rubber products, apparatus for preparing, handling and vulcanizing tires or other, E. C. Shaw	758,864, 758,865
Ruler, rolling, R. H. Swinerton	758,796
Sander or smoothing machine, G. H. Ober	759,187
Sash fastener, R. Baxter	758,952
Sash lock, A. J. McGehee	758,679
Sash stop and lock, W. Edmund	758,632
Saw guide, hand, J. W. Culpepper	758,619
Scale, charging, R. W. Remig	759,016
Scale removing device, L. Strasser	758,717
Scales, relieving gear for portable weighing, F. W. Taylor	759,044
Scouring board, J. Adams	759,147
Scraper, feed lot, W. T. McBride	758,769
Screw cutting implement, H. B. Keiper	758,840
Scrubber and mop, combined, J. A. Zerbe	758,803
Scrubbing machine, E. J. Stewart	758,714
Seal, F. W. Brooks	758,891
Sealing machine, envelope, L. Madas	758,992
Separator sieve, W. C. Black	759,068
Serum storing and administering device, Apple & Mundorf	758,949
Sewing machine shuttle, H. A. Dodge	759,082
Shade machine, window, M. F. Miller	758,999
Shaft, collapsible, F. Meisel	758,996
Sharpener, drill, B. G. Morgan	758,926
Sheet conveying machine, T. C. Dexter	759,211 to 759,213
Ship lift, J. A. Saner	758,857
Shoe fastener, W. J. Shorten	758,787
Shredding machine feeder, C. E. Curtiss	758,989
Signal system, electric, G. L. Vannals	759,047
Signaling apparatus, wireless, L. De Forest	759,216
Signaling on electric traction systems, T. H. Jones	758,922
Signaling system, J. Weatherby, Jr.	758,724
Singling machine, M. Sarfert	758,937
Sing card, Benes & Jones	758,933
Sliding gate, J. L. Laurence	759,116
Smoke consumer and fuel economizer, Barrett & Hickerson	759,061
Soldering machine, can, J. J. Griffin	758,911
Sole and heel protector, shoe, G. C. Calentine	758,818
Spectacle holder, G. L. Eason	758,629
Speed indicator, magnetic, S. B. Storer	759,041
Spinning apparatus, yarn, J. Hayden, Jr.	758,752
Spinning frame, thread board, J. E. Prest	758,933
Spinning machine, mule, J. Holt	759,852
Sprinkling attachment, wagon, F. E. Allen	758,731
Stacker, straw, G. W. Culp	758,739
Stamp, printing, J. Miller	759,218
Stay strips, forming, Knowlton & Beach	758,923
Steam engine, H. J. Hays	759,102
Steam generator for hydrocarbon burners, G. W. Arper	758,807
Steam trap, H. J. Wessinger	758,795
Steam trap, C. Gulland	758,965
Steam trap, J. D. Walsh	759,144
Stock guide, A. C. Jones	758,921
Stocking, R. Meyer	758,184
Storage battery, W. J. Redmond	758,962
Storage battery, J. T. Niblett	759,007
Storage battery, V. G. Apple	759,058
Storage battery, electric, A. G. Betts	759,066
Straw cutter, B. A. & J. F. Stewart	758,792
Stud, garment supporting, B. P. Oreville	758,929
Sulfuric anhydride, making, Lunge & Pellitt	758,844
Superheater, A. C. Bethune	759,064
Surgical operating cushion, Eggers & Stahl	759,884
Swinging head coupling, W. E. Coffin	758,958
Switching mechanism, G. L. Mansfield, re- issue	12,216
Syringe, portable, J. Heigh	758,643
Syringe, vaginal, C. W. Melbecke	758,673
Talking machine, L. P. Valliquet	759,142, 759,143
Tea kettle, G. T. P. Callum	759,194
Telegraph, automatic fire and burglar alarm, R. G. Callum	758,736
Telegraph, printing, J. C. Barclay	758,732
Telegraph, wireless, J. F. King	758,842
Telephone line apparatus, Scribner & McQuarrie	758,703
Telephone receiver, E. H. Strauss	758,795
Telephone receiver, J. I. Gemmill	759,039
Telephone system, W. W. Bean	758,925
Telephone transmitter, J. I. Gemmill	759,094
Temperature of a distant point, electric system for indicating the, R. G. Callum	758,819
Tent, F. H. Gotsche	758,642
Testing device, O. A. Trowbridge	758,799
Thrill or draft pole coupling, H. Turner	759,046
Thill shifting device, Lawrence & Puff	758,925
Ticket, coupon, O. B. Stanton	758,712
Ticket rack, H. W. Thompson	759,140
Time recorder, watchman's, C. T. Hawley	759,177
Tire and carriage, holder and clamp, combined, C. P. Wing	759,055
Tire, armor, pneumatic, J. W. Aylsworth	758,885
Tire, vehicle, J. H. Schoedding	759,134
Tires of bicycles, etc., means for removing the rubber, S. Nicolson	759,123
Tires, etc., on wheels, means for setting, T. Gare	758,747
Titanous compound and making same, H. Spry	758,710
Tobacco heating apparatus, E. Pope	759,190
Tobacco leaves, machine for the treatment of, G. A. Marier	758,765
Tool, compound, J. J. McGrath	758,928
Tool handle, M. D. Converse	758,825
Tool holder, C. A. Edlund	759,083
Tower for recreation or other purposes, J. W. Grayden	758,834
Toy projector, G. E. Mellen	758,674
Traction engine, G. M. Beckson	758,757
Tractor, engine, W. R. Jones	758,757
Tramway lift, B. Phelps	758,685
Trip mechanism, W. Spalckhaver	758,709
Trolley, electric railway, D. M. Shaler	758,785
Truck bolster, railway car, C. F. Street	759,137
Truck, railway, W. E. Ludlow	758,990
Twine cutter, M. Forst	758,832
Typewriter platen shift, J. Alexander	758,804
Typewriter machine, E. C. Stickney	758,794
Typewriter machine, E. G. Latta	758,982
Umbrella tip cup and catch therefor, E. S. Ross	758,696
Undergarment, R. M. Appleton	759,149
Underwaist, W. W. Bewsic	758,892
Urinal, D. Craig	759,078
Valve actuating mechanism, blowing engine, G. B. Petsche	758,931
Valve, circulating, J. Collis	758,822
Valve gear, gas engine, F. Dickinson	758,901
Valve, steam engine reversing, J. Nielsen	758,772
Vapor burner, H. F. Steamer, G. H. M. A. Lawrence	759,034
Vehicle bodies, means for connecting running gears to, W. H. Wansbrough	758,878
Vehicle, motor, Shadolt & Wetmore	758,705
Vehicle seat covers, lock for motor, G. W. Kerr	759,181
Vehicle top support, B. K. Hendricks	759,104
Vehicle wheel, W. E. Mitchell	759,000
Vehicle wheel, C. Rendell	759,017
Vehicle wheel, W. C. Oswald	759,124
Vending machine, G. C. Stroop	758,872
Ventilator, C. P. Tanner	758,720
Vessels, adjustable level and slanting supporting bar for, L. B. Sherwood	758,866
Vise, W. T. Hellar, L. B. Sherwood	759,107
Vise bench, J. Bergeleke	758,630
Vise jaw liner, I. A. Hermann	758,838
Vise mount, E. E. Remsburg	758,779
Voting machine, A. Sjoberg	758,708
Vulcanizer door locking device, E. C. Shaw	758,862

