

**In the Pay Envelope**  
That's where our education affects you.

We teach mechanics the theory of their work; help misplaced people to change their work; enable young people to support themselves while learning a profession.

250,000 students and graduates in Mechanical, Electrical, Steam and Civil Engineering, Architecture, Telegraphy, Stenography, Book-keeping, etc. Write for circular and mention subject in which interested.

**INTERNATIONAL CORRESPONDENCE SCHOOLS,**  
Established 1891. Capital \$1,500,000.  
Box 342 Scranton, Pa.

## ELECTRICAL ENGINEERING TAUGHT BY MAIL.

Write for our Free Illustrated Book.  
"CAN I BECOME AN ELECTRICAL ENGINEER?"

We teach Electrical Engineering, Electric Lighting, Electric Railways, Mechanical Engineering, Steam Engineering, Mechanical Drawing, at our home by mail. Institute endorsed by Thomas A. Edison and others.

**ELECTRICAL ENGINEER INSTITUTE,**  
Dept. A, 240-242 W. 23d St., New York.

**LEARN TO WRITE ADVERTISEMENTS**

20 MINUTES a day in the study of advertising will fit you for \$25 to \$50 per week position. Employed graduates prove it. We teach every practical feature by mail. Write for evidence free. **PAGE-DAVIS CO.** Suite 20, 167 Adams St. Chicago.

**The BusinessMan's Magazine SYSTEM**

Explains fully, with elaborate illustrations, the methods actually in use by successful business and professional men. Trial four months' subscription for eight 2-cent stamps.

**Shaw-Walker,** Muskegon, Michigan.  
Write for cat. of card systems.

**VOLNEY W. MASON & CO.,**  
Friction Pulleys, Clutches & Elevators  
PROVIDENCE, R. I.

**DO YOU USE GRINDSTONES?**

If so we can supply you. All sizes mounted and unmounted, always kept in stock. Remember, we make a specialty of selecting stones for all special purposes. 17¢ Ask for catalogue.

**The CLEVELAND STONE CO.,**  
2d Floor, Wilshire, Cleveland, O.

**McCabe's Portable Electric Conveyor**

For Loading Ships from Docks and Warehouses

saving over 50 percent in time of loading. By means of this portable ship and warehouse conveyor, any sack or package cargo, that can be handled in a sling, can be put aboard ship as fast as it can be stowed and in an unbroken condition.

By means of this Electric Conveyor, flour, grain, sacked goods, etc., can be delivered at the hatch at the rate of 4,000 sacks per hour; and it does away with all stazing and hoisting.

Correspondence with ship, warehouse and stevedoring firms solicited, when photos and a full description of the invention will be forwarded.

Address **Capt. W. L. McCABE, Stevedore,**  
Tacoma or Seattle, Washington.

**LET US START YOU! \$100.00 MONTHLY**

Gold, Silver, Nickel and Metal Plating. At home or traveling, taking orders, using and selling **Prof. Gray's** Machines. Plates Watches, Jewelry, Tableware, Bicycles, all metal goods. No Experience. Heavy plate. New methods. We do plating, manufacture outfits, all sizes. Guaranteed. Only outfits complete, all tools, lathes, material, etc., ready for formulas free. Write today. Pamphlet samples, etc. FREE.

**P. GRAY & CO., Plating Works, CINCINNATI, O.**

**THE SANITARY STILL**

on your kitchen stove furnishes plenty of distilled aerated water at trifling cost. Simple as a tea kettle.

**Hon. HILARY A. HERRICK, Ex-Secretary of the Navy,** writes: "The Sanitary Still has been used with success in my family, and I consider that the use I have made of it shows that it will afford a good supply of absolutely pure water for drinking and cooking and other uses."

The Sanitary Still used in the **WHITE HOUSE.** Highest award at Paris Exposition.

Write for booklet. **WARD & CO.,** 133 N. Green Street, Chicago.

## No Orders Expected

during the holiday season, but we have found it good business policy to advertise in all seasons, for through our advertising we find investors who desire to secure the unusual profits realized by investments in legitimate working mines, and by continuous advertising they find us.

**The New Year's Dividends**

disbursed by our house as financial agents for the several mining companies we represent and whose stock we have recommended to our customers, required the drawing and mailing of over 1,500 separate drafts and money orders, distributed in every State of the Union, and we have never yet had a single dissatisfied investor or customer.

