thin, even film. Lay over the magnesium thus arranged a very thin layer of guncotton. Connect to the bunch of cotton a small fuse of twisted cotton about 6 inches lor g, so that it will extend to the side of the dust pan. Then set the pan on a step ladder near the object, and when ready, light the guncotton fuse with a match, when instantly a brilliant flash will ensue. There are several ready prepared magnesium compounds now sold with special devices and lamps to fire them. 3. Also, how to make a good, cheap, vanilla extract? A. Cut up fine 1 ounce vanilla bean, grind with 2 ounces of loaf sugar, in a mortar, mix 8 ounces of rose water and 24 ounces of alcohol \$5 degrees, add a portion to the vanilla and sug ir, put in a displacer and pour on the balance of diluted alcohol. Add a few drops of caramel if not dark enough.

(7608) J. H. F. E. asks: Can you give me the receipt for making the glue preparation that will, when spread upon a perch or any other object, hold fast birds or whatever may come in contact with it? A. Boil the middle bark of the holly, gat lered in June or July, for six or eight hours in water, until it becomes tender: then drain off the water, and place it in a pit under ground, in layers with fern, and surround it with stones Leave it to ferment for two or three weeks, until it for:ns a sort of mucilage, which must be pounded in a mortar into a mass, and well rubbed between the hands, in running water, until all the refuse is worked out; then place it in an earthen vessel, and leave it for four or five days to ferment and purify itself. Remarks: Birdlime may also be made from mistletoe berries, the bark of the wayfaring tree and other vegetables, by a similar Should any of it stick to the hands, it may be removed by means of a little oil of lemon or turpen-tine. Use. To rub over twigs to catch birds or small animals. It is said to be discutient when applied externally

(7609) C. C. R. asks: 1. What is the prevailing belief among scientific men as to the nature of the electric current? A. That electricity is due to a vibration of the ether of space, and that light, heat, and electricity are simply different forms of manifestation of the energy of ether vibration. 2. If it is thought to be the molecular motion of the conductor, or motion of the intermolecular ether, what is the nature, as near as can be ascertained, of the motion? A. The office of the conductor seems to be to furnish a center or core, so to speak for the electrical waves which pulsate through the space around the wire. By means of such waves wireless telegraphy is carried on. 3. What recent reliable treatise can I obtain upon the subject? A. We can reconmend Barker's "Physics," advance course, price \$3.50; Trowbridge's "What is Electricity?" price \$1.50; Lodge's "Modern Views of Electricity," price \$2.

(7610) A. L. Y. asks: Has the wind any effect on a thermometer, all other conditions remaining the same? A. If the air in the wind is at the same temperature, hour after hour, the thermometer will soon change to the temperature of the air which is blowing past it and in which it is. After that state is reached there can be no further change in the thermometer.

## INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

FEBRUARY 28, 1899,

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

sen 6	20,14
Board. See Wind board.	
Boiler. See Steam boiler. Wash boiler. Water	
tube boiler.	
Bolting cloth cleaning brush, H. H. Emminga 6	20,43
Book, account, Selden & Smith 6	20.50
Book, account, G. C. Shepherd 6	
Book mark or leaf holder, J. E. Roantree 6	20.36
Book, paper, and lamp rest, Soderstrom & Nels-	
son 6	20,24
Bottles, device for preventing refilling of, E. W.	
Phinney 6	20,17
Box. See Provision box.	
Box, M. S. Cadwell 6	20,53
Box filling machine. J. P. Wright 6	20,52
Bracket. See Curtain pole bracket.	
Bracket arm, Z. R. Pinault 6	20,17
Brake. See Automatic brake. Bicycle brake.	
Pulley brake.	
Brickwork tie, J. G. McDowell 6	20,34
Bridge gate, W. A. Fusch 6	20,11
Buggy top support, T. H. Mayfield	20.34
Bullet greasing machine, J. F. McGrail	20.3
Durial analyst C M Drannan	20 5

Burial casket, C. M. Drennan
Burner. See Gas burner. Incandescent burner.
Burner for hydrocarburets, C. Rosier 62
Button, E. H. Danforth
Button making machine, F. G. Rodler
Button setting machine, E. Flagg
Button setting machine, I. A. Nash
Button, shirt collar, W. O. Wheeler,
Cable grip, G. S. Fouts
Can. See Milk can.
Cane sling, D. H. Walsh 6
Car coupling, J. A. Graham et al
Car coupling, F. H. Stark
Car door, grain, L. Gookins 6
Car fender, H. C. Cady 65
Car for gravity railways, etc., pleasure, M. C.
Campbell
Car replacer, J. Lanius
Car roof, A. N. Monteer

