of beeswax in 1 pint of the best boiled linseed oil over a gentle fire, applying when cold with a piece of rag, rub bing it well in and afterward hanging up to dry, which will take four or five days; or paint with boiled linesed oil colored to suit. It must be done in very hot room or in a bright sunlight. A shoebrush is the best for apply ing it. A little patent drier may be added. It is said that the Chinese use a mixture of 1 ounce each of beeswax and soft soap with the oil, which is then boiled down. If the surface seems tacky, varnish with shellac varnish. In any case, apply the oil as thin as possible and let it dry perfectly between successive coats. 2. Which side of a leather belt should be run next to the pulley? A. All the best belt makers say run grain side to the pulley, and it is claimed that 33 per cent more power can thus be transmitted than with the flesh side next the pulley. The grain of the leather has a velvety surface. which enables it to hug the pulley closer than will the hard flesh side. Some users run the flesh side to the pullev for small belts, and then daub and stick up the belt with beeswax or resin to make it take hold, but this is not economical for the life of a belt, is unworkmanlike, and there is always more or less fussiness in running ma chinery where the belts are so treated, instead of their running for years without any attention, as they will sometimes do when run grain side to the pulley, and of proper size to transmit the desired power.

(7531) D. L. G. asks how to adapt an arc lamp suited for 52 volts and 125 amperes to a circuit carrying 60 amperes at 104 volts. A. The arc lamp in question, when run on the 52 volt circuit, used probably 15 amperes and 45 to 50 volts, though perhaps it was wound so that it was put on the circuit directly at 52 The 125 amperes did not pass through the lamp. Such a lamp can be put on a circuit of 104 volts by supplying it with a rheostat whose resistance can be varied will require the same voltage and amperes as before. The other 59 to 54 volts will be taken up by the rheostat. This rheostat requires 200 feet of No. 12 (B. & S.) German silver wire. It should be arranged so that the coils can be cut out one by one to the last one, and then the current can be adjusted to the lamp. We advise you to call upon dealers in lamps of this kind.

(7532) J. J. W. asks: Could you advise the adoption of the storage battery instead of the trolley system for running a line of street cars from town out into the country? A. We regret to say that the storage battery has disappointed its friends in this respect. Even in cities it is not used, since it cannot compete in cost with the trolley. The trolley system is much cheaper, and on country roads there has never been any chance for the storage battery. There the overhead trolley is the best possible mode of electrical traction. In cities the open conduit underground trollev is at present considered the best. On leaving the town this is changed to the overhead trolley, as in Washington, D. C.

(7533) W. W. asks: For an electric heater on 110 volt circuit, what size and quantity of German silver wire is suitable? A. If you wish to make a small heater to use about 1 ampere of current with German silver wire, get 1,300 feet of No. 18 B. & S. gage For a heater using about as much current as an arc light, get No. 12 B. & S. wire and about 500 feet of it. Fo articles on electric heaters see Scientific American SUPPLEMENT, Nos. 513, 825, 1112, 1185, ten cents each.

TO INVENTORS.

An experience of fifty years, and the preparation of more than one hundred thousand applications for patentist home and abroad enable us tounderstand the laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business, Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted **DECEMBER 6, 1898,**

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these pate	ents.]
Advertising device I W Lynch	615 358
Air and gas mixer I & Barker	615 520
Advertising device, J. W. Lynch	615326
Air ship, F. R. Merritt	615 569
Airtight vessel, J. F. Davenport	615.478
Alarm. See Burglar alarm.	020,110
Alcohol, manufacture of, H. W. Wiley	615.376
Ambulance and tourist wagon, combined, C. H.	020,010
W. Larrabee	615,396
Anticreosoting device, W. Wewers	615,600
Asphalt etc apparatus for manufacturing ob-	
jects from compressible material, such as, A. Pieper. Autographic register, Rauh & McNeal	
Pieper	615.573
Autographic register, Raub & McNeal	615,306
Back pedaling brake, Mandleberg & Young	615,5ti4
Bag. See Sleeping bag.	
Baking or roasting pan, self-basting, Rinner &	
De Hart. Baling press, N. B. Wilder. Bandage rolling machine, Mullen & Shannon	615.638
Baling press, N. B. Wilder	615,602
Bandage roung machine, Muhen & Shannon	010,200
Bar. See Cutter bar.	015 : 20
Barrel, O. H. P. Cornell	615,530
Barrel, O. H. P. Cornell. Basin or sink, hand, J. J. Wade. Basin, set wash, J. W. Grantland.	015,410
Bath. See Shower bath.	615,387
Battery. See Electric battery. Bearing, axle arm roller, G. F. Callaghan	e15 een
Dearing, axle arm rouer, G. r. Canagnan	615,662
Bearing, self-oiling, A. Weinhold	615,511
Bearing, shaft, G. E. Sovereign. Bell, bicycle, J. D. Lord.	615,507 615,287
Dib C I Major	C15 902
Rievela attachment C F Relear	615,293 615,237
Rib, C. L. Maier. Bicycle attachment, C. F. Balser. Bicycle brake, L. E. Clark.	
Bicycle carrier, T. C. du Pont. Bicycle handle bar, A. Ross.	615 264
Rievelo handle har A Ross	615 308
Bicycle lock W River	615,659
Bicycle lock, W. Blyer Bicycle luggage carrier and support, W. H. Mar-	020,000
ley. Bicycle pedal, A. Sidwell Bicycle pedal attachment, A. Wagner. Bicycle step, A. R. Demory.	615.625
Bicycle pedal, A. Sidwell.	615.505
Bicycle pedal attachment, A. Wagner	615.595
Bicycle step. A. R. Demory	615.533
Bicycle support, F. Dunnam	615.612
Binder, order, C. A. O. Haarvig Binding post, J. P. Jones	615,551
Binding post, J. P. Jones	615,455
Bit. See Bridle bit. Rosette cutting bit. Black plate, manufacture of, W. H. Donner	
Black plate, manufacture of, W. H. Donner	615,535
Boiler. See Steam boiler. Tubular boiler. Water tube safety boiler.	
Boiler flue cleaner, W. L. Casaday	615,427
Boiler furnace, steam, L. F. Lyne	615,291
Boiler mud and scale receptacle, steam, B. Has-	,
kell	615,549
Bolt. See Stay bolt.	,
Bolt holder J S Higdon	615,273
Book fastener, L. W. Noves	615,301
Boot or shoe polishing device, J. B. Miller	615,566
Book fastener, L. W. Noyes. Boot or shoe polishing device, J. B. Miller Boot tree, T. G. Stevens	615,320