**Our Combination Order Plan**

divides the investment among several companies, dividend payers and first issues at the ground-floor inaugural prices, thus obviating risk of loss and insuring regular interest, maximum profits and security of principal to the investor.

If interested in large and unusual profits—regular interest and security of principal—send for our Booklets of paying mines, combination order blank, latest Reports and full particulars, that will give you interesting and profitable information on your investments for the coming year.

**DOUGLAS, LACEY & CO.,**  
Bankers & Brokers. Mining Stock Exclusively.  
66 Broadway 17 New St., New York.  
BRANCHES:  
CLEVELAND:—"The 'Cuyahoga'" Building.  
PHILADELPHIA:—"The Betz" Building.  
BOSTON:—"The International Trust Co." Building.

Power-transmitting mechanism, J. B. Williams	665,820
Primary battery, H. S. Amwake	665,825
Primary battery, H. K. Hesse	665,782
Printing plate or block, composite, L. D. Clark	665,506
Printing-press, L. L. Carson	665,881
Printing-press attachment, H. Salmon	665,840
Printing-press bed-motion, H. Hartt	665,525
Propeller, W. McMeus	665,543
Propelling apparatus, ship, P. N. Hicks	665,785
Pump, balance, G. A. Starr	665,807
Pump, gasoline, C. M. Kemp	665,567
Pump plunger, J. A. Carlson	665,506
Pump, rotary, J. J. Jr., & Roe	665,581
Pump, rotary, A. O. Wyman	665,590
Pump, steam, W. E. Ely	665,598
Punching-machine, gang, E. B. Stimpson	665,762
Purifying apparatus, I. V. Holmes	665,741
Puzzle, A. M. Chapin	665,508
Rail-joint, M. Waldvogel	665,490
Rail-joint, H. M. Williams	665,490
Railway gravity or pressure, L. A. Thompson	665,764
Railway, pleasure, L. A. Thompson	665,763
Railway-signal, Wrigley & McMahon	665,712
Railway switch and signal controlling mechanism, J. E. Gillmor	665,428
Ration and making same, condensed, L. O. Person	665,416
Refrigerating purposes, bottle-support for, K. Fletcher	665,776
Refrigerator, H. Tust	665,814
Revolving battery, S. Walker	665,816
Rivet-catcher, A. E. Barnhart	665,722
Rock-drill, O. G. Worsley	665,711
Rocking-chair and cradle, combined, S. S. Arnold	665,696
Rolling-mill for manufacturing cylindrical articles, T. Ledemuller	665,790
Rotary engine, M. A. Grier	665,778
Rotary engine, W. H. Preston	665,754
Rubber-block holder, reversible, H. M. Clements	665,510
Sallya-defector, C. O. Metzler	665,571
Sand-washing apparatus, J. M. Miller	665,835
Sanding device, air, Bailey & Hamilton	665,720
Sash-cord guide, W. E. Fox	665,777
Saw set and gage, F. Stodde	665,808
Scale attachment, weighing, J. C. Tarvin	665,742
Scale, computing, Sears & Fishburn	665,584
Scale or balance, weighing, H. M. Crittenton	665,511
School-chair, adjustable, J. M. Sander	665,471
Screen, G. W. Cross	665,408
Sewage-purifying apparatus, A. Heinholt	665,435
Sewing-machine binder attachment, J. B. Knickerbocker	665,445
Sewing-machine binding attachment, J. M. Steward	665,521
Sewing-machine ruffing attachment, J. M. Grist	665,519
Sewing-machine tuck-croiser, J. M. Grist	665,522
Sewing-machine tuck-croiser or marker, J. M. Grist	665,523
Sewing-machine tuck-marking attachment, A. Johnston	665,829
Shafting, expansion-coupling for, A. W. Thompson	665,501
Shearing-tool, J. K. Stewart	665,441
Shoeing, R. C. Tibbitt	665,812
Shoe-cutting machine, Kidd & Wampler	665,553
Shoulder-brace, R. Holton	665,467
Shutter attachment, G. J. Eppright	665,532
Sign, advertising, I. H. Taylor	665,688
Signaling apparatus, train, W. A. & B. S. H. Harris	665,733
Soldering-machine, slideseam, C. W. Sleser	665,811
Soldering-tool, W. F. Smith	665,852
Sole-edge trimmer, Mackwell & Angell	665,476
Spool-stand, E. J. Boersig	665,481
Stacker, bay, A. L. Akhn	665,494