WARNING!

The following Manufacturers and Importers are licensed under the pioneer patent No. 549,160, granted to George B. Selden, dated November 5th, 1895, on

Gasolene Automobiles.

In view of their license agreement they and their agents will not sell, keep on hand or in any manner dispose of or deal in directly or indirectly any unlicensed new or second-hand gasolene vehicles, infringing said Selden patent.

- MANUFACTURERS:**
- Electric Vehicle Co.
 - Winton Motor Carriage Co.
 - Packard Motor Car Co.
 - Olds Motor Works
 - Knox Automobile Co.
 - The Haynes-Apperson Co.
 - The Autocar Co.
 - The George N. Pierce Co.
 - Apperson Bros. Automobile Co.
 - Locomobile Co. of America
 - The Peerless Motor Car Co.
 - Standard Motor Construction Co.
 - Waltham Manufacturing Co.
 - Pope Motor Car Co.
 - J. Stevens Arms & Tool Co.
 - H. H. Franklin Mfg. Co.
 - Smith & Mabley, Inc.
 - The Commercial Motor Co.
 - Berg Automobile Co.
 - Cadillac Automobile Co.
 - Northern Manufacturing Co.
 - Pope-Robinson Co.
 - The Kirk Manufacturing Co.
 - Elmore Manufacturing Co.
 - E. R. Thomas Motor Co.
 - Buffalo Gasolene Motor Co.
 - The F. B. Stearns Co.
 - Pope Manufacturing Co.
 - Sandusky Automobile Co.
 - Crest Manufacturing Co.

