Mdvertisements.

ORDINARY RATES.

Inside Page, each insertion. - 75 cents a line Back Page, each insertion. - - \$1.00 a line TF For some classes of Advertisements, Special and Higher rates are required.

The above are charges per agate line—about eight words per line. This notice shows the width of the line, and is set in agate type. Engravings may head advertisements at the same rate per agate line, by measurement, as the letter press. Advertisements must be received at Publication Office as early as Thursday morning to appear in the following week's issue.



Lathes Automatic Cross feed

9 and 11-inch Swing. New and Original Features Send for Catalogue B. Seneca Falls Mfg. Company, 695 Water St., Seneca Falls. N. Y

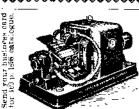
Foot power

...cutting

THE BICYCLE: ITS INFLUENCE IN Health and Disease.—By G. M. Hammond, M.D. A valuable and interesting paper in which the subject is exhaustively treated from the following standpoints: 1. The use of the cycle by persons in health. 2. The use of the cycle by persons in health. 2. The use of the cycle by persons diseased. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 1002. Price 10 cents. To be had at this office and from all newsdealers.









Ten inch pipe cut off and threaded by one man with ease.

Send for Catalogue.

CURTIS & CURTIS,



Little Giant Double Grip Drill Chucks, Little Glant Drill Chucks Improved, athe Chucks, Geared
ombination Lathe Chucks, Plain Universal Lathe
thucks, Independent Lathe Chucks, Made by
Westcott Chuck Co., Oneida, N. Y., U. S. A.
isk for catalogue in English, French, Spanish or German. TOURL CHILL CHILL

FIRST PRIZE AT COLUMBIAN EXPOSITION, 1893.

ROCK DRILLS AIR COMPRESSORS SIMPLEST, MOST EFFICIENT and DURABLE. (RAND DRILL CO.)

Send for Catalogue

100 Broadway, New York.

INVENTIONS INDEX OF

For which Letters Patent of the

United States were Granted

FEBRUARY 21, 1899,

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

Advertising, means for, Hawkins & Wright..... 620,033 619,946 619,908 619,721 620,003 619,775 620,060 619,768 620,012 619.796

The send of the cycle by persons in health. 2. The use of Months and the control of the control

Pieper (reissue).

Elevator. See Straw elevator.

Elevator vent device, pneumatic, J. K. Sharp

Fieper (reissue).

Elevator. See Straw elevator.

Elevator vent device, pneumatic, J. K. Sharpe, Jr.

Extractor. See Bolt or pipe extractor.

Fence machine, J. M. Keith tender.

Fence machine, J. M. Keith tender.

Fermentation of materials which have been rendered aseptic, J. Effont.

Filter Strainer, J. W. Hyatt.

Filter, Z. F. Potter.

Filter strainer, J. W. Hyatt.

Filter, Water, J. Ellis.

Fireproof celling, L. W. G. Lilienthal.

Fireproof celling, L. W. G. Lilienthal.

Foreps, device for crimping artificial, J. De Grandmont.

Forespe, druggist's bottle, P. H. Flynn.

Forespe, druggist's bottle, P. H. Flynn.

Funnace. See Crucible furnace.

Furnace. See Crucible furnace.

Furnace door, G. W. Wolf.

Game, coln freed, E. G. Matthewson.

Game, coln freed, E. G. Matthewson.

Gas burner, acetylene, E. H. J. Schulke.

Gas engine, P. Murray.

Gas engine, P. Murray.

Gas generator, acetylene, D. N. Long.

Gas generator, acetylene, F. O. McQueen.

Gas generator, acetylene, F. O. McQueen.

Gas generator, acetylene, F. O. McQueen.

Gas pipe joints and ends, locking clip for, F. J.

Gas generator, acetylene, F. F. Williams.

Gas pipe joints and ends, locking clip for, F. J.

Gas generator, acetylene, F. F. Williams.

Gas pipe joints and ends, locking clip for, F. J.

Gas generator, acetylene, J. F. Van Dervort.

Gas generator, acetylene, J. G. McJ.

Ga

Gearing. J. F. Morgan. 619.774
Germ of insect exterminator, E. W. Terrell. 620,079
Gin saw teeth, machine for cleaning and straightening, G. P. Roberts. 619,842
Glass or metal pipes, shrinking core for moulding, G. G. Winans. 619.815

(Continued on page 1/2)



apron, sunshade, lamps and pole or shafts, \$68; as good as sells for \$100.

WHY NOT SAVE IT?

WE HAVE NO ACENTS argest manufacturers of vehicles and harness in the world

IN VEHICLES WE MAKE

Rockaways, Surreys, Traps, Phaetons, Stanhopes, Driving Wagons, Top Buggies, Open and Top Road Wagons, Spring Wagons, Belivery Wagons, Milk Wagons and Wagenettes. In harness we make either single

double harness suitable to all the above vehicle SEND FOR LARGE FREE CATALOGUE.

Dead 16, good as as 115 for \$25

LKHART HARNESS AND CARRIAGE ELKHART, INDIANA.

LKHART HARNESS AND CARRIAGE ELKHART, INDIANA.



What the great soloists of Sousa's Band think of the Gram-o-phone.

"We consider the Gram-o-phone the only Talking Machine which perfectly reproduces the true tone qualities of our respective instruments."

ARTHUR PRVOR, Trombone Soloist.
HENRY HIGGINS, Cornet Soloist.
JEAN MOEREMANS, SAXOPHONE SOLOIST.
SIMONE MANTIA, Euphonium Soloist.
JOSEPH NORRITO, Clarionet Soloist.