Movertisements.

ORDINARY RATES.

Inside Page, each insertion. - 75 cents a line Back Page, each insertion, - - \$1.00 a line 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.



AMERICAN PATENTS. - AN INTER AMEDITICAN FATENTS.—AN INTER-esting 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 SUP-PLEMENT, No. 1002. Price 10 cents. To be had at this office and from all newsdealers.



FOOT POWER and TURRET LATHES, Plan-ers, Shapers, and Drill Presses. SHEPARD LATHE CO., 133 W. 2d St., Cincinnati, O.

LEARN BY MAIL.

Elect., Mechan., Stationary, Marine, Locom., Civil. MECHANICAL DRAWING AND MACHINE DESIGN Tuition Fee payable \$2 per month. Text Books and Drawing Plates Free. Write for free S. A. Circular. THE UNITED CORRESPONDENCE SCHOOLS,

. W. Ewald, Gen. Mgr. 156 Fifth Avenue, New York



WALWORTH PIPE VISES

are the Heaviest and Strongest vises made. RENEWABLE STEEL JAWS.

WALWORTH MFG. CO., 20 OLIVER STREET, BOSTON, MASS.

BARNES'

W. F. & JOHN BARNES CO.

1999 Ruby Street,



Queen Transits and Levels High Grade Instruments with the Latest Improvements. 180 page Engine ering
Catalogue on application.

THE QUEEN

240 page Mathematical Catalogue on application.

ENGINEERS' AND DRAFTSMEN'S SUPPLIES.

OUEEN & CO., Optical and Scientific
Instrument Works, 59 Fifth Ave., New York. 1010 Chestnut St., Phila.



ELECTRO MOTOR, SIMPLE, HOW TO make.—By G. M. Hopkins. Description of a small electric motor devised and constructed with a view to assisting amateurs to make a motor which might be driven with advantage by a current derived from a hattery, and which would have sufficient power to operate a foot latheor any machine requiring not over one man power. With If Igures. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641. Price 10 cents. To be had at this office and from all newsdealers.

DORMAN'S VULGANIZERS



TRANSITS AND LEVELING INSTRUMENTS. NICKEL ELECTRIC LEVELS



Sizes, 2 and 3 inches. Prices, 25 and 30 cents.

For Book on C. F. RICHARDSON & SON, the Level. P.O. Box 977, Athol, Mass., U. S. A.

Every Cool for Every Use



A complete list of all the Tools made for any and every purpose, all fully de-scribed and accurately illustrated will be found in the 1898 edition of MONT-GOMERY & CO.'S

TOOL CATALOCUE.

It contains 510 closely printed pages with index. Book is pocket size, 54 x 44 inches, with rounded edges and stitched covers Sent free by mail on receipt of 25 cents by

MONTGOMERY & CO.
105 Fulton Street, New York.