- IMPORTERS:**
- Smith & Mabley, Inc.
 - Central Automobile Co.
 - Alexander Fischer
 - Hollander & Tangeman
 - Standard Automobile Co.
 - E. B. Gallaher
 - Auto Import Co.
 - F. A. LaRoche Co.
 - Sidney B. Bowman Automobile Co.

Both the basic Selden patent and more than 400 other patents owned by members of this Association will be enforced against infringers. Manufacturers, Importers, Dealers and Agents, also Users of unlicensed machines are liable.

ASSOCIATION OF LICENSED AUTOMOBILE MANUFACTURERS
No. 7 EAST 42d STREET, NEW YORK

Aereo-Painter
is the improved way to apply paint, shingle stain and whitewash. A clever device that quickly spreads a smooth, even coat over any surface. Works by compressed air. Simple construction. Never out of order. No experience necessary to operate it.

No Scaffold No Ladder
required. Makes painting safe work. Saves valuable time. Economizes expense and is guaranteed to do satisfactory work. Send for free descriptive circular.

Pittsburgh Plate Glass Co. General Distributors.
Patton Paint Company, 227 Lake St., Milwaukee, Wis.

KLIP-KLIP
THE POCKET MANICURE
COSTS 25 CENTS LASTS 25 YEARS
Solid German Silver. Trims, Files and Cleans the nails with either hand. Don't take imitations. Sold everywhere or by mail for 25c. Money back if you want it. Manicure Book, "A Handy Hand Book of the Hands"—complete instruction on the care of the hands and nails. Sent for two 2c. stamps.
Klip-Klip Co., 556 Clinton Ave. S., Rochester, N. Y.

Why Buy An Outfit
of measuring instruments when the whole combination of them will not do the work of our Rotary Measure. Measures cutting speeds, curves, spirals, straight work, in fact almost everything that needs measuring quickly and accurately. You cannot afford to be without it. Highest endorsements from practical men. Get our circular.
STEUKREITER MFG. CO. 538 W. 58th Street, New York

Low-Priced Electric Wagons
Capacity 1 to 3 Tons
Double Motor Equipment
Direct Double Chain Drive
No Gears or Pinions
THE AUTO-CAR EQUIPMENT CO. Buffalo, N. Y.

THEY HANG ON
WASHBURN'S FASTENERS
The Fastener with a BULL-DOG GRIP.
Men find comfort and utility in their use. Applied to:
Key Chain and Ring, 25c. Cuff Holders, 20c. Drawers Supporters, 20c. Scaff Holders, 10c. Little but Never Let Go.
Sent Postpaid. Catalogue Free.
AMERICAN RING COMPANY, Sold Everywhere. Dept. 89 Waterbury, Conn.

CAST STEEL PIPES
We have special facilities for making and finishing steel pipes, elbows and tees and special fittings, to standard heavy pressures and up to ten feet in diameter. Our metal averages about 75,000 pounds tensile. Open Hearth Steel Castings for furnaces, shop building, electric pump and general machinery purposes. Patented by E. A. Gostensen, Lloyds, Railroad and other specifications. **SEABOARD STEEL CASTING CO., Chester, Pa.**

NOW READY! A HALF PRICE EDITION
Appleton's Cyclopedia of Applied Mechanics
Edited by **PARK BENJAMIN, Ph.D., LL.B.**
A Magnificent Set in Three Vols. Fully Illustrated
Handsomely bound in half morocco, each volume containing over 900 pages, with nearly 8,000 engravings.
SPECIAL PRICE \$12.00
Heretofore the publishers' price of this work has never been less than \$22.50 in the cheapest binding and it has been sold only by subscription. We have secured a special edition of this valuable work, and will box and ship, prepaid, the three volumes to any address in the United States or Canada on receipt of the above price. By purchasing now from us you save half the original price and have in return a technical cyclopedia and dictionary, the great usefulness of which has been testified to by nearly one hundred thousand purchasers of this valuable work—technicians and mechanics who refuse to estimate its value to them in their work by mere dollars and cents.
AS A REFERENCE WORK IT IS WITHOUT A PEER!
Containing upwards of 10,000 topics, 2,700 pages, nearly 8,000 engravings. It is the recognized standard of American mechanical practice in workshops, manufacturing, technical schools, and libraries all over the United States. There is not a machinist, engineer, electrician, business manager or foreman who can afford to be without the information contained in these volumes. You are doing yourself an injustice if you don't take advantage of our offer and send for these volumes at once.
Add \$1 extra for expressage to England and the Continent, or \$2 extra to Australia and other countries. Special circular of contents of these volumes sent free.
MUNN & COMPANY, Publishers of Scientific American 361 Broadway, New York City