The Gram-o-phone brings within the family circle actual reproductions of a hundred celebrated artists, and is used by the wealthy and refined for hlgh-class home entertainment Send for particulars, and how actual subscribers to the Scientific American may purchase this wonderful instrument on the installment plan.

THE NATIONAL GRAM-O-PHONE CO.

SEED DUE BILL FREE
Toget new customers to test my seed in will mail my handsome entailney a Toget new customers to test my see di for 1899, lithographed and beautifully illustrated, and a 10c. Due Bill, good for 10c. worth of seeds for trial, absolutely free, it is full of bargains. All the Beet Seeds, Bulbs, Plants, Roses, new Fruits, Farm Seeds, Potatocs, etc., at lowest prices. Ten Great Novelties offe ed without names. I will pay \$50. FOR A NAME for each. Don't buy our stock until you see this new catalogue. Several varieties shown in colors. Great inducements for orders this year.

until you see this new catalogue. Servial varieties show Great inducements for orders this year. You will be at my bargain offers. Send your address on Postai to-day friends to send too. Old customers will receive a cop F. B. MILLS, Seedsman, Box187, Rose Hill, N.Y.

BABBITT METALS.—SIX IMPORTANT formulas. Scientific American Supplement 1123. Price 10 cents. For sale by Murr. & Co. and all news-dealers. Send for 187 catalogue.

Rotary Neostyle 5.000 Copies from one original writ-ing or Typewriting. Operated by Crank, Treadle or **Electric Motor**. Speed 70 cop-ies per min-ute. Used and in-dorsed by leading firms and corpo-rations in every



NEOSTYLE CO. 98-102 Church St., New York

PRESSES, DIES and SPECIAL MACHINERY

For Sheet Metal Workers. WEST MFG. COMPANY Buffalo, N. Y., U. S. A.

TWO UP TO DATE

DRAWING TABLES Size of Top 20 x 23,

Adjustable to required height and angle. Shipped knocked down.

Price \$6.00 and \$8 00. Freight prepaid. Send for circular.
Adjustable Drawing Table Co.

Powers Opera House Block, Grand Rapids, Mich.



one year. Correspondence solicited. Address
ROTH BROS. & CO., Mfrs.
34 Market St., Chicago, III.

WOODWORKING MACHINERY. 🦡

For Planing Mills, Carpenters, Builders, Furniture, Chair. Vebicle, Wheel and Spoke Makers, etc. Correspondence Solicited. Illustrated 312-page Catalogue free

to manufacturers and foremen. THE ECAN CO. to 347 West Front Street, CINCINNATI, OHIO.



FOR A

REPAIR BICYCLES FO
EASY WAY TO MAKE A GOOD LIVING.
Bellows, Blowpipe, Vise, Files, Spokes, Pliers, Spoke Threader, Caliper,
Cones, Repair Farts. Complete Outfits. Send 25 cents, in U.S.
stamps, for illustrated treatise, "How To Repair BioyCles," by
competent authorities, and a fully illustrated catalogue embracing
thousands of bargains in Tools, Fittings, and Repair Parts.

THE FRASSE COMPANY, 21 Warren Street,



every machine shop will commend our Power Pipe Threading and Cutting Machine. Cones are central over machine, equalizing the weight. Within the cones are compound gears giving six changes of speed. Gears require so extra space, and are protected from dust or accident. Chasers can be opened, threaded pipe removed, another inscribed and cut without storping machine. Its Scutter Catalogue. THE MERRELL MFG. CO. 501 Curtiss Street, TOLEDO, OHIO.

PHOTOGRAPHY IN COLORS - FORmulas for producing photographs in colors by the Chassagne process. Scientific American Supplement, Nos. 1114 and 1125. Price 10 cents each, by mail, from this office and from all newsdealers.

ARMSTRONG'S No. 0 THREADING MACHINE



Can be attached to bench or post. Designed for threading the smaller sizes of pipe, iron or or brass, also bolts. Has two speeds, one for pipe 14 to 2 inches, inclusive. Uses the regular Armstrong adjustable dies. Other attractive features. Send for particulars. The Armstrong Mfg. Co., 139 Centre Street, New York. Bridgeport, Conn.

THE EUREKA CLIP The most useful a ticle ever invented for the purpose. Indispensable to Lawyens, Editors, Students, Bankers, Insurance Companies and business men generally. Book marker and paper clip. Does not mutilate the paper. Can be used repeatedly. In boxes of 100 for 25c. To be had of all booksellers, stationers and notion dealers, or by mail on receipt of price. Sample card, by mail, free. Manufactured by Consolidated Safety Pin Co., Box 121, Bloomfield, N. J.

SCREW-CUTTING DIE HEADS

SUREW - CUTTING DIE HEADS

SELF-OPENING and ADJUSTABLE.

The best die head on the market. Some advantages over "others," viz.: They are smaller, stronger, more compact, have no levers to spring, cannot be clogged by chips, are always reliable, and the prices are right. E Send for descriptive circular "S A." Our die heads are furnished in the send of th

CECMETRIC DRILL CO., WESTVILLE, CT.
EUROPEAN AGENTS: CHAR. CHURCHLL & CO., London, England,
WHITE, CHILD & BENEY, Vignus, Austria,

For Heavy Continuous Work & HOUSEHOLD PROBLEM SOLVED ₽<u>B</u> by covering Furnace and Heater Pipes with



GAST'S ASBESTOS AIR CELL COVERING

NEW YORK

Estimates and samples can be had for the asking. Estimates and samples can be had for the asking.