Stacker, bay, W. D. McAtlin	665,396
Stamp cabinet, hand, W. J. Reno	665,540
Steaming and shooting tubular fabrics, machine for, F. Weyer	665,576
Stenter-frame clip, W. G. Gass	665,800
Stenograph, W. H. Lough	665,766
Still, water, D. W. Hawkes	665,665
Stove, heating, J. W. Heuer	665,610
Stoves, vapor-burner for cooking or heating, W. F. Myers et al.	665,730
Support for operators' instruments, G. A. Rutherford	665,436
Swinging gate, W. H. Shaley	665,454
Tailings-sampler, automatic, Stephens & Munger	665,470
Tape-line case, A. D. Major	665,620
Telegraph, type-printing, A. Franke	665,557
Telephone attachment, Lalng & Ferry	665,734
Telephone-bell, coin-operated magneto, H. R. Mason	665,788
Telephone-switch, N. Bassett	665,834
Telephone-transmitter, T. Iwata	665,848
Telephone system, L. W. Pullen	665,630
Threshing-machine, A. Amams	665,548
Tire, W. A. Barrows	665,716
Tire, J. Kelly	665,822
Tire, bicycle, M. F. Melch	665,605
Tire, pneumatic, J. F. Ives	665,570
Tire-tightener, J. W. Hawkins	665,604
Tire, vehicle-wheel, C. F. Allen	665,602
Tire, vehicle-wheel, A. J. Stevens	665,715
Tire, vehicle-wheel cushion, F. H. Turner	665,700
Toy or puzzle, G. B. Chapman	665,488
Transformer, Moody & Embert	665,746
Transom-hanger, S. W. Beattie	665,671
Trunk, V. S. Klick	665,573
Trunk, barrel, E. Schmellbacher	665,543
Tube-cutter, H. Ord	665,444
Turbine, steam, H. Goldschlager	665,583
Type, cyano-graphic, J. Barry	665,578
Type-setting machine, P. P. Cox	665,490
Type-writer desk, M. J. Hagar	665,402
Type-writing machine, C. Elliott	665,406
Typing-press, R. G. Becker	665,678
Valve, W. E. Case	665,774
Valve, engine, W. Cumming	665,725
Valve for water-tanks, boat, J. Morrison	665,595
Valve gear, R. H. Hattie	665,512
Valve, tank outlet, C. Birkley	665,735
Valve of engines, operating mechanism for cylinder relief, C. E. Kemp	665,395
Vehicle brake-lever, road, E. A. Broke	665,640
Vehicle electric brake, J. N. Mahoney	665,503
Vehicle, motor, H. Courteen	665,503
Vehicle, motor, W. O. Worth	665,470
Vehicle, single-wheel, M. R. Heatherly	665,437
Vending and carrying apparatus for store, J. B. Hurd	665,434
Ventilator, J. M. Carlen	665,830
Vessel, H. W. Woolbert	665,507
Violin, piano, R. Mega	665,767
Vise, combination, P. Broadbooks	665,690
Voting-machine, A. H. Hart	665,398
Vulcanizer, J. Muegenhart	665,736
Warp-stop-motion detector, J. H. Wolger et al.	665,575
Water-closets, etc., flushing-tank for, S. C. Carroll	665,495
Water-purifying apparatus, C. L. Kennicott	665,825
Water-tube boiler, H. M. Perry	665,606
Wheel pivot structure, vehicle, J. P. MacLearn	665,515
Whetstone-making machine, I. Reitz	665,833
Whiffletree-hook, J. W. Chambers	665,468
Windmill, J. L. F. Elving	665,769
Windmill, C. P. Pritchard	665,420
Windmill, W. R. Savage	665,838
Window-cleaning apparatus, H. Crump	665,804
Wire-colling machine, C. J. Johnson	665,405
Wire-stay-twisting device, Burnham & Van Riper	665,659
Wood-burning furnace, E. H. Thunefeld	665,729
Yarns, threads, etc., imparting silky luster to, H. Heberlein	665,440
Yoke center, neck, C. W. McDonald	665,680
	665,749

### DESIGNS.

Ball-and-socket fasteners, socket-piece for, W. R. H. Dowse	33,854
Bed-frame corner-iron, P. B. Roney	33,866
Belt, S. Dresner	33,893
Belt, L. Sanders	33,894
Bicycle-hub, W. S. Gubelman	33,870
Broom-shield, H. W. Holge	33,863
Can or box, F. T. Kennedy	33,891
Casket-lowering frame, J. Bomgardner	33,869

(Continued on page 47)

**The Accuracy and Endurance of the Full Ruby Jeweled**

# ELGIN WATCH

has been proven by years of use on the largest railroads of the world, where sway and swing and jolt and jar have thoroughly tested its timekeeping and lasting qualities.

