

Our students succeed because they use I. C. S. textbooks.

Steam Engineering

A course in Steam Engineering enabling students to pass examinations and secure better positions. Includes operation of dynamos and motors.


Teach by mail, Mechanical, Steam, Electrical, Civil and Mining Engineering; Shop and Foundry Practice; Mechanical Drawing; Architecture; Plumbing; Sheet Metal Work; Chemistry; Ornamental Design; Lettering; Bookkeeping; Stenography; Teaching; English Branches; Locomotive Running; Electrotherapeutics.

When writing state subject in which interested.

taught by mail.

International Correspondence Schools,
Box 942, Scranton, Pa.

GRAND PRIZE, PARIS, 1900.
HIGHEST AWARD POSSIBLE



The Smith Premier Typewriter

Is a Headlight

THAT MAKES CLEAR THE PATH TO BUSINESS SYSTEM AND SATISFACTORY CORRESPONDENCE.

SEND FOR CATALOGUE

The Smith Premier Typewriter Co.
SYRACUSE, N. Y., U. S. A.

Pick a Perfect Pencil

One with a "dependable" point, a uniform grade—one that draws a clear, sharp, well-defined line, and to do this you will have to choose



Dixon's American Graphite Pencils

the best made lead pencil in any country. Hard, soft or medium. Suitable for all purposes. Architects, draughtsmen, clerks, reporters, etc., find them a boon.

Send 16 cents for samples. Worth double the money.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

HOLD ON THERE!

Send 3c. for catalog of

Monarch Marine Gasoline Engines.

½ to 45 H. P. \$200 up.

Grand Rapids Gas Engine & Yacht Co.,
Grand Rapids, Mich.

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.

Patented.

The Ober Mfg. Co., 10 Bell St., Chagrin Falls, O., U. S. A.

SHEET METAL NOVELTIES.

WE ARE PREPARED TO MAKE ARTICLES AND STAMPINGS OF ALL KINDS AND SIZES. TOOLS AND DIES MANUFACTURED ON CONTRACT. FURNISH US BLUE PRINTS OR SAMPLES AND GET ESTIMATES.

STANDARD STAMPING CO.

DEPT. R. BUFFALO, N. Y.

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.

Acetylene Safety

Is tenfold greater than with city gas when our generator is employed. It stops making gas immediately you stop using gas. Fourteen sizes, \$15 to \$100. Write for our literature.

The Carbide Feed Generator

Is based on the only correct and approved system, that of feeding dry carbide in small quantities to a large volume of water. It is safe, simple, economical, practical and patented.

THE J. B. COLT COMPANY

21 Barclay Street, Dept. S., New York.
Philadelphia, Boston, Chicago.
Criterion Stereopticons. Acetylene Search Lights.

Typewriting machine, C. H. Shepard.	677,706	677,707
Typewriting machine, G. H. Smith.	677,746	677,748
Unhairing machine, J. C. Rothe.	677,425	677,426
Unloading apparatus, R. Thew.	677,610	677,611
Unloading apparatus, G. E. Titcomb.	677,718	677,719
Valve, rotary cut off, C. Piguet.	677,370	677,371
Valve, steam, O. Richter.	677,570	677,571
Valve, testing, E. Haffner.	677,569	677,570
Vegetable cutter, R. E. Royal.	677,473	677,474
Vehicle, R. McCluskey.	677,58	677,59
Vehicle brake, Callahan & Short.	677,635	677,636
Vehicle toe rail, S. P. Hotaling.	677,743	677,744
Vehicle top, W. J. Estes.	677,743	677,744
Vehicles, means for connecting differential gearing to driving axles of, E. T. Bird-sall.	677,771	677,772
Ventilator, T. A. Dungan.	677,344	677,345
Vulcanizer, electric, A. J. Conlin.	677,399	677,400
Washboiler, F. M. Bain.	677,394	677,395
Washing machine, C. S. Bradford.	677,629	677,630
Washing machine, E. Campbell.	677,636	677,637
Watch balance staff, D. H. Church.	677,638	677,639
Watch barrel, O. Ohlson.	677,689	677,690
Water bag, S. A. Woods.	677,489	677,490
Water cooling tower, J. E. Swendeman.	677,749	677,750
Water module or delivery regulator, C. E. Livesey.	677,361	677,362
Water, purifying, C. H. Koyl.	677,968	677,969
Water softening and purifying apparatus, C. H. Koyl.	677,669	677,670
Waxlike bodies by the action of oxidizing agents, producing, E. Schliemann.	677,703	677,704
Weather strip for doors, automatic, W. E. Morgan.	677,681	677,682
Weighing machine, J. Manes.	677,526	677,527
Well packing device, tubular, C. F. Prestor.	677,468	677,469
Wheel. See carriage wheel.		
Wheel equalizing mechanism, vehicle, T. B. Dooley.	677,401	677,402
Wheel securing device, T. A. Keogh.	677,520	677,521
Whistle, electric, S. A. Brown.	677,772	677,773
Windmill, A. A. E. Sterzing.	677,747	677,748
Windmill, A. T. Scott.	677,805	677,806
Window, pivoted, E. Hamblin.	677,541	677,542
Wire reeling machine, C. L. Winget.	677,487	677,488
Wire weaving loom, shuttle, W. I. Whitehurst.	677,727	677,728
Wrench, J. J. A. Miller.	677,529	677,530
Yoke fastening, neck, T. M. McVay.	677,369	677,370

