### **Machine Design**

Railroad, BI COURSES & Bridge Engineering; Surveying and Mapping; Book-Keeping; Shorthand; English Branches; Architecture; Mining; Metal Prospecting. All who GUARANTEED SUCCESS. Fees Moderate, Advance or Installments.



CROOKES TUBES AND ROENTGEN'S CROOKES TUBES AND ROENTGEN'S Photography.—The new photography as performed by the use of Crookes tubes as a source of excitation. All about Crookes tubes. Scientific American Supplement, 1899, 238, 243, 244, 792, 795, 905, 980, 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 Roentzen's photography. Price 10 cents each To be had at this office and from all newsdealers.

### Three Complete Machines in One



Buy Telephones

THAT ARE GOOD-NOT "CHEAP THINGS."

The difference in cost is little. We guarantee our apparatus and guarantee our rustomers against loss by patent suits. Our guarantee and instruments are both good.

PIESTERN TELEPHONE CONSTRUCTION CO.

250-254 South Clinton St., Chicago.

Largest Manufacturers of Telephones exclusively in the United States.



### TELEPHONES

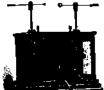
Long or Short Distance Use. Also nterior or Warehouse Telephones. Sent on trial to responsible parties, Sold thousands during the last two years, every one a success.

Send for Circular and Testimonials.

Julius Andrae & Sons Co. MILWAUKEE, WIS.

### ROSE POLYTECHNIC INSTITUTE

A College of Engineering. Mechanical, Electrical Civil Engineering, Chemical courses. Well endowed Extensive shops. Modernly equipped Laboratories in all Depts. Expenses low. 15th year. For catalogue address C. L. MEES, President, Terre Haute, Ind.



### STATIC Electric Machines

all kinds, for Physicians, Experimenters, and Schools. Our large mechine suitable for the most exacting X-Ray work. All kinds of X-Ray apparatus sold. Apparatus repaired and sold for owners.

REEDSBURG ELEC. MFG. CO. Successor to Wood & Ray. Reedsburg, Wis., U.S.A.

Special Machinery, Dies and Tools

### Sub Press Dies For Punching and Forming Sheet Metal

A SPECIALTY. GEO. M. GRISWOLD.

183 St. John St., NEW HAVEN, CONN.



The Berkefeld House Filter. The only Fitter Removing Typhoid and Cholera Bacilli. Tested and indorsed by many leading authorities in Europe and America. It gives a continuous flow of filtered water. absolutely free from germs. It is easily cleaned, as all impurities remain on the surface of the filtering cylinder. Cylinders can be sterilized by boiling in water for one hour. Send for circulars and prices to the Berkefeld Filter Co., 4 Cedar St. New York.

See Illus. Article in Scientific American, June 23, 1894.

# The Scientific American

### **PUBLICATIONS FOR 1897.**

The prices of the different publications in the United States, Canada, and Mexico are as follows:

			•
RATES	BY	MAIL.	

Scientific American (weekly), one year. Scientific American Supplement (weekly), one year, 5.00 Export Edition of the Scientific American (monthly) in Spanish and English, - - - - 3.00

# Export Edition of the Scientific American (monthly) in Spanish and English 3.00 0 12

Scientific American, Scientific American Supplement, and Building Edition, - 11.00 2 5 2 Proportionate Rates for Six Months.

The above rates include postage, which we pay. Re-it by postal or express money order, or draft to order of MUNN & CO., 361 Broadway, New York.