1	Card grinding apparatus, L. W. Penney	620,353
Ц	Card grinding apparatus L. W. Penney. Carpet fabric, woven, R. S. & H. Cookson. Carpet stretcher, W. F. Grigsby. Cart, child's, I. N. Dann. Cartridge implement, S. E. Kitchel. Casting apparatus, metal, L. C. B. Holmboe. Casting apparatus, metal, L. C. B. Holmboe. Centerboard for boats, tool for assembling and removing parts of, E. G. N. Salenius. Chain book for logging chains, J. Poquette. Chair. See Folding chair. Window chair. Checking and unchecking attachment, H. E. Twomley.  Twomley. E. Martin. Chute. castle. Q. Bruton. Clamp, W. S. Ramseaur, Jr. Cleaner. See Tube deaner. Closets, overflow, ventilating, and discharging fittings for, A. O'Brien. Cothes pin woode Free B. Ruckin.	20,104
١1	Carpet stretcher, W. F. Grigsby	620,120
4	Cart, child's, I. N. Dann	620,107
3	Cartridge implement, S. B. Kitchel	620,330
.	Casting apparatus, metal, L. C. B. Hollmoor	620,494
1	Centerboard for boats portable, C. S. Hamilton	620,311
١.	Centrifugal machines, tool for assembling and	,
٠1	removing parts of, E. G. N. Salenius	620,366
2	Chain hook for logging chains, J. Poquette	620,177
	Chair. See Folding chair. Window chair.	
١.	Checking and unchecking attachment, in. is.	620 382
٠.	Chimney cowl E Martin	620,472
)	Chute, cartle. Q. Bruton	620,099
f	Clamp. See Saw clamp.	200 100
1	Clamp, W. S. Ramseaur, Jr	620,495
ŧ	Cleaner. See Tube cleaner.	620 484
ı	Closet repairer, P. Muener	020,404
f	Strings for A O'Brien	620,352
t	Clothes pin, wooden, F. B. Benton	620,093
•	Clothes, wall rack for drying, H. Bucklin	620,274
	Coal separator, Caryl & Snyder	620,910   690 535
	Cook blom of D. P. Donneily	620 287
•	Coffee roasting machine, E. M. Potter	620,355
	Conveyer, A. J. F'rith	620,239
t	Conveyer, D. J. Sheldrick	620,371
ı	Closets, overflow, ventilating, and discharging fittings for, A. O'Brien. Clothes pin, wooden, F. B. Benton. Clothes, wall rack for drying, H. Buckin. Coal separator, Caryl & Snyder. Cock and valve for bottles, etc., J. Bengue. Cock, blow off, D. B. Donnelly. Coffee roasting machine, E. M. Potter. Conveyer, A. J. Frith. Conveyer, D. J. Sheldrick. Conveyer, bucket, A. J. Frith. Coop, folding, O. Terry.	620,512
1	Cornet I Heald	620,450
,	Converer, bucket, A. J. Frith. Coop, folding, O. Terry. Cornet, J. Heald. Cotten holder and waste receptacle, Browne &	020,100
;	Harrison	620,222
r	Harrison	620,109
	ner	020,103
•	Shaft coupling Thill coupling.	
t	Crank hanger, adjustable, A. Levedaul	620,241
а	Cultivator, circular tree, G. G. Guenther	620,546
,	Cup polishing apparatus, O. F. Pira	620 339
	Current meter and operating same, direct. R. G.	020,000
;	Cultivator circular tree, G. G. Guenther. Cup pollshing apparatus, O. F. Pira. Cupola furnace, H. E. Machell. Current meter and operating same, direct, B. G. Lamme Current transformer, multiphase, E. L. K. F. Kahlenberg Curtain pole bracket, S. Ascher. Cut out, E. Ellicott Cutter. See Lemon cutter. Coatch and the bracket of W. Lusebrink	620,333
r	Current transformer, multiphase, E. L. K. F.	con 144
l-	Kahlenberg	620,144
k	Cut out E Ellicott	620 111
	Cut out, E. Ellicott Cutter. See Lemon cutter. Cycle handle bar, F. W. Lusebrink	040,-11
r	Cycle handle bar, F. W. Lusebrink	620,242
e	Cycles, coin freed holder or stand for, A. C.	coo oca
_	Domes actuating device I D Storms	620.301
1	Orders, com freed nonder or stand for, A. C. Rice.  Damper actuating device, J. P. Stearns.  Damper regulator, J. C. Toomey  Darning apparatus, B. Baker.  Den tal flask, F. Groshans.  Deterpent. A Bernhardt.	620,380
	Darning apparatus, B. Baker	620,531
•	Den ta I flask, F. Groshan s	620,303
	Detergent, A. Bernhardt	620,407
_	obine for A M Todd	€20.198
е	Display cabinet, ribbon, J. D. Leen	620,464
e	Draught equalizer, W. F. Aidlott	620,528
a	Drawer guide, T. Hanson	620,447
	Dentalflask, F. Groshans.  Detergent, A. Bernhardt.  Digging and harvesting roots of peppermint, machine for, A. M. Todd.  Display cabinet. ribbon, J. D. Leen.  Draught equalizer, W. F. Aidlott.  Drawer guide, T. Hanson.  Drier. See Grain drier.  Drill See Grain driel.	
d	Dro and making some blue tetrazo, J. Schmid.	
f		
e	Dye, blue cotton, R. Demuth	620,428
	Dye, blue glycocol, K. Heumann	620,442
e	Dye, blue cotton, R. Demuth Dye, blue glycocol, K. Heumann Dyeing loose stock, apparatus for, G. Mallinson Dynamos, potential regulator for, A. A. Tirrill	620,410
n	Dynamos, potential regulator for, A. A. Tilling.	540,011
1-		
ζ,	O10.	
	D'anautic emente	