DESIGNS.

Badge, L. Sickles.	34,702	34,703
Badge or similar article, W. L. Panikoff.	34,701	34,702
Beam, metal, N. H. Davis.	34,721	34,722
Boot or shoe, C. T. Maguire.	34,733	34,734
Bottle, H. C. Heinz.	34,712	34,713
Broiler, R. M. Harrington.	34,725	34,726
Brooch or pendant frame, J. H. Theherath.	34,705	34,706
Cane or umbrella ring, D. Rose.	34,705	34,706
Cheese mold, N. Simon.	34,726	34,727
Clothes pin, O. H. Greene.	34,713	34,714
Cream separator, P. C. Smith.	34,727	34,728
Cup, A. C. Bosselman.	34,710	34,711
Fabric, woven, W. T. Smith.	34,734	34,735
Fence wire, barbed, D. C. Smith.	34,715	34,716
Governor cylinder, L. O. Goodwin.	34,718	34,719
Last hinge member, J. T. Brown.	34,731	34,732
Nasal cup, W. J. Evans.	34,708	34,709
Plate, G. R. West.	34,711	34,712
Rail bond, A. H. England.	34,716	34,717
Rug, A. Petzold.	34,740	34,741
Saddletree, R. G. Davis.	34,722	34,723
Scale frame or box blank, W. N. Pelouze.	34,706	34,707
Sewing machine frame, R. G. Woodward.	34,730	34,731
Sewing machine needle lever, R. G. Woodward.	34,728	34,729
Shade fixture, window, C. F. Bassett.	34,714	34,715
Shaving cup, J. V. Reed.	34,709	34,710
Stove, G. Thompson.	34,724	34,725
Stove leg, gas, H. P. Stimpson.	34,723	34,724
Thill coupling plate, Kell & Garthe.	34,719	34,720
Tiling, A. Plant.	34,742	34,743
Tombstone or monument, E. C. Hodges.	34,743	34,744
Valve, governor, L. O. Goodwin.	34,717	34,718
Wagon stake, G. Paul.	34,720	34,721
Weighing machine case, coin controlled, B. H. Cook.	34,707	34,708

TRADE MARKS.

Anesthetic, liquid, H. J. Bell.	36,672	36,673
Apparel, certain named wearing, L. Baer.	36,664	36,665
Apparel, certain named wearing, B. Lowenstein & Bros.	36,665	36,666
Beer, ale, and porter,lager, Hudson County Consumers Brewing Co.	36,675	36,676
Butter, D. E. Wood Butter Co.	36,679	36,680
Buttons, vegetable ivory trousers, Newell Bros. Manufacturing Co.	36,663	36,664
Candles, H. H. Bergmann.	36,685	36,686
Canned goods, Stone-Ordnance Co.	36,681	36,682
Chain links, detachable, King & Hamilton Co.	36,682	36,683
Coaster brakes, H. C. England.	36,688	36,689
Coffee compound, J. Camrick.	36,677	36,678
Coffee, Java and Mocha, Winslow, Rand & Watson.	36,676	36,677
Cooperage, certain named, J. H. Hamlin & Son.	36,687	36,688
Fabrics, certain named, G. Willis.	36,666	36,667
Fire kindlers, certain named, T. D. Bausher.	36,686	36,687
Food products, certain named, Mattie Mitchell Co.	36,680	36,681
Foods, compressed, American Compressed Food Co.	36,683	36,684
Furniture, rustic, Old Hickory Chair Co.	36,689	36,690
Medicines, proprietary, L. L. Browning.	36,669	36,670
Medicines, proprietary, Liquid Ozone Co.	36,670	36,671
Optical apparatus and devices, L. B. Holborn.	36,661	36,662
Remedies, cough, J. S. Dorsey.	36,671	36,672
Silverware, H. W. Broderick.	36,673	36,674
Sugar, "A," American Sugar Refining Co.	36,678	36,679
Toilet preparations and soaps, certain named, G. C. Stevens.	36,668	36,669
Tonic, Clifford Chemical Co.	36,674	36,675

LABELS.