New York Fire Proof Covering Co.
23 Dey Street, New York. 23 Dey Street, New York.

INGERSOLL WHEELS. Sout only to riders, no Deaters' Frofile Mighest Grade, \$25. Broades. Guarantee. Large Mail Order Catalogue of Bioy-Cles and Sundries FREE. R. T. KUERSOLL & BHO, Dept. 147, 87 Cortlandt St., N. Y. C.





The Little Giant gets better results on fire than extinguishers costing from \$15 to \$25. The only fire extinguisher indorsed and used by the Fire and Marine Insurance Companies, as a whole, in New York City also used in the New York Fire Debartment. Every Municipal building belonging to New York City is equipped with this extinguisher; also adopted and used by the United States Navy and United States Army. Likht, cheap, simple, durable and efficient.

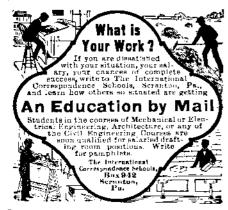
Have extinguished hundreds of accidental fires in the past two years. Never fails to put out fire. Needs no care or attention. Any child can work it. No acids are used and no gases are generated until the solution comes in contact with fire, thus preventing explos on. This cannot be said of any other fire extinguisher in the world. If AGENTS WANTED.

18 Books and pamphlets sunt FREE on application. Our book of 50 pages describing accidental fires extinguished, you will find most interesting.

you will find most interesting.

We guarantee every extinguisher, and when used at accidental fires they are replaced with new ones by giving us a testimonial of the fire uchnowledged before a notary public.

The Little Giant Fire Extinguisher Co., 22 Liberty St. N,Y.





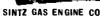
\$7.75 5.00 2.75 .25 1.50 3.75













SEND IDG FOR 126 PAGE ILL. SATALOGUE.

SEND IDG FOR 126 PAGE ILL. SATALOGUE.

OF PARTS OF L.S.

GOODNOW & WIGHTMAIN "WOLVERINE" GAS AND GASOLINE



ENGINES, STATIONARY The "Wolverne" is the only re-versible Marine Gas Engine on the market. It is the lightest en-

HOW TO MAKE AN ELECTRICAL Furnace for Amateur's Use.—The utilization of 110 volt electric circuits for small furnace work. By N. Monroe Hopkins. This valuable article is accompanied by detailed working drawinss on a large state, and the furnace can be mide by any amateur who is versed in the use of tools. This article is contained in Starvisic AMERICAN SUPPLEMENT, No. 1182. Frice ill cents. For sale by MUNN & CO., 30 Broadway, New York City, or by any bookseller or newsdealer.



Gold from river beds, apparatus for collecting,
J. T. Davis.

Gopher trap, C. W. Roth.

Grain, etc., apparatus for elevating, R. Folsche.

Grain trimming device. T. J. Skillin.

Graphophone, D. S. Williams.

Graphophone, D. W. S. Williams.

Graphophone, D. W. S. Williams.

Graphophone, D. Cruise.

Graphophone, D. C Gold from river beds, apparatus for collecting,

Burns.
Seed drill, R. H. Sleister
Self-leveling chair for ships, W. M. Knox.
Sewers, water closets, etc., cleaning device for, J.
Wrigley.

Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Sewing machine fair attachment, S. A. B. Burke. 619,835
Shoot obot of seving device, F. F. Williams. 619,835
Shoot obot stretcher, F. G. Pabst. 619,835
Shoot obot stretcher, F.

(Continues on page 143)

ON'T WORK all your life in the same old rut. Get out of it. We will increase your knowledge and earning capacity if you will devote some or your spare time at home outlay. Thorough courses by mail in Electrical, Mechanical, Civil, Mining, Steam, and Santree. Seven years experience in teaching by correspondence. Write for free illustrated 100 page S. A., sample pages of text books, drawing plate, and booklet of letters from students all over the world.

THE UNITED CORRESPONDENCE SCHOOLS, 156 Fifth Avenue, New York.

Annapolis and West Point OUFFS HELD... It costs the Government \$7,000 to educate a Naval Cadet; it costs the American Boy nothing. The Annapolis, West Point and Military School Handbook tells exactly how to secure appointments to Annapolis, the Point, Schoolship St. Mary's and the Naval Apprentice Training School at Newport. Prepaid, 5 cc. Cloth bound, 75c.

IGNITION OF GAS or GASOLINE



AMERICAN PATENTS. - AN INTEResting and valuable table showing the number of patents granted for the various subjects upon which petitions have been filed from the beginning down to December 31. 1894. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 1002. Price 10 cents. To be had at this office and from all newsdealers.



P8u 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. The CLEVELAND STONE CO. 2d Floor, Wilshire, Cleveland, O.

For the Best Ruling Machines, Hand and Power, with or without the



BURROWS IDEAL AUTOMATIC STRIKER and LAPPER,
IDEAL BEAM STANDARDS, and LAPPER. IDEAL INK FOUNTAINS, and IDEAL CRANK, apply to

E. J. PIPER, Manufacturer, Springfield, Mass.

PERPETUAL MOTION

A valuable series of papers giving all the classic forms of perpetual motion apparatus. The literature on this subject is so very limited, the only book being entirely out of print, so that this series will be imported to all inventors. 33 illustrations. Scientific American Superiment. Nos. 1136, 1131, 1133, 1135, 1136, 1137, 1138, Price, Illcents cach. For sale by Munn & Co. and all newsdealers. Send for new catalogue.

with the Improved Wash-burne Patent Cuff Hold-ers can be placed just where you want them; will never slip but may be instantly re-leased. Drawers Supporters, easily adjusted or taken off-excelent for bolding golf trousers. By mail, 20c. the pair. By Catalogue showing these and other novelties, free,





REVERSIBLE COLLAR CO., Dept. J. Boston, Mass



Revolutionary Newspapers, Magazines, Broadsides, etc.