Trade Mark **ORDER BY MAIL** All Sizes 3 PAIR FOR \$1.00

The Famous Hosiery Which is Superior to All Others FOR WEAR.

Send Postal for Illustrated Booklet 10c. extra for Mailing Each Three Pairs

Men's Women's and Children's

Never Surrender Hosiery

ALL WEIGHTS AND KINDS COTTON OR LISLE THREAD

Order for the entire family

BARNARD, SUMNER & PUTNAM CO. Worcester, Mass.

For 62 years one of the Leading Dry Goods Stores in New England

The Apple For Gas Engines, Launches, Automobiles, etc.

No more belt, battery and commutator troubles. Dirt and waterproof. Easily attached. Increases power and speed. Send for full particulars on our brilliant apparatus.

The Dayton Electrical Mfg. Co. SPARKER 55 Reibel Bldg., Dayton, Ohio.




THE AUTOMOBILE BARGAIN HOUSE

Largest in the world, 10,000 feet of floor space, crowded with new and slightly used autos; 55 now owned by us; here to be sold on commission. Several parties going to Europe have offered splendid machines for quick cash very low. Autos \$125 to \$3,500. Oldsmobiles, Knox, Locomobiles, U. S. Runabouts, Stanhopes, new; Mobile Des-a-dos, \$250 up. Electrics of all makes; Columbia, American, and Waverly, \$150 up. All kinds delivery wagons and buses. Electric, Gasoline and Steam, Daimlers, Packards, French Racing Auto, Searchmont, Cadillac, and Northons, \$400 to \$1,200; \$8,500 Mors, like new, \$3,500. Many others; call or send for list. Autos sold for owners on five per cent. commission.

MANHATTAN STORAGE CO.
332-342 West 44th Street, New York, N. Y.
Ten doors east of Ninth Avenue. Two blocks from 42d Street station. Open evenings. Telephone, 4286-35th

FLEXIBLE GRIP-CHAIN DRIVE. CLIMBS ANY HILL. METZ, WALTHAM, MASS.

FAST OR SLOW AS YOU WANT TO GO.




STEAM HEATERS For Manufacturing and Laboratory Purposes

Made with finished surface in various sizes. Write for circular and prices.

J. A. STOWELL CO. Leominster - Mass.

Price \$210 **Warwick Motor Cycles**

New Grip Control. Many other new features. The Best yet. Weight, 99 lbs. Send for catalog.



Warwick Cycle and Automobile Co., Springfield, Mass.

Lackawanna Motors

are Simple and Valveless. Easy to start and easy to operate. For automobiles and launches. 3 to 24 H.P. Cut shows Lackawanna Reversing Device attached to our 6 H.P. marine motor. No reversing gear necessary.

LACKAWANNA MOTOR COMPANY 51-61 Letchworth St. - Buffalo, N. Y.

Smooth as a Gun Barrel

is what one user says after the **Dean Boiler Tube Cleaner** had removed the scale from his boiler tubes. We can take the scale from your boilers and put them in the same condition, "smooth as a gun barrel." Let us at least send you our pamphlet "Economy in the Boiler Room." Write for it today.

THE WM. B. PIERCE CO. 319 Washington Street, Buffalo, N. Y.

50 Years' Experience

PATENTS

Trade Marks, Designs, Copyrights, Etc.

Anyone sending a sketch and description may quickly ascertain our opinion free whether an invention is probably patentable. Communications strictly confidential. Handbook on Patents sent free. Oldest agency for securing patents. Patents taken through Munn & Co. receive Special Notice, without charge, in the

Scientific American

A handsomely illustrated weekly. Largest circulation of any scientific journal. Terms, \$3 a year; four months, \$1. Sold by all newsdealers.