"E. B. F. Hayth's Great Egyptian Salve, for salves, E. B. F. Hayth.	8,506	8,507
"Empress Kitchen Set," for kitchen cutlery, Bridgeton Knife Co.	8,511	8,512
"Eucalypto," for a toilet preparation, C. W. Leffingwell, Jr.	8,504	8,505
"Gold Band Shoe Polish," for shoe polish, P. McLaughlin.	8,509	8,510
"Hood's Foot Friend," for a powder, Hood Chemical Co.	8,505	8,506
"Kentucky Belle," for whiskey, W. P. Strader.	8,501	8,502
"Life Saving Cholera Cure," for a medicine, L. V. Fischer.	8,507	8,508
"Lithia Salt," for mult extracts, A. Leber.	8,502	8,503
"Primos," for meats, A. von Cotzhausen.	8,510	8,511
"Shakespeare Rye," for whiskey, L. Blum.	8,500	8,501
"Stryx Tonic," for a hair tonic, W. D. S. Co.	8,503	8,504
"The Keystone," for cigars, J. M. Downs.	8,499	8,500
"The Penny Cobbler," for a leather dressing, G. M. Port.	8,508	8,509
"White House Kitchen Set," for kitchen cutlery, Bridgeton Knife Co.	8,512	8,513

PRINTS.

"Blowin' His Bazo," for harvesting machinery, McCormick Harvesting Machine Co.	367	368
"Chanut Gaunterie Parisienne," for gloves, J. M. Chanut & Co.	365	366
"La France Shoe," for shoes, Williams, Clark & Co.	364	365
"Miller," for paper hangers' trestles, H. M. Lay.	368	369
"The Singer Sewing," for sewing machines, Singer Manufacturing Co.	366	367

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. In ordering please state the name and number of the patent desired, and remit to Munn & Co., 361 Broadway, New York.

Canadian patents may now be obtained by 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.

CREST MFG. CO.

CAMBRIDGEPORT, MASS.

3 to 5 H. P. MOTORS

CREST Sparking Plug

Coils Batteries Carburetors

IF YOU SHOOT A RIFLE

Pistol or Shotgun, you'll make a Bull's Eye by sending three 2c. stamps for the Ideal Hand-book "A," 126 pages FREE. The latest Encyclopedia of Arms, Powders, Shot and Bullets. Mention SCIENTIFIC AMERICAN. Address CO., NEW HAVEN, CONN., U. S. A.

DICKERMAN'S

DURABLE DESKS

Don't buy until you get our catalogue—100 pages of money saving values.

AMERICAN STORE STOOL CO., 33 Howard St., New York

PUNCTURE PROOF TIRES

GLASS, NAILS, TACKS, ETC. WILL NOT LET THE AIR OUT

THEY SAVE YOU TIME, MONEY, TROUBLE, DELAY

Jim Company

CHICAGO ILL.

MENTION SCIENTIFIC AMERICAN.

STANDARD WIRING

for Electric Light and Power, as adopted by the Fire Underwriters of the United States; by H. C. CUSHING, JR., A. I. E. E., Electrical Engineer and Inspector; in use by over 35,000 Electrical Engineers, Central Station Managers and Wiremen. Because it is the only book on Wiring and Construction kept strictly up to date. Flexible Leather Cover, pocket size, \$1. Sent postpaid upon receipt of price, by H. C. CUSHING, JR., 39 Cortlandt Street, New York City.

NICKEL

Electro-Plating

Apparatus and Material.

Hanson & Van Winkle Co.,
Newark, N. J.
136 Liberty St., N. Y.
36 & 32 S. Canal St., Chicago.

LYON & HEALY'S

Own Make BRASS BAND

INSTRUMENTS. Indorsed by the great Jules Levy as the best in the world. Big Catalogue, 400 illustrations. FREE. Positively the lowest prices on Band Instruments, Uniforms and Supplies of all kinds. Also contains Music and Instructions for New Bands. Lyon & Healy, Manufacturers, 43 Adams St., Chicago. (Lyon & Healy is the largest music house in the world—Editor.)