Any one wishing to dispose of any colonial or revolutionary papers, etc., may correspond with the undersigned. Please describe the condition and state price.
M. A. C., care Scientific American Office, New York.

INGERSOLL '99 BELL, 25c.



A regular 50c. Electric-Kroke Bicycle Bell; cat shows the Patent
Rotary Movement. Pure Bell Metal
Gone; none better made. Postpaid
25c. Single Stroke Bell 15c.
Send for Big Catalogue of Bicycle
and Sporting Goods, FREE, R. H.
INGERSOLL & BRO., Dept.
147, 67 Cortlandt St., N. Y.

Chain BELTING of Various Styles, ELEVATORS, CONVEYORS, COAL MINING and HANDLING MACHINERY.

The JEFFREY MANUFACTURING CO., COLUMBUS, O. Send for latest complete Catalogue.

New York Branch, 41 Dey Street.

Sunlight Camera.

Makes a fine picture. Has a good lens and shutter for both instantaneous and time exposures. Uses class plates 34 x 4 ½. It can be used with tripod. Two extra holders can be carried in the camera. Price \$3.50. Send 5c for sample picture. Sunlight Junior, 34x35 plates, price \$2.00. Full equipments for developing and printing furnis



22.00. run equipments for developing and printing furnished for \$2.50 each. Photographs colored. Cir. Free. LORD & CO., 487 B'way, N.Y.

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



"NEW STANDARD"

NECKTIE PIN OUTFIT.

By mail, prepaid, ONE DOLLAR.
Unlike all others. The smallest, neatest and most durable ever placed on the market. Liberal discount to jobbers. WILLIAM ROCHE, Inventor and Sole Manufacturer. 2304 Greenwich Street, New York, U. S. A.

ADDIVE OF

METHOD AND SYSTEM are the basis of success in business. Use therefore in your counting-room a CASH RECORDER
The only Perfect
Cash Recorder in
existence, Made
by the HOUGI
CASH RECORD-

LAURCH—A detailed description of the motive power of a Modern Naphtha Launch, with sectional views showing all the parts of the boiler and engine. A most valuable paper, 4 illustrations. Contained in SUPPLEMENT 1744. Price 10 cents. For sale by Munn & Co. and all newsdealers. THE MACHINERY OF A NAPHTHA

MORAN FLEXIBLE JOINT for Steam, Air or Liquids. Made in all sizes to stand any desired pressure. Send for reduced price list. loran Flexible Steam Joint Co., Inc'd 147 Third Street, LOUISVILLE, KY.



PALMER Stationary and Marine Gasoline En-gines and Launches, Motor Wagon Engines. Engine Castings, Fumpling En-gines Send for catalog. MIANUS, CONN.

SENSITIVE LABORATORY BALANCE. SEINSITIVE LABORATORY BALANCE.
By N. Monroe Hopkins. This "built-up" laboratory
balance will weigh up to one pound and will turn with a
quarter of a postage stamp. The balance can be made
by any amateur skilled in the use of tools, and it will
work as well as a \$125 balance. The article is accompanied by detailed working drawings showing various
stages of the work. This article is contained in ScienTIFIC AMERICAN SUPPLEMENT, No. 1184. Price 10
cents, For sale by MUNN & Co., 361 Broadway, New
York City, or any bookseller or newsdealer.



LEAVE NEW YORK ARRIVE CHICAGO 4.30 P. M. next day,

by the New York Central's "Lake Shore Limited." The most comfortable and luxurious long distance train in the world.

MILES IN

A booklet on the "Lake Shore Limited," containing also a novel and unique descriptive time table of this wonderful train, will be sent free by addressing George H. Daniels, General Passenger Agent, Grand Central Station, New York.



This \$300.00 Launch for \$200.00, guaranteed or money refunded. Also builders of Row and Sail Boats. Sendstamps, 10c., for catalogue, specifying line required.

RACINE BOAT MANUFACTURING CO., CHICAGO

Our Folding Boats are puncture proof. Galvanized steel ribbing. For hunting, fishing, exploring and family pleasure. Walter Wellman took them on his polar trip. Lieut. Schwatkaexplored the Yukou with them. Awarded first premium at World's Fair. Send 6c, for cat-alogue. 40 engravings. KING FOLDING CANVAS BOAT CO., Katamazoo, Mich





Founded by Mathew Carey, 1785.

HENRY CAREY BAIRD & CO. INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS

810 Walnut St., Philadelphia, Pa., U. S. A.

TF Our New and Enlarged Catalogue of Practical and Scientific Books, 22 pages, 8vo, a New Catalogue of Books on Steam, the Steam Engine, etc., and our other Catalogues, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish us with his address.



placed upon your kitchen range will supply the family liberally with sparkling distilled water. Most Scientific in con-struction. Largest guar-anteed capacity. Highest award at Omaha Expo-sition. Endorsed by Ral-ston Health Club. Send postal for booklet "B" to

The A. R. BAILEY MFG CO. 54 Maiden Lane, N. Y.