	&*************************************	
1	Bottle, M. Fardy	We have seen
į	Bottle, M. Fardy. 615,348 Bottle holder and stopper, E. A. Parker. 615,460 Bottle, non-refillable, E. Wilbur. 615,601 Bottle opening or closing device, C. Kemper. 615,487 Bottle or jar stopper, J. Rau. 615,306 Bottle stopper, I. H. Broome. 615,606 615,606 Bottle stopper, F. L. Siegel. 615,606 615,609 Box. See Match box. Packing box. 615,552 Brace. See Ratchet brace. 615,606 615,606 Brace. See Ratchet toilet articles. A. O. Glock. 615,484	rods so badly sco
	Bottle stopper, F. L. Siegel. 615,839 Box. See Match box. Packing box. Box locking device, telescope, O. B. Hicks. 615,552	much out of I
	Brace. See Ratchet brace. Bracket support for toilet articles, A. O. Glock 615,484 Brake. See Air brake. Back pedaling brake.	third of the po
1	Brace. See Ratchet brace. Bracket support for toilet articles, A. O. Glock 615,484 Brake. See Air brake. Back pedaling brake. Bicycle brake. Carbrake. Bicycle brake. Carbrake. Brake handle, P. Flood	We used "Dani
	Brush, fountain, H. F. Haynes. 615.517 Brush bolder, tooth, Johnson & Guilfoyle. 615.357 Buggy top supporter, F. J. Stallings. 615.508	P. P. P. Diagona
1	Burglar alarm, C. F. Cline	ing." It filled
	Burner. See Gas burner. Button, separable, W. P. Devine. 615,609 Buttoner, R. Gans. 615,632 Cab, hansom, Paradis & Desrosiers. 615,633 Cam, double, Emmerich & Vonderlehr. 615,641 Cane crusher, B. Thoens. 615,591 Car ball housing, B. Thoens. 615,591 Car brake, F. O. Godman. 615,561 Car dumping apparatus, W. Hogan. 615,561 Car dumping apparatus, W. Hogan. 615,574 Car, railway, E. E. Pratt. 615,573 Car, transportation, E. A. Trapp. 615,573 Car ventilator, R. S. Howland. 615,275 Carborundum and manufacture thereof, article 615,693 Of, E. G. Acheson. 615,693	on account of it and enameled t
	Cane crusher, B. Thoens. 615.590 Cane mill bousing, B. Thoens. 615.591 Car brake, F. O. Godman 615.592	face until it was
1	Car coupling, J. M. Larkin	a glass bottle.
1	Car, railway, E. E. Pratt. 615.575 Car, transportation, E. A. Trapp. 615.373 Car ventilator, R. S. Howland 615.275	trouble stopped.
1	Carborundum and manufacture thereof, article of, E. G. Acheson	Hundreds of
1	Carrier. See Bicycle luggage carrier. Elevated carrier. Carrier. Cartridge loading implement. S. B. Kitchel	steam users in won't have anyt
	Case. See Shelf block case. Show case. Cash register, F. C. Osborn. 615,409 Caşter, ball, A. H. Cobb. 615,529	QUAKER CITY R
	Ceiling or floor plate, L. H. Snyder 615.641 Chain, C. W. Levalley 615.285 Circuit breaker, F. A. La Roche 615.395	409 Market St., P
	carrier. Cartridge loading Implement, S. B. Kitchel 615,282 Case. See Shelf block case. Show case. Cash register, F. C. Osborn 615,409 Caster, ball. A. H. Cobb 615,528 Celling or floor plate, L. H. Snyder 615,619 Celling or floor plate, L. H. Snyder 615,619 Chain, C. W. Levalley 615,285 Clarup, See Wagon box clamp. Clay shingles, roofing tiles, bricks, etc., machine I or pressing, A. B. Klay etal 615,560 Cleaner. See Boiler flue Cleaner. Flue Cleaner. Track cleaner. Wheat cleaner Window cleaner. Wheat cleaner Window	(If you will examine a sample of and read a booklet—send in you
	Track cleaner. Wheat cleaner Window cleaner. Cleaner. Cleaner. Clothes line, W. W. Smith	GET THE RIGI
	cleaner. Cotabe line, W. W. Smith	The easiest method of ascer-
	Cock or valve, gas, A. E. Bocquet	taining the proper angle required in any work, is to use our
	Compound engine with regulator for supernested steam, W. Schmidt	required in any work, is to use our ANGLE INDICATOR,
1	Corn or bunion plaster, H. H. T. Bennett	which can be used in connection with a universal
	Cravat, C. W. T. Davies	bevel for trans- ferring any given
	Crushing and pulverizing mill, F. G. Johnson. 615,278 Crushing mill, roller, J. F. Webb. 615,375 Cultivator, disk, J. L. Scott. 615.576	bevel for trans- ferring any given angle. It is as ac- curate as our Micrometer Prot made in minutes. Nicely gradua finished. Every mechanic, car maker, cabinetmaker, draughter own one. It is an indispensable Can be used for lathework with
1	Curtain ring, J. Berbecker	maker, cabinetmaker, draughtsr own one. It is an indispensable Can be used for lathework with
	Crusher. See Cane crusher. Crushing and pulverizing mill, F. G. Johnson. 615,278 Crushing mill, roller, J. F. Webb. 615,375 Cultivator, disk, J. L. Scott. 615,576 Cultivator leveler attachment, H. G. Kountz. 615,284 Curtain ring, J. Berbecker. 615,339 Curtains or screens. means for raising or lowering door or like, W. Brecknell. 615,633 Cutter bar, A. J. Anthony. 615,234 Cyanids, apparatus for making, T. B. Fogarty. 615,286 Cycles, etc., apparatus for reducing vibration in, F. Beauchamp. 615,521 Dental plate, J. S. Naulder. 615,404, 615,405 Dental saw handplece and frame, J. F. Snedaker. 615,616	J. Stevens Arms & Tool Co., Chic
	F. Beauchamp. 615.521 Bental plate, J. S. Naulder	HIGH GRADE WOOK
i	Door, Revible, A. Stevens. 615,418 Door, flexible, A. Spaulding. 615,468 Door, flexible, A. Spaulding. 615,468	Single Mac plete
	Dental plate, J. S. Naulder	Your Corres
	Draught regulator and ash pit door, combined, 615.599 W. Wewers	J. A.
	Dye and making same, black trisazo, Ris & Simon	10-30 John S
	Dyeing with quinonoxim colors, Alt & Culmann. 615.232 Electric battery, O. T. Bugg, Jr. 615.246 Electric battery, P. A. Emanu el. 615.539 to 615.541	Manufacturers