LEROY RACER

Is in every way a strictly up-to-date mount. It is one of the handsomest bicycles on the market and a pleasure to own one. We manufacture bicycles in every state of completion or complete from \$25 to \$35 and guaranteed for one year. Get our catalogue. Address Bicycle Dept., John R. Keim, Buffalo, N. Y.

PATENTS

50 YEARS' EXPERIENCE

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.

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.

Send for Catalogue.

W. F. & JOHN BARNES CO., 1999 RUBY ST., ROCKFORD, ILL.

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 your home by mail. Institute indorsed by Thos. A. Edison and others.

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

WILLIAMS' SHAVING SOAP

These Faces Show

the difference between Williams' Shaving Soap and other kinds. The lather of most soaps is thin and watery and as soon as it is applied to the face begins to evaporate. It appears full of little pin holes (see face No. 1); the skin becomes hard and dry, the face burns and itches; it's torture to shave with such soap.

The lather of Williams' soap is always thick, moist and creamy (see face No. 2); it softens the beard, makes the skin soft, pliable and velvety, and renders shaving easy and agreeable.

Williams' soap is the only kind that

No. 1. No. 2.

"Won't Dry on the Face."

Only firm in the world making a specialty of Shaving Soaps. SOLD EVERYWHERE.

THE J. B. WILLIAMS CO., Glastonbury, Conn.
LONDON. PARIS. DRESDEN. SYDNEY.

"The Four-Crack Series."

This is the title of a series of books of travel and education issued by the Passenger Department of the

NEW YORK CENTRAL & HUDSON RIVER R. R.

These small books are filled with information regarding the best modes of travel and the education that can best be obtained by travel.

They relate specifically to the great resorts of America—to trips to the islands of the sea and around the world.

They also contain numerous illustrations and now and accurate maps of the country described.

A copy of the 40-page Illustrated Catalogue of the "Four-Crack Series" will be sent free, post-paid, upon receipt of postage stamp by George H. Daniels, General Passenger Agent, New York Central & Hudson River Railroad, Grand Central Station, New York.

NEW DOMESTIC SEWING MACHINES

are equal to two of any other, because they make both chain and lock stitch.

GENERAL OFFICES, 16 Exchange Place, New York.

½ H. P. GAS ENGINE CASTINGS

Materials and Blue Prints. Write for Catalogue 9.

PARSELL & WOOD, 129-131 W. 31st Street, New York.

ICE MACHINES, Corliss Engines, Brewers' MFG. CO., 885 Clinton Street, Milwaukee, Wis.

STEEL TYPEWRITER TYPE

TYPEWHEELS, MODELS & EXPERIMENTAL WORK, SMALL MACHINERY NOVELTIES & ETC. NEW YORK. STENCIL WORKS 100 NASSAU ST. N. Y.

MODELS & EXPERIMENTAL WORK.

Inventions developed. Special Machinery.

E. V. BAILLARD, Fox Bldg., Franklin Square, New York.

SHORTHAND BY MAIL.

Pioneer home course Catalogue and First Lesson Free.

Potts Shorthand College, Box 33, Williamsport, Pa.

AGENTS.

You can't find a better proposition. Honest business, large profits, advancement. Write, give us a chance to convince you. Lewis & Company, 406 North Third Street, St. Louis, Mo.

AGENTS

on salary or commission; \$12 daily or \$100 per month and expenses, selling our claim file to merchants and physicians. Sayers & Company, D 60, 408 Olive Street, St. Louis, Mo.

D'AMOUR & LITLEDAL MACHINE CO.

130 WORTH ST., NEW YORK.
PATTERN AND MODEL MAKERS.

STATLER'S Pan-American HOTEL

The Largest in the World. Send for map of city and Exposition grounds, also folder telling how to secure guaranteed accommodations.

F. C. STATLER, Prop., Statler's Hotel, at Exposition, Buffalo, N. Y. Statler's Restaurant, Ellicott Sq.

UPRIGHT DRILLS

Complete line, ranging from Light Friction Disk Drill to 42" Back Geared Self-Feed. Latest improvements. Up-to-date in every respect.

Send for Catalogue.

Established 1872.

W. F. & JOHN BARNES CO., 1999 RUBY ST., ROCKFORD, ILL.