

OCTOBER

THIS ISSUE 110,000

10 CENTS

POPULAR MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT

PUBLISHED IN CHICAGO

LARGEST CIRCULATION OF ANY MECHANICAL PUBLICATION IN THE WORLD

Purest Sugar Made from Barrel Hoops

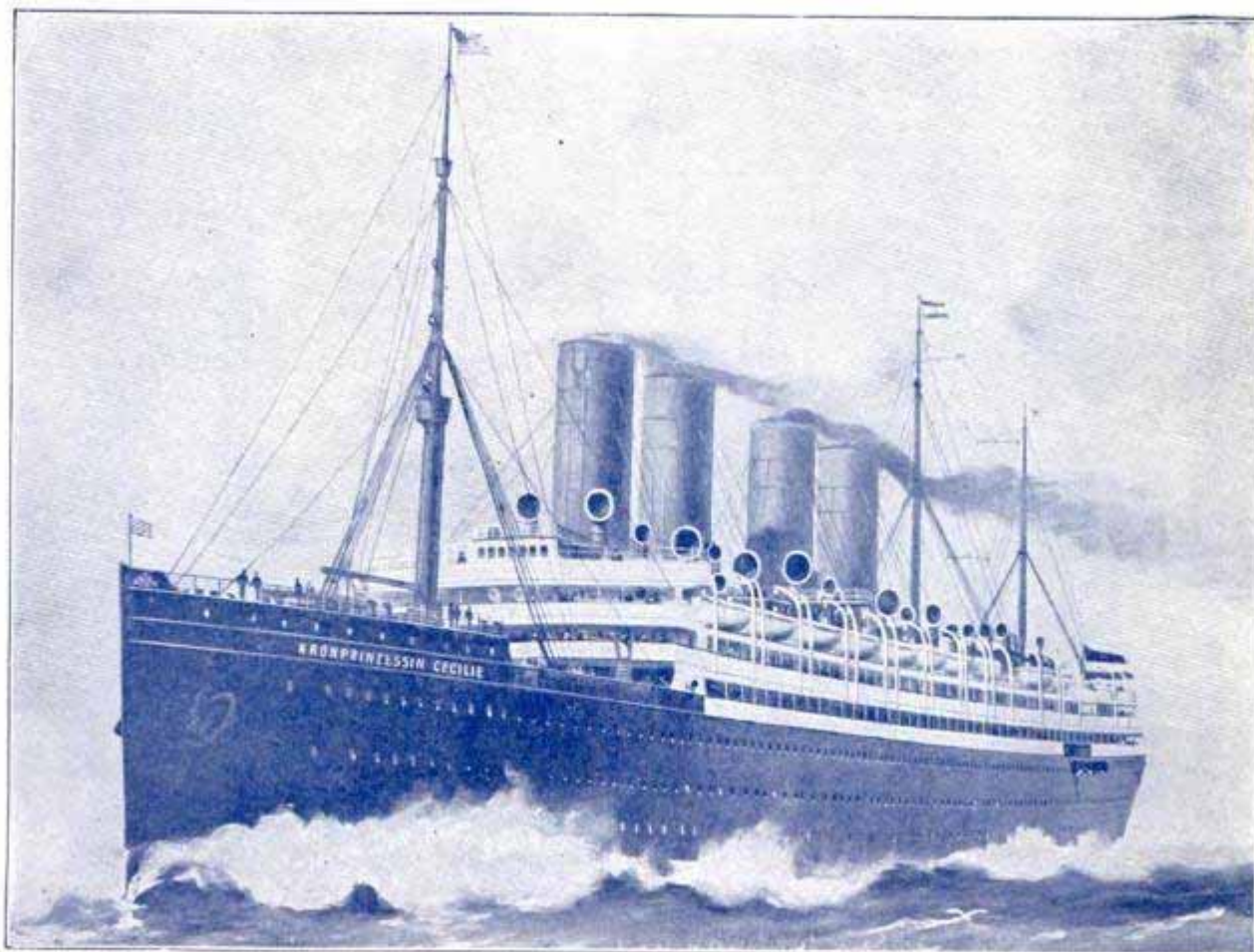
Corn Cobs and Other Scraps, by New Electric Method

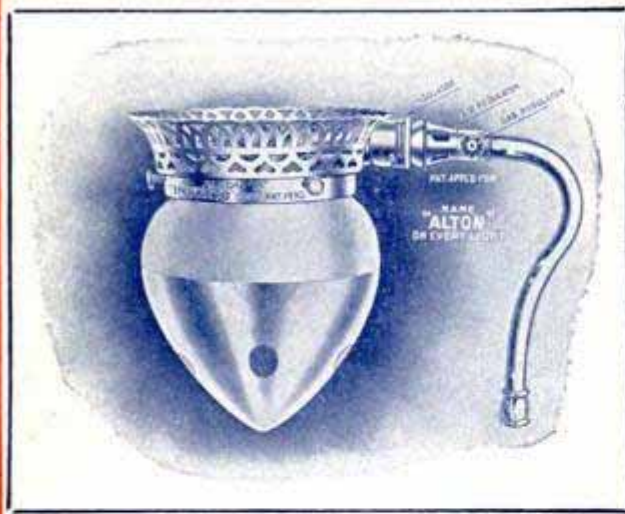
Huge Water Wheel Drains 2,000 Acres

Breaks All Records and Astounds Engineers

Teach Swimming on Dry Land

New Branch of Instruction in Germany





THIS IS THE NEW Alton "Inverto" GAS LIGHT

A Shadowless, Pure White Light
All the light is thrown downward

The Alton "Inverto" gives six times the light and cuts your gas bill in half. The best Inverted Gas Light human ingenuity can devise. Handsome in appearance, durable in construction, economical in use. The Alton "Inverto" is adjustable to any Gas Fixture.

Send \$1.50 for a Complete Sample. Express Prepaid
AGENTS WANTED in every city or town where gas is used.

ALTON MANUFACTURING COMPANY

1163 St. James Bldg., NEW YORK CITY

*Founded by Mathew Carey, 1785.
A House in touch with Three Centuries.*

THE PIONEER INDUSTRIAL PUBLISHERS
OF AMERICA.

HENRY CAREY BAIRD & Co.
Industrial Publishers, Booksellers and Importers
810 Walnut Street, Philadelphia, Pa., U. S. A.

Our new and Revised Catalogue of Practical and Scientific Books, 94 pages, 8vo. (March 1, 1907); Catalogue of Chemical Technology and General Chemistry, July 1, 1905 (New and Up-to-Date); a Catalogue of Books on Metallurgy, Mining, Prospecting, Mineralogy, Geology, Assaying, Analysis, etc.; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc.; and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.

Catalogue of Chemical Technology and General Chemistry

Our Complete Classified Catalogue of Books on Chemical Technology and General Chemistry arranged under the following heads: Acids, Alkalies, and Salts; Beverages, Brewing, Cider, Distillation, Fermentation, Liquors, Preserving, Vinegar, Wine; Bricks, Ceramics, Glass, Porcelain, Pottery; Cement and Concrete; India Rubber, Gutta Percha, Glue, Ink; Leather Manufacture; Oils, Fats, Waxes, Paints and Varnishes; Paper Manufacture, Fibres; Perfumery; Soap and Candles; Sugar, Starch; Flour, Baking, Bread, Confectionery; General Reference and Receipt Books, General Chemistry, Chemical Arithmetic, Calculation, Tables, etc.; Chemical Analysis; Inorganic Chemistry; Organic Chemistry; Electro-Chemistry; Addenda. Sent free to anyone in any part of the world who will send his address.

HENRY CAREY BAIRD & CO.

Industrial Publishers, Booksellers and Importers
810 Walnut Street :: Philadelphia, Pa., U. S. A.

The Best American Book on INDUSTRIAL ALCOHOL

By F. B. WRIGHT

This is a plain, practical handbook on the manufacture of Alcohol and denaturing for industrial purposes, from Potatoes, Grain, Beets and other waste farm products.

**Second Edition, Now Ready,
Contains Nearly 300 Pages,**

with 60 illustrations and plates, giving the latest American practice and machinery. Also valuable U. S. formulas, Free Alcohol Law and its Amendments.

Sent postpaid on receipt of \$1.00

SPON & CHAMBERLAIN
123 P. M. Liberty St. New York

Never Such Book News as This

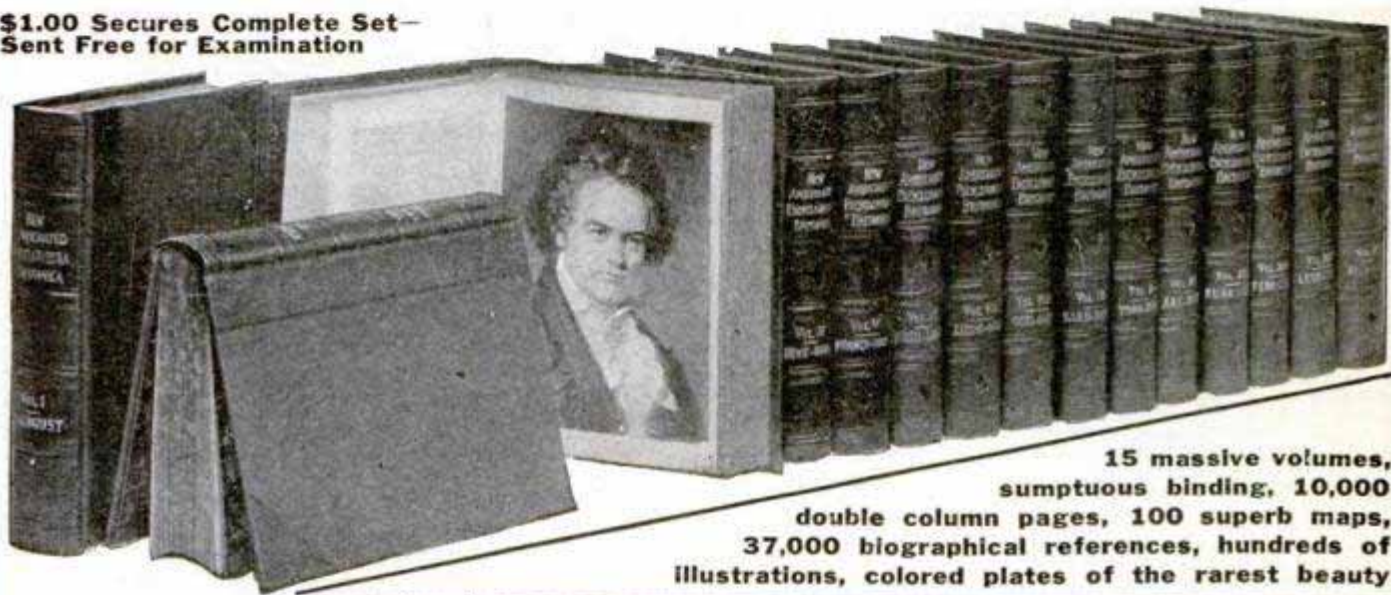
THE NEW AMERICANIZED ENCYCLOPEDIA BRITANNICA

**CONDEMNED TO BANISHMENT from our Market,
BIDS FAREWELL to the American People in the
MOST SENSATIONAL SALE OF OUR TIME**

Publication must cease at once. Entire publisher's stock now
on hand to be cleared with the utmost rapidity at less than

**ONE HALF THE PRICES AT WHICH OVER 250,000 SETS HAVE SOLD
A SALE TO MARK AN EPOCH IN BOOK HISTORY. AN EVENT WITHOUT EXAMPLE**

**\$1.00 Secures Complete Set—
Sent Free for Examination**



**15 massive volumes,
sumptuous binding, 10,000
double column pages, 100 superb maps,
37,000 biographical references, hundreds of
illustrations, colored plates of the rarest beauty**

Questions of international copyright have been decided against the American publishers. The greatest, most valuable and popular of all American book publications must end its marvelous and unparalleled career of success immediately. A temporary arrangement has been effected by which the publishers of the regular English edition who have secured absolute control, permit the selling of all sets that are now bound and can be marketed at once. In this great crisis the American publishers turned to us as the one house in America whose gigantic resources could grapple with the situation. We purchased the entire stock at our own figures and now offer them at prices absolutely without precedent in this country.

The sets in cloth binding we offer at \$37.00; in half morocco at \$46.00. When these are sold you CANNOT AGAIN BUY this popular Americanized edition AT ANY PRICE. The new English edition, now being prepared, will cost you \$150 and \$200. FOUR TIMES MORE than our clearance prices.

BUY NOW WHEN YOU CAN SAVE SO MUCH --- THE CHANCE WILL NOT COME AGAIN

THE GREATEST OF ALL ENCYCLOPEDIAS. This monumental work is in a class by itself. Its supremacy has never been questioned. What Napoleon is among soldiers, what Socrates is among philosophers, what Raphael is among artists, the New Americanized Britannica is among encyclopedias—beyond all comparison or competition. The most profound and brilliant thinkers of the world have written its articles. Three hundred of the ripest scholars in America have revised every word and line, added, condensed and improved and brought all information up to the very latest date. It is a home university, a college education, a huge library. It covers the entire range of human discovery, experience, knowledge and achievement.

SENT FREE FOR EXAMINATION. If you will sign and mail to us the accompanying coupon, we will send, while they last, a complete set of this superb work to any address in the United States or Canada for five days' free examination in your home. This does not involve one cent of cost or one particle of obligation. We pay all transportation charges. If you do not wish to retain the books, return them to us at our expense.

ONE DOLLAR SECURES THE SET. Should you decide to purchase after examination, you can then send us \$1 as the first payment and the balance can be paid at the rate of \$2.00 per month for the cloth, and \$2.50 per month for the half morocco.

DO NOT DELAY. Cut out and mail the coupon today, if you wish to secure the most wonderful book bargain of this generation. The sets will fairly melt away at these phenomenal prices, and in order to secure one you must act at once. You can never duplicate this opportunity. **Do it now.**

SIEGEL COOPER COMPANY

J. B. GREENHUT, Pres.

6th Ave., 18th and 19th Sts. - NEW YORK

Prop.
Mech.
Oct.

**SIEGEL
COOPER CO.,
New York**

Send me for examination, prepaid, a complete set of the New Americanized Encyclopedia Britannica in half morocco binding at your closing out price of \$46.00. If I should decide to purchase I will send you \$1 within five days after receipt of goods and \$2.50 per month for eighteen months thereafter. If I should not wish to retain them I will notify you promptly, and hold them subject to your orders. Title to remain in Siegel Cooper Company until books are fully paid for.

Name _____

This One



T008-ICE-2701

Save \$50 or More Each Year

Order One or More Articles From This Ad.

Our No. 68 Catalog and Economy Guide Book is a necessity to the farmer, planter, lumberman, mechanic—in fact to every resident of the country or small towns. Despite the great value of this Economy Guide Book to you and the large cost to us, we will give one copy FREE to every grown person who asks for it. Our past experience proves that those who make free use of it will save from \$50.00 upwards each year. We invite you to be one of them.

This Catalog contains nearly 1,000 pages, thousands of pictures photographed from the original articles, fully and accurately described, and shows many things you want that you cannot buy in the small towns, and thousands of things of better quality and at lower prices than any other catalog house or store offers you. The articles shown here are extra good values for the money. *Send a trial order today.*

Brass Trimmed Bed \$3.95



This extra high grade iron bed is made of the best material, trimmed and ornamented with brass. It is as rich a design as was

ever produced for double the money; furnished in white, green, blue and black. Three sizes, 3-6, 4-0 and 4-6.

Davenport Couch \$5.10

This fine Davenport bed couch has a fine drop front with patented lazy tong. Workmanship and material is the best; very easy to sit or sleep on; 6 ft. 2 in. long, 4 ft. 2 in. wide. Seat is 18 ins.



Dining Chair 85c Each



A beautiful saddle seat diner, with a 10 in. top slat, handsomely carved, and seven fancy turned back spindles. The chair is made of hardwood, gloss finished, and has short brace arms and strong, well braced legs.

Easy Rocker \$2.95

Here is one of the handsomest chairs that can be found for the price, material and workmanship considered. It is strongly made, finished in golden oak and birch mahogany. The panels are deeply carved and connected by a highly polished banister. It has a cobbler seat of ample proportions.



Our Guarantee: We positively guarantee that all purchases of every kind from us will be absolutely satisfactory, and that the goods ordered will be exactly as represented. This protects you, and you know that you will receive what you buy and pay for. If you receive any goods from us that are not as represented, return them to us and we will cheerfully refund your money. **Send us an order today.**

Our References: We are incorporated for \$1,000,000.00. We invite investigation as to our responsibility. Look us up in Dun's or Bradstreet's. Ask any railroad or express company. **Write to the editor of this paper.**

Advertising Coupons In our New Catalog No. 68 is a large section devoted to our Advertising Coupon Plan, which illustrates and describes many valuable articles which we give FREE to our customers, such as pianos, buggies, sewing machines, watches, clocks, jewelry, Morris and rocking chairs, saddles, harness, shoes, carpets, rugs, curtains, tools, stoves, lamps, violins, guitars, mandolins, sporting goods, clothing, furniture, dishes, and many other articles, all FREE to our customers. This New Catalog No. 68 is worth many times its cost, just to see this wonderful list of articles that await the selection of our customers, and for which no charge is made.

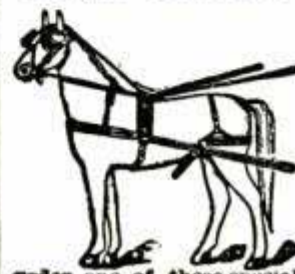
Freight Allowance In another part of this New Catalog No. 68 you will find several pages of articles from which to choose, and one of which is included in your shipment FREE. This gift applies on your freight charges, and in some instances more than equals the freight charges. Besides all this, you can easily save \$50.00 or more each year by ordering all your needs from our New Catalog No. 68. Many of our customers write us that they save hundreds of dollars by sending their orders to us.

*It Pays Others
It Will Pay You*

Albaugh-Dover Co.

900-965 Marshall Blvd., CHICAGO, ILL.

Single Harness \$8.75



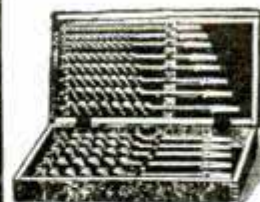
Our Special Choice Harness with double and stitched traces; is sold everywhere at from \$10.00 to \$15.00 per set. You should order one of these special sets today.

26-inch Hand Saw \$1.00

Our special high grade New York Saw is made of London spring steel of the highest grade; guaranteed perfect, patent ground and tempered. Every saw is hand filed and ready for use.



Bit Set \$1.75



This set of 13 special selected Auger Bits with double spur, sizes 1/4 inch to 1 inch inclusive. These bits are

made of the very best material and put up in nice wood box.

Asphalt Roofing \$1.40 Per Square (10 x 10 ft.)

This roofing is made from the finest grade wool felt, guaranteed to contain no coal tar; will not dry out, is coated with superior damp-proof material and cannot evaporate. A special grade at a special price.



POPULAR MECHANICS

160 WASHINGTON ST., CHICAGO, U. S. A.

H. H. WINDSOR EDITOR

SUBSCRIPTION:

In United States, and its possessions, and Mexico, per year, postpaid = \$1.00
To Canada and all countries in the Postal Union, postpaid, per year = \$1.50

All subscriptions are discontinued at expiration
Please examine the date printed on your wrapper

Published Monthly by POPULAR MECHANICS COMPANY

Entered as mail matter of the second class at the postoffice at Chicago, Ill.

Eastern Advertising Office :: 116 Nassau St., New York

The attention of prospective advertisers is called to the policy of this magazine in accordance with which the publisher waives all claim for payment of any advertisement appearing in any issue where the number of copies actually printed and circulated is less than the number printed on the front cover page.

CONTENTS FOR OCTOBER, 1907

URNS WOOD AND WATER INTO SUGAR	1077
Miner's Life-Saving Helmet	1078
SEE-SAW TARGET FOR BIG GUNS	1078
Electric Table Fountain	1078
GIANT SHIPS IN THEIR BATH	1079
British King's Train	1081
Cross Tube Boiler	1082
ELECTRIC INCUBATOR	1082
Two-Story Lumber Yards	1082
To Double Life of Umbrellas	1082
Motorboat Whistle	1083
PIPING WATER ACROSS THE MOUNTAINS IN HUGE WOODEN PIPES	1083
Girls' First Racing Sculling Eight	1084
MACHINE TO TYPEWRITE 1,000 WORDS A MINUTE	1084
Car Ditched; Truck Went On	1084
PERILOUS WORK IN MID-AIR	1085
Utilizing Dying Pigs' Squeal	1085
Two-Cents-a-Mile Rate Pays	1085
HUGE WATER WHEEL DRAINS MARSH	1086
A Horseshoe Advertisement	1087
LITTLE KINK MAKES BIG WRECK	1087
\$5,000 Prize Design	1087
Short Stop for Railroad Cars	1088
Terra Cotta Chimney Thimbles	1088
Sink Ship to Save It	1088
GAS MAINS IN LONDON SUBWAY	1088
BIG CONDENSER PIPE LINE	1088
Hauling with Wagon Trains	1089
Dash for South Pole	1089
AN ELECTRIC CONVEYER FOR SHIPS	1090
Teach Swimming on Dry Land	1090
Mining Kaolin with Water Jet	1090
JAPANESE DAYLIGHT FIREWORKS	1091
In the Stoke Hold	1091
Peculiar Wreck of Building	1091
Largest Sailer Afloat	1092
HAY PRESS GATHERS, BALES AND DELIVERS	1092
Huge Dock for Fleet Ships	1092
BUILDING A RAILROAD IN SAVAGE AFRICA	1093
Iron in Cuba	1096
Japanese Advertisement	1096
MOTORCYCLE MAKES RATE OF 90 MILES AN HOUR	1096
Illuminating Gas from Corn Cobs	1096
Pay-as-You-Enter Street Cars	1097
BOSTON'S NEW \$3,000,000 BRIDGE	1097
Monorail with Overhead Guides	1097
Fire Extinguisher for Submarines	1098
Life of Treated Poles	1098
MACHINE THAT SELLS LUNCHES	1098
A Non-Bursting Steel Fly-Wheel	1098
Rifted Better than Smooth Pipe Line	1098
PHOTOGRAPHING MOVING PICTURES	1099

INTERIOR OF A BATTLESHIP	1100
Fifty Searchlights for Niagara Falls	1100
Flange Union Without Gasket	1101
Auto Runs 14,371 Miles Without Stop	1101
Ornamental Cement Work	1101
RENEWING ELECTRIC BULBS IN HIGH PLACES	1101
BRIDGING A CHASM IN A CAVE	1101
Soft and Hard Coal Briquette	1102
Railroad Into Canyon	1102
MEXICAN GOVERNMENT THEATER	1102
Fulton Planned Submarines	1102
Mired in Pekin to Paris Race	1103
Improved Hoisting Machines	1103
MACHINE THAT LINES A TUNNEL	1104
Graceful Concrete Bridge	1104
Recovering Copper from Ruins	1104
LEARN HOW TO FLY	1105
Italian Army Training	1105
Manufacturing Icicles in Austria	1105
BIG CHURCH OF CEMENT BLOCKS	1106
TWO NEW BATTLESHIPS TO OUTCLASS "DREADNAUGHT"	1106
Train of "Goods Wagons"	1107
Big Blast Moves 500,000 Tons	1107
Electric Cage for Patients	1107
RAIN NOZZLES TO FIGHT FIRE	1107
DIRECT DRIVEN DIRT LOADER	1108
A Collapsible Window Ventilator	1108
Launching Battleships Expensive	1108
FARMER'S BOY BUILDS A TELESCOPE AND DISCOVERS A COMET	1109
AMATEUR MECHANICS—	
How to Make a Small Electric Furnace	1127
How to Make a Small Fire Screen	1127
How to Make a Simple Water Rheostat	1128
Enlarging with a Hand Camera	1129
How to Make a Gasoline Burner for Model Work	1129
How to Make a Cup and Saucer Rack	1130
A Window Conservatory	1130
ST. LAWRENCE RIVER BRIDGE WRECK	1131
LESH FLIES THREE MILES IN AEROPLANE	1132
Big Water Main Bursts	1132

SHOP NOTES.