	Dyeng with quinono medors, Alt & Culmann. 615,226 Electric battery, O. T. Bugg, Jr 615,236 Electric battery, P. A. Emanuel \$15,539 to 615,541 Electric battery, M. Maas 615,232 Electric cable conductor, S. D. Field 615,349 Electric machine, alternating current dynamo, S. 7 de Everente.	of every description mad ness, precision and econon ters, "ypewriting Machine meters, Revolution Counter
	Z. de Ferranti	meters. Revolution Count of model made from design machinery for any and eve ence invited from those in
-	Elevated carriers, means for supporting ropes of,	Che Duct a White at Go
	Elevator, G. Holly 615,415 Elevator electrical appliance, J. H. Roberts. 615,365 End gate, O. C. Sanger. 615,366 Engine. See Compound engine. Rotary engine.	
	Excelsior, manufacturing, J. M. Titus. 615.416 Fabric. See Fence fabric. Waterprooffabric. Fastener. separable, G. E. Adams. 615.338	
	Fastener, separable, G. E. Adams. 615,338 Feed roll, M. M. Whipple, 2d. 615,646 Feed water heater. C. Applegate. 615,517	burne Patent Scener. Useful also ing papers or any a cents each, by ma
	Fence fabric, mesh wire, W. A. Kilmer. 615,281 Fence Joint, wire, J. Harris. 615,651 Fence post, J. Y. Propst. 615,304	Supporters that the leg nor injure By mail, 20 cents a
	Fastener, separable, G. E. Adams. \$15,328 feed roll, M. M. Whipple, 2d. \$15,644 Feed water heater. C. Applegate 615,517 Fence fabric, nesh wire, W. A. Kilmer. 615,281 Fence joint, wire, J. Harris. 613,681 Fence post, J. Y. Propst. 615,304 Fence post, J. Y. Propst. 615,304 Fence post, A. Snell. 615,583 Fence stay, wire, A. J. Munger. 615,401 Fence wire, F. A. Curtis. 615,260 Fender. See Plow fender.	trated Catalogue of other novelties, free. AMERICAN R Box P. Waterbu
	Fibrous or shearbant surfaces anishing D D	
5	Goldsmith. Fifth wheel, E. H. Hungerford. 615.39 Fifther, J. A. Maignen. Fire extinguisher valve, F. Gray. 615.39 Fire extinguisher valve, F. Gray. 615.39 Fire extinguisher willer, J. H. R. Dinsmore. 615.282 Fire sprincher, E. W. Grew. 615.276 Fish scaler, J. W. Court. 615.432 Fishitus reel, G. O. Brossphon. In. 615.432	E
1	Fish scaler. J. W. Court. 615.432 Fish ing reel. G. O. Brosnaham, Jr. 615.452 Flooring, composition, H. Gallinowsky. 615.352 Floors or similar structures, construction of, E.	
i	Floors or similar structures, construction of, E. L. Pease. 615.634 Flue cleaner, J. Cathriner 615.245	The state of the s
e	L. Pease 615,634 Flue cleaner, J. Cathriner 615,248 Flue cleaning apparatus, W. L. Casaday 615,248 Fluids, apparatus for treating, J. Whiteley 615,329 Fly screen, H. C. Loudermilch 615,289 Flyding, seat, A. E. Brockett 615,260 Fruit seeding apparatus, J. G. Gibson 615,615 Frunnel, H. Altshul 615,337 Furnace See Boiler furnace. Hydrocarbon burning furnace, Smelting furnace. Furnace, J. J. & T. F. Meidrum 615,400 Furnace bosh plate, E. Kerr 615,456 Furnace for heating billets, blooms, etc., W. Swindell 615,465	SKINNER CHUCK CO., Church
	Fruit seeding apparatus, J. G. Gibson 615,615 Funnel, H. Altshul 615,337 Furnace See Boiler furnace Hydrocarbon	ACETYLENE GAS A
	burning furnace. Smelting furnace. Furnace, J. J. & T. F. Meldrum	Calcium.—All about the new chemistry, pressure of liquefact experiments performed with it
	Gage. See Sewing machine gage.	of articles, giving in complete this subject. Details of furnace gas generators, gasometers, bu
010.0	Game or puzzle. R. B. Barrows. 615.469 Garbage and noxious gases, treating, J. A. Dubbs 615.439 Garment fastener. F. B. Nelson. 615.361 Garment fastening device. J. V. Washburne. 615.510	this subject. Details of furnace gas generators, gasometers, bu Scientific American Sti 1004, 1007, 1012, 1014, 1035, 1038, 1057, 1064, 1083, 1084, 1085, 1086, 1149 and 1150. Price 10 c this office, and all newsdealers.
	Garment, union, G. O. Cook. 615.632 Gas apparatus, C. M.Gearing. 615.882 Gas burner, incandescent, C. E. Lotz. 615.288 Gas engines, supply controlling mechanism for,	
•	Gas engines, supply controlling mechanism for, J. S. Klein	Oster Pat. Adjustabl
;		
	Gas manufacturing apparatus, J. L. Hastings 615,350 Gas producers, coal feeder for, J. L. Hastings 615,451 Gate. See End gate. Railway zate.	and with the
	cent, W. F. Rudolph. Gas manufacturing apparatus, J. M. Bois. 615.308 Gas manufacturing apparatus, J. L. Hastings. 615.452 Gas producers. coal feeder for, J. L. Hastings. 615.452 Gate. See End gate. Railway gate. Generator. See Gas generator. Steam generator. Glass, ornamenting, C. P. Dorpols. 615.478 Glassware manufacturing apparatus, T. Coleman,	dies
	Grain tank emptying device, pneumatic, F. J. Weber. 615,328	A L L O
	Grinding round objects, apparatus for, C. A. & O. W. Hult. 615,394 Gun mounting, L. V. Benet. 615,524 Hame strap, T. E. Brockman 615,342 Handle. See Brake handle. Dust pan handle. Hanger. See Door hanger.	Acetylene Ga
e	Handle. See Brake handle. Dust pan handle. Hanger. See Door hanger. Harrow P. J. Heller. 615.275	Reduced to Safest, and
1	Harrow, P. J. Heller. 615.27 Hasp fastener, W. H. Smith 615.50 Headlight, locomotive, J. S. Thurman 615.37 Headlight reflector, A. Metternich 615.49 Heater. See Feed water heater. 615.49 Hemmer, R. S. Irwin 615.55	We cla tbe onl matic
8	Hides or skins, machine for working, W. B. Tur-	sizes m
d n	10 et 615,656 High frequency apparatus, T. B. Kinraide. 615,655 Hinge, lock M. C. Mulcaby 615,655 Hook, See Snap hook 615,476 Horse power, A. J. Boyce 615,476	in unoc
	* * * * * * * * * * * * * * * * * * *	I III G