CROOKES TUBES AND ROENTGEN'S the use of Crookes tubes as a source of excitation. All about Crookes tubes. Scientific American Supplement, Nos. 181, 189, 238, 243, 244, 792, 795, 905, 908, 1050, 1054, 1055, 1056, 1057, also Scientific American, Nos. 7, 8, 10 and 14, Vol. 74. These profusely illustrated Supplements contain a most exhaustive series of articles on Crookes tubes and the experiments performed with them. Among them will be found Prof. Crookes' early lectures, detailing very fully the experiments which so excited the world, and which are now again exciting attention in connection with Roentgen's photography. Price10 cents each. To be had at this office and from all news dealers.



What is so important as Health — impossible without Pure Water! It postpones age and its infirmities.

The Sanitary Still

is simple, economical, and effectively produces distilled (the only pure) water. Our \$10.00 Still has twice the capacity of others, and is the only Still recognized by the U. S. Govt. Send for booklet.

THE CUPRIGRAPH CO., 138 N. Green St., Chicago

No Money in Advance! Sij550

Shipped anywhere C. O. D. with privilege to examine. Latest sty les for Men Women, Boys and Girls, well made and durable. Sign "Quikwood" \$22.50 (Others at \$10, \$12.50, \$15.50, \$17.50 a \$19.60 at 18.50 at 18.50, \$10.50 at 19.60 at 18.50 a

ACETYLENE GAS AND CARBIDE OF ACETYLENE GAS AND CARBIDE OF Calcium.—All about the new illuminant, its qualities, chemistry, pressure of liquefaction, its probable future, experiments performed with it. A most valuable series of articles, giving in complete form the particulars of this subject. Details of furnaces for making the carbide, gas generators, gasometers, burners, etc. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NOS. 998, 1004, 1007, 1012, 1014, 1015, 1016, 1022, 1035, 1038, 1057, 1064, 1071, 1072, 1082, 1083, 1084, 1085, 1086, 1104, 1124, 1132, 1149 and 1150. Price 10 cents each, by mail, from this office, and all newsdealers.



8000 BICYCLES
Overstock: Aust Be Closed Out.
STANDARD '98 MODELS,
Guaranteed, \$9.75 to
\$16. Shopworn & secput hand wheels, good

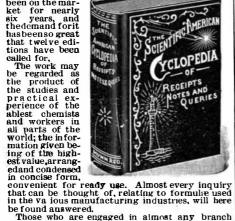
town FREE USE

TOMKINS HORSE BLANKET PIN. Protect your horse and save your blanket. Once adjusted, al-ways ready. Sent by mail 10c., or 2 hooks and 1 breast pin 25c

Nickel plated. S. P. TOMKINS, TILLY FOSTER, N.Y. THE SCIENTIFIC AMERICAN Cyclopedia of Receipts, Notes & Queries

12,500 RECEIPTS. 708 PAGES. Price, \$5.00 in Cloth; \$6.00 In Sheep; \$6.50 in Half Morocco, Postpaid.

THIS great work has now been on the mar-ket for nearly six years, and thedemand for it



in the va ious manufacturing industries, will not be found answered.

Those who are engaged in almost any branch of industry will find in this book much that is of practical value in their respective callings. Those who are in search of independent business or employment, relating to the home manufacture of salable articles, will find in it bundreds of most excellent suggestions

MUNN & CO., PUBLISHERS, Office of the SCIENTIFIC AMERICAN. 361 BROADWAY, NEW YORK.