A Hinge Joint that Will Not Slip	1111
A Blacksmith's Tool Table	1111
Home-Made Water Cooler	1111
Door Holder for Carpenters	1111
Alarm for a Break in Line Wire Circuit	1111
Black Mortar for Concrete Blocks	1112
Method for Reducing Play in Steady Rest Hinge	1112
Gasoline Reserve Supply	1112
Device for Turning Breeze Through a Window	1113
How to Color Old Window Shades	1113
Paint Brush Keeper	1113
Handy Coal Bin	1113
Cement Watering Tank	1114
How to Bore a Conical Hole	1114
How to Make a Windmill Quadrant	1114
How to Make a Ladle for Melting Lead	1115
Support for Shaft When Babbitting	1115
Iron Punching Machine	1115
A Hand Tapping Device	1115
How to Wind Irregular Shaped Springs	1116
How to Enclose Coin in a Letter	1116
Painting an Old Brick Wall	1116
A Wire Fence Splicing Tool	1116
How to Make an Expansion Bolt	1117
Oil Tempering Bath	1117
How to Sharpen an Air Brush Needle	1117
A Home-Made Generator	1118
A Handy Clamp for Die-Makers	1118
A Surface Plate Jack	1118
How to Make a Wiped Joint in Cable Splicing	1119
How to Make a Folding Oar	1119
How to Make a Temporary Street Bridge	1120
How to Make a Wire Straightener	1120
Soldering Brass to Lead	1121
How to Build an Ice House	1121
Pipe Joint Mixture	1122
A Home-Made Line Lightning Arrester	1122
Making a Bevel Pipe Fitting	1122
A Current Indicator	1123
Pounding of Engine Head Through Teeth	1123
Utilizing Heat from a Chimney	1123
How to Harden and Temper an Axe	1124
Device for Holding Field Coil While Varnishing	1124
Cooling a Metal Cutting Tool	1125
Hydraulic Elevator for Window Display	1125
Home-Made Electrolytic Interrupter	1126
Tinting a Cement House	1126
Pasting Cardboard to Glass	1126

Do You Wear Glasses?

Does Your Wife, Mother, Sister?

Perhaps you know, then, how irritating it is to find that the little screws have become loose, also how very often this happens. Here are

several little tools for quickly and effectively attending to such cases, made especially for that purpose:



No. 556 Screw Driver for Eye Glasses is made in two pieces and screwed together, telescoping the blade when not in use. Nickel plated. Price, 15 cents.

No. 558 is threaded on the end opposite the blade. This may be reversed and screwed into the part with the ring, thereby making a longer handle. Nickel plated. Price, 20 cents.



No. 554 is made with a chuck to hold the blade firmly in a split socket when in use. The blade is removed by slightly loosening the chuck, then reversed and inserted into the

socket nearly full length and held safely by tightening the chuck. Nickel plated. Price, 25 cents.



Carry one in your pocket, on your key-ring or watch chain. Either style mailed on receipt of price.

Ask for complete Catalog No. 17AP of Fine Tools

THE L. S. STARRETT CO.

ATHOL, MASSACHUSETTS, U. S. A.

Simply a coupon. But send it NOW. Let us know that you are thinking about getting a new piano,—or that you might exchange

My Name.....

My Address.....

WING & SON
394-397 West 13th St.
NEW YORK

Send Me Your Offers.
Explanation of Your
System, Miniature
Models of Wing
Pianos, Book of
Complete In-
formation
About
Pianos—
FREE

your old piano for a better one. Do this for your own sake. We have an offer for YOU

Don't think that the high Reputation of the Wing Piano means that the price is going to be exorbitant. Don't think that to get a piano at moderate price you must take a low-grade "Merchandise" piano. And don't rush to the other extreme, and pay an exorbitant price for a piano whose reputation is based only on its high price.

You *must* have the WING Book and the WING Offers, or you *can't* buy, or judge piano values, safely,—intelligently.

WING PIANOS

Are Pre-Eminently Musical Pianos. Manufactured in New York City for nearly 40 Years Past, They are Widely Known and Admired for Their Supreme Vibration, and the Flutelike Quality of that Vibration.

Delicate runs and embellishments are very pure in tone—free from the usual noise of stroke. A light, springy touch, not tiresome even to an invalid.

WE MAKE IT EASY FOR YOU TO TEST

the Wing Piano thoroughly wherever you may live. We will send you any one of our numerous styles on 20 DAYS' TRIAL FREE, outward and return freights prepaid, in order to prove the remarkable qualities we claim them to possess over all others (and to this thousands of purchasers testify). Bear in mind if you will, our house has been in business 40 years and that our trade is ever increasing with no agents or their friends to help our business. The Wing Pianos have sung their own way to fame for nearly half a century.

A TRUE ECONOMY

All the usual expenses of show-rooms, salesmen, agent's commission, local advertising, etc., is saved by the Wing System, and you get the whole benefit of it. The salesroom is your own home, the Piano does its own talking and stands on its own merits. If your home requires a good piano our methods and capital save you a very considerable sum of money. The reasons we will fully explain in the printed

matter we will send you. This saving will decidedly interest you. We do not claim *miracles*—we can't save you \$200 on a \$200 piano. We do save you at least \$200 on a \$500 piano; \$75 on a \$300 piano, etc., etc.

Compare the value we offer and the proofs we offer you. Compare not only the Wing Piano itself but the *basis* on which you will make your purchase.

It is not only what we offer, it is the way we invite investigation of our offers and the way our offers stand investigation.

YOU WILL RECEIVE ANYWAY

A large and handsome book, which we want to send you free by early mail (explains the entire subject of pianos).

A book of 156 pages—handsomely bound—it is called "The Book of Complete Information About Pianos;" it tells about the very first piano; the qualities of labor, felt, ivories and woods used in every artistic piano and compares high qualities with the cheaper kind used in inferior pianos.

It explains the devices of the average dealer and agent.

Illustrates the "Note-accord"

commended by Paderewski. Describes what constitutes a musical piano tone.

Send directly to us for the book as we do not send either our books or our pianos to piano stores.

Its illustrations are interesting and instructive to children.

From correspondents all over the world we hear: "Your sumptuous book of Piano Information and your miniature models are the finest and most costly musical exhibits we have ever seen."

You will want to see anyway the handsome books, miniature piano models, etc., which we send you free, so that you can think them over and can have them in your hands to compare with every other piano offer that may come to you.

Remember we sell these instruments at just about one-half the prices of the few others that most nearly approach the Wing quality of tone.

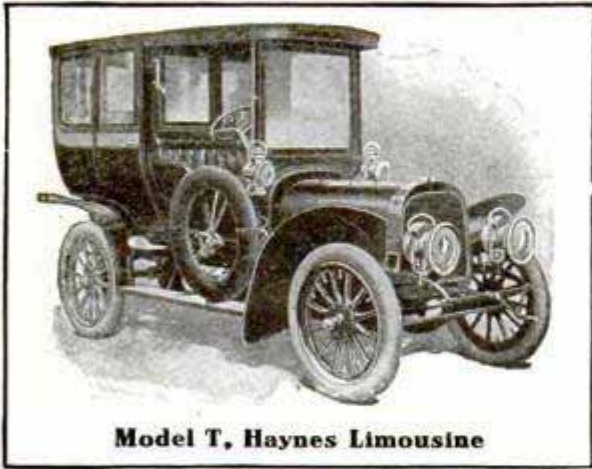


Tear off the Coupon NOW. Fill it in and mail it without delay. Whether you may buy soon—or not for a long while; no matter what other piano you may be considering—no matter if you feel that the money is not ready—you owe this much to yourself and family to get our offers and to get them at once. It puts you under no obligation. Sit right down and send the coupon now.

WING & SON 394-397 WEST 13th ST. NEW YORK

HAYNES

RELIABILITY

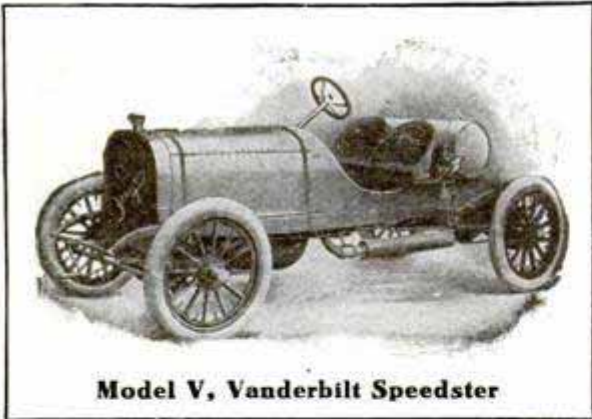


Model T, Haynes Limousine

The makers of the Haynes have been developing their car for 13 years. They know their car through and through. Year after year they have seen their old cars come back after varied use and have spotted here and there chances for improvements.

Their experience has developed for 1907 a car that can be safely advertised for reliability—a car that can be trusted. It contains no parts not made in the Haynes Factory, no principles that are unfamiliar to the Haynes designers.

In these days, when every blacksmith is buying parts and assembling cars under a private trademark, the fact that the Haynes factories really make everything in their car is a guarantee of Haynes reliability.



Model V, Vanderbilt Speedster

The Haynes Standard 50 H. P. Touring Car for 1907, Model "T," the highest powered shaft driven car built. Price, \$3,500.

Send at once for full information and advance specifications. Address, Desk P-P.

HAYNES AUTOMOBILE CO., Kokomo, Ind.

Oldest Automobile Manufacturers in America. Members A.L.A.M.

New York—1715 Broadway. Chicago—1420 Michigan Ave.

HAYNES

HOT WATER

IN 2 MINUTES

Cost—Two Cents

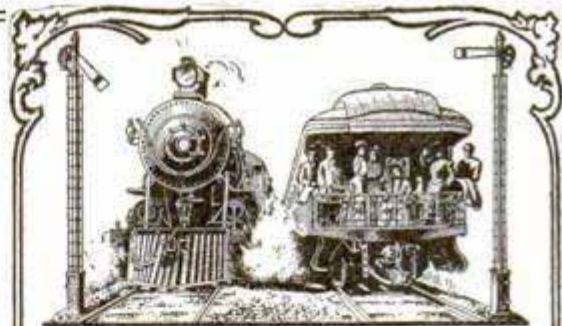
The Peerless Kitchen Boiler has solved the hot water problem, in city and country homes, hotels, restaurants, clubs, bath-houses, gymnasiums—every place where hot water is required.



Burns either gas or gasoline; heats water to 185° and keeps it hot at **one-half cent per hour**. A hot bath in **two minutes for two cents**. The PEERLESS is simple in construction—only **three parts**—disk, burner, drum. Absolutely noiseless; creates no odor. Occupies but a very small space; easy to install and connect. No pipes to clog or mechanisms to get out of order. The water is kept in constant circulation, the capacity almost unlimited. **PRICE, surprisingly moderate.** Ask your plumber about the PEERLESS, or write for catalog, prices and discounts.

JAMES MCCARTNEY

39 State Street, - CHICAGO



COMING AND GOING

ALWAYS USE

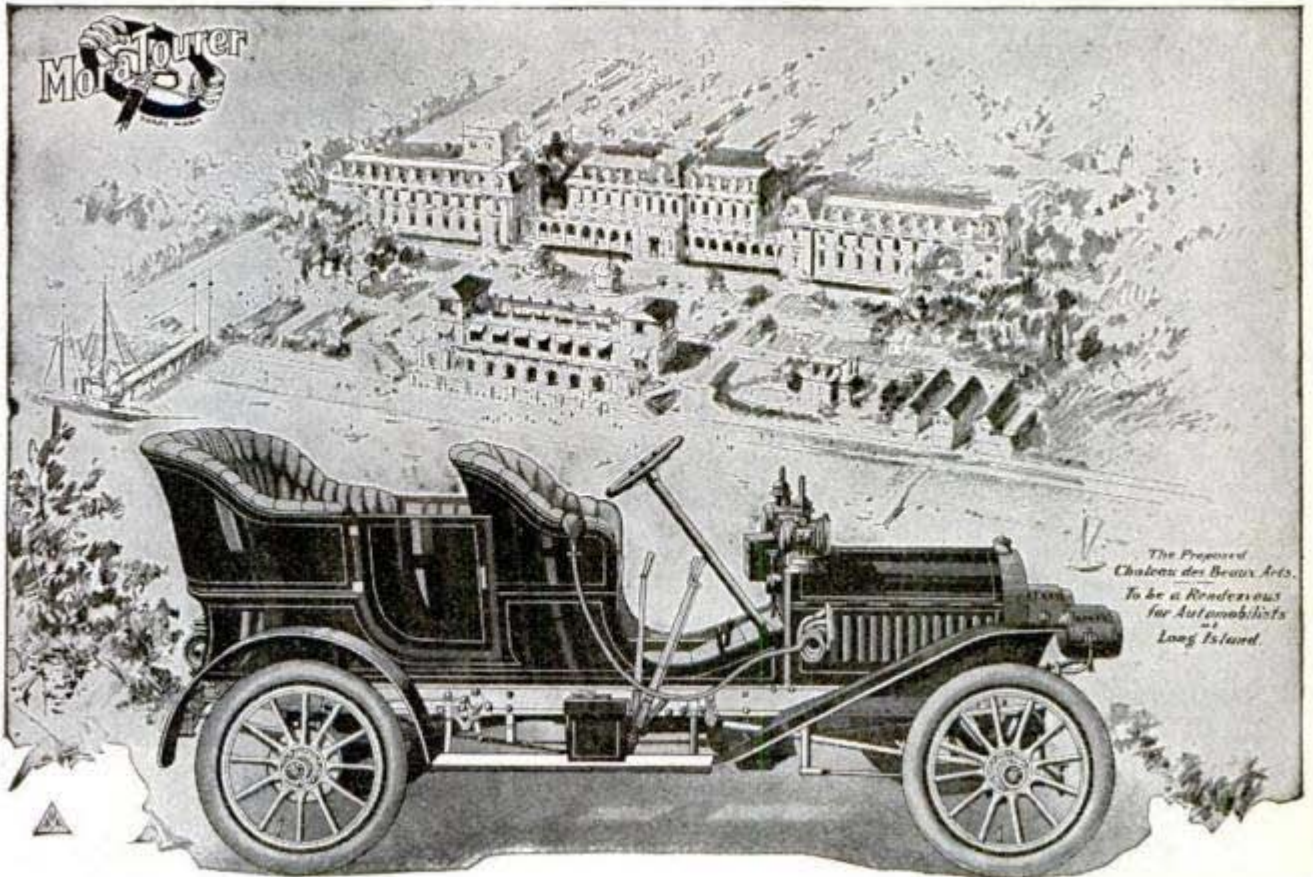
"The Only Way"

NO DIRT
NO DUST



NO SMOKE
NO CINDERS

GEO. J. CHARLTON,
GENERAL PASSENGER AGENT
CHICAGO.

The Proposed
Chateau des Beaux Arts.
To be a Rendezvous
for Automobileists
on Long Island.

SPECIFICATIONS

Rear Axle—Divided driving axle, completely housed, running in tubular axle.
Front Axle—Tubular, with ball-bearing front wheels.
Springs—Transverse semi-elliptic front spring, platform type rear springs.
Wheels—32 inches, wood artillery type.
Tires—32 x 4, G J regular clincher.
Brakes—Two internal expanding, two external constricting. External operated by foot pedal. Internal operated by emergency, brake lever. All four operate on drums attached to rear wheels.
Tank Capacity—15 gallons gasoline.
Tread—56 inches.
Wheel Base—103 inches.
Motor—Four cylinder, 4 x 5½, cast in pairs.

Mora Tourer

MECHANICALLY RIGHT

SPECIFICATIONS

Water-Cooler—Capacity 5 gallons.
Lubrication—Splash system.
Carburetor—Mora.
Ignition—Jump spark, with 4-unit La Coste coil on dash, current from storage battery.
Control—Throttle and spark.
Transmission—Sliding.
Speeds—3 forward and reverse.
Drive—Shaft.
Steering Gear—Irreversible wheel, screw and nut type.
Equipment—2 oil side lamps, 2 headlights and generator, 1 tail lamp, horn and tools.
Horsepower—24, mechanically right.
Standard Color—Mahogany red body, cadet gray running gear.
Approximate Total Weight—1,900 lbs.
Price—\$2,200, without magneto.

Price, with La.Coste High Tension Magneto, \$2,500

“Every Owner a Satisfied Motorist”

MORA MOTOR CAR CO.,
Newark, N. Y.

Rochester, N. Y., August 19, 1907.

Gentlemen:—I am pleased to state that the Mora Touring Car I purchased of you last year has given me excellent satisfaction. I am more than satisfied with my car, as it is running better every day. Every person that I have taken out for a ride, say it runs just as smooth as any of the Best Electric Cars they have ever ridden in; it is quiet, no noise about it, and it will do the work of many a car at twice the price. I am taking good care of my car—I find it pays—as I am getting excellent results. I must say that I feel proud of my car, as she gets there; don't have to take the dust from anyone. The car is very light and easy on tires. As regards my repair bill since I had my car, it is nothing to compare with my old car, needless to say, not a Mora. So far, it has cost me \$22.00, including all of last season. I don't see how anyone can have any trouble. I don't expect to run the car forever, without having any expense connected with it, as an automobile is nothing more than a locomotive running on public highways, and it has to have good care; reckless driving will kill any car, regardless of price, but with good care I expect little trouble. I am satisfied to say that I got more than my money's worth, and so will every one that buys a Mora. Wishing you good success, with good healthy increase of sales every day on the Mora, I remain,

Yours very truly,

(Signed)

A. A. MENG.

Of the firm of Meng & Shafer, Leading Hatters and Furriers of the Flower City.

Write for “The Sealed Bonnet,” giving complete story of the Mora's World's Record Power Plant



Office and Works: **Mora Motor Car Co., 23 Mora Place Newark, N. Y.**



Please Mention Popular Mechanics

"Goodly the covering as thy purse can buy,
For the covering oft proclaims the Engineer."



Have you ever wanted to cover a piece of steam pipe in a hurry and found yourself without material to do it?

Have you ever wanted to cover a gas or water pipe to keep it from freezing and experienced a lot of trouble?

If you have we are sure you will be interested in "Remanit," the pipe covering which is always ready to put on and requires no experience in applying. By having a bale of it on hand you can cover any kind of pipe at a moment's notice. It is simply wrapped around the pipe, as you can see from the illustration, and for an exposed pipe or when an extra good job is required a muslin or canvas bandage is put on over the "Remanit" and painted. This is so extremely simple that it hardly seems possible a pipe so covered will save more steam than if covered by any other material.

"Remanit" is made of pure silk, carbonized, has no combustible medium, will not burn and is clean.

In an "ad" of this kind it is not possible to give more than an outline, but if you will send for our catalogue and samples you will find out just what "Remanit" is and why it is so largely used in this country and abroad.

J. EDWARD OGDEN CO., Cedar and Washington Sts., NEW YORK



Valuable Book for Letterers

Modern Show Card Lettering, Designs, Etc.

NEW AND REVISED EDITION

A practical treatise on Up-to-Date Pen and Brush Lettering, giving instructions respecting many styles of lettering, position, movement, shading, spacing, designing and arrangement; with illustrations of large and small letter of each alphabet, together with a full analysis and diagrams of making neat and prominent figures off-hand for Price Tickets, etc.

Over 150 illustrations of finished show cards and price tickets are given with practical instruction, outside of a large variety of standard show card alphabets.

This book is far beyond anything ever published in this line. It contains solid, practical common sense instruction—a book that is free from absurd theories and mystifying kinks, and contains 2,000 advertising Phrases for Card Signs, Posters, etc.

The price of the book is but \$1.00 delivered to your address. If you find book not as represented, you have the privilege to return the same in good condition within three days, and I will return the money.

Address **W. A. THOMPSON, Pontiac, Mich.**

A NEW MONTHLY MAGAZINE

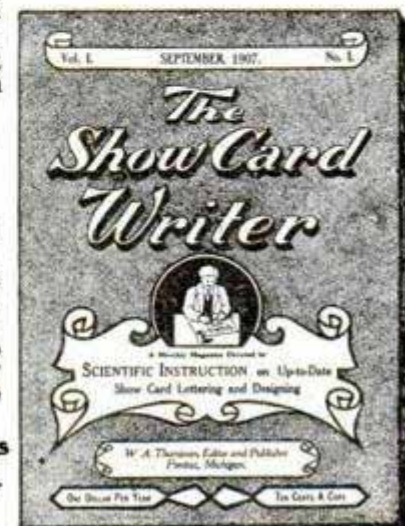
The accompanying illustration shows a small outline of the cover page design of a new publication—"The Show Card Writer," a handsome new illustrated monthly. The first number will appear before September First (about August 15th).

No Card Writer can afford to be without it a single month. It will be a credit to the craft, an inspiration to the worker and a delight to the eye. Every page, every article, every illustration will be clear and distinct. It will show you how to improve your skill, how to enlarge your field and how to make money.

One Dollar per Year Ten Cents a Copy No Free Samples

Write for prospectus. Address

W. A. Thompson, Publisher, Pontiac, Mich.



"A Little Class of Three"

(One of the exceptions to that old rule, "Two's Company, Three's a Crowd")

Used in fine work, in marble, tile, brick, etc. A favorite with Plumbers and Electricians.



Made in one piece of lead composition metal. Easily and quickly operated. Fit all wood screws.

Universally used where fastenings of a little heavier nature are required. THE most popular expansion on the market.



Furnished in mall. iron unless otherwise specified. May also be had from stock in lead compositions. Fits all lag screws.

For use in heavy construction work, for which this bolt is endorsed by Government examiners.



Unless otherwise specified, furnished in mall. iron. Brass, bronze and other metals furnished on order. Fits all machine screws.

Send for Complete Illustrated Descriptive Matter. Samples and Catalog if you like

Star Expansion Bolt Co.

142 Lake Street
CHICAGO, ILL.

BAYONNE, N. J.

147 Cedar Street
NEW YORK CITY

A School Within Itself

There are XX chapters in all, XIX carrying you from the fundamental principles of electricity on through the various branches to a point where the careful student comprehends the complete designing, care and operation of a dynamo or motor, and I chapter on electric automobiles, outlining their construction, care and operation, and all about storage batteries and how to handle them. Each subject is carefully written and to the point.

After a student studies a subject, he is questioned on that subject in such a manner as to bring clearly to his mind the points he needs to know regarding same. A DICTIONARY in back of book will enable him to learn the meaning of any electrical word, term or phrase used in this book, as well as hundreds of others in common use. All required tables necessary in the study are in it.