#### 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.

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.



# WOOD of METAL WORKERS without steam power can save time and money by using our

-Footand Hand Power Machinery SEND FOR CATALOGUES—

A-Wood-working Machinery.

B-Lathes, etc.

SENECA FALLS MFG. COMPANY, 695 Water St., Seneca Falls, N.Y.

POWER & FOOT SHAPERS, PLANERS, DRILLS, ATHES, MACHINE SHOP OUTFITS, TOOLS AND SUPPLIES, CARLOGUE FREE SEBASTIAN LATHE CO. 120 CULVERT ST. CINCINNAT I. O. Foot Power and TURRET LATHES, Plan-ers, shapers, and Drill Presses. SHEPARD LATHE CO., 133 W. 2d St., Cincinnati, O.







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

## SUB-PRESS PUNCHES AND DIES

We make to order to drawings or models blanking, shaving and swaging dies. either simple or compound, for work requiring accuracy and finish. Subpress Dies for the parts of watches, clocks, cyclometers, and other small mechanisms a specialty. We carry in stock different sizes of Sub-Press Bases and Stands. Send for Descriptive Circ'r.

THE PRAIT & WHITNEY CO.





The Standard Magneto.

Our high grade Magneto Bells and Receivers are recognized to be the best on the market. We have the best facilities for their manufacture, we use the best materials, and employ the most skilled workmen. Hence as a result our goods are not only unexcelled but unequaled. Send for Catalogue "S"—correspond with us.

The Holtzer-Cabot Electric Co.. Boston (Brookline), Mass.

Electric meters, com controlle
W. F. Browne.
Electric motor suspension, G. Gibbs.
Electric motors, means for suspending, S. H.
Short.
Short.
The switch H. O. Swoboda 620,537 620,239Short. 620,256 Electric time switch, H. O. Swoboda 620,196 Electrical apparatus, coin controlled, R. W. Tay-lor, Sr. 620,196 Electrical apparatus, coin controlled, R. W. Tay.

lor, Sr.

Lor, Sr.

Electrical distribution and regulation, system of,
B. G. Lamme.

Electrical distribution, direct current system of,
B. G. Lamme.

Electrical distribution, direct current system of,
B. G. Lamme.

Electrical distribution, direct current system of,
B. G. Lamme.

Electrical machine, G. F. Martin.

Electrical transformers, automatic cut out for,
W. J. Greene.

Electrical transformers, automatic cut out for,
Electromotive force regulation, means for and
method of, N. Kowe.