1	Tile finish for buildings, interior, C. Keiser Tire. ice bicycle. E. A. Dean Tire upsetter or shrinker, J. M. Bender	581,734	ı
- 1	Tire. ice bicycle. E. A. Dean	582,010	١
	Tire upsetter or shrinker, J. M. Bender	582,033	l
	Tires, implement for repairing pneumatic, E. Scott.  Scott.  Tires, inner tube for pneumatic, G. C. Moore.  Tires, tool for repairing pneumatic, F. H. Mayer.  Tobacco pipe, L. F. Bradley.  Tobacco pipe, C. W. Foster.  Tobacco pipe, R. H. F. Henne.  Tollet case, G. W. Hessler.  Tool case for bicycles, etc. F. Eigenraug, Jr.  Trace holder, R. H. Berkstresser.  Track sander, H. A. Nolty, Jr.  Traction engine, W. O. Worth.  Trap, See Sewer trap.  Tripod stand for photographic cameras, etc., F.  S. Bouton.  Tripod stand for photographic cameras, W. F.		ı
	_ Scott	581,945	ı
	Tires, inner tube for pneumatic, G. C. Moore	581,962	l
	Tires, tool for repairing pneumatic, F. H. Mayer.	582.143	l
- 1	Tobacco pipe, L. F. Bradley	202,000	ı
	Tobacco pipe, C. W. Foster	501 004	l
- 1	Moilet ages C. W. Hoggler	E01 001	ı
- 1	Tool and for biggeles etc. F. Figoresus, In	1001.001	ı
- 1	Trong holder D U Berketrogger	582,010	ı
- 1	Track gander H A Nolty Ir	591 449	ı
	Traction engine W O. Worth	581.951	
- 1	Tran See Sewer tran.	0021002	ı
- 1	Trellis, Warren & Clark	581.896	!
	Tripod stand for photographic cameras, etc., F.	,	l
	S. Bouton	581,806	•
$\mathbf{S}^{!}$	S. Bouton	•	ì
y!	Carlton	581,808	ı
7	Trousers guard, A. H. Castle	581,848	!
Z-	Truck and scale, combined, W. B. Swindell	581,889	ı
,	Truck motor car, H. Tesseyman	581,792	ı
o	Trunk. C. T. Wilt, Jr	581,950	ı
4.	Trussing machine, M. Corcoran	581,695	ı
a	Tube joint, brazed, Hedenberg & Reamy	582,138	ı
d	Twine and bag holder, E.T. Ramer	582,038	ı
11	Typesetting machine, P. F.Cox	581,954	ı
у:	Typewriting machine, G. W. Hall	581,717	ı
ďι	Typewriting machine, G. B. Webb	581,928	ı
n	Utensii, A. Mullison	581,869	ı
:h	Valve, cylinder relief, T. H. Symington	581,788	ı
- 1	valve, relief, T. H. Symington	581,789	ı
- 1	valve, safety, T. H. Symington	581,790	ı
<b>a</b> l	Vaporizer, II. Walker	001,007	ı
e	venicle jump seat, G. H. Hutton, Jr	501,932	ı
	Venicle jump seat, A. L. & F. H. Knoblaugh	001,759	١
n.	Vehicle motor, Gibbons & Wilcox	001,010	ī
ıd	Velicie wheel, S. M. Caborii	001,010	ł
n.	ton	500 004	ļ
8-	Tripod stand for photographic cameras, W. F. Carlton  Trousers guard, A. H. Castle  Truck and scale, combined, W. B. Swindell  Truck motor car, H. Tesseyman  Trunk. C. T. Wilt, T.  Trussing machine, M. Corcoran  Tube joint, brazed, Hedenberg & Reamy  Twine and bag holder, E. T. Hamer  Typewriting machine, P. F. Cox  Typewriting machine, G. W. Hall  Typewriting machine, G. B. Webb  Utensil, A. Mullison  Valve, relief, T. H. Symington  Velotiped on and relief, T. H. S	501 044	!
·u	Wagon brake Rane & Mondows	589 089	ı
te t-	Wagon wheel and axle. Govers & Swenson	582,015	ı
ιāΙ	Walling excavations, apparatus employed in. W.	,	ı
	C. Thomas.	582,028	١
	Wardrobe, E. M. Stafford	581,834	ı
4	Washboard, I. H. Gaston	582,122	ı
•	Washer. See Bottle washer.		ı
- 1	Waste end disposer, E. McCormick	581,995	ı
١.	Watering device, chicken, H. M. Amos	581,952	ı
7	Waxing implement, W. Cole, Jr	581,694	ı
	Waxing implement, W. Cole, Jr. Wheel. See Bicycle wheel. Fifth wheel. Gear wheel. Sandpapering wheel. Vehicle wheel.		ì
	wheel. Sandpapering wheel. Vehicle wheel.		Į
			Į
	Whistle, aero-electric, C. R. Alsop	001,004	Ų
	Winding thread onto bobbing machine for F	382,143	ĺ
	Winding thread onto bobbins, machine for, E. Franke. Windmill equalizing device, L. E. Fagan. Window, Richards & Bloch. Window, Richards & Bloch. Window or door screen, J. A. Stenen. Window screen, E. K. Hunter. Wire stretcher, L. S. Hanson. Workbench, S. Pecoy. Wrapping machine, newspaper, L. C. Crowell. Wrench. See Pipe wrench. Ratchet wrench. Wringer. See Mop wringer.	581 709	
_	Windmill canaliging darios I W Fagan	601,100	į
	Window Richards & Rloch	582 141	i
!	Window cellar I. Tremmel	582 020	J
ı	Window or door screen. J. A. Stenen	582.105	Į
•	Window screen, E. K. Hunter	581.863	Į
_	Wire stretcher, L. S. Hanson	581.859	J
•	Workbench, S. Pecoy	581,829	Į
•	Wrapping machine, newspaper, L. C. Crowell	582,008	Į
	Wrench. See Pipe wrench. Ratchet wrench.	,	Į
30	Wringer. See Mop wringer.		Į
	, <del>,</del> , , , , , , , , , , , , , , , , ,		
	I .		