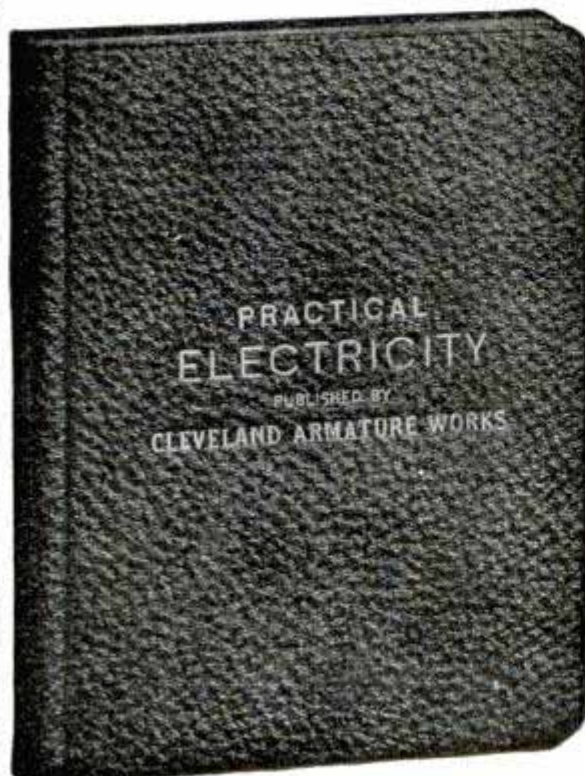


TABLE OF SUBJECTS:

CHAPTER

- I—Wiring
- II—Electric Batteries. Electric Plating.
- III—Magnetism
- IV—The Magnetic Circuit
- V—Magnetic Traction
- VI—Magnetic Leakage
- VII—Energy in Electric Circuit
- VIII—Calculation of Size of Wire for Magnetizing Coils
- IX—Calculation of E. M. F.'s in Electric Machines

CHAPTER

- X—Counter E. M. F.
- XI—Hysteresis and Eddy Currents
- XII—Armature Reaction
- XIII—Sparking
- XIV—Winding of Dynamos and Motors
- XV—Proper Method of Connecting Dynamos and Motors—Self-Excitation and others

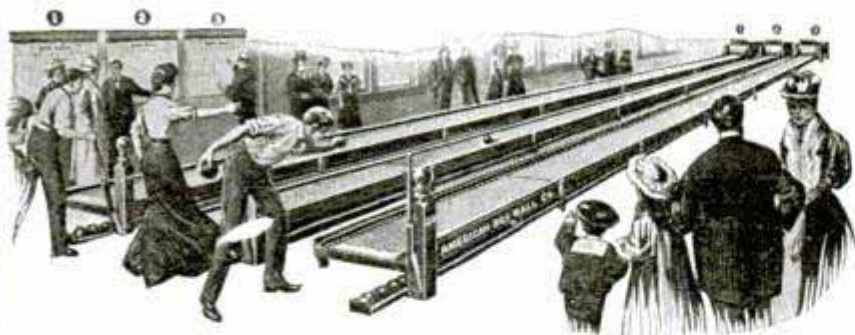
\$2.00 PER COPY—FOURTH EDITION—16,000 COPIES SOLD.

The offer we make of refunding money if book is not satisfactory upon examination is AN UNUSUAL ONE in connection with the sale of a book. But we have no fear of its return. Your decision will be what thousands of others has been. Money would not buy it if it could not be duplicated. We could print testimonials by the hundreds. It is best to order and be your own judge of its merits.

CLEVELAND ARMATURE WORKS, Cleveland, Ohio.

AMERICA'S GREATEST REPAIR WORKS. Armatures and Fields Wound—Commutators filed.

\$513.00 Clear Profit in 51 days from an investment of \$150.00



Is the result from the operation of one American Box 'Ball Alley in Sullivan, Ind. Why not go into this business yourself? It is the most practical and popular bowling game in existence. It will make big money in any town. These alleys pay from \$25.00 to \$65.00 each per week. This is no gambling device, but a splendid bowling game for amusement and physical exercise. Liberally patronized by the best people of both sexes. Quickly installed, conveniently portable. No pin boy needed. Receipts are nearly all profit.

More than 3,000 already sold. We sell on payments, and our catalog is free. Write for catalog.

AMERICAN BOX BALL COMPANY, Patentees, 1375 Van Buren Street, INDIANAPOLIS, INDIANA



THIS THEN IS TO ANNOUNCE THAT

STANDARD

We manufacture a **LIGHTING SYSTEM** for lighting Factories, Shops, Stores and Homes, that is far superior and more economical than either Gas or Electricity.

Burns Gasoline or Alcohol.

In sending for our description and illustrated catalogue, please send us a rough draft, giving dimensions of your factory, shop, store or home and we will cheerfully send you an estimate for lighting, together with a few facts which will, at least, cause you to stop and think.

HYDRO CARBON LIGHT

THE STANDARD-GILLETT LIGHT CO.

932 No. Halsted St., CHICAGO, U. S. A.

ECONOMICAL, SAFE AND DURABLE A CHILD CAN OPERATE THIS SYSTEM

Publisher's Notice to Subscribers in Canada

The Post Office Department of Canada has abrogated the treaty in force with the United States for many years by which periodicals have been mailed from this country to Canada at 1 cent per pound. The rate is now made as high as to the most distant point in the world and forces Popular Mechanics to raise its subscription price to all Canadian subscribers to \$1.50 per year.

The retail price on newstands will remain at 10 cents per copy as the newsdealers' supplies are shipped in bulk by freight.

POPULAR MECHANICS

Great Suit Offer



JUST WRITE US and we will send you absolutely **FREE**, by return mail, postpaid, a large outfit containing a big variety of cloth samples, fashion figures, tape measure, order blanks, etc., everything **FREE**, and **WE WILL START YOU IN A PAYING BUSINESS.** A most liberal offer on a suit for yourself that will make you wonder. Terms, conditions, and privileges that will astonish you. We will name you so much lower prices on men's fine clothing that it will surprise you.

WE WANT A LIVE AGENT

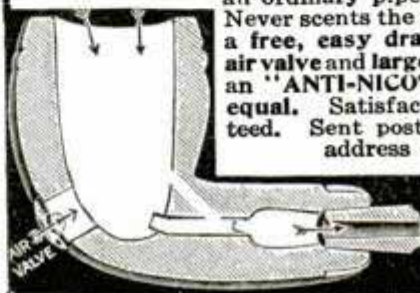
In your town. You can make from \$1,000 to \$2,000 per year. If you write us before we get an agent in your town you will get a wonderful offer. As soon as we get an agent in your town he will get profits on every dollar we sell in his territory. **WE TURN ALL OUR BUSINESS OVER TO HIM.** That's why our agents make so much money. If you want a suit for yourself **ANSWER QUICK**, before we get an agent in your town; you will then get all of our great inducements. If you would like to be our agent tell us all about yourself. Address, Dept. 26

AMERICAN WOOLEN MILLS CO., Chicago, Ill.

Smoke an Anti-Nicotine Pipe

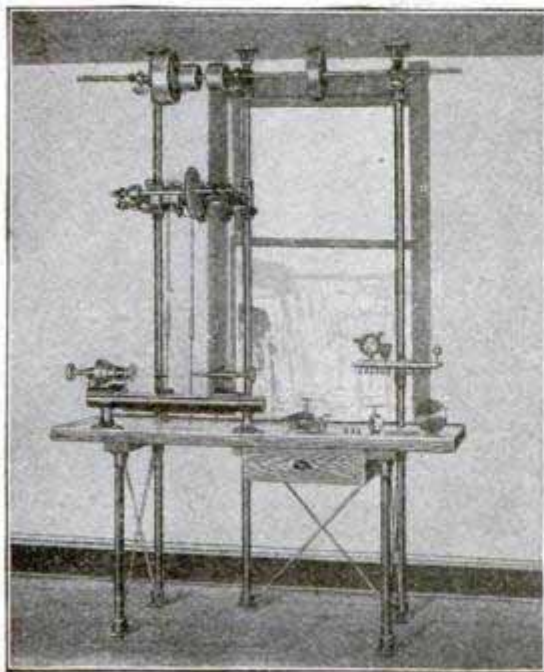
and experience for once a cool, delightful smoke, free from every trace of nicotine. Not a particle of anything enters the mouth but smoke. Smokes absolute dry—no sizzling. Every grain of tobacco is burned—a saving of 25%. Never bites the tongue or mouth. Only pipe that can be smoked in comfort, while lying down. Lasts longer than an ordinary pipe. No offensive odors. Never scents the house or clothes. Has a free, easy draught. Note the cold air valve and large stem—that's why an "ANTI-NICOTINE" PIPE has no equal. Satisfaction guaranteed. Sent postpaid to any address on receipt of

50c



The Anti-Nicotine Pipe Co., Dept. A, Ottawa, Illinois

CATARACT



A COMPLETE MACHINE SHOP is attained suitable for all kinds of repairing, experimental work or tool making, by having the NEW CATARACT PRECISION LATHE and ATTACHMENTS, made complete, applicable to a room in your home, a manufacturing plant or tool room. This is a revelation few mechanics are aware of, and is the most practical, universal and interchangeable outfit ever designed. If interested send for further information and complete catalogue.

MANUFACTURED BY

HARDING BROS., 1034-1040 Lincoln Avenue, CHICAGO, U. S. A.
ESTABLISHED 1890

It's Best to Buy in New York Everything for Your Home WRITE NOW For 700-Page Catalog



Just write us—postal or letter—for this our Free 700-page illustrated 1907-8 Buyers' Guide of lowest wholesale prices on over 75,000 reliable articles needed for the home—office—or shop. As the oldest mail-order house in America, we refer by permission to the Publishers of this Magazine. We show you

75,000 Reliable Articles

Watches	Fancy Goods
Jewelry, Clocks	Lamps
Silverware	Groceries
Knives, Razors	Whips
Seeds, Palets	Carrriages
Baby Carriages	Wagons
Freezers	Hardware
Sew'g Machines	Revolvers
Elect'l Supplies	Rifles
Tool Cabinets	Shot Guns
Stoves, Ranges	Traps
Boots, Shoes	Shells
Sweaters	Cartridges
Fishing Tackle	Farm Tools
Skates, Sleds	Incubators
Ice Tools	Brooders
House Furnishing Goods, Etc.	

This 700-Page **FREE** CATALOG

You Positively Save 1/4 to 1/3

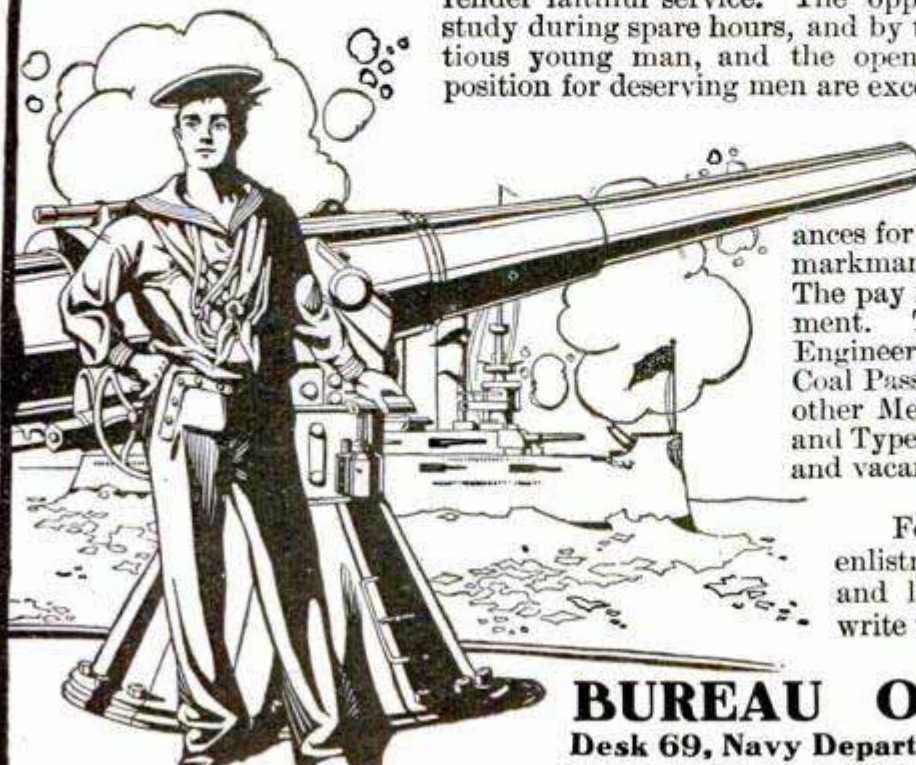
on local dealers' prices anywhere. Safe, prompt delivery and absolute satisfaction or money back Guaranteed. For nearly a century, since 1816, we have dealt with the people everywhere direct to their homes through our big catalogs. We also send you list of 100 Valuable Premiums Free. Also our grocery list of guaranteed Food Products of highest quality saves you one-third. Just write us. Then you'll prove by a first trial order that it pays to have our Grand Free Catalog No. 93 all the year round. It costs us \$1 to print it, but it's free to you.

White, Van Glahn & Co., 30 Barclay St., New York City
Oldest Mail-Order House in America, Estab. 1816

Opportunities

For Machinists, Engineers, Coppersmiths, Carpenters, Firemen, Coal Passers, Electricians and Mechanics of various Trades in the Navy.

You need never worry about being laid off when you are in the Navy; you are sure of permanent, healthful work, with pay equal to or better than that earned in civil life, as long as you render faithful service. The opportunity for self-improvement by study during spare hours, and by travel, should appeal to any ambitious young man, and the openings for advancement in pay and position for deserving men are excellent.



In addition to the regular pay—which ranges from \$16 to \$70 a month, practically free of living expenses—there are extra allowances for special duty, for skill in signalling, marksmanship, sub-marines, extra duty, etc. The pay is materially increased on re-enlistment. There are good openings now for Engineers, Machinists, Firemen, Electricians, Coal Passers, Coppersmiths, Carpenters and other Mechanics, as well as Stenographers and Typewriters, with good pay at the start, and vacancies in higher ratings.

For full information about the Navy, enlistment, pay, pension, retirement, and list of Navy Recruiting Stations, write to

BUREAU OF NAVIGATION
Desk 69, Navy Department WASHINGTON, D. C.

NEW BOOKS—Just What Is Wanted

Storage Batteries

Their Theory, Construction and Use.

By A. E. WATSON, Ph. D., E. E.

An up-to-date book that will be appreciated. It contains all the essentials of an adequate treatment of the subject. The general scheme of the storage of electrical energy is explained, the theory of the chemical actions given in descriptive language, as well as the ordinary equations. In the "How to Make" chapter, the most approved constructions are followed, with descriptions of the author's effective method of making-plates. Rules for the setting up and care of batteries are comprised in a clear and orderly manner. The chapter on the switch-board arrangements is the most concise and complete in the space ever published. Indeed, some books almost ignore this highly important subject, as more properly belonging to Storage Battery Engineering. We regard this as one of the most valuable features of our book. The diagrams are drawn with exceptional clearness. Scant space has been given to cells of other than the lead type, for they have not shown their worth. The explanation of the modern cells has been given with the approval of the manufacturers, and can be relied upon as correct.

The author writes from practical experience, extending over many years, and only those matters have been emphasized which are of permanent value. To record only the essentials, and leave out the accidental is a requirement hard to comply with, but we believe this result has been attained in an unusual way in this new book.

Price, Cloth, \$1.50.

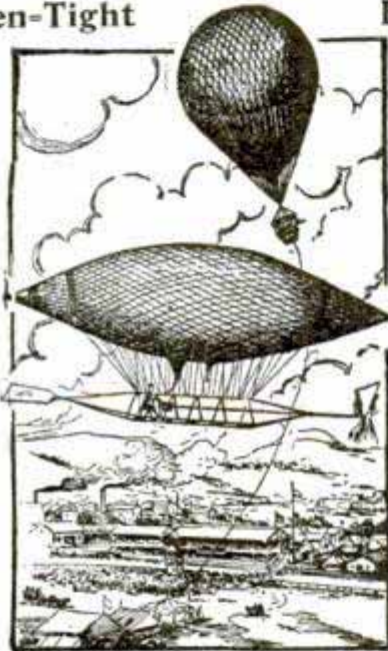
For sale at all bookstores or will be mailed, postpaid, by the publishers, upon receipt of price.

BUBIER PUBLISHING COMPANY - Department 3 - LYNN, MASS

Hydrogen-Tight

Buoyant

B
A
L
L
O
O
N
S



A
I
R
S
H
I
P
S

With or without Motors

All sizes from smallest models of lightest weight to largest captive or long voyage vessels.

Patent machine varnished, hydrogen-proof fabrics, ready for speedy construction. Best varnish made. Patent hydrogen gas generator systems, complete, all sizes.

Estimates made; practical professional advice given. Largest, most reliable manufactory in America. Operated 28 years; 140 gas balloons for U. S. Government. Instructions given; all sorts of experiments conducted. Only American Institute of Aeronautics. Any kind of gas balloon ascents, captive or free, or airship flights made at any time or place.

CARL E. MYERS, Balloon Farm, FRANKFORT N. Y.

Manufacturers of Various Styles and Sizes of Draughting Tables, Drawing Boards, Blue Print Filing Cabinets, Blue Print Frames, Etc. Send for Illustrated Catalogue or ask your jobber.



FRITZ & GOEDEL MFG. CO., 99 Alabama Street, Grand Rapids, Mich.

When You Want Anything and Don't Know Where to Find It, Write *Popular Mechanics*.

Photographs Wanted

Photographs of new and interesting subjects, suitable for publication in this magazine, may be submitted to its editor and those accepted will be paid for promptly.

Address: Editor Popular Mechanics
160 Washington St. :: :: Chicago

PEERLESS BOOK FORM CARDS

NOTICE SMOOTH EDGES OF CARD WHEN DETACHED



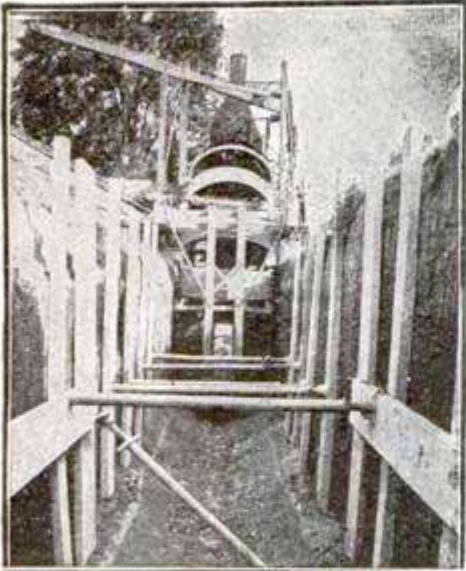
Write us for Samples and

ARE BOUND TO ATTRACT ATTENTION

They are bound together in tabs of 25 and when detached from book, all edges remain perfectly smooth—no perforation whatever. When your cards are carried loosely in case they seldom have a fresh clean appearance. In BOOK FORM every card is always perfect, no matter how long carried. It is a DRAWING CARD, because every man who sees it detached from book, wants to look closer and examine it. Your card is then laid aside for future reference, and your interview is gained. Let us send you a sample tab of these ENGRAVED BOOK FORM CARDS. The result will surprise you.

THE JOHN B. WIGGINS COMPANY
SOLE MANUFACTURERS
ENGRAVERS - PRINTERS - DIE EMBOSERS

Have you seen the New Improved BUCKEYE TRACTION DITCHER?



Sold to contractors on 6 days' test before asking for settlement.

Works in hard pan and shale rock, where it can be taken out with the ordinary pick. Passes over the work but once, cutting to a perfect grade if desired.

Write for catalog H, also reprint article giving cubic yards Ditcher will handle per day and the cost of operating.

Read the following testimonial:

24"x7½' Machine.

CANADA

Pincher Creek, Alta, Can., 7th March, 1906.

The Buckeye Traction Ditcher Co., Findlay, O.

Gentlemen:—After using for four months the 24 in. x 7½ ft. Ditcher I purchased from you, I am able to give you the following results:

In good loam the machine can average 1,500 feet of 6 foot ditch per 10 hours, including delays and stops. In hard, dry clay that leaves a polish on the sides the machine can be counted on to cut 900 feet per day. In gravel the size of a man's fist it will dig 750 feet per day; numerous stops are required to pick the stones that may roll into some part of the machinery.

I have dug in ground composed of gravel and boulders larger than a man's head, but it is not economical. I am satisfied that the machine will do the work of 100 men at one-tenth the cost of hand labor.

Yours truly,

J. E. Woods, C. E.

The Buckeye Traction Ditcher Co., Findlay, O.

Edison New 1908 Model Outfit No. 5

This is the leading Edison on which we make you a most remarkable offer—an offer open to all responsible people.



ON TRIAL

Free trial in your home

No money down—no C. O. D.—no guarantee.

Mr. Edison says: "I want to see a phonograph in every American home."—We will send a genuine 1908 Edison outfit to any responsible person anywhere and will give you a two days' free trial in your own home.

If you don't like the instrument after the free trial send it back to us at our expense. If satisfactory pay cash in full after trial or pay \$3.50 a month at our lowest rock-bottom cash price.

The fine outfit No. 1 at only \$2.00 a month!

The Superb

Edison Outfit No. 5

TRADE MARK

Thomas A. Edison

The grand 1908 model Edison that eclipses all other talking machines—although not priced so high as many other instruments. It laughs, sings and talks. It renders the compositions of the great music masters just as they are played by the great bands and orchestras. It sings the songs of the greatest singers and recites the comedies of the leading minstrel show artists. So excellent is the tone and technique of the Edison that many musical critics have written articles in which they have said that they would rather hear a band selection on one of these high-class machines than to be in the same hall with the band, because the tones of the phonograph are clearer and the music is softer and prettier.

Catalog on Request

Sign the coupon and mail it to us and we will send you by return mail the wonderful Edison catalogue, the beautiful Edison poster and the catalogue of 15,000 Edison records. The Edison catalog tells you all about phonographs and about Mr. Edison's struggles before he perfected the wonderful instrument. Do not fail to write for this free Edison catalogue and note the remarkable prices, the liberal terms on the finest high-grade talking machines that the world has ever seen. Our free trial offer is fully explained in the catalogue. Sign the coupon today. Don't bother with a letter. Just send the coupon.

F. K. Babson,
Edison Phonograph Distributors,
Chicago, Ill.

FREE
COUPON

F. K. Babson
Edison Phonograph Distributors
EDISON BUILDING
Suite 1197, Chicago

Without any obligations to me please send me prepaid the Edison Catalogue, Edison poster and Edison record list, all free prepaid.

Name.....

Address.....

No letter necessary; just mail the coupon

NO MONEY DOWN MEN'S SUITS ON CREDIT \$1.00 A WEEK

Buy Men's Suits, Overcoats, Topcoats and Raincoats direct from our factory by mail

For \$15 & \$18

We require no security or reference and we trust any honest person anywhere in the United States.

We send garments on approval—you don't pay a penny 'till you get the clothes and find them satisfactory—then pay \$1.00 a week.

We are the pioneers and twice over the largest Credit Clothiers in the world. We operate 73 stores in the principal cities of the United States and have over 500,000 customers on our books.

FREE Send today for our fine line of Fall and Winter samples. Self measurement blank, tape and full particulars of our convenient payment plan—all free to you.

Commercial rating \$1,000,000.

Menter & Rosenbloom Co.

220 St. Paul Street

Rochester, N. Y.

DON'T PAY TWO PRICES FOR STOVES & RANGES

Order direct from our Stove Factory and save for yourself all Jobbers' and Dealers' big profits.

HOOSIER STOVES AND RANGES

"The best in the world." Are sold on 30 days' free trial. We pay the freight. Guaranteed for years, "backed by a million dollars." Hoosier's are "fuel savers and easy bakers." Very heavily made of highest grade selected material, beautifully finished, with many new improvements and features. Our large Stove and Range Catalog shows the greatest bargains ever offered. Write for catalog and Special Free Trial Offer.

HOOSIER STOVE CO., 249 State St.
Marion, Ind.



Hoosier Steel

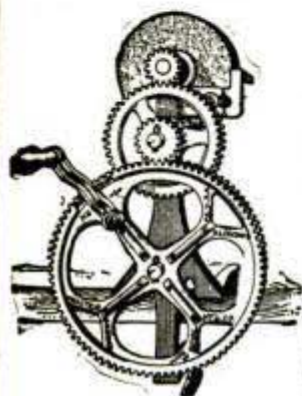


Hoosier Oak

SHARPEN YOUR TOOLS

You can save trouble and save time, you can do better work with less effort if you have in your shop or home a

PRACTICAL GRINDER



It will sharpen any edged tool in one tenth the time that an ordinary grindstone will sharpen it. The alundum wheel will not heat the metal and take the temper out either. We guarantee that. Clamp it on table or bench, hold knife or tool lightly on grinding wheel and turn. That's all. Any one can do it.