Elevator. See Passenger elevator.
Elevator safety device, L. W. G. Rolff.
Emergency screen for paying tellers, M. J. Carey 620,276
Empine. See Air and gas engine. Explosive enpine. Rotary engine.
Engines, automatic controlling stop for, C. W.
Borring.

Exercising device, A. C. Mueller.

620,342
Exercising device. Engines, automatic controlling stop for, C. W. Boring.
Exercising device, A. C. Mueller.
Exercising machine, A. A. Hendrickson.
Explosive engine for vehicles, J. W. Eisenhuth.
Fabric. See Carpet fabric.
Fastener, C. A. Bryant.
Fancet, F. Hassis.
Fancet, can, G. F. Tong.
Fence stays, tool for attaching, J. E. Boys.
Fence, wire, D. P. Anthony F. Boys.
Fender. See Car fender.
Fertilizers, making, W. L. Goldsmith.
Filer, J. R. Haselden.
Filter, J. F. Ziegler.
Filtering apparatus, R. Helwig.
Firearm, magazine, W. W. Wood.
Fire kindler, A. Sendlein.
Fireproofing wood, etc., method of and apparatus for, J. I. Ferrell.
Fishing reel. W. Washburn.
Flowers, bulder or supporter for cut, E. C. Murray.
Flue stop, G. A. Higgins. ray.
Flue stop, G. A. Higgins.
Flue stop, G. A. Higgins.
Fly paper holder, R. D. Safford.
Fly trap. automatic, M. S. Featherstone.
Folding chair or seat, F. O. Brandt.
Food from bananas and making same, cattle, O.
Zurcher. 620,209 Zurcher. 620,209
Forts or fortifications, construction of, M. C.
Mengis. 620,161
Fruit gatherer, C. M. Stewart. 620,195
Furnace. See Cupola furnace. Manufacturing
or other furnace. Furnace feeding apparatus. blast, E. E. Slick. 620,510
Furnaces, grate for underfeeding, B. D. Childrey. 620,103 Furnaces, grate for underfeeding, B. D. Childrey.

Furnaces, grate for underfeeding, B. D. Childrey.

Furnaces, grate for underfeeding, B. D. Childrey.

Gare, See Micrometer gage.

Gare apparatus, E. K. Griesemer.

Gare apparatus, E. K. Griesemer.

Gare apparatus, E. K. Griesemer.

Gare and burning apparatus, J. J. Kennedy.

Garment supporter, G. H. Blakesley.

Gasumer, J. G. A. Kitchen.

Gas burner, J. G. A. Kitchen.

Gas burner igniters, manufacture of, M. Spier.

Gas burners, lighting device for, E. S. Ullmann.

Gas generator, R. Bocking.

Gas generator, acetylene, M. L. Proctor.

Gas generator, acetylene, M. E. Williams.

Gas generator, acetylene, M. E. Williams.

Gas generator, acetylene, M. Spier.

Gasse by refrigeration, especially applicable to separation of oxygen from air, apparatus for separation of oxygen from air, apparatus for separation of oxygen from air, apparatus for Separation. See Acetylene generator.

Gate. See Automatic gate.

Gearing, wheel, W. H. Monk.

Generator. See Acetylene generator.

Gas tubing joint, G. E. Hoey.

See 20.320 erator. See Acetylene generator. Gas generator. Glass tubing joint, G. E. Hoey. Gold from oranid, extracting, W. A. Caldecott... Gold from ores, minerals, or other gold bearing substances, extracting, Black & Skeet... Grain drill, J. E. Ricklefs... Grain drill, J. E. Ricklefs... Grain drill shoe, Brennan & Christman (reissue) Grain loader, M. L. Page. Grain shocking mechanism, A. P. Phillips... Grating, protective illuminative, C. E. Manning. Gun breech mechanism, J. W. Stockett... Gun carriage. A. Resow. J. W. Stockett... 620.359. 

Guns, percussion lock for breech loading, C. Pollit
Gynecological stirrup, J. A. Steurer. 620,534
Harness ring, J. W. Fisher. 620,543
Hat fastener, J. H. Roland. 620,642
Hat fastener, J. Stauber. 620,193
Hay and stock rack for vehicles, G. P. Holmes. 620,194
Hay carrier, W. Louden. 620,622
Hay carrier, W. Louden. 620,105, 620,225
Heet slug, boot or shoe, E. J. & M. D. Leighton. 620,114
Hides or skins, machine for softening, G. W.
Glazier. 620,55
Hoisting hook, G. B. McMerrick. 620,514
Hoider, C. T. King. 620,146
Hook, See Chain hook, Hoisting hook, Snaphook.