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

Vulcanizing press, compound hydraulic, E. C. Shaw	758,863
Vulcanizing press, horizontal, E. C. Shaw	759,196
Vulcanizing press, vertical, E. C. Shaw	759,195
Wagon body bracket, P. V. Becker	758,911
Wagon, dumping, O. B. Reynolds	758,932
Wagon or cart, push, D. J. Baay	758,889
Wagon like coupling, A. Koppel	758,843
Wagon running gear, J. Gear	759,172
Washbailer, Snyder & McConaha	758,867
Watchcase bezel, G. E. Hart	759,111
Water heater, portable, E. H. Schwartz	758,859
Water heating apparatus, F. A. Gale	758,966
Weather strip, Douden & Robb	758,626
Welding tool, F. E. Thul	758,797
Wheelbarrow frame, G. C. Cone	758,824
Whist tallying sheet, E. Bach	758,908
Wire stretcher, C. W. Epperson	758,637
Wire tightener, C. A. Willmarth	758,726
Wire machinery, J. C. Tweed	758,721
Wire working tool, J. W. Dodd	758,829
Work bench attachment, W. J. Connell	758,677
Zither, Almerantz & Danielsen	759,057

DESIGNS.

Badge or similar article, S. Anderson	36,898
Lavatory, C. Weelans	36,907
Medallion or similar article, A. J. Balish	36,897
Paper weight, E. D. Conklin	36,899
Picture frame, H. L. Ashton	36,899
Plaques, F. W. Deitrich	36,902
Smoker's set, J. M. Huffer	36,903
Spoons, forks, or similar articles, handle for, J. E. Straker, Jr.	36,900
Spoons, forks, or similar articles, handle for, Crees & Court	36,901
Tiling for floor and wall coverings, A. W. Nilssen	36,906
Trimming for ladies' underwear, Kerwin & McGinley	36,908
Type, font of, I. Kimball	36,905

TRADE MARKS.

Advertising novelties, certain named, Whitehead & Hoag Co.	42,526
Belting, Jewell Belting Co.	42,557
Beverage composed principally of whisky and syrup, J. Mengon	42,541
Bicycle parts, certain named, New Departure Manufacturing Co.	42,561
Brads, skin binding, McKnor & Co.	42,522
Cards, playing, H. G. Gritt	42,529
Cheese, International Cheese Co.	42,547
Cigars, cheroots, and cigarettes made of cigar tobacco, Cayey-Caguas Tobacco Co.	42,537
Coloring matters, dyes, and mordants, C. Barolin	42,551
Confections, G. J. Mueller	42,534
Cork extractors, H. Reisinger	42,559
Duck, Wellington, Sears & Co.	42,523
Flavoring extracts, Weaver, Conger Co.	42,537
Fruits, dried, and canned, Aspegren & Co.	42,549
Gin, E. J. Cantin	42,539
Knitted underwear, certain named, Denholm & McKay Co.	42,519
Lard substitute and lard compound, T. M. Sinclair & Co.	42,548
Macaroni and vermicelli, J. B. Canepa	42,550
Medicated tonic beverage, Vim Manufacturing Co.	42,542
Metal, unctuous mixture for protecting, Sylvan Manufacturing	42,553
Milk, condensed milk, cream, and evaporated cream, Michigan Condensed Milk Co.	42,546
Ointments and salves, C. L. Douglas	42,533
Packing for valve joints, Fairbanks Co.	42,558
Paint, certain named, Muralo Co.	42,555
Paint in paste form, water, Water Paint Company of America	42,554
Picture post cards and color prints, Raphael Tuck & Sons	42,528
Remedy for galls, sores, cuts, and bruises, external, M. W. Savage	42,532
Remedy or preparation in tablet form, headache, Egyptian Remedy Co.	42,531
Ribbon, G. Balay et Cie	42,520
Saponaceous compound for treating fabrics, E. F. Zurn Co.	42,552
Shevils, spades, scoops, and spading forks, Supplee Hardware Co.	42,560
Silk dress goods, Rogers & Thompson	42,524
Stamps, trading, Crown Stamp Co.	42,527
Table and stand covers, towels, napkins, and doilies, Richardson Roberts Dry Goods Co.	42,525
Tobacco, chewing, B. Payn's Son's Tobacco Co.	42,536
Tops, M. Wallstein	42,536
Twine for binding grain, P. E. Cooper	42,556
Vehicles and parts thereof, certain named heretofore, Fahrzeugfabrik Eisenach	42,562
Water spring, Valley Forge Good-Fyr Springs Co.	42,545
Whisky, E. J. Cantin	42,538
Whisky, G. McPherson & Co.	42,540
Wine, port, E. J. Cantin	42,543
Wine, sherry, E. J. Cantin	42,544

LABELS.