Uniform wheels for general purpose work—special beveled wheels for certain styles of implements.

A NECESSITY IN THE SHOP

A time and bother saver in the home. Nothing to get out of order, no water necessary, no chain to buckle or belt to break. Small and portable, will save its cost in a week when drills and tools are carried out of the shop on outside work.

SEND FOR FREE BOOK

Practical Talks About Practical Grinders. It will settle the dull tool and dull knife business for you. Ask your dealer or send to us direct.

ROYAL MANUFACTURING COMPANY
133 E. Walnut Street, - Lancaster, Pa.

New Lamps for Old



should you have a Rochester that does not give satisfaction, return it to us, (if not injured) and we will give you a new one FREE.

The Rochester gives a soft, cheerful, mellow light of wonderful brilliancy, enabling weak eyes to read without straining. Made of brass throughout, any finish. Perfectly constructed, absolutely safe, guaranteed; millions in use.

We manufacture, import and deal in all sundries pertaining to light and heat—oil, gas, alcohol, electricity.

Agents wanted, men and women; experience unnecessary; permanent home employment, salary or commission. Send stamp for salesman's instructions and Lamp Information, the knowledge acquired through years of experience.

Rochester Lamp Co., Dept. AA, Rochester, N.Y.

WHEN YOU WANT ANYTHING
AND DON'T KNOW WHERE TO FIND IT
WRITE POPULAR MECHANICS

Fire Protection—Small Cost

If you want the surest fire protection for your factory, warehouse, place of business, home, etc., and at lowest cost, it will pay you to write us for full particulars. Our System in use by leading business houses all over the country. May we explain further?

FAIR MFG. CO., F9310 Fifth St., RACINE, WIS.

U. S. Govt. Publications

FOR SALE AT COST
These publications are official and are authorities on the subjects treated. Many of them are magnificently illustrated. They relate to all branches of knowledge, including Agriculture, Live Stock, Manufacturing, Commerce, Mining and Fisheries, Military, Naval and Diplomatic Affairs, Laws of the United States, American History, Engineering, Mechanics, Medicine, Hygiene. All branches of Science, Astronomy, Anthropology, Zoology, Chemistry, Geology, Forestry and Fish Culture, etc. Send for FREE CATALOGS and price lists of subjects in which you are interested. Address Supt. of Documents, Govt. Printing Office, Washington, D. C.



**\$3000 to \$10,000
A YEAR IN THE
REAL ESTATE
BUSINESS.**

We will teach you by mail the Real Estate, General Brokerage, and Insurance Business, and appoint you

SPECIAL REPRESENTATIVE

of the oldest and largest co-operative real estate and brokerage company in America. Representatives are making \$3,000 to \$10,000 a year without any investment of capital. Excellent opportunities open to YOU. By our system you can make money in a few weeks without interfering with your present occupation. Our co-operative department will give you more choice, salable property to handle than any other institution in the world. A THOROUGH COMMERCIAL LAW COURSE FREE TO EACH REPRESENTATIVE. Write for 62-page book, free. THE CROSS COMPANY, 848 Resper Bldg., CHICAGO, ILL.



10 DAYS FREE TRIAL

We ship on approval, without a cent deposit, freight prepaid. DON'T PAY A CENT if you are not satisfied after using the bicycle 10 days.

DO NOT BUY a bicycle or a pair of tires from anyone at any price until you receive our latest art catalogs illustrating every kind of bicycle, and have learned our unheard of prices and marvelous new offers.

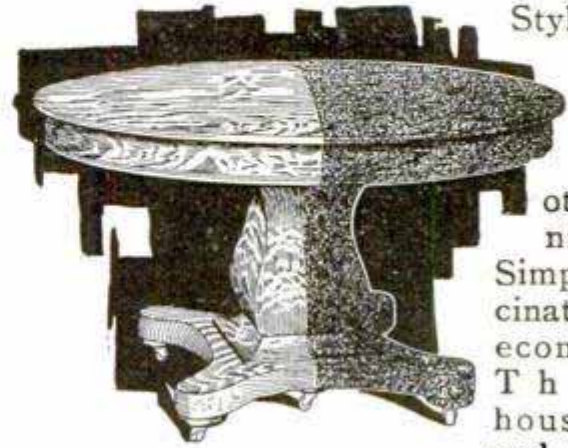
ONE CENT is all it will cost you to write a postal and everything will be sent you free postpaid by return mail. You will get much valuable information. Do not wait, write it now.

TIRES, Coaster-Brakes, Built-up-Wheels and all sundries at half usual prices.
MEAD CYCLE CO. Dept. M108 CHICAGO

Please Mention Popular Mechanics

Refinish Your Furniture

You Can Easily Make it Look New,



Stylish and in harmony with your other furnishings. Simple, fascinating and economical. Thrifty housewives and successful

business men find pleasure in beautifying their homes according to the complete instructions in our new 48-page color book, sent **FREE**. Use coupon below.

You can finish new or refinish old furniture, woodwork and floors in **Weathered, Mission, Forest Green, Flemish, Mahogany** or any desired shade with Johnson's Electric Solvo, Johnson's Wood Dye and Johnson's Prepared Wax.

First remove all old finish with Johnson's Electric Solvo. Then apply our Dye (14 shades), and when perfectly dry apply our Wax with a cloth and rub to a polish with a dry cloth. A beautiful wax finish in any of the above named shades will be immediately produced.

Johnson's Wood Dye for the artistic coloring of wood (14 shades), 1/2-pint cans, 30c; pint cans, 50c.

Johnson's Electric Solvo (for removing paint, varnish, shellac, etc.), pt. cans, 40c; 1/2-pt. cans, 25c.

Johnson's Prepared Wax, a complete finish and polish for all wood—10c and 25c packages and large size cans. **Sold by all dealers in paint.**

Sent FREE "The Proper Treatment for Floors, Woodwork and Furniture," 48-page book of complete instructions about wood-finishing. Full of home beautifying ideas. Mail us the following coupon properly filled out and get book at once prepaid **FREE**.

----- **COUPON** -----

S. C. JOHNSON & SON, Racine, Wis.

"The Wood-Finishing Authorities."

Please send me **FREE** copy of your book, "The Proper Treatment for Floors, Woodwork and Furniture." It is understood that this request does not incur any obligation on my part.

Name -----

Address -----

PA 10

DOLLARS & DOLLARS COLLARS

\$16.00 Saved

The usual "Laundry-way" figures something like this:

2 doz. Collars, at \$1.50	..	\$3.00	
1 doz. pr. Cuffs	..	\$3.00	
Laundering Collars 365 times		\$7.30	
Laundering Cuffs 156 times		\$6.24	\$19.54

The new "Litholin" way:

1/2 doz. Litholin Collars	..	\$1.50	
4 pairs Litholin Cuffs	..	\$2.00	\$3.50 \$16.04

With a damp cloth they wipe clean, and as white as when new. Won't wilt, crack or fray.

Collars 25c. Cuffs 50c.

Ask for **LITHOLIN** (Waterproofed Linen) at your shirt store. If not in stock, send style, size and remittance, and we will mail to any address, postpaid.

Catalogue, complete with all latest styles, free on request.

THE FIBERLOID CO., Dept. 25, 17 Waverly Place, N. Y.

WATERPROOFED LINEN
LITHOLIN
TRADE MARK

Press your trousers over night at home.
Send for booklet and prices.
Use it 60 days. Money returned if not satisfactory.

PERFECT PANTS PRESSER CO.
216 So. 5th Ave. Maywood, Ill.



TYPEWRITERS AT SAVING OF 50%
All makes—good as new, biggest bargains ever offered. Shipped on approval for trial. We rent all makes at \$3.00 per month and allow rent on price. Send for Catalog, Special Flyer and Terms.

ROCKWELL-BARNES CO., 935 Baldwin Bldg., Chicago, Ill.

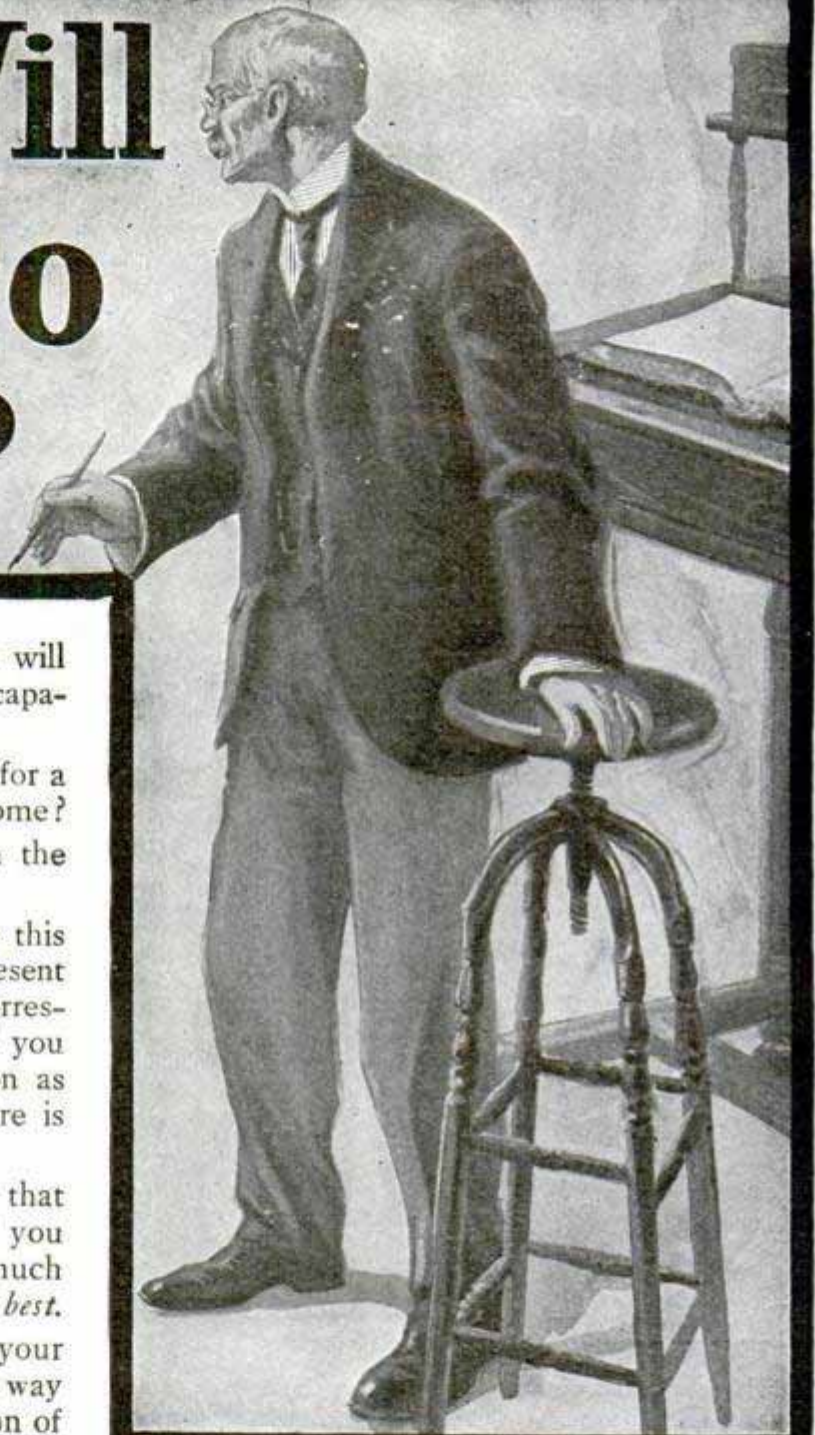
OVER 15,000 IN USE
There is a reason for it

GEM ADDING MACHINE
Carries automatically. Automatic resetting device. Visible total. Collapsible holder.
Sent on Ten Days' Trial at our Expense

E. GANCHER
Automatic Adding Machine Co.
332 Broadway
New York

\$ 15 \$ 15

What Will YOU Do At 50?



Have you ever thought what will become of you when your earning capacity is gone?

At 50 will you still be working for a low wage or enjoying a good income?

Only *training* will put you in the *income* class.

To learn how you can receive this training without giving up your present occupation let the International Correspondence Schools *advise* you. All you have to do is to mark the coupon as directed and mail it to-day. There is no charge for this advice.

The I. C. S. method is so easy that you will be surprised how quickly you will be enabled to command a much higher salary *at the occupation you like best*.

No matter who you are or what your present occupation, the I. C. S. has a way of helping you. It is an institution of experts—experts in helping poorly paid men succeed. All it costs to learn about it is a two cent stamp. Is your future worth it?

It *is* galling to see the other man pushed ahead when you know you could do just as well if you only had the training. It's the training that counts.

During the month of June 386 students reported promotion and higher salary as a direct result of I. C. S. training.

The I. C. S. will help you; but *YOU* must take the first step.

Mail the Coupon To-day.

International Correspondence Schools, Box 372, SCRANTON, PA.

Please explain, without further obligation on my part, how I can qualify for a larger salary in the position before which I have marked X

Bookkeeper
Stenographer
Advertisement Writer
Show Card Writer
Window Trimmer
Commercial Law
Illustrator
Civil Service
Chemist
Textile Mill Supt.
Electrician
Elec. Engineer

Mechanical Draftsman
Telephone Engineer
Elec. Lighting Supt.
Mechan. Engineer
Surveyor
Stationary Engineer
Civil Engineer
Building Contractor
Architect/Draftsman
Architect
Structural Engineer
Bridge Engineer
Mining Engineer

Name _____

Street and No. _____

City _____ State _____

POPULAR MECHANICS

Vol. 9. No. 10. CHICAGO, OCTOBER, 1907.

10 Cents a Copy
\$1.00 a Year

URNS WOOD AND WATER INTO SUGAR

Barrel Hoops and Other Scraps Changed to Chemically Pure Sugar—Process a Long Cherished Dream of Scientists

An electro-chemical process by which wood and water are actually converted into the purest and sweetest sugar is being demonstrated in a western city. The machine, which cost only \$1,000, is composed of a water boiler, a furnace for heating steam until it turns into hydrogen and oxygen, a retort in which the charcoal is reduced to a gas and mixed with the hydrogen and oxygen, a water tank in which the combination of gases is cooled, an air compressor and a set of highly charged electrodes.

To operate the plant the inventor took an armful of pine wood, eucalyptus, corn cobs, a piece of old buggy and a barrel hoop and piled them into an oven where they were made into charcoal.

The charcoal ready, he put 32 lb. of it into the retort and started the fire under his water boiler. Twenty minutes later, when things were getting hot, he started the air compressor and a set of highly charged electrodes. The water, converted into steam, passed through a heater where it was dissociated into hydrogen and oxygen at a temperature of 3,000°. The mixture of gases was then compressed upon the carbon heated to a like temperature.

Then he let the compressed gas flow past the electrodes and a fine spray of powdered sugar burst from the end of the pipe. Thirty minutes later it ceased. The entire output was about 70 lb. of sugar. It is claimed sugar can be produced commercially at a cost of only 1 cent per pound.

* * *

**Comment by Dr. James Lawrie, of the
Miner - Lawrie Laboratories, Chicago.**

Regarding your article on the new process for making sugar:

The synthetical process of building up sugar and alcohol has long been a dream of commercial chemists. Some of the lower sugars have actually been made in this manner, but only on a small scale and at great expense. The idea itself is feasible, and as sugar contains the elements carbon, hydrogen and oxygen, in the proportions C12, H22, O11, in which the hydrogen and oxygen bear the same relationship as they do in water, namely, two parts of hydrogen to one of oxygen, thus the invention has all the starting material necessary, at practically no cost. The only problem, of course, was the combining of this material in the desired proportions of 12 parts of carbon to 11 of water. As to whether he has actually accomplished this matter as in the way stated you will have to rely upon the accuracy of the report. The chemical men who read it will probably scoff at it, whether it is true or not. As it is such a far-reaching invention, personally I, like the others, would have to be shown. It is well known that hydrogen and carbon combine at high temperature and under certain conditions to form acetylene and some of the other higher hydrogen-carbon compounds. I believe that they have even succeeded in making small amounts of formaldehyde, formic and acetic acids at high temperatures by use of the electric arc.

MINER'S LIFE-SAVING HELMET

Several types of life-saving helmets are already in use by miners and firemen and in refrigerating plants. The



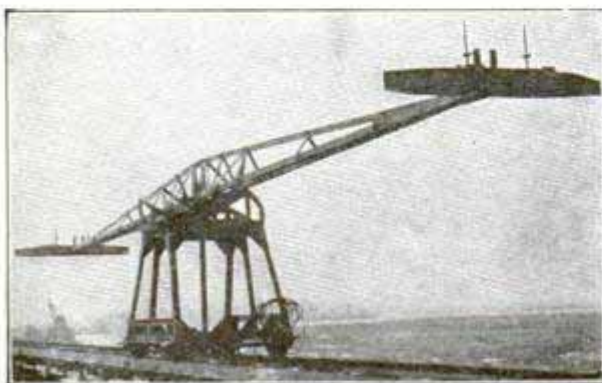
Working in Deadly Gases

latest device is a German invention, in which the air supply comes from two oxygen cylinders strapped on the back.

A special diving helmet is also made for submarines. It can be put on in one minute and will sustain life while the wearer dives from the boat and makes his way to the surface.

SEE-SAW TARGET FOR BIG GUNS

One of the most unique targets ever devised is in use at the greatest school of naval gunnery in the world—Whale Island, Portsmouth, Eng. Here the seamen and coast defense gunners are educated.

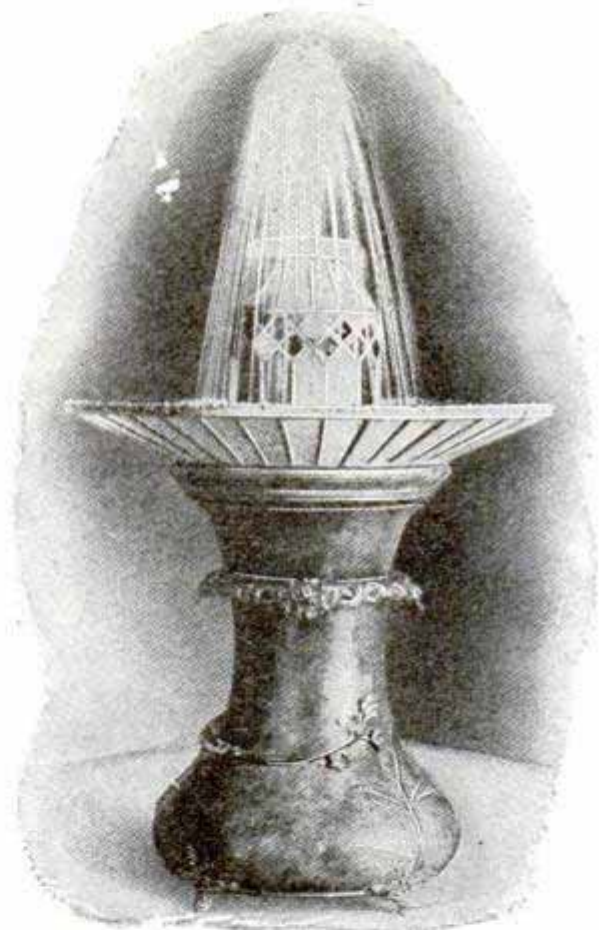


A Target Hard to Hit

The target consists of two dummy warships oscillating on an immense steel beam. This imitates the pitching of a vessel in a heavy sea. At the same time the car on which the target is carried moves back and forth, giving motion in two directions at the same moment. At this elusive target the gunners fire.

ELECTRIC TABLE FOUNTAIN

The latest ornament for a banquet table is the electric fountain which throws dainty streams of perfumed water, through which glimmer the soft rays of colored lights.



Electric Table Fountain

The fountain can be moved about like a table lamp, and takes current through a flexible wire cord. A small electric motor drives a centrifugal pump to keep the fountain playing.

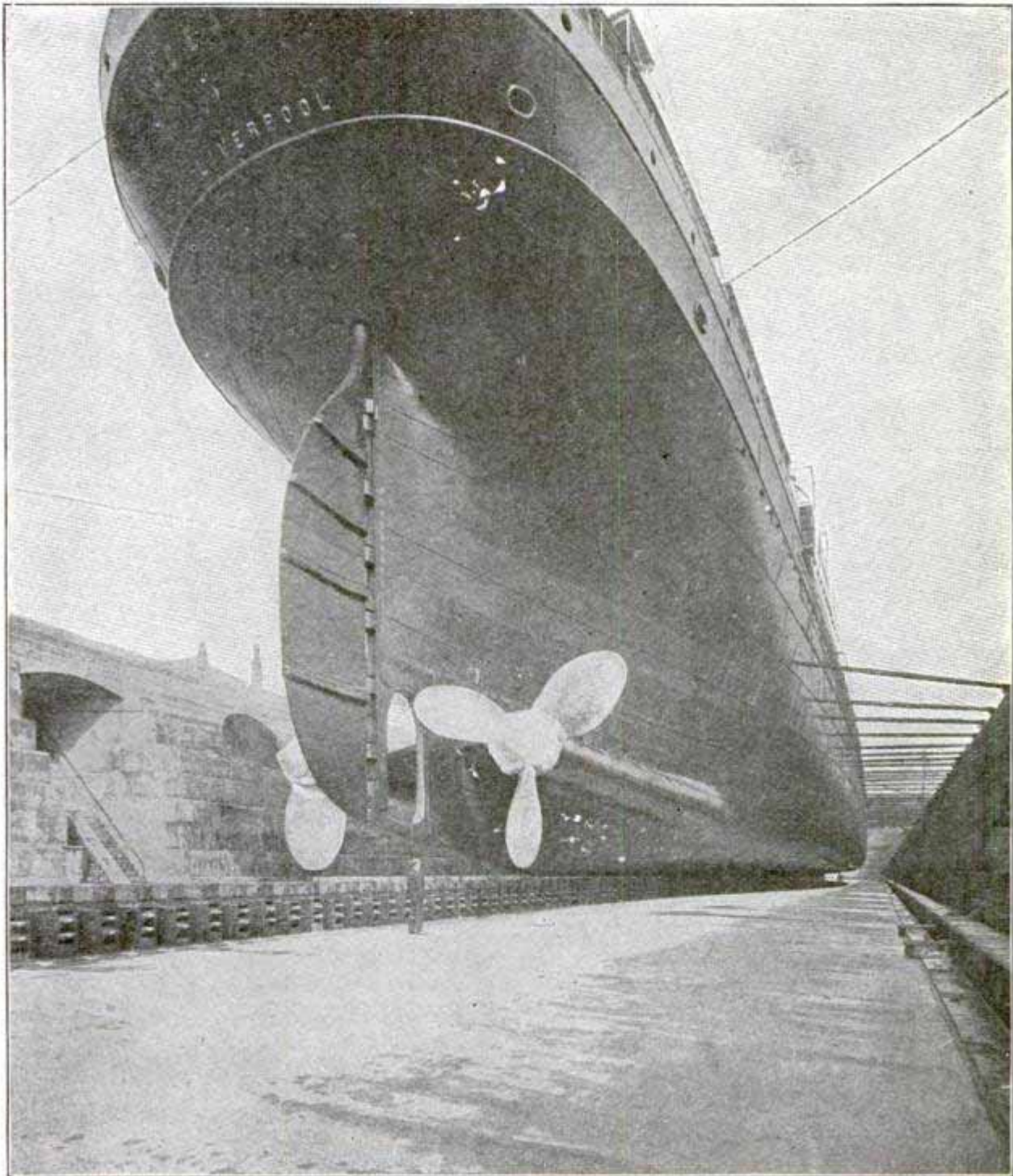
A New York steeplejack, after years of perilous adventures on the tallest spires and stacks in the city, fell 4 ft. and died from the injury.