١	Tap for beer or other kegs, H. Mock	619,348	
ı	Tap for beer or other kegs, H. Mock. Telephone, J. T. Gent et al (reissue) Telephone apparatus, coin controlled and registering, Cransfor & Williams. Telephone call register, B. Krausse Telephone exchange annunciator, W. R. Cole Telephone switchboard circuit, T. C. Wales, Jr. Ticket machine, pin, W. G. Metcalf Tire, vehicle, J. J. Czepull Tongue cap and line guard, Lockrem & Estwik. Tooth crowns annuratus for casring subt dies	11,719	
ı	tering Creneton & Williams	619 868	
ł	Telephone call register R Kruusse	620,042	
ı	Telephone exchange a non neighbor. W. R. Cole	619.942	
١	Telephone switchboard circuit, T. C. Wales, Jr	620,004	
	Ticket machine, pin, W. G. Metcalf	619,773	
	Tire, vehicle, J. J. Czepull	619,871	
ı	Tongue cap and line guard, Lockrem & Estwik	619,969	
ı	Tooth crowns apparatus for casting split dies for artificial, J. H. Slinkman. Towel holder, O. S. Fitzsimons.		
ı	for artificial, J. H. Slinkman	619.847	
1	Towel holder, O. S. Fitzsimons	619.948	
ı	Toy, H. T. Kingsbury. Toy, Kissinger & Matthias. Toy puzzle, P. Gasparine. Track sanding device, W. H. Kilbourn. Tration order bolder and signal, A. McKanna. Tran order bolder and signal, A. McKanna. Tran See Kish tran Couper tran Mouse.	619,759	4
ı	Toy, Kissinger & Matthias	619,762	
ı	Observanding device W U Vilhoum	620,031	
ı	Praction engine I M Hamilton	620,030	
ı	Train order holder and signal A McKanna	614 778	
ı	Trap. See Fish trap. Gopher trap. Mouse	525,	
ı			
Ì	Trolley, electric railway, E. M. Bentley	619,926	
ı	Tube forming apparatus, E. F. Holinger	619.747	
	Tufting apparatus, cushion, A. Freschl	620,070	
	Tug, shaft, Colligan & Daley	619,943	
3	Twisting machines, kink preventer and signal	### CO#	
	Tor, J. E. Tynan	619,807	
ı	Typewriter platen pawl, J. H. Niles	619,985	
ı	Typewriting machine, w. J. Barron	619 (11	
١	Typewriting machine, J. Felbel	619 777	
	trap. Trolley, electric railway, E. M. Bentley. Tube forming apparatus, E. F. Holinger. Tufting apparatus, cushion. A. Freschi. Tug., shaft. Colligan & Daley. Twisting machines, kink preventer and signal for, J. E. Tynan. Typewriter platen pawl, J. H. Niles Typewriting machine, W. J. Barron Typewriting machine, J. Fielbel. Typewriting machine, J. H. McElroy. Typewriting machine, J. H. McElroy. Typewriting machine, J. H. McElroy. Typewriting machine, M. A. Wier. Umbrella notch joint, J. H. Fleisch	619 855	
	Umbrella notch joint. J. H. Fleisch	620,025	
	Umbrella stick, W. Morrison	619.831	
	Unicycle, H. G. Wise, Jr	619,816	
	Upper folding machine, L. T. Ad ams	619,922	
	Umbrella notch joint, J. H. Fleisch. Umbrella stick, W. Morrison. Unicycle, H. G. Wise, J. Upper folding machine, L. T. Ad ams. Valve, ball. J. Douglas.	619,732	
	Vehicle spring, W.C. Holland	619,748	
	Venicle wheel, H. J. Shawcross	615,846	
	Ventiletor See Corportiletor	019,010	
	Vise, anvil I. Stover	620.001	
	Voltaic battery, H. D. Hamilton	619.885	
	Wagon, dumping, Wuest & Klatt	620.081	
	Wagon starter, B. J. Sykes	620,059	
	Wall furring, E. R. Leonard	619,968	ı
	Washing machine, T. W. Stone	619,910	í
ĺ	Water heating apparatus, M. H. Dorgan	619,876	ı
	Water, purifying, J. Wilson	619,510	ı
	Welding machine cligin H Snuhl	619 850	ı
	Wells, tubing or casing joint for artesian and oil	015,050	ı
	Velocipede, land and marine, J. C. Young, Jr. Ventilator. See Car ventilator. Vise, anvil, L. Stoyer. Voltaic battery, H. D. Hamilton. Wagon, dumping, Wuest & Klatt. Wagon starter, B. J. Sykes. Wall furring, E. R. Leonard. Washing machine, T. W. Stone. Water heating apparatus, M. H. Dorgan. Water, purifying, J. Wilson. Weighing apparatus, G. U. Merrill. Weighing apparatus, G. U. Merrill. Weilding machine, chain, H. Spuhl. Wells, tubing or casing joint for artesian and oil, T. J. Bray. Wheel. See Spring wheel. Vehicle wheel. Whistle, F. L. Johnson.	619821	ı
•	Wheel. See Spring wheel. Vehicle wheel.		l
	Whistle, F. L. Johnson	620,037	ı
	Wig foundation, C. C. Cotin	619,823	l
	Winding machine thread oiling device, E. E. Kil-	(13.000)	ł
	bourn	615,893	ı
	Windless W. T. Wood	690,004	ı
	Windmill M W Goodrich	619 954	l
	bourn. Windlass, E. M. Carr. Windlass, W. T. Wood Windmill, M. W. Goodrich. Window frame and sash. C. A. Eighmy Wire drawing machine, C. A. Cowles. Wire, machine for stringing drawing dies upon,	620.023	ı
	Wire drawing machine, C. A. Cowles	619.724	I
	Wire, machine for stringing drawing dies upon.	-10,1-2	ı
	C. A. Cowles.	619,723	ĺ
	C. A. Cowles. Wirerings and attaching clips thereto, machine	,,	١
	for making, A. Calleson	619,937	ĺ
	Wire screen, Hip olito & Mastin	619,958	١
	Wire stretcher, A. A. Coon. Wire twisting machine. L. W. Noyes. Wool, cotton, etc., machine for cleaning and card-	620,018	ĺ
	Wool cotton etc. machine for cleaning and cord	019.162	ĺ
	ing, J. D. Morel	619.979	۱
	ing, o. D. Motel	010.010	ı

DESIGNS.

н	
١	Bedstead head or foot, J. M. Adams
1	Bicycle frame, E. C. Stearns. 30,245
ı	Bicycles, etc., fork tube for, W. H. Fauber 30,243
ı	Bicycles, etc., 10 R tube 10, W. H. Fauber
ı	Boiler plate. E. P. Waggoner 30,246 to 30,248
ı	Box or like article, ornamental powder, B. G.
ı	Taite
1	Carpet border, J. Spring 30,257
1	Chain link, J. Smith
1	Chain link, J. Smith
ı	Corkscrew handle, W. R. Clough 30,234
1	Counterbalance spring casing, J. M. Gagan 36,238
١	Cream separator, J. E. Phillips
1	Fabric, A. Bierman 30,258
ı	Garment hanger, F. Sager 30,231
1	
ı	
ı	Hammock back, W. A. Green
1	Hook, trouser A. J. Shipley 30,232
1	Lamp body, F. Rhind 30,249
	Lamp chimney, W. Buttler
	Lever, A. A. Longman
	Massage tool, M. E. Barnet 50,230
	Match safe or tray, B. Wolf
	Nut cracker base, A. Baumgarten
	Pattern, coat, F. W. Beberdick 30,259
	Pliers, member for pair of, L. P. Smith 30,237
	Pouring guide, L. Melcher
	Punch die or cutter. O. Sohni. 31.2%
Ŋ	Scraper, cotton, Z. N. T. Milirons
	Scraper, cotton, Z. N. T. Minrolls
	Sewing card perforators, frame for, J. R. Orwig 30,240
	Stair corner guard, F. D. Goodwin
	Tag, J. C. Wells
	Thermometer case, J. B. Gabe 30,225
	Trousers fastening bar, A. J. Shipley 30,233
	Type, font of, J. W. Phinney
	•
1	

TRADE MARKS.