We have seen some piston ods so badly scored and so nuch out of line, that a hird of the power of the ngine or pump was lost. Ve used "Daniel's Patent P. P. P. Diagonal Rod Pack= ng." It filled the scoring n account of its pliability, nd enameled the rod surace until it was smooth as glass bottle. Then the rouble stopped.

Hundreds of the biggest team users in the country on't have anything else.

QUAKER CITY RUBBER CO., 409 Market St., Philadelphia, Pa.

you will examine a sample of "P, P.P."—dread a booklet—send in your name.)

ET THE RIGHT ANGLE



it connection it a universal sevel for transgring any given as un Micrometer Protractor, in degrees, not as un insuled. Every mechanic, carpenter, machinist, tooliaker, cabinetmaker, draughtsman and tinsmith should win one. It is an indispensable tool to all using angles an be used for lathework without the bev.el. Price \$1. Stevens Arms & Tool Co., Chicopee Falls, Mass., U. S.A.

IGH GRADE WORKING MACHINERY



Single Machines or Complete Equipments for Any Class of Work.

Your Correspondence is Solicited.

137 Illustrated Matter and Prices on application.

J. A. FAY & CO. 10-30 John St., CINCINNATI, OHIO

Manufacturers' Models

of every description made to order with promptness, precision and economy. Models of Typesetters, Typewriting Machines, Cash Registers, Cyclometers. Revolution Counters, etc.; in fact. any kind of model made from designs. Also special tools and machinery for any and every purpose. Correspondence invited from those intending to equip a plant. II Mustrated circular free

he Pratt & Whitney Co., Bartford, Conn.

Hold Your Scarf



with the Improved Wash-burne Patent Scarf Fast-ener. Useful also for fastencener. Useful also for fasten-ing papers or any articles. 10 cents each, by mail. Hose Supporters that do not bind the leg nor injure the fabric. By mail, 20 cents a pair. Illus-trated Catalogue of these and other novelties, iree. AMERICAN RING CO. Box P. Waterbury. Conn.



TIGHT GRIP. The SKINNER PAT-ENT DRILL CHUCK is simple, strong, and accurate. The jaws are of hardened tool steel. Stands severest tests. Is self-centering, self-tightening, most durable, Holds straight or taper shank drills.

Send for catalogue. KINNER CHUCK CO., Church St., New Britain, Conn

CETYLENE GAS AND CARBIDE OF ACETYLENE GAS AND CARBIDE OF Calcium—All about the new illumina t, its qualities, themistry, pressure of liquefaction, its probable future, experiments perform ed with it. A most valuable series of articles, giving in complete form the particulars of his subject. Details of furnaces for making the carbide, as generators, gasometers, burners, etc. Contained in CIENTIFIC AMERICAN SUPPLEMENT, Nos. 998, 404, 1007, 1012, 1014, 1015, 1016, 1022, 032, 1038, 1037, 1064, 1071, 1072, 1

ster Pat. Adjustable Stocks & Dies



They are light in weight, dies made of the best tool steel, guaranteed just as strong and reliable as solid dies, cut the thread at one operation and release from the work without running back over finished threads. Each set of dies cuts two distinct sizes. THE OSTER MFG. CO. 85 Prospect Ave., Cleveland, Obio, U.S.A.

Acetylene **Ga**s Lighting

Reduced to the most Efficient, Safest, and Economical use. We claim for the NIAGARA
the only Machine entirely Automatic in its action. Standard
sizes from 10 to 150 lights. Larger
sizes manufactured promptly to
order. Licenses granted for use
in unoccupied territory.
Correspond with the

NIAGARA FALLS ACETYLENE GAS MACHINE CO., Niagara Falls, N. Y. and Canada,

(Continued on page 398)

Holiday Suggestions

MAGIC

Stage Illusions and Scientific Diversions, Including Trick Photography.

By A. A. HOPKINS. 568 pages. 420 illustrations. Price, \$2.50.



ations. Price, \$2.50.

This work appeals to old and young alike, and it is one of the most attractive holiday books of the year. The illusions are illustrated by the highest class of engravings, and the exposes of the tricks are, in many cases, furnished by the prestidigitateurs them selves. Conjuring, large stage illusions, fire-earing, s w or d-swallowing ventriloquism, me nt al magic, andent magic, automata, curious toys, stage effects, photographic tricks, and the projection of moving photographs are all well described and illustrated making a hand, some volume. It is tastef ully printed and bound.

Acknowledged by the profession to be the

STANDARD WORK ON MAGIC

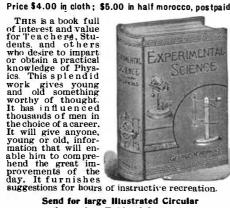
Circular of Contents and sample illustrations free upon request.

1898 EDITION.

EXPERIMENTAL SCIENCE By GEO. M. HOPKINS.

20th Edition Revised and Enlarged. 914 Pages, 820 Illustrations.

Price \$4.00 in cloth; \$5.00 in half morocco, postpaid

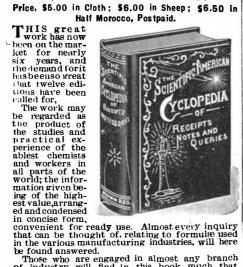


Send for large Illustrated Circular and complete Table of Contents.

*** 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



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 hundreds of most excellent suggestions.

Sena for aexcriptive circular.

IMPLETE ELECTRICAL LIBRAR

BY PROF T. O'CONOR SLOANE. AN INEXPENSIVE LIBRARY OF THE BEST BOOKS ON ELECTRICITY.