### DESIGNS.

	DESIGNS.		
	Badge, B. M. West	27,0 27.0	01 01
•	Brush, F. Mason. Cabinet, kitchen, J. A. Overall. Corner strip, F. Woods. Cuff. F. Young	27,0	02 01
	Cultivator frame, F. Bateman. Display rack, O. E. Sully. Door or cover, E. C. Smith. Douche pan, Haviland & Pratt.	27, 27, 27,	01 01 02
е	Flag, C. B. Perkins	21, 21, 27	01 01 02
	Meat holder, C. P. Loughridge	27, 27, 27,	()1 ()() ()1
•	Paitern for cloth, E. Stohn. Salt holder, C. A. Leonard. Shoe, N. C. Bohr.	27, 27, 27,	02 01 02
۲.	Type, font of printing, T. Wag ner Watchcase, C. L. Depollier	27,	Œ

### TRADE MARKS.

ļ	Axes, Kelly Ax Manufacturing Company	29,972	į
ı	Beer, lager, Reymann Brewing Company	29.358	•
i	Beverages, certain non-intoxicating, W. B. Timms	29,959	
١	Bicycles, Garland Cycle Manufacturing Company.		i
į		29,974	:
	Biscuits, F. B. Washburn & Company	29,949	ı
	Brandy, whisky, wines, gins, rums and olive oil, T.	29,955	ı
	N. Dwyer	40,000	ı
	Company	90 047	ı
	Company	29 QAR	ı
	Carpet sweepers, Bissell Carpet Sweeper Company	29,970	ı
	Cars, locomotives, tenders and goods of like char-	,	ı
	acter, railway. Associated Manufacturers		ı
	Trades Special	29,976	ı
	Chemical and pharmaceutical products, Chemische		ı
	Fabrik von Heyden, Gesellschaft mit Besch-		ı
	rankter Haftung	29,942	i
	Colors, alizarin, Farbenfabriken of Elbe feld Com-	29,904	ł
	Colors, alizarin, rarbentabriken of Libe feld Com-	90.049	ı
	panyConfectionery, P. Wunderle	20,053	
	Cottonades, double and twisted, Eagle & Phenix	20,000	ŀ
	Manufacturing Company	29.934	
	Manufacturing Company  Dolls and dolls' costumes, L. Wolf & Company Food, poultry, L. B. Lord	29,931	1
	Food, poultry, L. B. Lord	29,944	
	Gas indicators of chemically treated paper or		ï
	fabric and frames for mounting the same, Efflu-		ı
	meter Company	29,936	ı
	Gunpowder, she is for same, and blasting powder,	00 000	ı
	Hazard Powder Company		ı
	Hose supporters, George Frost Company Hosiery yarns, bale fabrics, knit goods and under-	29,352	i
	wear, Commonwealth Cotton Manufacturing		ı
	Company	29.935	1
	Company Lithographic stone, substitute for, W. R. Lewis	29.537	
	Locks of all kinds. Yale & Towne Manufacturing		i
	Company Lubricants, varnishes, resins, mineral oils, petro-	29,971	ļ
	Lubricants, varnishes, resins, mineral oils, petro-		ī
	leum, naphtha and oils obtained from carbon-		ı
	aceous substances, Ichthyol Gesellschaft,	00 000	
	Cordes, Hermanni & Company	29,939	ı
	Machinery and engineering or mechanical appar- atus and parts thereof, certain named, Mel-		ı
	drum Brothers	29,975	
ı	Meats and lard, cured, John C. Roth Packing Com-	20,010	i
	pany	29.946	ĺ