GIANT SHIPS IN THEIR "BATH"

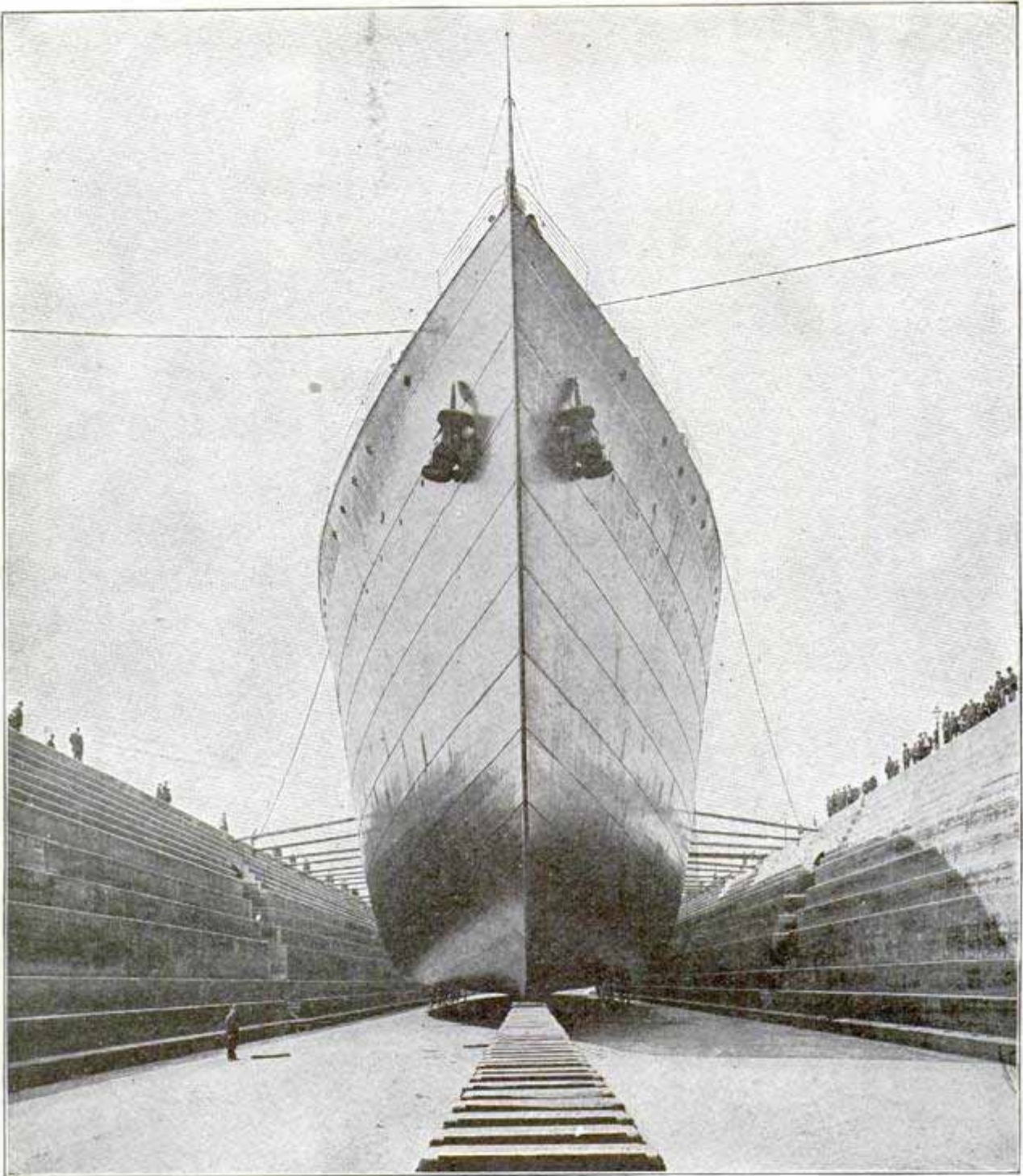
How the Colossal Floating Palaces are Taken out of the Water and Cleaned

There is such keen competition today among the great ocean-going lines that no matter how luxurious a 20,000-ton monster may be when she is first launched, all the vast expenditure upon her will go for naught unless she is kept keyed to the highest pitch of efficient perfection. She must keep her times in New York harbor and Liverpool as regularly as though she were an express train; and that in spite of icebergs, fogs, uncharted rocks, derelicts, and other menaces to navigation.

No sooner has she docked in Liverpool, and her immense population of



20,000-Ton "Oceanic" in Liverpool Dry Dock



Bow View of "Adriatic"—25,000 Tons—in Dry Dock

perhaps 3,000 souls streamed down the gangplank, than the overhauling begins. Silver-plate and linen, with china, books, furniture and a thousand other necessities are checked and inventoried; and a whole army of decorators and stewards let loose among the nine decks that rise tier above tier to a height of 60 or 70 ft. above the water. The engineering staff, too, go over the mighty mechanism that may develop the strength of 70,000 horses, lest some rival liner do better than they, and fastidious passengers transfer their patronage. But most curious of all perhaps is the putting of the 20,000-ton monster in her "bath"! This bath is in reality a dry-dock, which in order to receive the leviathans of today conveniently must be fully 1,000 ft. long.

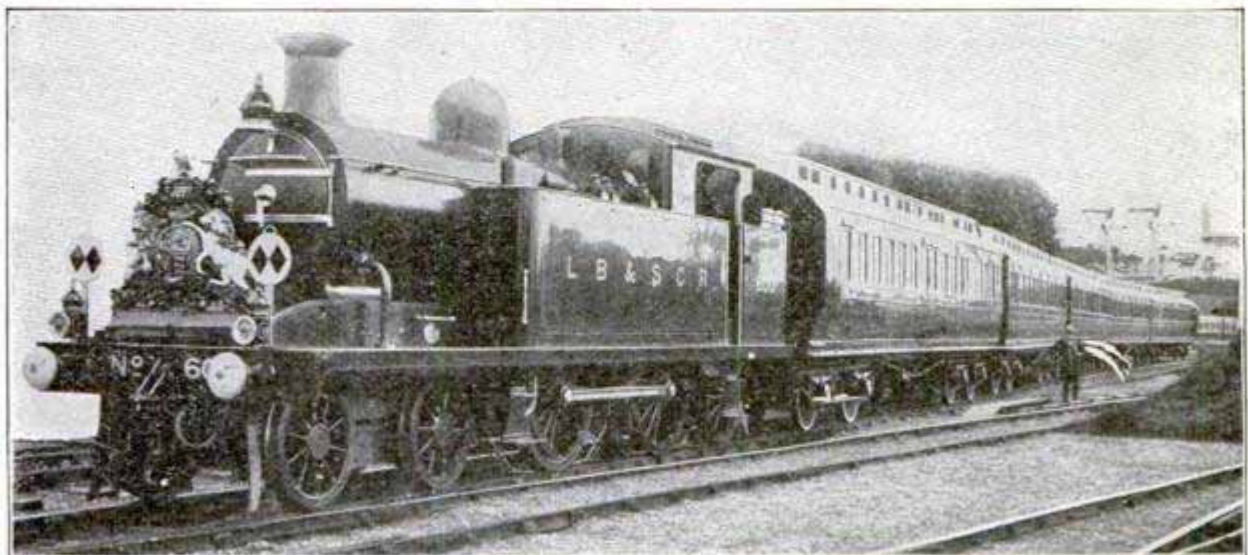
Just such a curious receptacle is the famous Canada dry-dock in Liverpool, where all the most magnificent liners of today are overhauled. One can imagine no more delicate operation than landing a great liner on the elm and

oak blocks at the bottom of this bath. While yet the monster is floating in deep water a plan of the bed arrangements is submitted to the chief officer, and very careful calculations are made so that the stupendous hull may rest evenly upon the blocks. Then the flood gates are opened and the bath filled. When its level is the same as that of the outer water, the colossus is wheeled round and her nose pointed in. Then tugs begin to haul in, and when once her towering bow is between the amphitheater-like walls, her speed is so slow that it takes a sharp eye to detect any movement at all.

You understand that if she scraped her sides it would do great damage. No sooner is she fairly in, than a whole army of men get to work with brushes of steel wire on the ends of long poles; and when at length the stern and propellers are inside, the outer gates of the bath are closed and enormous steam pumps get to work throwing out millions of gallons. Gradually the mighty ship sinks, and as she goes lower and lower consultations are held as to how likely she is to settle on an even keel on the blocks prepared for her. Moreover long poles are stretched from the walls, so that when she comes to rest she may not heel over either way. The breaking of these poles would surely result in disaster, entailing scores of thousands of dollars to put right.

Remember, the ship may be nearly 800 ft. long, and the dead weight in the case of the new Cunard liners "Lusitania" and "Mauretania" is 33,000 tons! At last every drop of water is removed from the bath, and scrapers, brushes and painters get to work on the towering steel flanks of the ship. She has settled on her bed within a fraction of an inch of the spot designed for her, and you will soon see busy men, perched like acrobats and looking like flies on a wall, on narrow planks high up on the hull, driving rivets, testing plates, painting or scraping. A ship like the "Mauretania," by the way, contains over 4,000,000 rivets, and the largest of them are 8 in. long and weigh nearly 3 lb. The removal of weeds, barnacles and other marine growths from the hull of one of these magnificent liners means a material increase of her speed.

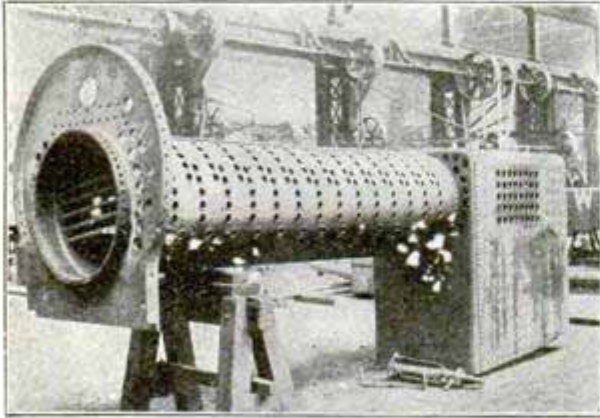
At last the floodgates are opened once more, and gradually the monster lifts off the blocks, and is hauled out again with as much care as she was hauled in. A whole fleet of tugs are fussing about her; her head is swung round, and, all spick and span both within and without, she is ready to receive her thousands of passengers and poke her nose out once more into the stormy Atlantic for another journey of 3,000 miles.



Royal Train Used by the King between London and Epsom Race Course

CROSS TUBE BOILER

In a new type of locomotive boiler being built in England the tubes are



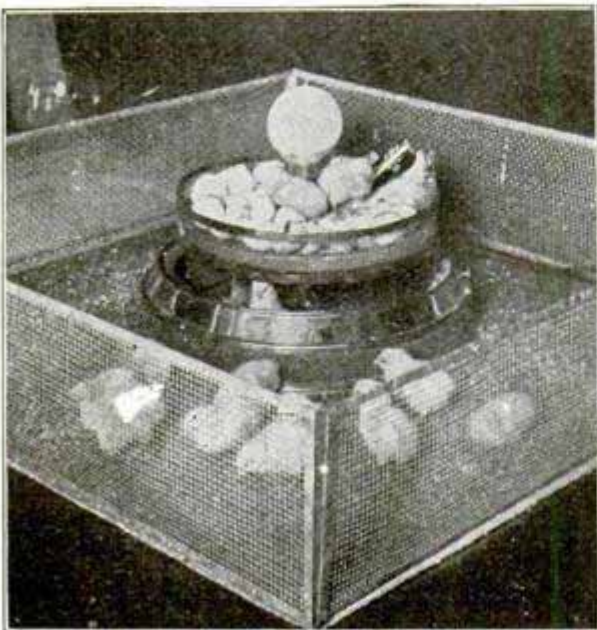
Odd Locomotive Boiler

placed across the boiler, instead of lengthwise.

ELECTRIC INCUBATOR

Hatches Chicks for Parlor Table

An electric incubator has been perfected which can be used in connection with ordinary oil incubators or independently. It is also made in ornamental style for use as a store window attraction, having a neat metal base of ornamental design, with nickel plate, oxidized copper or gun-metal finish, the base forming the hover or brooder for the newly hatched chicks. A drawer is



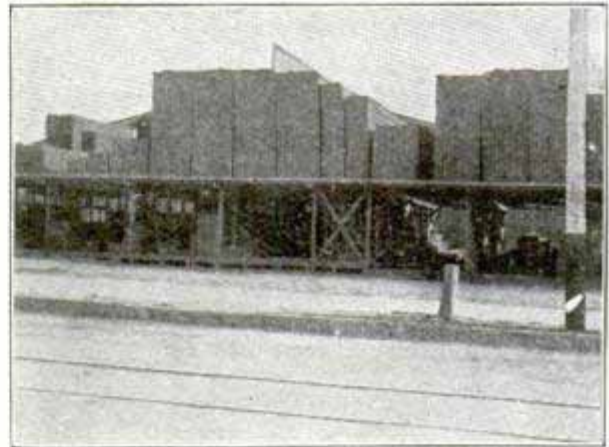
New Table Novelty

provided, which is partly drawn from the base and the electric chicks run about in the fenced enclosure, about 3 or 4 ft. square, making a most interesting exhibit.

Still another design is used as an ornament for a library or parlor table when the chicks are hatching out and affords a decided novelty in which the human interest which attaches to anything young and alive has full scope. Current is taken from any wall socket with the usual flexible cord and plug.

TWO-STORY LUMBER YARD

In a western city, where land available for lumber yards has become very valuable, a dealer conceived the novel



Skyscraper Lumber Yard

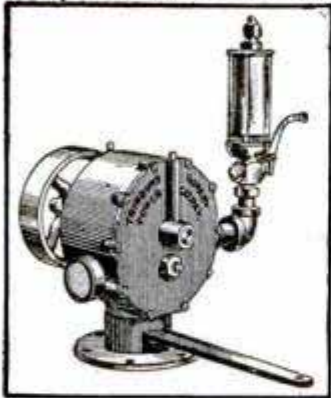
idea of a two-story lumber yard. This double-decked yard has a frontage of 100 ft. and extends back 80 ft. from the street.

TO DOUBLE LIFE OF UMBRELLAS

The usual way on coming in out of the rain is to place the umbrella in the rack or corner with the handle upward. This allows the water to run down and remain a long time in the metal that holds the ribs together, which will rust the joints and rot the fabric. If the handle is placed downward instead of upward the water will run away from this point first and the whole top will dry quicker.

MOTOR BOAT WHISTLE

A new whistle for motorboats is sounded by a rotary blower driven by a friction contact with the flywheel of the engine. The whistle can be maintained as long as desired and the sound is uniform and steady. The blower, of course, must be at the engine, but by use of piping, the whistle can be placed anywhere in the boat and a whistle cord run to the steering wheel.

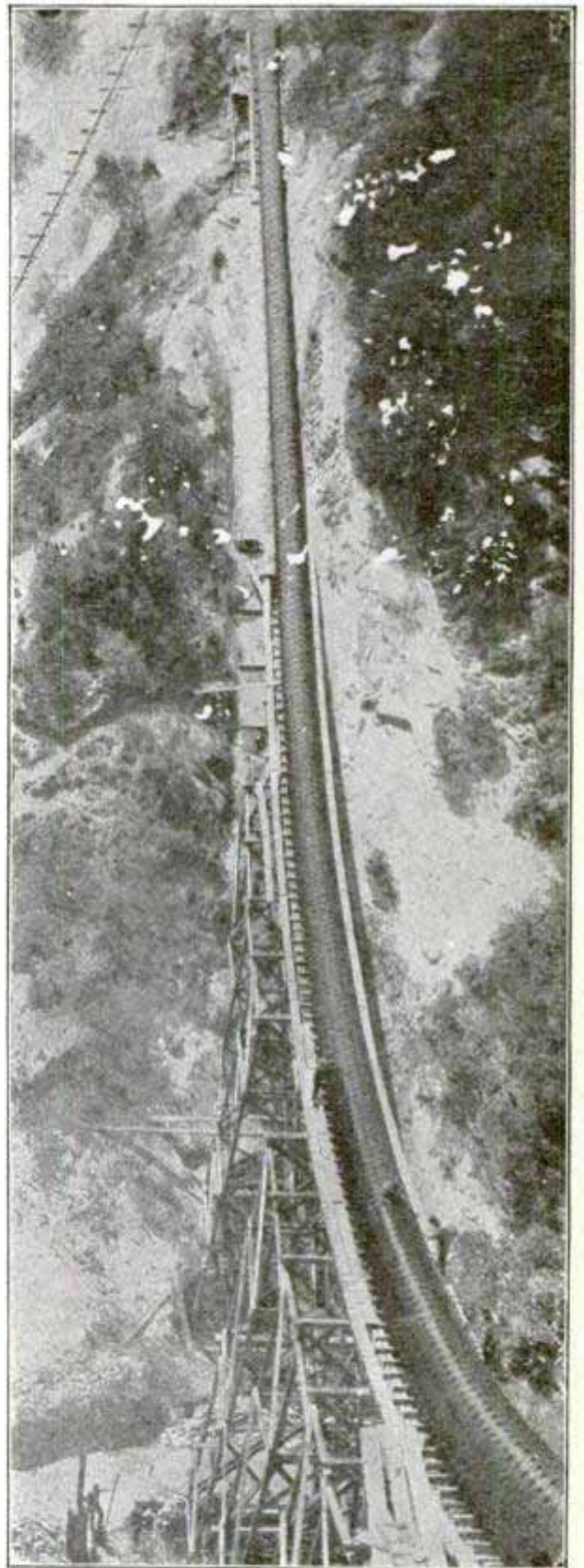


PIPING WATER ACROSS THE MOUNTAINS IN HUGE WOODEN PIPES

In California there are many great irrigation, mining and water-power enterprises, and as more than four-fifths of the state is mountainous, water in not a few cases has to be taken over high rocky ridges and across deep ravines and canyons. In order to conduct water over such a rough country huge wooden pipes, more than 6 ft. in diameter, are used.

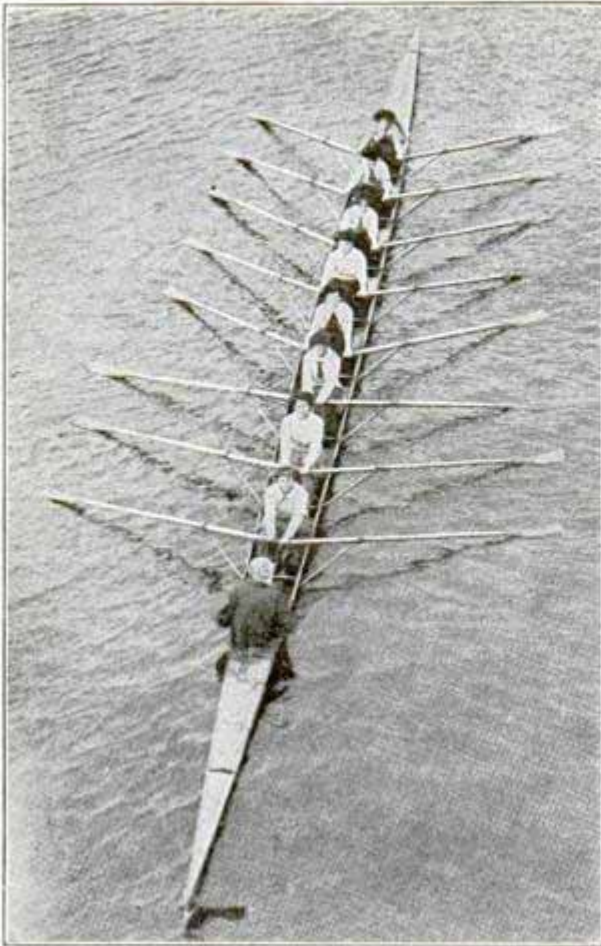
These pipes are made of redwood staves banded by iron rods that may be tightened by screws and the pipes thus made watertight. California redwood is found to be an excellent material for making water pipes, for the reason that a large proportion of lumber from that tree is "clear stuff," free from knots, pitch and pitch seams, and the wood being very free from sap is enabled to resist decay to a remarkable degree.

The wood stave pipe is found far preferable to iron or steel pipe for construction in mountainous regions, for the reason of its light weight, and that the material may be transported to the site of operations in pieces. It is not infrequently the case that it is found impossible to transport even this light material upon wagons, so rugged is the



Pipe is 6 Ft. Diameter

country, and in cases of this kind the wood staves are lashed to the backs of burros and thus taken into the steep places. Our illustration shows a section of this huge pipe descending a steep mountain side and crossing the gulch at the bottom.



GIRLS' FIRST RACING SCULLING EIGHT

Dr. Furnivall, the eminent Shakespearean scholar, claims his crew of girls is the first racing sculling eight to be pulled by women, and that the American girls' eight is a rowing, not a sculling eight. The illustration shows his crew of fair oarswomen in full swing in their racing scull on the Thames river.

MACHINE TO TYPEWRITE 1,000 WORDS A MINUTE

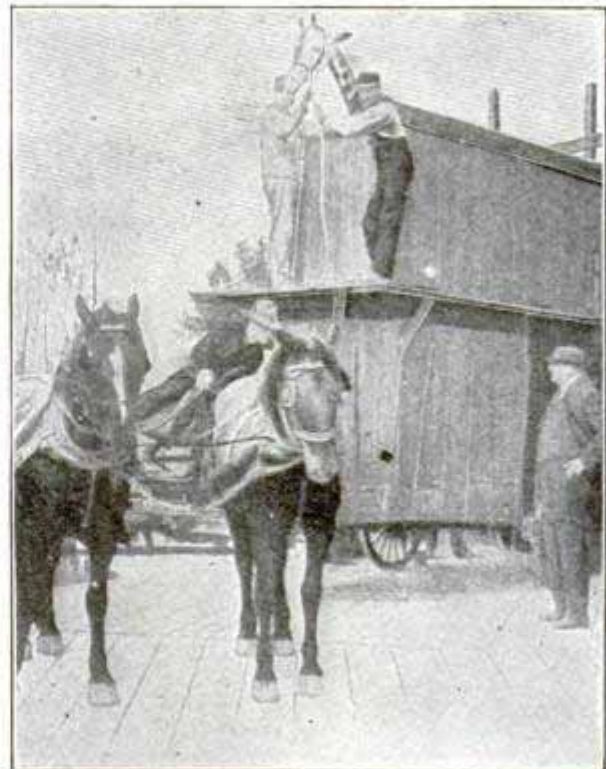
Remarkable claims are made by the inventor for a new automatic typewriter which is to be placed on exhibition. If its construction is such as not to require an engineer, electrician and a crew of machinists in constant attendance, and it will do one-half it promises, it will revolutionize correspondence in large establishments. The inventor says:

"This machine will actually write letters at the rate of 1,000 words a minute. The machine may be operated in two ways. If it is desired to make a number of copies of the same letter with

different names and addresses it will perform this work, producing in each case an original letter in one, two or three colors, fill in the name and address and add the signature. A business man desiring to dictate may use this automatic typewriter by talking his letters into a device like the phonograph, transfer the record to the machine, turn on the electric current and go home. The next morning the letters will all be done and the machine will automatically stop when all the letters are written. It will also address envelopes or wrappers and count them as well. It will write forwards or backwards, and, if desired, the lines may be justified like type.