For the Student, the Amateur, the Workshop, the Electri-cal Engineer, Schools and Colleges. Comprising five books, as follows:

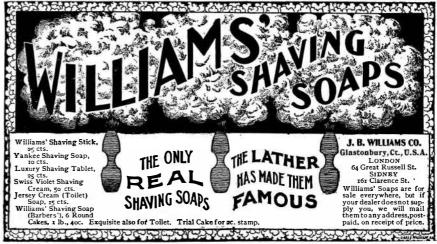
Arithmetic of Electricity, 138 pages. - \$1.00
Electric Toy Making, 140 pages, . - 1.00
How to Become a Successful Electrician, 189 pp. 1.00 Standard Electrical Dictionary, 682 pages, - 3.00 Electricity Simplified, 158 pages,

THE The above five books may be purchased singly at the published prices or the set complete, put up in a neat folding box, will be furnished to readers of THE SCIENTIFIC AMERICAN at the special reduced price of Five Dollars. You save \$2 by ordering the complete set. Five volumes, 1,300 pages, and over 450 illustrations. 13 Send for full table of contents of each of the above books.

MUNN & Co., Publishers, Office of the SCIENTIFIC AMERICAN,

361 BROADWAY, NEW YORK.

	Scientit	ıc	8
	Horse soaking boot, G. W. Dillon. Horsesboe, J. G. Parsons. Horsesboe, B. F. Spry. Horsesboe nails, machine for finishing forged, H.A. Williams. Hose coupling, W. E. Jones. Hub, wheel, A. Sirotich. Hurdle, J. Foster. Hydrocarbon burning furnace, C. M. Gearing. Inpact tool, T. R. Browne. Incandescent light, Welsbach or other, T. Wilson.	615,437 615,303 615,317	
	Horseshoe nails, machine for finishing forged, H.A. Williams. Hose coupling, W. E. Jones.	615,377 615,279 615,640	
	Hurdle, J. Foster. Hydrocarbon burning furnace, C. M. Gearing Impact tool, T. R. Browne. Impact account light Welsheab, or other T. Wil	615,443 615,445 615,245	
	Indicator. See Office indicator. Induction apparatus, high frequency, T. B. Kin-		
	rande	615,653	
	Jar. S. Hipkins, Jr. Jar. C. A. Tatum. Key fastener, A. E. Brockett. Knitting machine, G. E. Frink	615,453 615,322 615,38 0 615,384	
	Knitting machine attachment, F. W. Sumner Labeling composition, Eschenbach & Sielke Ladder. J. A. Weston Lamp, H. A. Brognard.	615,585 615,613 615,512 615,244	
	Iron. See Smoothing iron. Ironing board support. C. M. Shaw. Jack. See Lifting jack. Jack. Shaw. Jack. Jack. Jack. Jack. Jack. Tatum Key fastener, A. E. Brockett. Kutting machine G. E. Frink. Kutting machine attachment, F. W. Sumner. Labeling composition Eschenbach & Sielke. Labeling composition Eschenbach & Sielke. Labeling, T. Langston. Lamp, H. A. Brognard. Lamp, T. Langston. Lamp elimney, incandescent, O. Schott Lamp clettic arc. M. S. Okun	615,666 615,586 615,578 615,408	
	Lamp for incandescent lights, antivibration, G. S. Barrows. Lamp, incandescent gas, E. Lindner.	615.239 615,286	
	Lamp, incandescent gas, E. Lindner Lamp, incandescent gas, J. Moeller Lamplighter, time, N. Durant Leaf stemming machine, G. P. Butler. Lift or handle for boxes, cases, etc., detachable,	615,538 615,247	_
	Lift, safety, M. J. Oliver	615,362	
	Lifting jack, J. C. Covert. Light. See Incandescent light. Limb. artificial. F. V. McParlin. Linnoleum, machinery for manufacturing, M. B. Nairn. Liquid raising apparatus. H. C. Sergeant.	615,299 615,631	1
	tion lock. See Bicycle lock. Door lock. Permita-	_	-
1	Locomotive and truck, electric, S. M. Vauclain. Locomotive, electric, M. E. Thomas. Log carriage steam feed device, C. Carlson. Loom, Crompton & Wyman. Loom attachment, J. Peltier. Loom shuttle, J. H. Morin. Loom temple, P. Duffy.	615,592 615,475 615,532 615,635	-
	Loom shuttle, J. H. Morin. Loom temple, P. Duffy. Match box, stand, or receptacle having automatic striking action, R. L. Dunford et al. Match spiint bundling machine, C. J. Donnelly	615,567 615,536 615.611	Ī
	Match splint bundling machine, C. J. Donnelly Matrix sheets, manufacturing, H. Schimansky Measure, cloth, R. B. Luse et al Measuring and delivering device, liquid. G. F.	615,610 615,577 615,290	HunT
	Barron Measuring and marking length on fabrics, apparatus for, G. Newsum. Mill. See Crushing mill. Crushing and pulverizing mill.	615,238 615,406	A
	ing mill. Milling machine, C. G. Shedin	615.313 615,276	
	ing mill. Milling machine, C. G. Shedin. Mine trap door. A. Hurford. Mining dredge, I. Stead Mining machine, Ball & Officer. Mirror holder, S. H. Clark Mixer. See Air and gas mixer. Moulding machine, L. Poole Mop holder, C. W. Parks Morpholin and making same, L. Knorr Motor. See Car motor.	615,236 615,250	
-	Monding machine, L. Poole	615.410 615,488	1
-	Motor: See Car motor. Nouse trap, M. J. Lawler Mowing machine tinger bar latch. J. Woods Music book leaf turner, A. McRae Music rack, J. Englund	615.334 615.403 615,480	
	Music book leaf turner, A. McKae	615,481 615,434 615,367 615,568	1
	Ore concentrator or placer mining machine, Brown & Steely Ore washer, L. J. Mytinger Package and grocer's caddy, convertible ship- ping, C. T'oohey Packing box. C. C. Mengel Pack See Court and	615,424 615,459	T