WOOD MACHINERY

Machines or Complete Equipments for Any Class of Work.

Correspondence is Solicited. Inches Standard Magneto.

Inches And Dies

Inches Content of the Inches And Dies

Inches And Dies

Inches And Dies

Inches Content A. E. Dowell. 620,381

Inches Cement, or mortar, composition for make ing carehonated bydraulic, H. J. Livingston. 620,381

Inches Cement, or mortar, composition for make ing carehonated bydraulic, H. J. Livingston. 620,381

Inches Cement or composition for make ing carehonated bydraulic, H. J. Livingston. 620,381

Inches Cement, or mortar, composition for make ing carehonated bydraulic, H. J. Livingston. 620,381

Inches Cement or composition for make ing carehonated bydraulic, H. J. Livingston. 620,381

Inches Cement, or mortar, composition for make ing carehonated bydraulic, H. J. Livingston. 620,381

Inches Cement or mortar, composition for make ing carehonated bydraulic, H. J. Livingston. 620,381

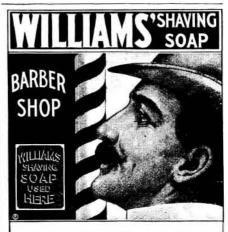
Inches Cement or mortar, composition for make ing carehonated bydraulic, H. J. Livingston. 620,381

Inches Cement or mortar composition for capital state in the make in the maken in t

(Continued on page 158)

If you make a good machine and think it deserves an individualizing-paint, our booklet on PECORA FLAT STEEL COLOR and PECORA DRESDEN MACHINE ENAMEL will interest you. Want one? Pecora Paint Co., Philadelphia.

YOU WOULD USE PECORA BLOW HOLE CEMENT IF YOU READ OUR CIRCULAR



When you see that sign on a barber shop "Williams' Shaving Soap used here," you need not hesitate to enter. You may be sure of a good, clean, comforting, refreshing shave. Above all, you are safe from the dangers which lurk in cheap, inferior shaving soaps.

WILLIAMS' SHAVING SOAPS are used by all first-class barbers, and are for sale all over the world.

The J. B. Williams Co., Glastonbury, Ct. Depots: London, Paris, Dresden, Sydney.

## 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 ISSS edition of MONT-GOMERY & CO.'S

TOOL CATALOGUE.

It contains 510 closely printed pages with index. Book is pocket size, 6% x 4% inches, with rounded edges and sutched covers. Sent free by mail on receipt of 25 cents by

MONTGOMERY & CO. 105 Fulton Street, New York.

Pipe Threading Machines of Highest Merit. **COMBINATION BENCH** 

and PIPE VISES. Catalogue containing interesting information free. Bignall & Keeler Mfg. Co.,



## THE OBER LATHES



For Turning Axe, Adze, Pick, Sledge, Hatchet, Hammer, Au-ger, File, Knife and Chisel Han-dles, Whiffletrees, Yokes, Spokes, dles, Whimetrees, Lokes, Sponder,
Porch Spindles, Stair Balusters,
Table and Chair Legs and other
irregular work.

The Ober Lathe Co., Chagrin Falls, O., U.S. A.

## AUSTIN SEPARATOR



27 Woodbridge Street West, Detroit, Mich.

CHISELS, CARVING TOOLS.

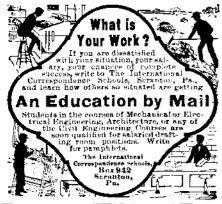
GOUGES. PLANE IRONS, RAZORS, LIGHT EDGE TOOLS

620,381
620,376
620,469
620,469
620,469
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,503
620,50

BUCK BROTHERS, Riverlin Works, Millbury, Mass.

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 SOPPLEMENT, Nos. 998. 1004, 1007, 1012, 1014, 1015, 1016, 1022, 1035, 1035, 1057, 1066, 1104, 1124, 11.22, 1149, and 1150. Price 10 cents each, by mail, from this office, and all newsdealers.







for their Illustrated Catalogue "S.A."

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 rable. Any mechanic can end for catalog.