CAR DITCHED; TRUCK WENT ON

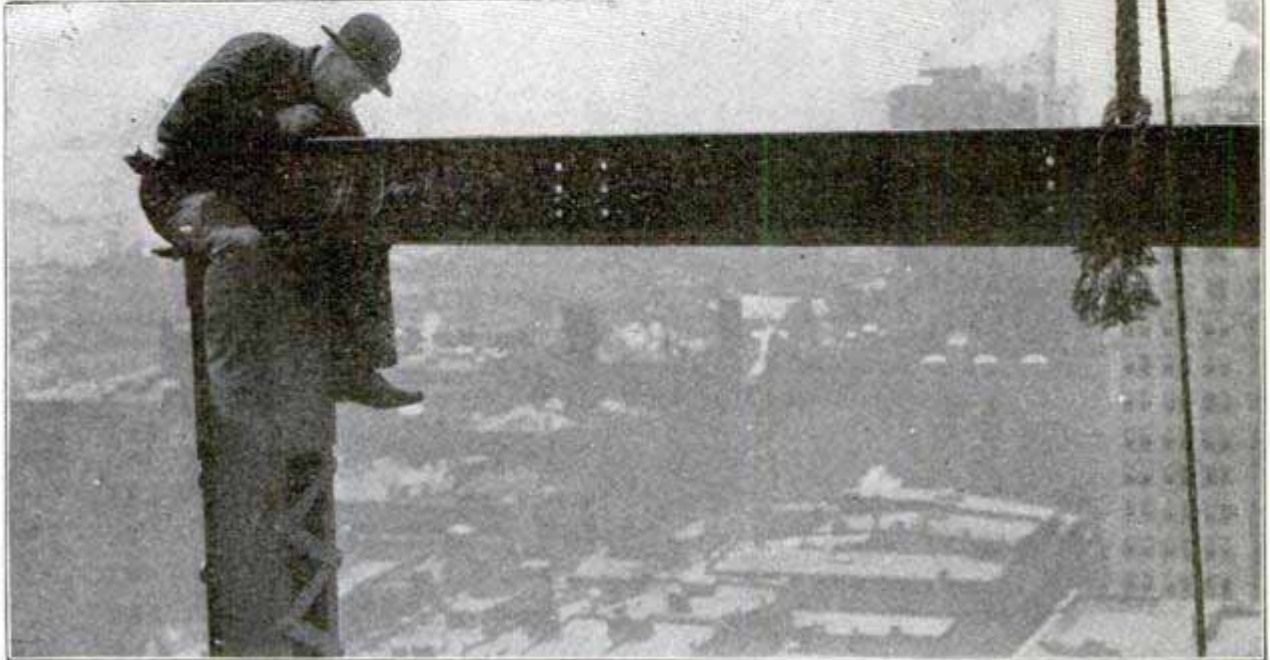
The motorman on an interurban line near Grand Haven, Mich., forgot to shut off the current as his car approached a curve at high speed. The result was the car body was thrown completely off the trucks which remained on the track and ran 1,500 ft. before coming to a stop.



Peculiar vehicle specially constructed for the transportation of giraffes. The top of the wagon is about 20 ft. above the pavement.

PERILOUS WORK IN MID-AIR

A daring photographer risked his life to secure the picture from which this illustration is made. It shows the placing of a steel beam 400 ft. in air during the construction of a skyscraper in New



Structural Worker 400 Ft. Above the Street

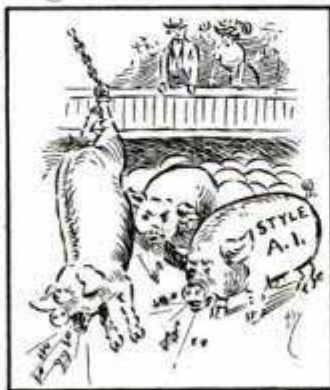
York City. It requires the steadiest of nerves to perch on the top of a slender column and guide the great beams into place as they are brought up by the hoisting machine from the street.

UTILIZING DYING PIGS' SQUEAL

It has long been the boast of the Chicago packing houses, that in killing hogs everything is utilized—except the squeal.

The squeal has now been turned to account in this way:

An ingenious piano salesman travels through the country, taking several instruments with him. To draw a crowd he gives a free evening entertainment with a moving picture machine. Between each series of views he



Courtesy "Pratt"

demonstrates on the pianos. One of his pictures shows the progress of events at a packing house. To make the scenes in the killing room realistic he visited the plant and secured some phonograph records of the porkers as they let out some vigorous remarks. Now when the moving picture reaches the pig sticking act, he turns on his phonograph and his visitors can see and hear just as if they were actually present at the original scene of operations.

TWO-CENTS-A-MILE RATE PAYS

While the western state legislatures were passing the 2-cents-a-mile passenger rate the passenger departments went into spasms. Whether genuine or not we don't know. The record of the first month at the reduced rate on a large number of western roads shows in nearly every case a marked increase in earnings over the corresponding month last year. And this has been earned with practically the same equipment, which

means little or no increased cost of carrying, as the passengers load and unload themselves.

The explanation is few empty seats in a train which formerly went only partly filled. People are riding now at 2 cents

who thought they could not afford to at 3 cents—and many of them actually could not. Once the travel habit is formed it lasts. The stockholders ought to thank the legislatures which reduced the rate.

HUGE WATER WHEEL DRAINS MARSH

2,000 Acres Reclaimed in a Novel Manner

By James C. Mills

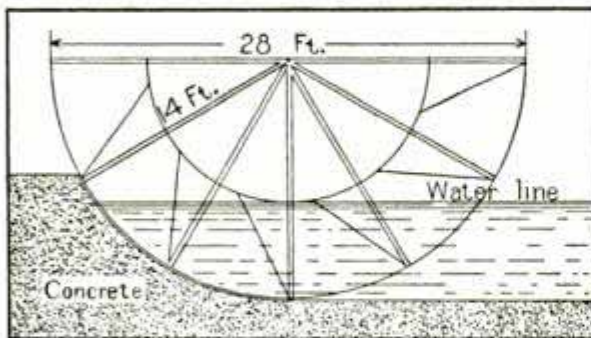
Two thousand acres of Michigan marsh land have been reclaimed by a system which is declared to be new.

The new drainage consists of two principal factors, namely, a monster water wheel and a series of high and wide dikes, with broad and deep ditches within. The dikes are 20 ft. high above the normal stage of water in the river and the ditches are 16 ft. deep and 34 ft. wide at the bottom. The building up of the dike and the digging of the ditch was done by a dredge which, starting at the river, dug its own channel around the tract, the earth taken out in the operation being dumped on the outside to form the dike. Running straight across the tract are five smaller ditches, joining both ends with the main ditch. At the corner of the tract where the north and east sections effect a junction, at the lowest point, the power house was erected and the water wheel and the machinery to operate it installed. Under the power

house and cutting straight through the dike there is a sluiceway 4 ft. wide and 30 ft. long by 16 ft. deep, constructed of concrete. In this flume the water wheel is set, its shaft adjusted so that its wood paddles are within a quarter of an inch of the smooth flat walls and bottom of the flume. On the outlet end, where the wall is rounded to conform to the circumference of the wheel for a distance of 6 ft. from the bottom the end of the paddles slip along the surface and discharge the water into the outer sluiceway.

The wheel is 28 ft. in diameter and 4 ft. wide and constructed entirely of steel. The wood paddles are bolted on at a decided angle to the wheel spokes, in order to permit the water to flow off more freely as the wheel revolves and the paddles pass the mouth of the sluiceway. This is necessary because the water is not raised as high as the wheel axis, at which point the spokes would be parallel to the surface of the stream. There are 16 of the paddles and when the wheel is in operation they are the important factor in lifting the water from the ditch to the river beyond.

The great wheel is arousing much interest because of its novelty and large capacity, and as yet is the only one so used in this country. The small expense of operation is its chief recommendation, and when one considers that it has drained seven miles of 34-ft. ditch, 6 to 7 ft. deep, in less than 10 hours, he has some idea of what it could do in draining swamps and marshes now covered with water at all seasons of the year.



EXPLANATION.—The diagram shows the wheel in the flume immersed to depth of 6 ft. Wheel is 28 ft. diameter; 16 paddles; space between each paddle at the outer rim, 5 ft. 5 in. The paddles are set at an angle to the spokes and are thus 7 ft. long. The inner rim, to which the inner end of the paddles are attached, is 16 ft. in diameter, or slightly more than 50 ft. in circumference. The space between the inner ends of the paddles is 3 ft. 1 in. The width of each paddle is 4 ft. At five revolutions per minute 9,520 cu. ft. of water is raised, or 571,200 cu. ft. per hour, or 19,278 tons of water per hour.

To operate the wheel there is provided heavy continuous gearing with 5-in. face, which is bolted securely to the rim and which engages a pair of 12-in. spur-gears, mounted on a counter-shaft,



What a Little "Kink" Did

which in turn is connected by belting to the engine shaft. The engine is 125 hp. of the ordinary slide valve type, supplied with steam from a fire-tube boiler. When operated at its full capacity the wheel revolves five times a minute and will take a foot of water off an acre of land in six minutes.

A HORSESHOE ADVERTISEMENT



A blacksmith in Pasadena, Calif., to show his thrift and to call attention of the passing public, has piled up about 3 tons of old horseshoes, in the shape shown, nails upward.

The new cruiser "Salem," 423 ft. long, will be the fastest boat in our navy.

LITTLE KINK MAKES BIG WRECK

A washout in the track near Fayetteville, Ark., removed the support from under a single tie, but this was sufficient to so weaken the track that a passing freight train left a kink in one of the rails. The kink was so small the engineer of the passenger train, which followed soon after, did not notice it until he was within a very short distance. There was not time to stop, so putting on full speed he tried to get over. The engine and mail car cleared, but the rest of the train was ditched, although none of the trucks left the rails until they had gone a car's length.—

Photos by Fred. L. McMillan, Fayetteville, Ark.

\$5,000 PRIZE DESIGN

The design for the emblem for the Alaska-Yukon-Pacific Exposition at Seattle in 1909 has been accepted. It is the work of Adelaide Hanscomb, a young lady artist of San Francisco, and



she was awarded the prize of \$5,000 over several hundred contestants. She says: "The figure to the right typifies the Pacific Slope, with right hand extended in welcome and the left holding

a train of cars, representing commerce by land. The figure to the left represents the Orient, and the ship in her hand represents commerce by sea. The central figure in white is that of Alaska, the white representing the North and the nuggets in her hands representing her vast mineral resources. Across the sky in the background is seen the Aurora Borealis, so vivid in the North."

SHORT STOP FOR RAILROAD CARS

In this case, the railroad being on a public street, it was not practical to



put up the usual bumper, so they placed ties rather deep and boldly let the cars run off the track into the soft dirt. The bent rails easily guide the car onto the main

track when pulled forward.

TERRA COTTA CHIMNEY THIMBLES

In building residences terra cotta or clay thimbles are now being much used in chimneys in preference to the thin sheet iron rims. They come in lengths of from 4 in. to 10 in. and diameters 5 in. to 10 in. They are usually made in flower pot factories.

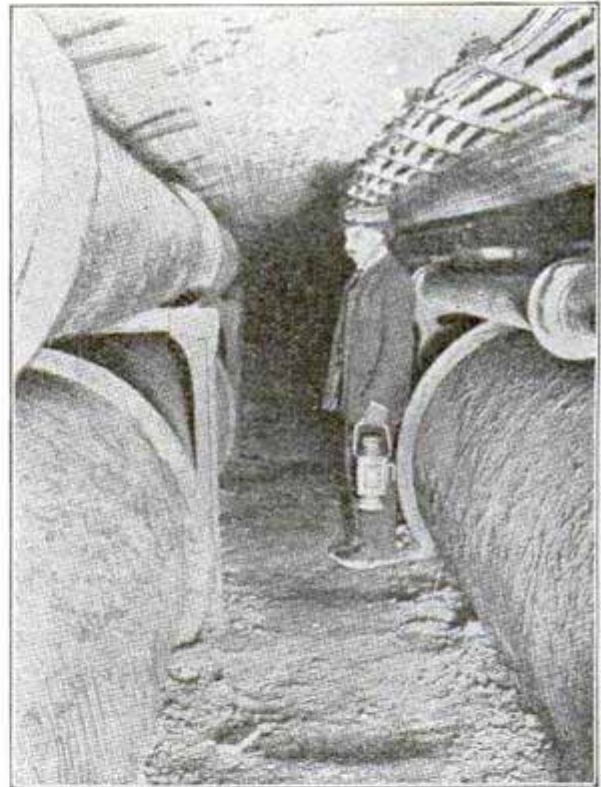


These Will Never Rust

SINK SHIP TO SAVE IT

To sink a ship, and that by means of a submarine torpedo, in order to save it, is one of the strangest of marine experiences; yet that is precisely what happened to the "Canada" in the harbor of Oran, Algeria.

The vessel which flies the English flag, with a valuable cargo on board, caught fire. In spite of the efforts of crew and tugs it was found impossible to subdue the flames. A destroyer towed the ship to a safe place and fired a torpedo under the water line. The vessel sank in comparatively shallow water, which of course instantly put out the fire, and she was then repaired and raised.



One of the subways under London in which are the largest gas mains in the world.

BIG CONDENSER PIPE LINE

To supply condensing water for the 7,000-hp. engines in the million-dollar electric power plant at Redondo, Calif., three lines of immense steel pipe 50 in. in diameter are carried out 500 ft. into the ocean. Pipes are made of $\frac{3}{16}$ -in. metal. When the big pumps were started one of the pipes collapsed for



Arrow Shows where the Pipe Collapsed

a length of about 100 ft., from the suction, on account of having been improperly braced, the loss amounting to \$3,000. An arrow in the picture shows the flattened pipe. The pipes are 18 ft. above the water.

DASH FOR SOUTH POLE

Lieutenant Shackleton's Antarctic ex-



pedition sailed from London July 30 in the "Nimrod," a Newfoundland sailer of 227 tons. The vessel carries supplies to last two years.

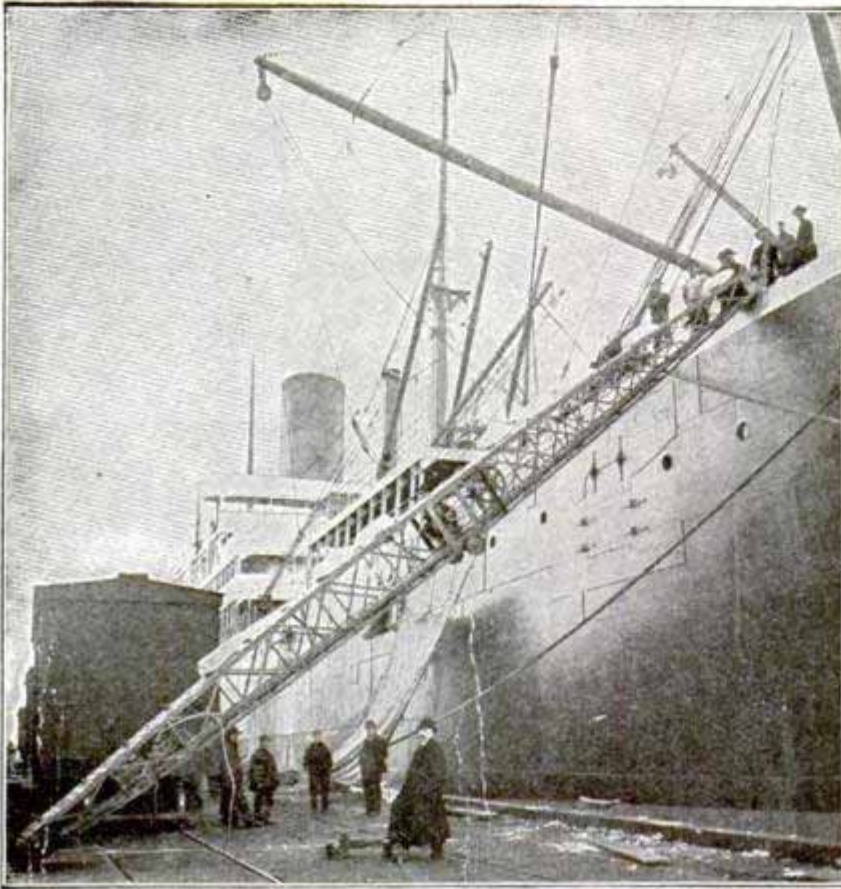
HAULING WITH WAGON TRAINS

All the heavy hauling in Los Angeles is done by coupled wagons, as shown. The second wagon has a short pole with a clevis on end which fits over the end of the reach of the first wagon. A long continuous chain extends from a loop around the king pin of the first wagon clear through to the rear axle of the second wagon. Five horses are used, thus saving the expense of one driver; also, because the second wagon exactly trails in path of the first wagon, power is saved.



Wagon Train with Five Horses

AN ELECTRIC CONVEYER FOR SHIPS



Courtesy Spence Mfg. Co.

Loads 5,000 Packages an Hour

TEACH SWIMMING ON DRY LAND

By means of a new invention school children in Germany are being taught how to swim before they enter the water. The apparatus consists of a broad sling placed under the chest and a narrow band for each ankle, allowing free movement of the arms and legs. The leg slings are balanced on weights and pulleys to allow a compensating motion.



German Swimming School

Electricity plays an important part in the loading and unloading of modern vessels. It is claimed that the conveyer shown in the illustration will save \$50 to \$65 per day, doing the work formerly done by hand.

It is electrically driven and has an endless wooden apron which runs on steel rollers. It operates at any angle, is from 25 to 50 ft. in length and can be transported to any place. There is an automatic registering device which accounts for every package, no matter how small, that passes over it. The conveyer will transport and register from 3,000 to 5,000 sacks, cases, barrels, bundles of shingles or bales per hour,

according to size and weight. The illustration shows a 50-ft. machine loading the steamship "Minnesota" at Seattle.

MINING KAOLIN WITH WATER JET

A company mining kaolin in Connecticut successfully uses a water jet instead of a shaft. A 4-in. pipe is put down to the bottom of the kaolin bed, about 200 ft. Inside this pipe a 2-in. pipe is let down with a nozzle at the lower end, through which water is forced at a pressure of 60 lb. About 100 gal. of water and kaolin per minute come to the surface, 10% being solid matter, of which 75% is kaolin. The discharge is then pumped 4 miles through pipe line to washing plant.

A railroad brakeman has invented a hot-box alarm, in which the melting of a fuse rings a bell in the coach.



An exhibition of Japanese daylight fireworks in which thousands of subjects, made of colored paper, are fired into the air. Animals, fish, balloons, furniture, umbrellas, and countless other objects are sent up several hundred feet and float slowly down, unfolding as they descend.

IN THE STROKE HOLD

What is doubtless the fiercest work performed by man is firing the furnaces of the great ocean liners, which consume several hundred tons a day. The men are obliged to work incessantly in a temperature which few people can endure longer than a few minutes. Although they work in short shifts it is so exhausting that the men are short lived, and new stokers have to be secured constantly to take the place of those who have become broken-down wrecks.



Man-Killing Work

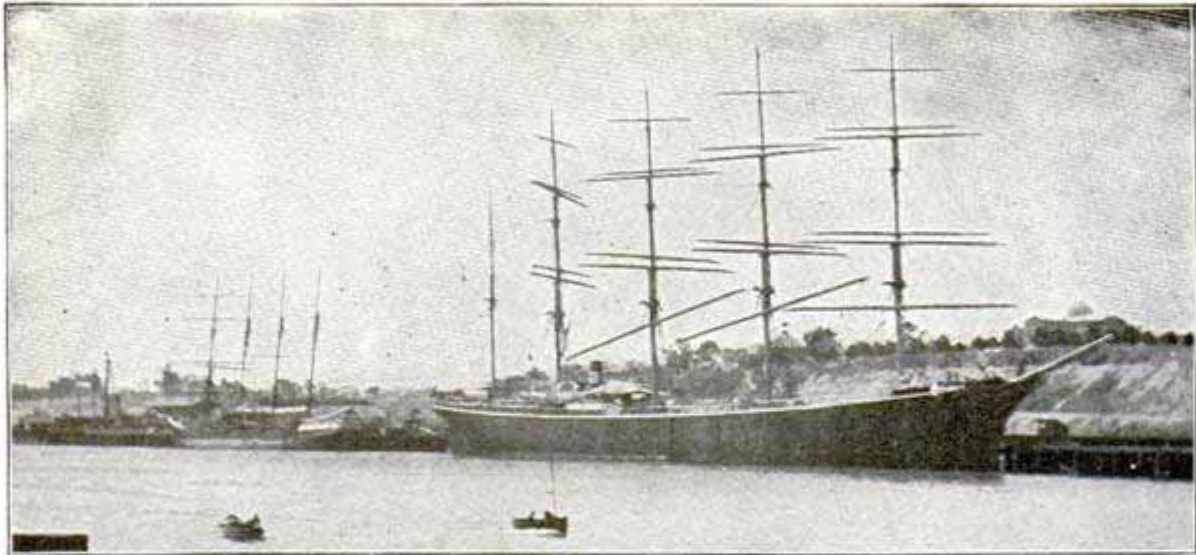
PECULIAR WRECK OF BUILDING

A three-story frame tenement whose height had been increased by raising on jack screws preparatory to moving, was blown down in Chicago.



A midnight gale blowing nearly 50 miles an hour overturned the building; five persons were killed and 16 badly injured. The collapse of the structure was almost complete as seen in the illustration.

A pile driver at New Orleans is 108 ft. high; supposed to be the highest ever built.



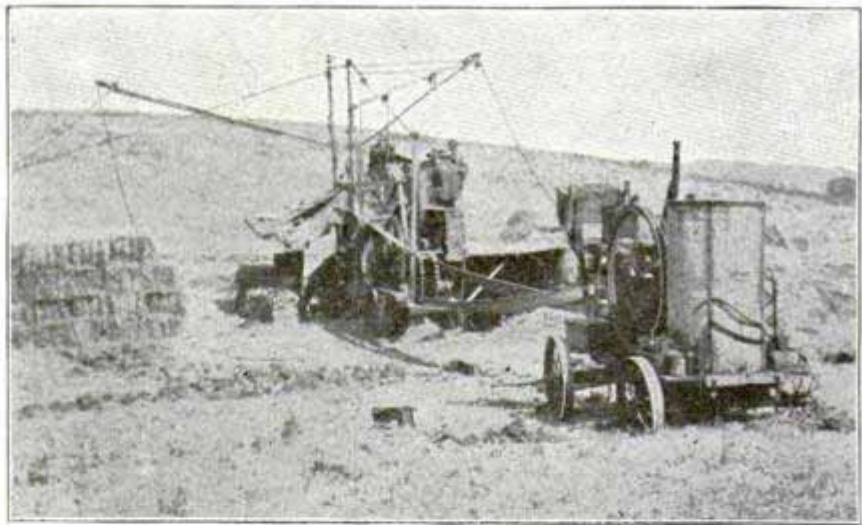
LARGEST SAILER AFLOAT

The "R. C. Rickmers," a German vessel, is the largest sailing ship afloat. She is 8,000 tons burden, a recent cargo being 40,000 bbl. of cement.

The boat has an auxiliary engine and propeller with feathering blades. Masts and cross yard arms are tubular steel.

HAY PRESS GATHERS, BALES AND DELIVERS

In California haying is conducted on a large scale, some ranchers producing annually 100,000 tons each. The hay is all baled for shipment. The cut shows a hay press run by a gasoline engine. On this press are arranged several extra spools with friction clutches to operate them when a bell signal is given. The farther man sits on a high seat and by means of levers operates the several ropes, one to draw the loose hay for a distance of about 40 ft. and another rope to carry the pressed bales away about 30 ft. About 60 bales an hour of 125 lb. each are handled without lifting by hand, and all material is brought to the machine without labor. Still on account of putting on the wires at such a speed quite a few men are required. It is said to be the only machine both pulling the material and piling up the bales as shown.