-	Paul See Cont paul	615 595	V
	Padlock, per mutation, J. R. Brodie	615,627 615,417 615,655	L
	Pessary applier. E. A. Butler	615,425 615,297 615,315	_
	Padlock, permutation, J. R. Brodee. Painter, pole. P. W. Meinecke. Pan. See Baking or roasting pan. Paper box form, folding, F. W. Wilcox. Permutation lock, J. H. Parks. Pessary applier. E. A. Butler. Photographic shutter. J. A. Mosher	615.457 615,392 615.603	1
			1
	Plow fender, J. H. Taylor. Plow, wheel, W. B. Richards Plow, wheel, M. & A. Sattley. Polishing prochine K. F. Ellis	615,588 615,462 615,310 615,383	
	& Galbraith. Plow ditching attachment, L. U. Valentine. Plow ditching attachment, L. U. Valentine. Plow wheel, W. B. Ricbards. Plow, wheel, M. & A. Sattley. Poilshing machine. F. F. Ellis. Post and billiard table, combined. V. Fountain Post. See Binding post. Fence post. Post driver, H. J. Whitener. Potato separator. D. E. Updegraff. Power. See Horse power.	615,350 615.330 615.325]
	Potato separator. D. E. Updegraff. Power. See Horse power. Press. See Baling press. Pressing machine. Lorillard & Tremaine. Printing machine taple binding delivery mechanism, L. C. Crowell	615,397 615,596	G
	Printing machine staple binding delivery mechanism, L. C. Crowell	615,259 615,636	8
	Pulley, friction, J. Gillet. Pump connection, F. M. Stevens Pump, force, H. Bender.	615,268 615,509 615,470 615,331	G
	Puzzle, J. E. Sharpe Puzzle, J. E. Sharpe Puzzle bank, A. E. Brockett. Rack. See Music rack.	615,413 615,381	1
	Rack. See Music fack. Railway gate. McGregor & Williams Range, broiler, 'l'. Guinean. Ratchet brace for serew drivers, etc., pocket, J. W. Dawson Reel, E. H. W eaver.	615,548 615,649 615,657	W.
	Register. See Autographic register. Cash register.	015,411	
	ter. Retort door, H. E. Davis. Revolver, A. C. Wright. Rheostat. C. Wirt. Rheastat. automatic. E. T. Wilkinson.	615,467 615,419 615,418	-
	Retort door, H. E. Davis. Revolver, A. C. Wright. Rheostat. C. Wirt. Rheostat. C. Wirt. Rheostat. automatic. E. T. Wilkinson. Ring. See Curtain ring. Riveting machine, hydraulic, E. Graves. Roadway, H. M. Williams. Rock drill. A. J. Bant. Holl, G. M. Pelton. Rosette cutting bit, A. W. Cooper. Rotary engine, D. M. Dearing. Rotary engine, J. C. Walker. Rubbing or polishing machine, Johnston & Sowers. Safe or vault, E. C. Shankland. Salt purifier, P. Yoder. Saw filing and setting machine, A. Keppeler. Sawmill carriage, W. Springer. Scale, asphalt, P. C. Brennan. Screening or bolting machine, F. Brandstaedter. Scythe, Baker & King.	615,332 615,379	-
	Rosette cutting bit, A. W. Cooper. Rosary engine, D. M. Dearing Rotary engine, J. C. Walker	615,251 615,664 615,597	tl a M
	Sowers. Safe or vault, E. C. Shankland. Salt purifier, P. Yoder.	615,621 615,503 615,335	T
	Saw filing and setting macrine, A. Reppeter Sawmill carriage, W. Springer Scale, asphalt. P. C. Brennan Screen. See Fly screen.	615,587 615,423	t w
	Seal, car, A. H. Peirce	615,461	T
	Seal, Car, A. H. Petroe. Seat. See Folding seat. Separating machine, J. Higginbottom. Separator. See Potato separator. Sewing machine. H. Diamond. Sewing machine. E. Duplessis. Sewing machine gage. H. S. Shaft. Sewing machine thread controlling mechanism.	615,618 615.436	F
			9
	Shade notified mechanism, H. H. Forsyth	615.442 615,645 615,449	J
	Sheatning, metallic, T. Hagerty. Shelf block case, book, A. E. Foutch. Ship's log, J. L. Bliss. Show case, H. H. Driggs. Shower bath. E. Jendis Signal system, block. W. L. Stockton. Signaling codes, indicating chart for marine, F. V. De Bem Sleeping bag, R. O. Stebbins.	615,422 615,438 615,486 615,584	8 V M 8
	Signaling codes, indicating chart for marine, F. V. De Bem. Sleeping bag, R. O. Stebbins. Smelting furnace. H. Charlier.	615.604 615,642 615,429	-
	V. De Bem. Sleeping bag. R. O. Stebbins. Smelting furnace. H. Charlier. Smoke consumer. W. L. Denio. Smoothing iron, T. Hawkes. Snap hook, E. A. Cummings. Snap hook, G. M. Hubbard. Snap hook, Some steps for moulding, A. F. & A. G.	615,346 615,356 615,345 615,556	
	Snap hook, G. M. Hubbard. Snap hook, G. M. Hubbard. Snap, etc., apparatus for moulding, A. F. & A. G. Beyer. Spectacles, G. W. Mansfield. Speeder machine, E. W. Houghton. Sprinkler. See Fire sprinkler. Fire extinguishing	615.421 615.624 615,555	
	Staging horse, W. Porten	615,364	
	(Continued on page 599)		1



MIETZ & WEISS KEROSENE

The most economical power known. Absolutely safe and reliable. Runs with common kerosene. Perfectly auto-matic. Patented 1897, U. S. and European countries. 128-132 Mott St., New York

THE BICYCLE: ITS INFLUENCE IN 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 diseased. Contained in SCIENTIFIC AMERICAN SUPPLEMENT, NO. 10092. Price 10 cents. To be had at this office and from all newsdealers.