WILLIAMS BROS., Ithaca, N. Y.



Skinner Combination Lathe Chuck Strong and true. Best reversible jaws-easily reversed. Made of ste-1, case hardened. No strain on the screws. I pper section of jaw may be left off and chuck used for cutting stock.

Greater capacity than any other chuck. Can be fitted with interchangeable jaws.

SKINNER CHUCK CO. Church St., New Britain, 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.

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



This beats Wind. Steam. or Horse Power. We over the WEBSTER 2% actual horse power

GAS ENGINE

for \$150, less 104 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. Mad for Gasor Gasoine. Also Horzontal Engines, 4 to 36 horse power.

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

#### \$1 YEARLY FOR REPAIRS!

It has been found that it costs a trifle less than \$1 per year to keep our HOIST-ING ENGINES in repair. That speaks well for their ity, doesn't it? There is no more economical or service-able engine made for mines, quarries, docks, etc. Much cheaper than steam. Both friction and geared hoist 6 to 150 H. P. Send for Catalogue. Weber Gas & Gasoline Engine Co., 402 S.W. Boulevard, Kansas City, Mo.



WOLVERINE" GAS AND GASOLINE

### Power? Power? Power! RACINE GAS AND GASOLINE ENGINES.

LOCAL ENGINE AGENTS WANTED

Racine Steam and Vapor Launches. Racine Row and Sail Boats. Send stamps for



THE BICYCLE: ITS INFLUENCE IN Health and Disease.—By G. M. Hammond, M.D. A valuable and interesting paper in which the subject is exbaustively 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 Scientificants. No. 1402. Price 10 cents. To be had at this office and from all newsdealers.



Paper making machine, Moore & White. Paper pulp digester, F. S. Lyman...... Paper makink machine shore a white.

Paper pulp digester, F. S. Lyman.

Passenger elevator, J. McLean.

Pedai, J. Wediska.

Pen, fountain, J. Blair.

Pen fountain, J. Blair.

Pen fountain, J. Blair.

Pen torating machine. J. J. Flett.

Photographic plate holder, G. C. Stanley.

Plano hammer head, S. W. Durham.

Pleture support, H. R. Brown.

Plin. See Clothes pin.

Plipe bending apparatus, H. F. Condon.

Plipe coupling rust guard, J. E. Windle.

Plipe or boiler covering. H. C. Michell.

Plipe testing plug, pneumatic, J. J. Welstead.

Pleturner, S. McAdoo.

Pistons, instrument for indicating continuously mean effective pressure on engine, W. Ripper. 620,266 620,216

nican encoive pressure on engine, W. Ripper...
Placket closer, W. J. Worden.
Placket fastener, skirt, T. Hollander.
Plane, joiner's, J. M. Cole.
Planter, combined corn and cotton, W. Sobey.
Planter, corn, T. Frietschek. Plow, W. C. Cousins.
Plow, J. C. Cox.
Plow, revolving, M. C. Dethlefs.
Plow, sulky, W. Sobey.
Plow turning attachment, W. Kester.
Post. See Wagon post.
Post office boxes, indicating sign for, W. J. Williams.
Postal card, D. W. Custer.
Power, means for transmitting, H. Paulson.
Protectile, E. Abergs. 620,421

liams. 620,423
Power, means for transmitting, H. Paulson. 620,423
Power, means for transmitting, H. Paulson. 620,423
Projectile, F. Abrens. 620,400
Projectile, F. Abrens. 620,400
Projectile, F. Abrens. 620,401
Propeller, screw, N. H. Borgfeldt. 620,411
Propeller, screw, N. H. Borgfeldt. 620,411
Propeller wheel, J. K. Bowman. 620,410
Provision box, window, H. G. Plumb. 620,167
Pulley brake and safety device, H. Bockmann. 620,410
Pulley, sash, C. H. Ocumpangh. 620,408
Pump attachment, beer, Latimer & Crenshaw 620,468
Pump proce A. E. Whiting. 620,409
Rack. See Hay and stock rack.
Railway, electric, L. M. Aspinwall. 620,609
Rack. See Hay and stock rack.
Railway, electric, J. F. Munsie. 620,404
Railway, electric, J. F. Munsie. 620,640
Railway switch R. W. King.
Railway switch R. W. King.
Railway switch R. W. King.
Railway tie shearing machine, W. Barth. 620,321
Railway tie shearing machine, W. Barth. 620,332
Racording apparatus, electric, C. L. Jaeger. 620,323
Recording system. electric, C. L. Jaeger. 620,323
Recording apparatus, electric, C. L. Jaeger. 620,323
Recording system. electric, C. L. Jaeger. 620,32