A Hay Press That Does Things

HUGE DOCK FOR FLEET SHIPS

The London & Great Western Ry. is building the largest dock in the world at Southampton, England. It is planned for the giant vessels of the future and will provide berths at one time for four ships 800 ft. long and of great draft. The dock will be 1,700 ft. long, 400 ft. wide; will enclose a water surface of 16 acres and be capable of being dredged to a depth of 40 ft.

BUILDING A RAILROAD IN SAVAGE AFRICA

Giraffes and Elephants Pull Down the Telegraph Wires—Hostile Savages Pull Up the Tracks to Make Spears

By W. G. Fitzgerald

Slowly, but surely, the Dark Continent is being conquered for civilization, and the most potent factor in this is certainly the railroad. Already from Cape Town, in the south, as far north as Lake Tanganyika, 2,000 miles, the Cape to Cairo line has won its way and in East Africa, the Uganda Railroad has fought with wild beasts, hos-

gether by gorgeous orchids and other floral parasites. The only "roads" are the beaten tracks which the herds of elephant have made as they crashed through the jungle on their way to water. Then, too, it must be remembered how dangerous a country this is for the white man, owing to the deadly fevers so easily contracted, not to men-



Natives Making an Embankment through Ashanti Jungle

tile tribes, fever and pestilence, until today its shining tracks stop short on the shores of the great Victoria Nyanza, that vast inland sea of Central Africa. Even in the cannibal Congo the Belgians are pushing railroad construction, and the Portuguese on the Indian Ocean, the Germans in West Africa and the French on the Ivory Coast are all laying down tracks and winning a way into a wilderness hitherto given up to lion and rhino, elephant and giraffe.

Now consider for a moment what such an undertaking means. The country is primeval jungle with trees whose upper branches are knitted to-

gether by gorgeous orchids and other floral parasites. The only "roads" are the beaten tracks which the herds of elephant have made as they crashed through the jungle on their way to water. Then, too, it must be remembered how dangerous a country this is for the white man, owing to the deadly fevers so easily contracted, not to men-

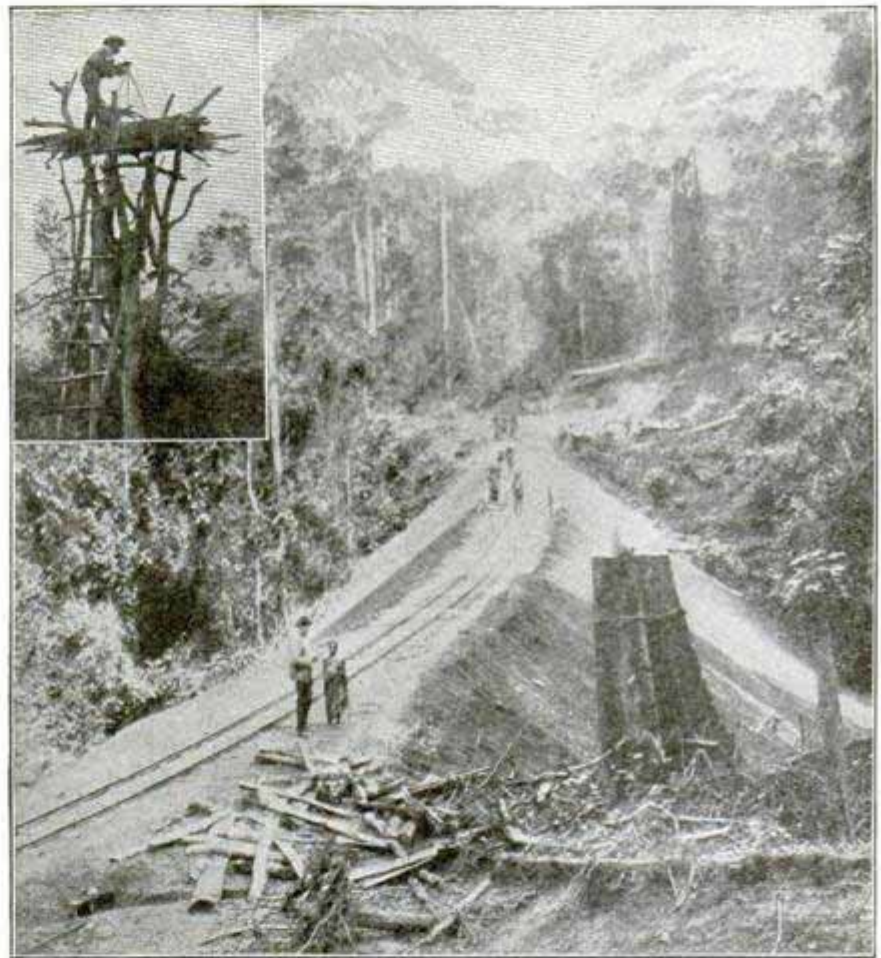
tion sudden descents of hostile savages, and attacks from wild beasts, and poisonous snakes. Worse still, there is the question of labor. As every explorer knows, the African native hardly does a stroke of work from childhood to the grave. A living is to be had by merely scratching the ground, or bringing down antelope with the bow and arrow; and all the necessary labor is done by the women. And when a railroad company does succeed in getting a few thousand native laborers, there is sure to be an outbreak of that most mysterious of all diseases known as "sleeping sickness" which last year swept away 200,000 natives on the Congo

alone. Animal transport, chiefly mules and oxen, was to be had at one time, but all these four-legged helpers are now impossible by reason of the dreaded tsetse fly, which has actually compelled the Belgian officials to introduce, on a large scale, zebras, as beasts of burden which might possibly be proof against the poison of this insect.

Thus, it will be seen that the construction of a railroad in savage Africa is indeed a heroic undertaking. In the first place gangs of savage laborers go ahead and clear the jungle of trees and brush. Behind comes another party digging holes for the telegraph posts, and last of all come the tracklayers. Now the surveying pioneers who map out the course have all the difficulties and dangers of the explorer in an unknown land to contend with. Had I space I could tell thrilling lion stories more exciting than any fiction, of camps attacked in the night by howling savages; of mysterious disappearances of white men. But these are the ordinary incidentals of an African pioneer railroad. On the Uganda line all operations were stopped for two months at Tsavo station, owing

to the depredations of a man-eating lion and lioness which had so terrorized the native workers that at length they dropped their tools and disappeared in the wilderness. There was nothing for it but to track and kill the lions—a highly risky and difficult work, for both were old and crafty. Like all man-eaters their fangs had become so worn and their joints stiff with age that they could no longer chase the swift antelope

which is their ordinary prey. And under such conditions is it that the larger carnivora seek human beings as being much easier to secure. The strange thing is, that once having tasted human flesh, a lion rarely cares for any other prey. Three or four surveyors and engineers of the Uganda railroad were specially sent from Mombasa to Tsavo, where they took up their quarters every night in the old pay coach which ran up and down the line once a month distributing pieces of cotton cloth,



Surveyors Work from Tree Tops

cowrie shells, and brass wire—the currency of Central Africa.

For many days and nights the lion and his mate continued to carry off employes of the road, avoiding the white watchers with almost human cunning. Indeed they appeared to grow more and more daring, and the climax came one evening when a Hindu paymaster was picked off an open freight car by the lioness, who made a sudden

swoop from the grass thicket and dragged him off shrieking into the jungle. That same night was marked by a still more terrible tragedy. One of the white engineers towards two in the morning dropped off to sleep in the

tered in the Arab slave raiders who make periodical descent upon Central African villages in order to supply the slave markets of Egypt, Persia and Turkey. Sometimes hundreds of the laborers would be kidnaped and their



Material is Hauled by Long Horned Oxen

coach with his express rifle across his knees. There was a sudden scuffle, and before his comrades knew what had happened the maned head and massive paws of the male lion were thrust in at the open window, and the sleeping man dragged out and carried off into the forest. His pitiful remains were found some weeks later. It is satisfactory to learn that both lion and lioness were eventually bagged, but even after their magnificent skins were exhibited all up and down the line it was very difficult to induce the laborers to return to work.

And even when the railroad was opened for traffic, the patrolling of it was a most difficult undertaking. On no less than five occasions giraffes 15 and 20 ft. high were found dead by the way, having been strangled by the telegraph wires which they had run against blindly and dragged down with their long necks. Then, too, some of the blood-thirsty Masai regarded the shining steel tracks as heaven-sent material for their own weapons, so that it was no uncommon incident to find great gaps in the track where the savages had stolen the metal to be forged into spears and arrow-heads in their rude village smithies.

Another great difficulty was encoun-

villages burned with circumstances of great atrocity. Accordingly the white authorities had to maintain little standing armies whose forces could be entrained at any given spot on receiving news by telegraph, and swiftly transported to the scene of a raid. On such occasions serious pitched battles would be fought, but victory always lay with the railroad people, who were better armed and had the strategic advantages of their rolling stock. Yet another difficulty was experienced from the herds of wild elephants. Many of these brutes appeared to think that the telegraph poles were put there specially so that they might rub themselves against them. Or an angry tusker whose upraised trunk had been hurt by the wire would think little of uprooting the poles for miles or more. It is surely an amazing monument to the pluck and persistence of the white man in Africa that even in the face of all these difficulties railroad work is being pushed with feverish zeal in all parts of the continent from Uganda to the Senegal, and from the Zambesi to the sources of the Nile.

Rich mineral and agricultural lands are being opened up and capital introduced from all nations. Cotton, tobacco and wheat are being grown on the

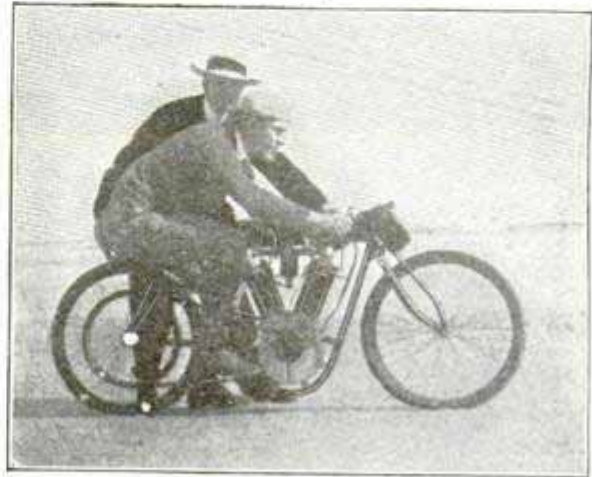
highlands of British Central Africa, and luxurious trains are now crossing the stupendous falls of the Zambesi at a point where one of the world's mightiest rivers two miles wide falls over an appalling precipice 400 ft. deep. Long ago the various nations interested in the development of Africa, realized that the best way to conquer all the forces arrayed against them there was to clear a way into the heart of the continent for the iron horse, which is fast carrying prosperity and the blessings of civilization into regions where but a year or two ago a white face had never been seen.

IRON IN CUBA

After boring several thousand holes and making other explorations covering a period of two years, it is announced that there is quantities of iron in Cuba. The body of ore already located is estimated at 600,000,000 tons, and only 12 miles from a good harbor. Steel interests in this country have already secured 27,000 acres.

MOTORCYCLE MAKES RATE OF 90 MILES PER HOUR

At Atlantic City William H. Bray, jr., made an official mile from a flying start in 38 seconds, or at the rate of 90 miles per hour. The machine is of



W. H. Bray, Jr.

French construction and is a two-cylinder 14-hp. and broke the world's record last year at 61 miles per hour.

ILLUMINATING GAS FROM CORN-COBS

The town of Beatrice, Neb., has the only gas plant in the world that manufactures commercial illuminating gas from corn-stalks, corn-cobs, hay, and vegetable matter. The quality is as good as coal gas and it sells for \$1.18 per thousand cubic feet, the lowest price in any city in Nebraska. The plant cost \$100,000 and John D. Rockefeller is thought to be back of it, as the franchise is held by the Rev. Charles Eaton, pastor of Rockefeller's church in Cleveland. There are a number of manufacturing plants which make a cheap grade of gas out of bark and hay for use in gas engines, but it is believed that this is the first instance where vegetable matter has been utilized for the manufacture of illuminating gas.

During 1906 in the state of Pennsylvania, 126 boys between the ages of 16 and 21 years were killed in the coal mining regions.

領受牌銀譽名會覽博念紀戰捷於

象印 ショーベル



象印
シスコップ

右ハ鋼鐵板ヲ以テ製造シタルモノナレバ
世ノ粗製品ニ比シ堅牢且價亦廉ナレバ最
モ經濟的實用品ナリ
自發御入用ノ向ハ御一報次第送呈ス

大阪府下堺市綾之町

淺香本店

電話百五十三番
發電話稱アケホ

象印 スコップ

目品業營
製造工機和場名
要製工コ洋名
輸具用コ洋名
出入製具用山打
製具用山打身物

The above is an advertisement of railroad supplies appearing in a Tokyo, Japan, railroad journal.

"PAY-AS-YOU-ENTER" STREET CARS

The Montreal system of collecting fares on the rear platform before the passenger enters the car is to be tried on several street railway lines in this country. The advantage is that the conductor remains constantly on the rear platform, having no occasion to enter the car, and can thus give better attention to his duties other than collecting fares. The passengers all leave from the front platform which prevents confusion and delay, and avoids the danger of starting a car while a passenger is in the act of getting off.

To operate the system to best advantage cars with platforms specially arranged have to be constructed, and 150 such cars are now building for a line in New York City. Where it has been tried the public are said to like the system.

BOSTON'S NEW \$3,000,000 BRIDGE

The new bridge over the Charles river, connecting Boston and Cambridge, is completed at a cost of \$3,000,000. It is 3,700 ft. long, including approaches, and 105 ft. wide. Four towers, each 100 ft. high, mark the center span, which has a clearance of 26 ft., allowing tugs and small boats with telescope masts to go through. In its construction 150,000 bbl. cement and 14,500,000 lb. steel were used. Avenues are provided for elevated cars, trolley cars, other vehicles and foot passengers. It is the best lighted and one of the finest examples of bridge architecture in the country.



MONORAIL WITH OVERHEAD GUIDES

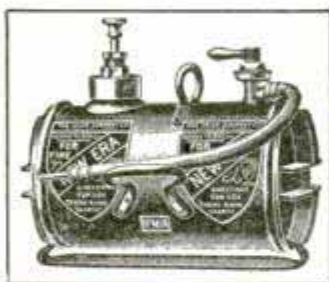
One of the new things exhibited at the Jamestown Exposition is the monorail illustrated below. An ordinary T rail is laid on short ties. On this runs the electric car, 47 ft. long, 6 ft. wide, and is carried on two trucks, each having two double flanged wheels in tandem. A light steel structure carries the overhead guides, made of L-shaped steel rails, 30 in. apart. The guide rails serve to hold the car upright, and also transmit the current for the motors. The line is $\frac{1}{2}$ mile long. A speed of from 50 to 100 miles an hour is expected.



New \$3,000,000 Bridge over Charles River

FIRE EXTINGUISHER FOR SUBMARINES

Gasoline is being used almost exclusively in submarines as fuel, and there is always danger of leakage from both engines and tanks. Fire in such confined quarters means speedy death to all the inmates. A chemical fire extinguisher constructed and filled with special reference to quenching gasoline flames is now being placed in all the Italian submarines.



LIFE OF TREATED POLES

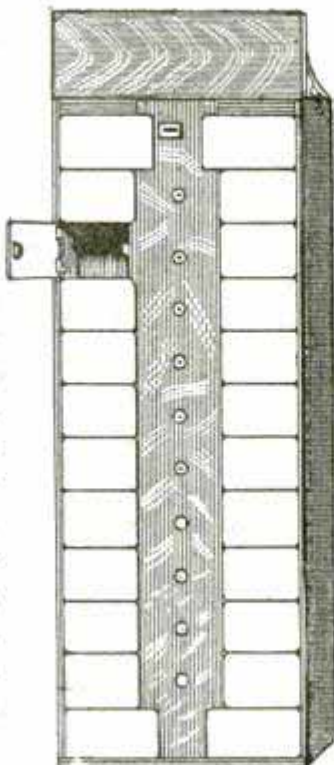
As a result of records of 3,000,000 poles, covering a period of 52 years, the telegraph department of the German government finds:

Poles impregnated with—	Last.
Sulphate of copper.....	11.7 years
Corrosive sublimate	13.7 years
Creosote	20.6 years
Unimpregnated	7.7 years

MACHINE THAT SELLS LUNCHES

To the numerous vending machines will now be added one that dispenses lunches — when you drop a dime in the slot.

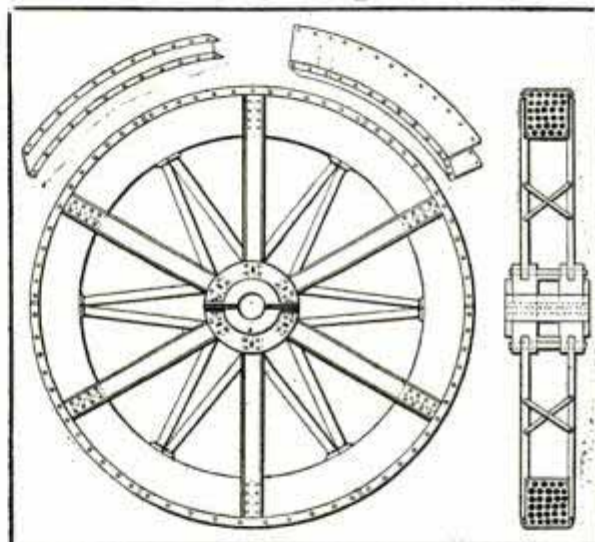
The machine is designed primarily for factories and places where no restaurant is near at hand, and may also be installed in depots, parks, boats and other public places. It is 5 ft. high, 2 ft. wide and contains 24 assorted lunches, as indicated



by a bill of fare bearing a number. On pressing a button with the proper number a door opens and releases the lunch selected.

A NON-BURSTING STEEL FLY-WHEEL

A recently patented improvement on the present type of fly-wheels for large engines shows how they are made of steel. The rim is built up by a continuous length of wire rope which is enclosed in a steel casing. This casing is composed of riveted steel plate with sectional sides and a curved bottom plate, and the top plate extending over half the two adjoining sections, thus



Non-Bursting Steel Fly-Wheel

forming a lock. The rim and casing are supported by steel channel and angles, which form the spokes, fastened to a cast iron or a forged steel hub.

Rifled Better than Smooth Pipe Line

To distribute oil along its route for locomotive fuel a railroad in California is building a pipe line 250 miles in length. The new feature of the pipe is that it is rifled like a gun barrel instead of being smooth. This form gives to the moving oil a swirling motion, with less resistance, hence the pumping stations can be placed 25 miles apart, which is much greater than would otherwise be necessary. The rifled pipe line will carry 20,000 bbl. of oil each 24 hours.

PHOTOGRAPHING MOVING PICTURES

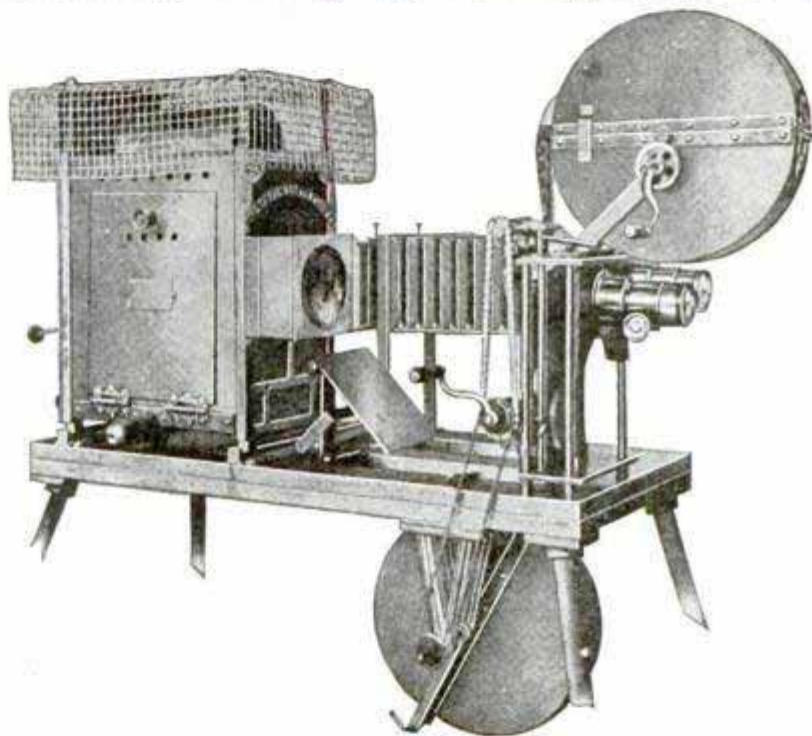
When a moving-picture machine owner decides to make a new film, he first writes a story, embodying whatever elements of comedy or tragedy he may choose. From this he works up various situations and proceeds to have actual people, usually actors, go through them as naturally as possible. All of which, of course, takes place before the picture machine.

The taking of moving pictures is a rather difficult art, and the ordinary amateur photographer would probably experience considerable difficulty in obtaining even half-way satisfactory results. The lens of the camera is arranged to work automatically and is opened for an almost infinitesimal period of time. When it is closed the film moves a sufficient space to take the next picture. The camera itself is quite complicated and can be operated either by hand or electricity. The exaggerated rapidity of movement in some pictures is due to the operator of the reproducing machine not running the film at the same speed as it was when taken.

The films themselves are small, not more than $1\frac{1}{2}$ or $1\frac{3}{4}$ in. in width, and each roll 200 ft. long. However, when necessary, films can be joined together, thus insuring any length. This is done after the films have been developed. Each picture is very small, so narrow are they that it takes 17 to make one running foot of film, and the change in each is so slight that the casual observer would say that there was no difference in any two adjoining ones.

The exposure of a film can be stopped instantly, and at the will of the operator. It is due to this fact that some remarkable results are obtained. Thus several years ago there was a film in

use that was very popular. It depicted a man crossing a railway track and being run down by a locomotive. It was made by having an engine approach the man, then stopping the film just before he was struck, of course not showing his leap to safety. The train again approached, a dummy was thrown before it, and the machine started. The result was a picture showing the man apparently being

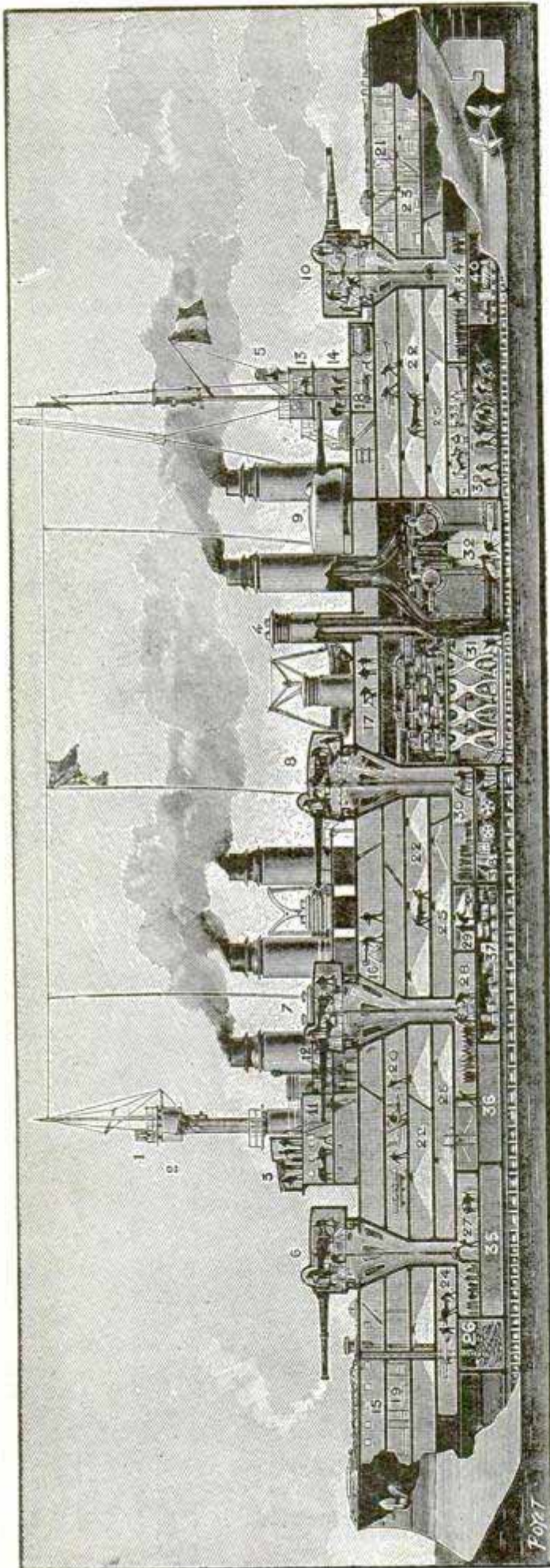


Fireproof Projecting Machine

ground to death beneath the wheels. All poor spots were later retouched.