ı		ı
	Antiseptic and germicidal compound, R. & F. Schweickhardt	١
	Bales of cotton and other fibrous goods. Planters	١
	Chemical substances, certain named, Actien Ge-	١
	sellschaft fur Anilin Fahrikation32.529 to 32.542 Coffee, Hygienic Specialty Company32,517	١
ı	Firearms, Colt's Patent Fire Arms Manufacturing Company	١
	Grease for lubricating purposes, Snowdon Sons &	l
	Company	l
	Hats and caps, men's and boys', Boogher, Force	l
	& Goodbar Hat Company 32,510 Knit goods or underwear, Hay & Todd Manufac-	I
	turing Company	I
	Company	١
	Medicinal remedies, certain named, E. L. Andrews	I
	Medicines and toilet preparations, proprietary, L.	١
	Oil, illuminating, Union Chemical Company 32,634	١
	Paints, certain named, A. A. Eberson	١
	Hammond	١
	Soap, Montgomery & McGrigory	ı
	Soap, laundry, toilet, and scouring, F. Acker &	ı
	Company 32,526 Starch, laurdry, W. P. Clotworthy 32,515 Tea, package, Oakford & Fahnestock 32,516	1
	Toilet preparations, certain named, M. C. Whelan 32,525	١
		-1

PRINTS.

" for glazed kid leather.

LABELS.

LABELS.

"Armstrong's Furniture Polish," for a furniture polish, Armstrong Furniture Polish Company. 6.829
"Dare's Elixir Mentha Pepsin," for a remedy for certain named diseases, C. F. Dare & Son. 6.827, 6.828
"Dutch Java Blend Coffee," for coffee, Dayton Spice Mils Company. 6.824
"Fill the Basket." for egg food, J. W. Barwell. 6.823
"Mellin's Food for Infants and Invalids," for food for infants and invalids, Mellin's Food Company. 6.820
Mellin's Infants' Food." for food for infants and invalids, Mellin's Food Company. 6.820
"Peirce's Golden Rio Coffee," for coffee, O. 21
"Peirce's Golden Rio Coffee," for coffee, O. 21
"Peirce & Company. 6.825
"Uncle Sam's Button Shine," for a cleaning and polishing preparation, R. F. Bradbury. 6.836
"Wurtzberger Mait Extract," for mait extract, W. E. Beckham. 6.826

A printed copy of the specification and drawing of any patent in the foregoing list or any patent in print issued since 18% 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. Special rates will be given where a large number of copies are desired at one time.

Canadian parents may now be obtained by the inventors for any of the inventions named in the foregoing list, provided they are simple at a cost of \$40 each. If complicated the cost will be a little more. For full instructions address Munn & Co., El Rroadway, New York. Other forcing parents may also be obtained.

CAN I BECOME AN ELECTRICAL ENGINEER?

For our Free, handsomely illustrated book entitled ** Can I Become an Electrical Engineer? **

Address THE ELECTRICAL ENGINEER INSTITUTE OF CORRESPONDENCE INSTRUCTION, Dept. A. (Conducted under the auspices of "'I'HE ELECTRICAL ENGINEER"),

Endorsed by Every Prominent Electrical Engineer.

120-122 Liberty Street, New York, U. S. $\Lambda_{\rm c}$

ELECTROTYPING.

Wood Base, Patent Metal Base, and Patent "Interchangeable"; Job, Catalogue and Book Plates. ONLY GOOD WORK.

Wm. T. Barnum & Co. 424 State & 103 Court Sts. New Haven, Conn.

"REEVES" Variable Speed Counter Shaft

r securing any speed without change of belt loss of time. Specially adapted for all nds of experimental machinery, Printing resses, Motor Carriages, Ironworking Tools, oodworking Machinery, or any and all maniers requiring a chanke of speed or feed.

The Send for handsomely illustrated Catalogue "S. A." free.

REEVES PULLEY CO., Columbus, Ind., U. S. A.

STEVENS' MECHANICAL CATECHISM.



Indispensable to all Steam Engineers, Indispensable to all Steam Engineers, Machine Han, Electricians, Firemen and Mechanice spenerally. New and original. All modern machinery fully described and explained. Technical points made sectional illustrations, and over 300 pages of text. Descriptions alternate with exhaustive sets of Questions and Answers, affording an effective preparation for Civil Service Examinations. Subjects treated: The Boiler and Engine, Combustion, Safety Vaive, Injector, Link Motion, Lubricator, Indicator-tiety, Dynamos, Motors, Link Motion, Lubricator, Indicator-tiety, Dynamos, Motors, Link Motion, Lubricator, Indicator-tiety, Dynamos, Motors, and Control of the Cont



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

A handsomely illustrated weekly. Largest circulation of any scientific journal. Terms, \$3 ayear; four months, \$1. Sold by all newsdealers. MUNN & Co. 361 Broadway, New York

INGERSOLL CYCLOMETER. 25c.