For Long Distance,
For 5 to 15 Mile Lines,
Short Distance Te lephones,
Carbon Cylinder Batteries,
Battery Table Lamps,
Medical Batteries,
DYNAMO CASTINGS.
Send stamptor Complete catalogue of Send stamp for complete catalogue of Electri-cal Specialties and Supplies.

MIANUS ELECTRIC CO., - Mianus, Conn

Buy Telephones
THAT ARE GOOD-NOT "CHEAP THINGS."
The difference in cost is little. We guarantee our apparatus and guarantee our customers against loss by patent suits. Our guarantee and instruments are both good.
WESTERN TELEPHONE CONSTRUCTION CO.
250-254 South Clinton St.. Chicago.
Largest Manufacturers of Telephones exclusively in the United States.



"American-Hunnings" TELEPHONES.

Transmitters, Magneto Bells and Telephone Switchboards. Over 200,000 of our telephones in successful operation. Used by War and Navy Departments. In ordering state length of line, whether single line or metallic circuit and number of telephones to be used on one line. If Send for catalogue "S.A."

AMERICAN ELECTRIC TELEPHONE CO., 173 South Canal St., Chicago, III.

HOISTING ENGINES

operating on GASOLINE, DISTILLATE OF CRUDE Oll. Both Frictien and Geared Hoist, from 10 to 50 H. P., for Mines, Quarries, Ducks. etc. Great Saving over steam, especially where wood, coal or water are scarce Send for catalog. Guaranted Holly, State size wanted. Address Weber Gas and Gasoline Engas Gas and Gasoline En-rine Co., 402 S. W. Boulevard Kansas City, Mo.



"Wolverine" Three Cylinder Gasoline Marine Engine.



The only reversing and self starting gasoline eligine on them arket. Lightest engine for the power built. Practically no vibration. Absolutely safe.

Single, double, and triple marine and stationary motors from \$\frac{1}{2}\$ to \$30 \text{ H. P. To Write for catalogue.} WOLVERINE MOTOR WORKS, Grand Rapids, Mich

CROOKES TUBES AND ROENTGEN'S CROOKES TUBES AND ROENIUEN'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, Nos. 181, 189, 238, 243, 244, 792, 795, 805. 1905, 1908, 1054, 1055, 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

GEO.H.GERE YACHTAN LAUNCH WORKS. GRAND RAPIDS, MI OPEN LAUNCHES MONITOR GASOLINE VAPOR ENGINES

Launch.—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 SUPPLE-MENT 11 104. Price 10 cents. For sale by Munn & Co. and all newsdealers. THE MACHINERY OF A NAPHTHA



"HORSELESS

Monthly. Established 1895. Devoted to Motor Vehicles (Horseless Carriages). Subscription, \$2.00 a year. 6 months, \$1.00.

Illus. Catalogue of American Motor Carriages. 52 pages, 60 cuts. Price 25 cents. No postage stamps. THE HORSELESS AGE, 216 William St., P.O. Box 2564,



Manufactory Established 1761.

LEAD PENCILS, COLORED PENCILS, SLATE PENCILS, WITTING SLATES, STEEL PENS, GOLD PENS, INKS, PENCIL CASES IN SILVER AND IN GOLD, STATIONERS' RUBBER GOODS, RULERS, COLORS AND ADTISTS' MATERIALS. COLORS AND ARTISTS' MATERIALS

78 Reade Street. - - - New York, N. Y. Manufactory Established 1761.



THE ELECTRIC HEATER.-A VALUable paper, with working drawings of various forms of the electrical beaters, including electric soldering iron, electric pad for the sick, etc. 6 illustrations. SCIEN-TIFIC AMERICAN SUPPLEMENT 1112. Price10 cents. For sale by Munn & Co. and all newsdealers.

NO MORE "POISON IN THE BOWL"

No excuse for smoking foul pipes.

The "Mallinckrodt" Patent Nicotine Absorbent and Ventilated Tebacco Pipe will render smoking a bealthy enjoyment. Try it and you will become convinced. See notice, SCI. Am. of Aur. 7, '97.

Manufactured only by

Manufactured only by
The Harvey & Watts Co., Station E, Philadelphia, Pa.
and No. 276 Canal Street, New York.
Wustrated Circulars "S. A." mailed on application.



This beats Wind, Steam, or Horse Power. We oberthe WEBSTER 2% actual horse power GAS ENGINE

for \$150, less 10% discount for cash. Built on interchangeable plan. Built of best material. Made in lots of 100 therefore we can make the price. Boxed for shipment, weight 80 pounds. Made for Gas or Gasoline. Also Horizontal Engines, 4 to 30 borse power.

The Write for Special Catalogue.

WEBSTER MFG. CO., 1074 West 15th St., CHICAGO Eastern Branch, 38-D Dey Street, New York City.

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 sills. With engines or horse powers, Strong, simple and durable. Any mechanic can operate them easily. Send for catalog. WILLIAMS BROS., Ithaca, N. Y.



A Perfect and Practical Type Writing Machine for only ONE DOLLAR. Exactly likecut: regular Remington Type; does the same quality of work: takes a fools cap sheet. Compiler with paper holder, automatic roll feed, perfect type wheel and inking roll; uses copying ink; in fact it does all of the work of a high priced machine. Speed, 16 to 26 words a minute. Size, Exxis in.; weight, is ox. Battefacton guaranteed. Price 51.00. Peatage 15c. Extra. ROBT. H. INGERROLL & ERO., 65 & 67 Certlandt St., Dept. Ec. 147.