pany. 29,346
Medicine used in liver, bowel, kidney and other
troubles, patent, H. J. Lamar & Sons. 29,962
Medicines, worm, Simard & Mignault. 29,962
Milk, converted, R. Hudnut. 29,362
Ointments, skin soaps and blood medicines, A:
Turner. 29,967 Export Edition of the Scientific American (monthly) in Spanish and English,

Turner endetine and a bore cholers oure,

growth tenderloins, F. McMulkin & Company.

COMBINED RATES

in the United States, Canada, and Mexico.

Scientific American and Supplement,

Scientific American and Supplement,

Scientific American and Building Edition,

Scientific American and Building Edition,

TERMS TO FOREIGN COUNTRIES.

The yearly subscription prices of Scientific American publications to foreign countries are as follows:

U. S. Money.

Money.

Money.

Money.

Money.

Scientific American (weekly),

Scientific American (weekly),

Walters.

U. S. English
Money.

Money.

Money.

Money.

Scientific American (weekly),

Walters.

U. S. English
Scientific American (weekly),

Scientific American (weekly),

Scientific American (weekly),

Walters.

U. S. English
Money.

Money.

Money.

Money.

Scientific American (weekly),

Walters.

U. S. English
Scientific American (weekly),

Walters.

U. S. English
Money.

M

ican (monthly) in Spanish and English 3.00 0 12 4

COMBINED RATES TO FCREIGN COUNTRIES.

Scientific American and Supplement, - 8.50 1 14 11

Scientific American and Building Edition, - - - - - 6.50 1 16 9

Scientific American, Scientific American and Building Edition, - - - - - - - - 6.50 1 6 9

Scientific American, Scientific American Scientif

Canadian natents may now be obtained by the venturs for any of the inventions named in the for soing list, provided they are simple, at coat of \$40 a.

If complicated the cost will be a lattle more. For I instructions address Munn & Co., 351 Broadway, N York. Other fureign parants may also be obtained.



Scientific

Books

Our catalogue S, is sent free for the asking. It lists books pertaining to all the sciences. A copy should be had for ready reference by those desiring electrical, medical, engineering, scientific, mining and technical books, which we sell to everybody at wholes le prices.

body at wholes le prices.

Montgomery Ward & Co., Chicago.

CONTINUOUS PAPER FEED for Typewriters. Cheap, durable, nest and always ready for work; a day's sup-py of paper without change; models furnished for trial to responsible parties. Indorsed by the leading operators and typewriter men of Texas. U.S. patent No. 566,289 for sale I.B. Baker. Naples, Texas



୭8ଘ USE GRINDSTONES? If so, we can supply you. All sizes in ounted 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.

"WE USE APOLLO STEEL."

but somebody lied. We are told that We are told that a certain galvanized-iron Mill pretends to be buying black sheets of us and dioping them. We don't sell black sheets to galvan ers.

Apollo Iron and Steel Company, Pittsburgh, Pa.



LOOKING UP VACATION TRIP? IF SO SEND 2"STAMP FOR COPY OF Excursion<sup>S</sup> J.R.Watson G.P.Act. FITCHBURG RR. BOSTON MASS

### FREEDOM FROM FIRE

No fear of being burnt out in residence, office, or factory as long as you use the Stempel FIRE Extinguisher.

Unequaled for simplicity, certainty, quickness and power in action. Adopted and indersed by leading manufacturers. Best and most durable on the market, illustrated catalogue free. H. R. BENNETT, 1215 Filbert Street, PHILADELPHIA, PA.