620.517

Sewing machine bemstitch, J. Gutmann.
Sewing machine work holder, E. M. Case.
Shade hanger, S. Gray.
Shade hanger, S. Gray.
Shafting, tubing, etc., construction of hollow, S.
Vanstone.
Sharting, tubing, etc., construction of hollow, S.
Vanstone.
Shaving apparatus, I. Mazell.
Sheet metal wheel, G. E. Mittinger, Jr.
Shirt, W. M. Andrews.
Shoe, G. W. Chase.
Shoes, etc., fastener for, G. Barnes.
Shoes, etc., fastener for, G. Barnes.
Shoutter fastener, F. Wankel.
Signal system, E. L. & G. Hail.
Siphon head, Welling & Fritz.
Skiving machine, welt, E. E. Winkley.
Snap hook, J. Wilson.
Snow shed construction, C. F. McGlashan.
Solar and transit instrument, J. B. Davis.
Soldering lamp, P. & J. Hennz.
Speed gearing, changeable, W. C. lliffe.
Speed of direct current motors, method of and means for varying, B. G. Lamme.
Spoke fastening machine, R. O. Stutsman.
Spraying implement, plant, A. J. Brummeler.
Stakk and bay rake, E. A. Morris.
Stalk performing and driving apparatus, B. A. & B.
J. Grasberger.
Steam boiler, R. J.JO'Neill.
Stereotypes casting box, B. F. Curtis.
Stope, propessed or and composition for cleaning, F. W. Prentice.
Stone, process of and composition for cleaning, F. W. Prentice.
Stone, prospector's knockdown camp, F. Stapp. 6
Stove, Droposed of and composition for cleaning, F. W. Prentice.
Stove, C. H. Cosby.
Stove, Droposed or and composition for cleaning, F. W. Prentice.
Stove, Droposed or and composition for cleaning, F. W. Prentice.
Stove, prospector's knockdown camp, F 620.133

CRAND RAPIDS. MICH.

POWER ?

POWER ?

POWER ?

POWER ?

POWER S. Gaso- Case City, Mo.

Switch. See Electric time switch. Railway switch. Tielephone switch. Syringe case, bypodermic, G. Ermold.

Syringe case, bypodermic, G. Ermold.

Telephone switch. W. D. Gbarky.

Telephone switch.

Thanking apparatus, steam, G. R. Elliott.

Thanking apparatus, work
Time recording and checking appa 620,499

(Continued on page 159)

on't work will increase your knowledge and earning capacity if you will devote some or your spare time at home to study, at a cost so low that you will not feel the outlay. Thorough courses by mail in Electrical, Mechanical, Civil, Mining, Steam, and Sanitary Engineering. Architecture, Mechanical Drawing, Machine Design, etc. Best Text. e., Seven years experience in teaching by correspondence. Write for feel illustrated DD page S. A. ample 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.



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

MIETZ & WEISS ENGINE.

The most economical power known. Absolutely sale and reliable, Runs with common keroseue. Perfectly automatic. Patentel 185, U.S. and European countries. Send for Catalogues. 128-132 Matt St., New York.

**GAS** and **GASOLINE** ENGINES. Using Natural Gas, Coal Gas, Producer Gas, and Gasoline di-rect from the tank. 1 to 40 H. P., actual. The Springfield
Gas Engine Co.
21 W. Washington St
Springfield, O.



gines. Send for catalog MIANUS, CONN.

Bohm, treating of open circuit batteries, historical dry batteries, modern dry batteries, Hellesen's battery, Rryan's battery, Koller's battery, and the efficiency of dry cells. With three illustrations, Contained in Scientific American Supplement, No. 1001. Price 10 cents, To be had at this office and from all newsdealers. "Universal" Kneading and Mixing Machines

DRY BATTERIES.—A PAPER BY L. K.

Over 6200 in use. Over 300 varieties in 155 different industries.

Patented in all countries. WERNER & PFLEIDERER
Naginaw, Mich. Buitters of all kinds of Chemicai Machinery, also at
Cannstatt, London, Vienna,
Berlin, Paris and Moscow.