**The World's Standard.**

Elgins are sold by jewelers everywhere in sizes and cases to suit the purchaser.

An Elgin watch always has the word "Elgin" engraved on the works—fully guaranteed.

Send for free booklet—"The Ways of a Watch."

**ELGIN NATIONAL WATCH CO., Elgin, Ill.**

**50 YEARS' EXPERIENCE**

# PATENTS

TRADE MARKS  
DESIGNS  
COPYRIGHTS & C.

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.

**HOW TO MAKE AN ELECTRICAL Furnace for Amateurs' Use.**—The utilization of 110 volt electric circuits for small furnace work. By N. Monroe Hopkins. This valuable article is accompanied by detailed working drawings on a large scale, and the furnace can be made by any amateur who is versed in the use of tools. This article is contained in **SCIENTIFIC AMERICAN SUPPLEMENT, No. 1182.** Price 10 cents. For sale by Munn & Co., 361 Broadway, New York City, or by any bookseller or newsdealer.

**FERRY'S SEEDS**

You know what you're planting when you plant Ferry's Seeds. If you buy cheap seeds you can't be sure. Take no chances—get Ferry's. Dealers everywhere sell them. Write for 1901 Seed Annual—mailed free.

**D. M. FERRY & CO.,**  
Detroit, Mich.

# ARCHITECTURAL VOLUMES

Bound volumes of the Building Edition of the **SCIENTIFIC AMERICAN** for 1900 are now ready for delivery. Beautifully printed perspectives and floor plans of many houses of a wide range of architecture and cost; also a large number of cuts of handsomely furnished and decorated interiors, combine to make these volumes of great value to those interested in the subject. The semi-annual volumes are \$2.00 each; yearly volumes, \$3.50 each.

**MUNN & CO., Publishers, Scientific American Office, 361 B'way, New York.**

**\$50 A Week**  
And Expenses Made By Live Agents Selling

## THE ACORN LAMP

Underneath & overhead generators. **MAKES ITS OWN GAS** At a Cost of One Cent for Ten Hours.

Gives better and brighter light than electricity. Absolutely safe. No smell, no trouble. Indorsed and approved by Fire Insurance Underwriters. Made in 25 different styles. Prices from \$4.00 up. They sell on sight to stores and families. Guaranteed to give satisfaction. We have agents who are selling 10 to 20 lamps per day.

It's a wonder. Catalogue free. Write for terms to agents.

**ACORN BRASS WORKS,**  
Dept., 10, Chicago, Ills.

**PALMER** Stationary and Marine Gasoline Engines and Launches. Motor Wagon Engines, Pumping Engines.

Send for Catalog. **PALMER BROS.,** MIANUS, CONN.

Hawkins' "Aids" to Engineer's Examinations, with questions and answers, 34x36, leather, gilt edges, gold titles. Contains all information needed to obtain an engineer's license. \$2. Postpaid. **THEO. AUBEL & CO.,** 65 Fifth Ave., cor. 15th St., New York.

**200 Egg Incubator For \$12.00.**

The simplest, most perfect incubator made in the world. This is a new one at a remarkably low price. It is an enlargement of the famous

## WOODEN HEN

and made as thoroughly good as any incubator on the market. It will hatch every fertile egg put in it and stand up to regular usage as well as the most costly. Write for free catalogue.

**GEO. H. STAHL, Quincy, Ill.**

**FOOS GAS and GASOLINE ENGINES.** 4 to 250 HIGHEST GRADE ENGINES FOR ALL POWER PURPOSES. Largest Exclusive Gas Engine Factory in America. Engines held in stock in principal cities for quick delivery.

SEND FOR OUR NEW ILLUSTRATED CATALOGUE 3. **FOOS GAS ENGINE CO.,** STATION A, SPRINGFIELD, O.

## PERFORATED METALS

FOR ALL USES. MADE AS REQUIRED.

**HARRINGTON & KING PERFORATING CO., CHICAGO.**