Motor controlled from bow. Valve movement, 12 to 1. 16 to 60 ft. Launches. Twin Screws a specialty. 1, 2, 3, 5, 1, 12, 14 and 20 h.p. No licensed engineer or pilot required. Speed and Safety guaranteed. No dangerous Naphtha or Gasoline used. No disagreeable vibration.

15 Sen Ten Cents in Stamps for 1897 Catalogue.

Marine Vapor Engine Co., ft. Jersey Av., Jersey City, N.J.

WM. WOOD, 15 West 125th St., New York.

NII.LING ATTACHMENT for lathes, patent No. 565.277, for sale for \$2,500. Chas. C. Keyser, Mulat, Fla.

Shorthand by Mail Thoroughly taught by re-lesson Free. Potts Shorthand College, Williamsport, Pa.

MACHINES. Corliss Engines. Browers, and Bottlers' Machinery. THE VILTER MFG. Co., 899 Clinton Street, Milwaukee, Wis.

Finished Castings "Metal Work Circulars to Mira Franklin MFG. Co., SYRACUSE, N. Y.

TYPE WHEELS MODELS LEYPERIMENTAL WORK SMALL MANHERY
TYPE WHEELS MODELS LEYPERIMENTAL WORK SMALL MANHERY
TYPE WHEELS BETT. HEW TOTH STEMBLE WORKS SOO MASSAU ST. N. T.

BAND FASTENERS THE BEST FOR TANKS

A. P. DICKEY MFG. Co., RACINE, WIS.

TURBINE WATER WHEELS.
SEND FOR PAMPHLET.
JAMES LEFFEL & CO.,
Apring field, Ohio, U. S. A.



Family Ice Machine Ice, etc., in a few minutes, \$10 and up. Filters, \$1.25 and up. Chokers, \$1. Seltzateurs to prepare one's self soda water, \$4.50 and up. L. Dermigny, 126 W. 25th St., N. Y.



Anyone sending a sketch and description may quickly ascertain, free, whether an invention is probably patentable. Communications strictly confidential. Oldest agency for securing patents in America. We have a Washington office. Patents taken through Munn & Co. receive special notice in the

SCIENTIFIC AMERICAN,
beautifully illustrated, largest circulation of
any scientific journal, weekly terms \$3.00 a year;
\$1.50 ist. months. Specimen copies and HAND
BOSK ON PATENTS sent free Address

MUNN & CO., 361 Broadway, New York.

# SPRING CAN SPRINGS.







WILLSON CARBIDE WORKS Calctum car-of 200 bs. \$15 f. o. b. New York, including from easi nackages. Fatenthes and manufacturers for export. Office 20 Maiden Lane, New York.

TO INVENTORS! We are open to manufacture to purchase outright patents on good selling novelites or tows—send samples to CHAFFEE & SELCHOW, Manufacturers of Toys, Games, and Novelites, 451 455 West 125th Street, New York.



## **WOODEN TANKS.**

For Railroads, Mills and Manufactories. Builders of Steel Towers and Tanks. La. Red Cypress Wood Tanks a specialty.

Charles E. Schmunk, Glassurgical Engineer. Expert opinion given on anything appertaining to Glass or Glass Ware. 20 years practical experience. Drawings made for Machinery for Glass Ware. 27 First Ave., Pittsburg, Ps. Expressage must be prepaid on models and samples. Designer of Glass Ware.



PAPER A Revolution in Photographic Printing.

When exposed to the same light printing. When exposed to the same light, prints 500 times quicker than albumen. . .

GLOSSY or MATT. No dul or rainy weather to interfere with your work. No durk rooms nor complicated manipulation.

Developed and toned as fast as the printing frames can be filled. A choice of tones more heautifuthan can be produced on anyother paper. Permanent prints. The greatest paper for hot or damp climates. So cents in stamps brings two sample ducen cabs, developer and three sample prints. Septem Platinoid, Etamcica and Rough Br mide Papers are the best and most uniform in the market. Neptem P O P. an insoluble gelatine paper. Rembrandt. Matt Printing-out Paper. NEPERA CHEMICAL CO., Sole Manufis.

Paris, France, 8 Rue Martel. Chicago. Ill., 21 Quincy St. NEPERA PARIS, N. Y.