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 drawings on a large scale, and the furnace can be mide by any amateur who is versed in the use of tools. This article is contained in Scientific American Supplications. For sale by MUNN & Co., 381 Broadway, New York City, or by any bookseller or newsdealer.



AN ART SOUVENIR OF THE WAR

UT INE WAK
consisting of SIXTEEN elegant engravings of the ARMY
and NAVY HEROES, with Autheoric Autographs. All inclosed
in portfolio. handsomely embossed
in gold. A Valuable Krepsake.
Complete Ser, by mail, 50c.
THE HERO MFG. & SPECIALTY CO.
31 Broadless New York City.

31 Broadway, New York City.

De Agents Wanted Everywhere.



Registers an accurate acco unt of work done on printing presses, grain tallies, weighing, measuring and other automatically. Simple, accurate, durable. Special counters to order. Send for circular. C. J. ROOT, Bristol, Conn., U. S. A.

BABBITT METALS.—SIX 1MPORTANT ormulas. Scientific American Supplement 1123. rice 10 cents. For sale by Munn & Co. and all news. ealers. Send for 1897 catalogue,



# TIME RECORDER

The Rochester Card System keeps the record for a full week on a small card. See Illustrated Editorial Sct. AMER., Dec. 24, 1898.

WILLARD & FRICK MANUFACTURING CO. ROCHESTER, N. Y.



DON'T

perfectly decolorless and deodorizes
without the aid of
any chemicals. Over
30.00 Purifiers in
use. Celebrated for
30 years as the most
remarkable
Water Purifier
ever devised. Catalong mailed free unever devised. Cata-logue mailed free up-on application Lib-eral terms to agents. BÜHRING WATER

PURIFYING CO.

LOSE THE POINT of your pencil. Carry it in the Improved Washburne Patent Pencil Holder, fastens to pocket or lapel of vest. Grips firmly but don't tear the fabric. Everlass Holder, with swive hook, equally handy. By mail, libc, cuch. Catalogue of these and other novelties made with the Washburne Fasteners free for the asking.

CAN RING CO., Box P, Waterbury, Conn.



Train pipes, metallic pipe connection for, C. W.
Vaighan. 620.518
Transformer regulating, Cowan & Still. 620.283
Transformer regulating, Cowan & Still. 620.283
Transformer regulating, Cowan & Still. 620.283
Transformer regulation, rotary, R. D. Mershon. 620.331
Transformer regulation, rotary, R. D. Mershon. 620.331
Transformer regulation, rotary, R. D. Mershon. 620.331
Transformer regulating, Cowan & Still. 620.331
Transformer regulating to the still from the st

THE BÜHRING SYSTEM ON A STILL HUNT.

The up-to-date sportsman needs for success, personal comfort, and protection the Ideal Hunting Shee.
I Tanned borsehide uppers gray color, soft as a glove, touch as steel, cannot harden. Wide double soles, rubbercer mented together. Practically water-proof, fewible, easy. The most serviceable shoe for surveyors and engageers. Hus. circulars free.
M. A. SMITH & 50N,
Manufacturers, 29 31 N. 13th
Street, Philadelphia.
Sporting Shoes of all kinds.

THE ELECTRIC HEATER.—A VALUable Daper, with working drawings of various forms the electrical heaters, including electric addering in electric pad for the sick, etc. 6 illustrations. Scin TIFIC AMERICAN SUPPLEMENT 1112. Price 10 cen For sale by Munn & Co. and all newsdealers.



The Robinson Cablest is the only genuine Foldin abinet with door. It folds like a screen in a six inc

Awarded First Fromlan at Gmaha Exposition. We duarantee nor Catinet for Myers. Samp goods, circulars and Holleton-from dell'ghted racent from Ever admention be cured or greatly edited by the bath. We handle all kinds of hyphanese. Price of Calinets range from Exact Carrie commissions to good Agents. We fucasital. Write techny.

C. ROBINSON THERMAL BATH CO., Toledo, Obio.



## Cash Buyers Like Our Prices.

This screw-plate for bicycle repairers mailed for \$3.25 or at store \$3.00. Sold elsewhere for \$4.50.

THE FRASSE CO., 21 Warren St., New York. An illustrated catalogue of 1,500 other bargains mailed when 25 cents accompanies the request.