"A. J. Bargahiser's Chick-Hen Powder," for powder for poultry, A. J. Bargahiser	11,039
"Acne Egg Preservative," for egg preservative, J. E. Ulrich & Co.	11,038
"Andrew McLean Co. Mosquito Nets," for mosquito nets, A. McLean Co.	11,013
"Aphrodine," for medicine, East India Chemical Co.	11,026
"Bleedzone," for medicine, East India Chemical Co.	11,021
"Buster Brown Leggings," for leggings, H. Jacobs & Sons	11,012
"Carnation Bouquet," for toilet water, Randolph Box and Label Co.	11,014
"Catarrhine," for medicine, East India Chemical Co.	11,023
"Cholerine," for medicine, East India Chemical Co.	11,027
"Constapine," for medicine, East India Chemical Co.	11,029
"Coughine," for medicine, East India Chemical Co.	11,028
"Egrytan Oil," for medicine, East India Chemical Co.	11,025
"It Reaches the Right Spot," for medicine, A. Crichton	11,030
"Kuntz's Heidelberg Rheumatic Cure," for medicine, A. & A. Kuntz	11,032
"Lilac Blossoms," for toilet water, Randolph Box and Label Co.	11,015
"Madame Roland's Parisienne Face Massage," for massage preparations, B. T. Weyhing	11,020
"Malatine," for medicine, East India Chemical Co.	11,022
"Mann's Vegetable Syrup," for medicine, T. Dyer	11,031
"Old Beechwood," for whisky, Vegt-Applegate Co.	11,033
"Oyama," for tea, Dailey & Moore	11,034
"Palatine Hair Tonic," for hair tonic, B. Bowen & Co.	11,016
"Pompeian Massage-Cream and Skin Food," for massage cream and skin food, F. W. Stecker	11,019
"Pompeian Massage-Soap," for soap, F. W. Stecker	11,017
"Southern Cross," for coffee, Hewlett & Hewlett	11,035
"Sulphurine," for medicine, East India Chemical Co.	11,024
"Sweet Peggy," for crystallized popcorn, Felham & Foster	11,036
"U-Bat-A-Biscuit," for crackers and biscuits, P. Badanes	11,037

PRINTS.

"Home Educator," for coffee, C. Pearlman. 987

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., 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., 361 Broadway, New York.

PERFORATED METALS FOR ALL USES. MADE AS REQUIRED. HARRINGTON & KING PERFORATING CO., CHICAGO.



EASIER TO ROW ABSOLUTELY SAFE Mullins Unsinkable Steel Pleasure Boats

Write to-day for free catalogue

15-foot boat, crated \$29.00


for family use, summer resorts, parks. Guaranteed. Will give a new boater pleasure, safety and durability. No other boat so desirable.

W. H. MULLINS, 384 Depot St., Salem, Ohio

The Curtain Rises On the World by the time of the

ELGIN WATCH

Every Elgin Watch is fully guaranteed. All jewelers have Elgin Watches. "Timemakers and Timekeepers," an illustrated history of the watch, sent free upon request to ELGIN NATIONAL WATCH CO., ELGIN, ILL.



Columbia

LIGHT TONNEAU

12-14 HORSE POWER \$1,750

Self-lubricating, two-cylinder opposed motor in forward position. Cylinders 5x4 1/2 in. Bevel gear drive. Driving pinions and gears as strong as found in most cars of twice the weight. Easiest of all gasolene cars to operate and maintain.

30-35 HORSE-POWER TOURING CAR \$4,000

Most powerful and most comfortable. Comfort top. Luggage or baggage held in order.

24-30 HORSE-POWER TOURING CAR \$3,500

Powerful and comfortable. Luggage or baggage held in order.

NEW MODEL ELECTRIC RUNABOUT \$850

Electric motor and gear set. Light and easy to handle.

"ELBERON" ELECTRIC VICTORIA \$1,600

In its class, successful beyond compare. Best of the year.

Carriages will be sent on request. Also special catalogue of Columbia Electric Taxis, Buggies and Carriages.