Most Durable, Practical and Cheapest; 10,000 Miles and Repeat; constantly Moving Hand shows Every Poot of Frogress—not every Quarter-Mile; attaches to Fork or Hulb. Exally Read from Saddle. Postpaid 25c., Large Mail Order Catalogue of Bicycles and Other Goods FREE. ROBT. H. INGERSOLL & BRO. Dept. 147, 67 Cortlandt St., N. Y. C.





HALF A CENTURY OF CYCLES.—AN HALF A CENTURY OF CYCLES.—AN interesting history of the cycle from its origin up to the present time. The first crank-driven bloycle. The "bone-shaker" and its successors. The tricycle. The modern wheel. Cycle building a science. Points of improvement. The pneumatic tire. A hand and foot cycle. With 9 illustrations. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 1412. Price 10 cents. To be nad at this office and from all newsdealers.



would make a good title for our 228page BOOK ON POULTRY, for it reads like a romance. Tells all about hatching and brooding chicks; gives plans for poultry houses; description and cuts of all leading breeds of pure bred fowls and incidentally about the "OLD RELIABLE" INCURATOR, 10c. get as copy. RELIABLE INCB. & BROODERCO., Box B I 05, Quincy, Ill.

Before You Send & C. forour No. 10 catalog. Tells how you can make money with the Buy an action Regulator—prevents overheating. Thousands are batching 100 per cent with it. 50 cg Bantam & 55.00—larger you 30 days trial before you pay a cent. 10.000 satisfied customers annually, BUOKEYE INCUBATOR CO., Springfield, Ohio.

PROPOSALS.

SEALED PROPOSALS WILL BE RECEIVED AT the office of the Light-House Engineer, Baltimore. Md., until 12 o'clock M., March 15, 1899, and then opened, for furnishing the material and labor of all kinds necessary for the erection and delivery of the Hooper Island Light-House, Md., in accordance with specifications, copies of which, with blank proposals and other information, may be had upon application to W. A. JONES, Lieut.-Colonel, U. S. A.

SEALED PROPOSALS WILL BE RECEIVED AT the office of the Light-House Engineer, Baltimore, Md., until 12 o'clock M., March Is, 1898, and then opened, for furnishing the material and iabor of all kinds necessary for the completion and delivery of the metal work for Hooper Island Light-He use, Md., in accordance with specifications, copies of which, with blank proposals and other information, may be had upon application to W. A. JONES, Lieut.-Colonel, U. S. A.

REFRICERATION One to 25 tons daily capacity. Challoner's MACHINE

I desire to purchase some good patent right, or would furnish money to patent an acceptable invention for a part interest therein. H. McCoy, Annapolis, Md.

MODELS WE ASSIST INVENTORS.

Ideas for Asking. | 137 Catalogue Free.

J. C. SEYL, 181 Madison St., CHICAGO.

FOR SALE Foreign patents protecting a unique and useful invention. Address patentee, L. M. Campau, 94 Fort Street W., Detroit, Mich.

TURBINES JAS. LEFFEL & CO. Springfield, Ohio, U. S. A.

Experimental & Model Work Cir. & advice free. Wm. Gardam & Son. 45-51 Rose St., N.Y.

NOVELTIES & PATENTED ARTICLES Manufactured by Contract. Punching Oles, Special Machinery. E. Konigslow & Bro., 181 Seneca St., Cleveland, O.

GRINDING MILLS FOR ALL PURPOSES. Bogardus Patent Universal Eccentric Mill. Address J. S. & G. F. SIMPSON, 28 Rodney Street, Brooklyn, N. Y.

INVENTORS We make Special Machinery, Models, Pat-Also patented novelties by contract. Eagle Tool and Metallic Mig. Co., Cor. 5th & Elm Sts., Cincinnati, O.

GAS NO GASOLINE ENGINES WATER MOTORS BACKUS WATER MOTOR CO. NEWARK N.J. U. S. A.

A LARGE AND SURE INCOME IN THIS

A simple and effective Nut Lock Patent for sale or on royalty. Costs no more than ordinary bolts and never falls to hold under any conditions. It is one of the practical ideas. Address, E. W. Lynch, Brainerd, Minn.

WANTED Assistant Foreman for Machine Sh Active young man who is familiar w modern machine shop methods and who has had perience in engine building and repairing. Apply mail, stating age, nationality and past experien The Atlantic Works, East Boston, Mass.





Sa Day Sure
Bendus your address
and we will show you
how to make \$3aday
absolutely sure; we
the locality where you live. Sendus your address and we will
how to make \$3aday
absolutely sure; we
the locality where you live. Sendus your address and we will Of \$3 for every day's work, absolutely sure, write at once.

ROYAL MANUFACTURING CO. Box 713. DETROIT, MICH.



A New Idea in Trunks The STALLMAN DRESSER TRUNK
is constructed on new principles.
Drawers instead of trays. A place
for everything and everything in its
place. The bottom as accessible as
the top. Defles the baggage-smasher.
Costs no more than a good box trunk.
Sent C. O. D., with privilege of examination. Send 2c. stamp for illus-

F. A. STALLMAN, 61 W. Spring St., Columbus, Q.





THE CYPHERS Incubator and Brooder

The Only Practical System of Incubation. Moisture Self-Supplied and Regulation Ab-solute. Produces Strong, Healthy Stock. GOES PREIGHT PREPAID. Send 10c. for fully Rustrated Catalogue to the

CYPHERS INCUBATOR CO. Wayland, N. Y.