ELECTRIC VEHICLE CO HARTFORD, CONN
New York, 134-136-138 West 39th St. (Opp. Metropolitan Opera House.)
Chicago, 1413 Michigan Ave. Boston, 74-78 Stanhope St.
Member Association of Licensed Automobile Manufacturers

SPECIAL MANUFACTURING. DIES AND STAMPINGS TO ORDER.

SPECIAL MACHINERY—MODELS—EXPERIMENTAL WORK.

PROOF FORGING DIES AND DROP FORGINGS.

HARDWARE SPECIALTIES AND MACHINERY TO ORDER. SEND SAMPLES OR DRAWINGS FOR ESTIMATES. WRITE FOR OUR BOOKLET, "THE GLOBE MACHINE & STAMPING CO." 970 HAMILTON ST., CLEVELAND, OHIO.

Export Trade

How to Secure and How to Hold It

Valuable hints on how to secure Export Trade sent gratis on request. Address

EXPORT EXPERT Box 773, New York

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, Fox Bldg., Franklin Square, New York.

SPECIAL MACHINERY Tools and Dies. Model & Experimental Work. Costilo Machine Works, 60 Centre St., New York

CHEMICAL EXAMINATIONS OF ALL KINDS. DR. H. C. STIEFEL, Bissell Block, Pittsburgh, Pa.

The National Sheet Metal Works is especially equipped to manufacture small articles stamped, pressed, cut from sheet metal. White metal casting and plating a specialty.

The National Sheet Metal Co., Peru, Ill.

MODELS & GEARS CATALOGUES FREE UNION MODEL WORKS & GEARS 133 CLARK CHICAGO.

MODEL Draughting and Experimental Work. Inventions developed. Salable articles. Manufactured on royalty or contract. MARION MODEL WORKS, Box 457, Marton, Ind.

Models and Patented Articles, Advertising Novelties, etc., mfd. by National Supply Co., 65 E. W. N. Y.

Dies, Tools, Models and Special Machinery. Metal Specialties and Engineering. HOEFT & MOORE, CHICAGO, U. S. A.

DRYING MACHINES. S. E. WORRELL, Hannibal, Mo.

SPLITDORF SPARK COILS 25 VANDEWATER ST. N. Y.

BUILDERS of Special Machinery. Models. Experimental work. Inventions developed. THE FENN-SADLER MACH. CO., Hartford, Conn.

SEALED PROPOSALS WILL BE RECEIVED AT the office of the Light-House Engineer, Tompkinsville, N. Y., until 1 o'clock p. m., Thursday, June 24, 1904, and then opened, for furnishing miscellaneous articles for the Light-House Establishment, for the fiscal year ending June 30, 1905, in accordance with specifications, copies of which, with blank proposals and other information, may be had upon application to W. T. Rossell, Major, Corps of Engineers, U. S. A., Engineer.

MODEL AND EXPERIMENTAL WORK. Electrical and Mechanical Instruments. Small Machinery. EDWARD KLEINSCHMIDT, 82 W. Broadway, New York.

AUTOMOBILE PARTS. Our line of automobile parts is complete and embraces new and original ideas in construction. Send for Catalogue and Prices. OTTO KONIGSLOW, Cleveland, Ohio.

MODELS & CHICAGO MODEL WORKS ESTABLISHED 1870. 101 E. MADISON ST. CHICAGO, ILL.

"THE CRYSTAL" "ONE CENT" Plate Glass Gum Vender. Designers and constructors of vending machines of all kinds, on contract. MICHIGAN NOVELTY WORKS, Kalamazoo, Mich.

Manufacturers of **HARDWARE SPECIALTIES** Contract Manufacturers and will market articles of merit LORIMER MFG. CO., 153 S. Jefferson St., Chicago, Ill.

TYPEWRITER HEADQUARTERS 332 Broadway, New York, etc., all makes under 12.50 per line. Don't buy before sending for samples of writing paper, and change an improved advice. Increase stock for selection. Shipped for trial. Guaranteed first-class condition. Dealers supplied.

THE "BEST" LIGHT Outshines the Sun. It's pure white light makes day of night. Costs less than kerosene; six times more powerful than electricity. Examined, tested and permitted by underwriters' association. CATALOG FREE. NO DIRT--NO WICK--NO SMOKE--NO SMELL Agents wanted. Exclusive territory, good commission paid. **THE BEST LIGHT COMPANY,** Sole Owners of Original Patents. 87 E. 5th St., Canton, Ohio.