The film is made of celluloid and is very inflammable. Great care is necessary in the reproducing machine that the heat of the intense light rays focused directly upon the picture, does not ignite it. Formerly disastrous fires were caused by an operator stopping his machine for 3 or 4 minutes and neglecting to place a screen before the lens. This danger has now been removed by fireproof magazines placed above and below the lens. The film to be used is contained in the upper magazine and as it passes the lens is rewound in the lower one. The lamp box is also air-cooled.

The moving picture is deservedly



popular, not only for its entertaining qualities, but its instructive features as well. In many colleges and high schools it is considered one of the most valued aids in modern methods of education. It is not necessary to own a large number of films, as they can be rented to illustrate almost every subject. The cost of moving picture machine complete is also much less than generally supposed, and they are not at all difficult to operate.

INTERIOR OF A BATTLESHIP

The accompanying illustration shows all the parts of a battleship, the particular subject being the French boat "Republic." The parts are as follows:

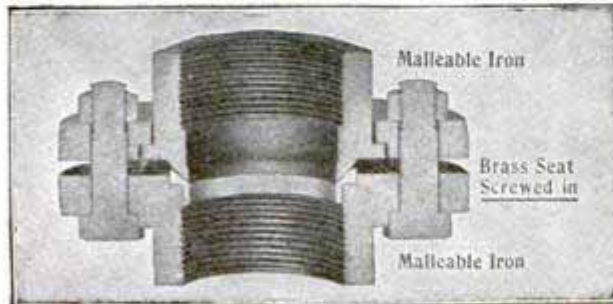
- 1, searchlight; 2, lookout for torpedo boats and submarines; 3, conning tower; 4, ventilator; 5, searchlight; 6, turret for two 12-in. guns; 7, lateral turret for two 10-in. guns; 8, lateral turret for two 8-in. guns; 9, lateral turret for two 10-in. guns; 10, turret for two 12-in. guns; 11, ship's records; 12, kitchen; 13, location of wireless receiving and transmitting apparatus; 14, steerage; 15, carriage storage; 16-17, 2-in. guns; 18, commandant's quarters; 19, chief's quarters; 20, torpedo carriage; 21, officers' promenade; 22, deck; 23, officers' cabin; 24, tube for torpedoes; 25, passage for access to cofferdams; 26, wells for chains; 27, magazine for 12-in. guns; 28, magazine for 10-in. guns; 29, officers' rooms; 30, magazine for 10-in. guns; 31, machines; 32, stoke-holds; 33, infirmary; 34, magazine for 12-in. guns; 35, reservoir for water; 36, reservoir for petroleum; 37, warehouse; 38, dynamos and auxiliary apparatus; 39, coal storage.

FIFTY SEARCHLIGHTS FOR NIAGARA FALLS

The most magnificent illumination in the world will be one of the permanent attractions at Niagara. Fifty monster searchlights throw colored lights upon the gorge, rapids and falls at night, several of the lights being capable of throwing a beam of white light 125 miles. In front of the big light projectors are mounted wheels, containing large gelatin disks, which are revolved slowly. With the changing of the color disks the beams of light will be variegated with kaleidoscopic effect, producing a color scheme on the mist and water excelled only by the great northern lights.

FLANGE UNION WITHOUT GASKET

These flange unions are made entirely of malleable iron except the brass seat, and that is made practically integral with the malleable part. No gas-



ket is required and the strength is such there is no danger of breaking the flanges in pulling the joints together.

AUTO RUNS 14,371 MILES WITHOUT STOP

The world's record for a non-stop motor car test has been made by an English 6-cylinder 50-hp. machine running between London and Aberdeen. The run totaled 14,371 miles.

ORNAMENTAL CEMENT WORK

The little posts for balustrade railing are made in plaster of paris forms. They are first turned out in wood, then sawed through diagonally and a plas-



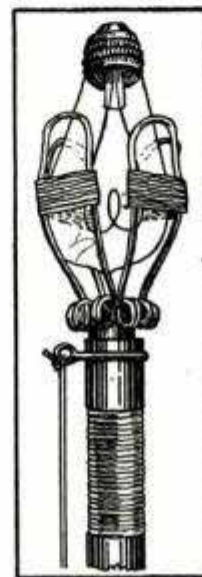
"Cast in Glue Molds"

ter cast made from each half. The mold, when dry, is painted with shellac varnish.

The castings on top were formed in glue molds. The glue is of about the consistency of printers' rollers, and when making a casting is contained in an outer casing of plaster of paris.

RENEWING ELECTRIC BULBS IN HIGH PLACES

A good deal of curiosity is occasioned when visitors to a very high room or auditorium wonder how it is possible to reach the incandescent lamps when they burn out. The usual explanation is the use of a high ladder, but in many cases several men would be required to move the ladder.



The explanation is the use of a long jointed pole, which can be extended to a great length. At the upper end of the pole is a holder, consisting of wire fingers, which open by pulling a string and close tightly around the bulb by means of springs, the moment the cord is released. When the bulb is thus gripped the lamp changer turns the pole and unscrews the lamp.

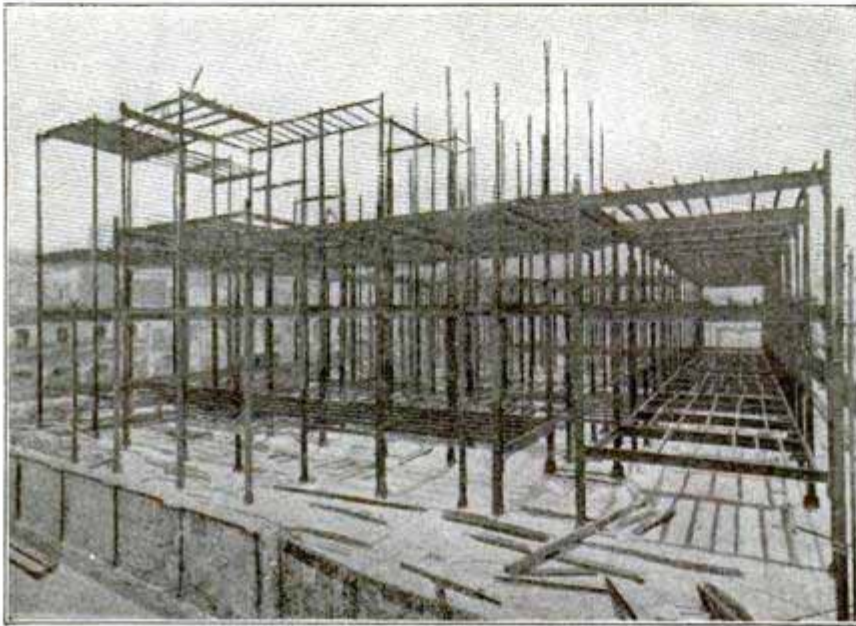
BRIDGING A CHASM IN A CAVE

The two crews of workmen driving the huge tunnel beneath Lookout Mountain have just met at a point one-quarter of a mile from the west entrance and 1,000 ft. directly under the Point Hotel, perched on the summit of the mountain.

The tunnel is unique in many ways. It is 3,400 ft. long and will be broad and high enough to accommodate four tracks. The progress of the digging has been rapid, equaling about an average of 800 ft. per month, the work all being done by double shifts, with two drill crews and two shovel outfits.

A serious obstacle was encountered.

A huge cavern starts at the Tennessee side of the mountain, intersects the tunnel and emerges in Alabama at a point 18 miles distant. Efforts were made to fill across this cave with the blasted rock taken from the tunnel, but only a slight impression was made and the attempt was abandoned. It has now been decided to throw a bridge across the chasm, which, if successfully accomplished, will be a feat entirely new and novel in bridge construction.



Steel Skeleton Mexico's National Theater

SOFT AND HARD COAL BRIQUETTE

A Pennsylvania inventor expects great results from a coal briquette he is making. Tests are said to indicate a success. He takes the at present waste coal dust from mines and dumps and mixes 60 parts soft coal with 15 parts hard coal and 25 parts binding mixture and other ingredients.

The briquette is said to burn for hours with a firm, strong heat and practically no smoke. Throughout the mining regions are small mountains of waste material, now worthless, which are suitable for use by this new process.

A committee of the peace conference at The Hague voted down the Belgian proposal that mercantile vessels seized by a belligerent be restored at the conclusion of a war.

RAILROAD INTO CANYON

The Grand canyon of the Colorado is a mile deep, and down its wall-like side a rock railway will be built. It will probably be the steepest railroad in the world and will save passengers an all-day and dangerous trip on horseback. Its construction will be along lines of other rock roads already in operation.

MEXICAN GOVERNMENT THEATER

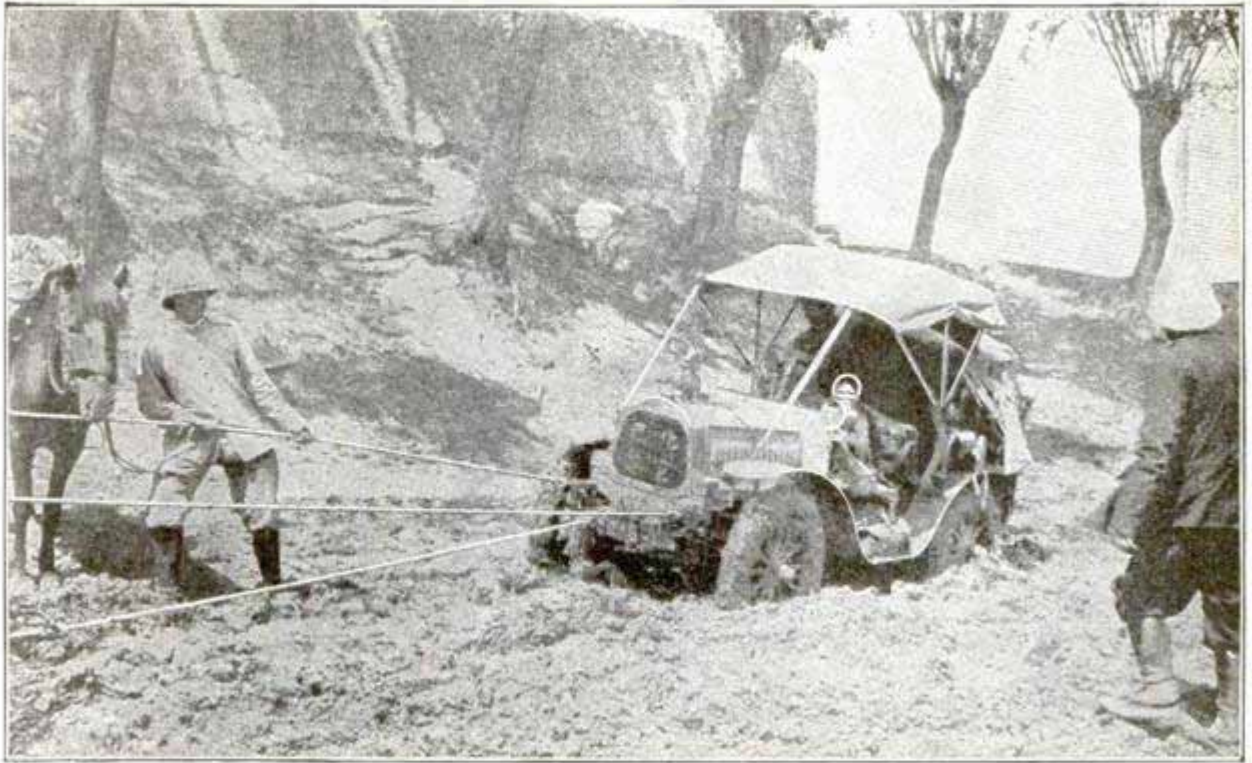
The Mexican government is erecting a new national theater building, which will cost when finished \$6,000,000. It is one of the few steel structural buildings to be erected in the City of Mexico. It is claimed that it will be the largest and finest theater in the world. More than 1,000 tons of steel were used in its foundation and more than 3,000 tons of steel will be required in the superstructure.

The building will be fireproof throughout. It will have the novel distinction of being the first building in Mexico to be equipped with heating and ventilating apparatus. The interior of the building will be elegantly finished and decorated. In addition to the theater the building will contain reception rooms, a dancing hall, a concert hall and a roof garden.

FULTON PLANNED SUBMARINES

The centennial anniversary on August 17th of Fulton's steamboat recalls the genius of this remarkable man in other ways. He planned and built a submarine for use in war and constructed and demonstrated a submarine torpedo in England on October 15, 1805.

With 180 lb. of powder and some clockwork which was timed to explode in 18 minutes he blew to fragments the "Dorothea," a 200-ton brig which had



In the great Peking to Paris motor car race great obstacles were encountered in passing over mountains but the most trouble was caused by the deep mud in Asia and Far Eastern Europe. The cars had frequently to be extricated by means of blocks and tackle. The illustration, which shows one of these trying experiences, is from the London Illustrated News.

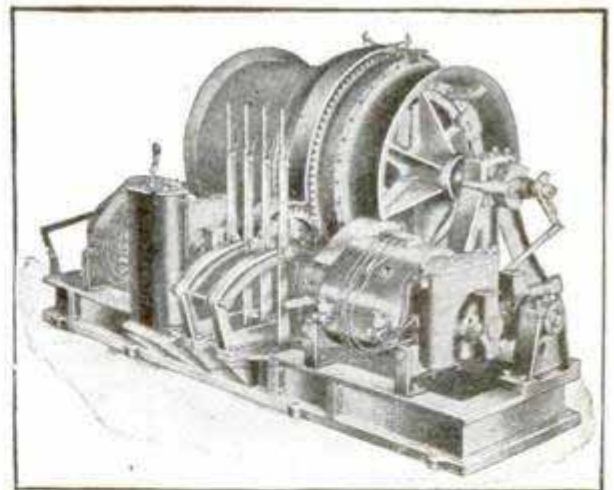
confidently been lent by Pitt for the experiment. The torpedo had to be towed under water by men in two small boats and drawn under the vessel with ropes, a maneuver contemplated only in the dark during hostilities. It is difficult to place bounds to what Fulton might have done could he have had the benefit of the scientific and mechanical facilities of today.

IMPROVED HOISTING MACHINES

The vast number of power plants scattered over the country, which facilitates the procuring of electricity, has almost revolutionized hoisting methods. Electrical hoists are being used more and more every day, because of their efficiency, durability and compactness. They are used extensively for the erection of buildings and general work about docks, warehouses, mines, quarries and coal yards.

These hoists are of the friction drum type and are controlled by a mechanical brake which acts directly upon the drum. This brake is operated by levers placed in a convenient position for the hoisting engineer. The power for the drum is furnished by a motor which is

started or stopped by the ordinary controller, so commonly seen upon the street cars. A 14-in. single drum hoist operated by an 18-hp. motor will



The Electric Hoist

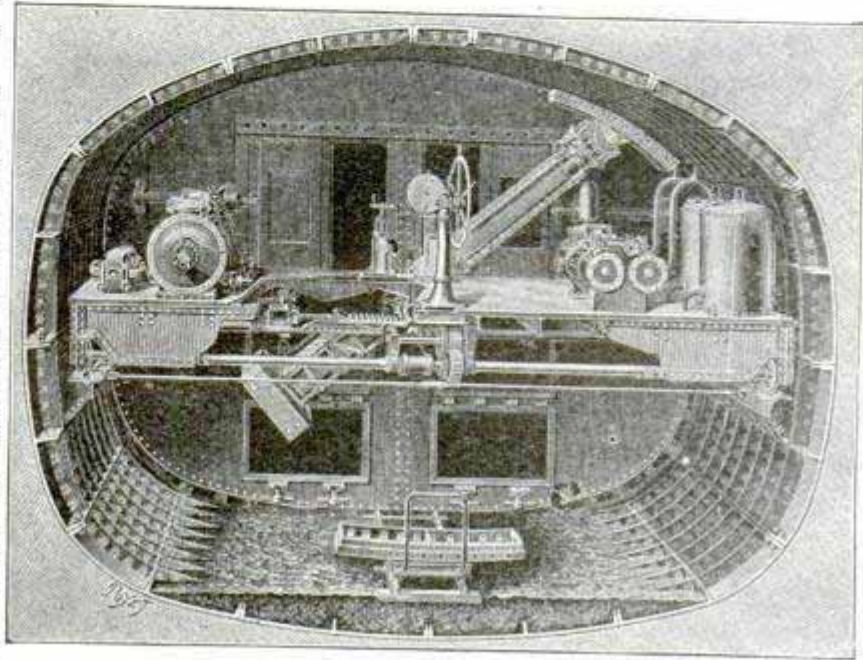
lift 2,500 lb. Freedom from sparks gives the electric hoist a great advantage over the portable steam hoist and boiler outfit.

The only locality in the United States where diamonds occur in place discovered to date is near Murfreesboro, Ark. Since August 1, 1906, 130 gems have been picked up, the largest weighing $6\frac{1}{2}$ carats—a fine white stone.

MACHINE THAT LINES A TUNNEL

An ingenious machine, the only one of the kind ever built, has been put in use to line the tunnel which the Metropolitan railway of Paris is constructing, under the river Seine.

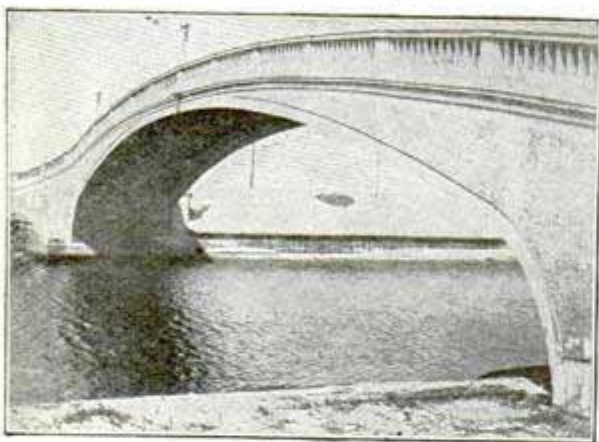
The tunnel is made of sections of cast iron bolted together, and had to be lined with concrete blocks quite large and heavy. To handle these blocks the machine illustrated was invented. It consists of a swinging arm moving quite like the dipper of a dredge, which swings down, seizes the block, and carries it with an upward and forward movement to its proper place. The workmen then secure the piece of lining with bolts. The machine is operated by hydraulic pressure and the entire outfit is carried on a temporary track fastened on each side of the tunnel.



Only One of the Kind Ever Built

GRACEFUL CONCRETE BRIDGE

This beautiful concrete bridge is an unusually fine instance of cement work.



Lends Charm to the View

The span is 80 ft. long. The bridge is near Venice, Cal.

To stop a leak in a hot water bag, apply a piece of adhesive plaster.

RECOVERING COPPER FROM RUINS

Recovery of valuables from the San Francisco ruins has led to many ingen-

ious undertakings. A ton a day of brass and copper particles is being recovered from the site where formerly stood a foundry. During the fire the metal melted and ran several feet into the ground. The process of recovery is described in the *Journal of Electricity* as follows:

"A well was sunk in the bottom of the basement, 8 ft. below the tide water level. Over this a 2½-in. centrifugal pump is installed, driven by a 2½-hp. motor. This pump discharges into a sluice 60 ft. long, with wooden riffles about 10 ft. apart. The debris from the foundation site is shoveled up and dumped into this sluice box, and the brass and copper caught in the riffles, while the lighter stuff is carried down and deposited at the foot of the sluice and hauled away. The water then runs through screens back to the mill and is used over and over again. This small plant, at an actual cost of but \$150, and operated at a cost of about \$15 per day, yields a quantity of brass and copper amounting to one ton per day, which is worth from 6 to 7 cents per pound."

LEARN HOW TO FLY

Although great advances have been made in the art of aerial navigation, the problem has not been attacked systematically enough. The first thing needed is a trained body of men who shall become familiar with everything already accomplished, and then devote their lives to the sole aim of building upon that foundation the airship which is to be perfectly safe and under control. For obtaining such a corps of experts there must be schools of instruction in the whole subject of aerostatics, supplemented by laboratories containing ample facilities for practice and experiment.

A beginning has been made in that direction. The United States Department of Commerce and Labor has obtained reports on the situation in Europe, which show that in France there is no real school of aerostatics, although the greatest progress in navigating the air has been made in that country. What has been accomplished there has been done chiefly in an experimental way by the army, whose object is war, and by nine ballooning clubs whose object is sport.

From Chemnitz, Saxony, comes news of the first attempt to establish a real school of aerial science, with regular courses of instruction extending over a year, ending with an examination and a certificate of proficiency. It opened May 1, 1907, under the direction of an aeronaut of twenty-six years' experience and 600 ascents. The outline given of the curriculum shows, however, that it deals with ballooning only, which is merely preliminary to the main problem. Perhaps we can establish the real thing over here.

The government-built ship "Connecticut" in her test trials proved herself better than her sister ship "Louisiana," built by the Newport News Company. The "Connecticut's" average speed was 18.73 knots for her five best runs, and the "Louisiana's," 18.59 knots.

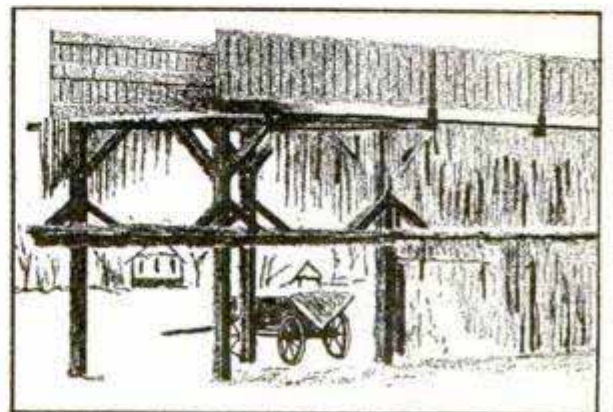


ITALIAN ARMY TRAINING

Special attention is given in the training of an Italian soldier to make him both agile and enduring. Living in a mountainous country and separated from other nations by mountains, climbing is one of the prime essentials. The illustration shows how the bicycle corps are taught to climb ropes and poles with their bicycles knocked down and hung from the shoulders.

MANUFACTURING ICICLES IN AUSTRIA

"Stick" ice is a commodity much in demand in upper Austria. Water is



Making "Stick" Ice

allowed to fall slowly over a series of poles, where, by the natural process, it freezes in the form of gigantic icicles. These icicles are broken off as fast as they are frozen and carted away to storage quarters.

BIG CHURCH OF CEMENT BLOCKS

The finest church structure in the country built entirely of concrete, is the First Methodist church, recently completed at Decatur, Ill.

The building is 250 ft. long, 105 ft. wide and 120 ft. to the top of the dome. It is built of cement blocks.

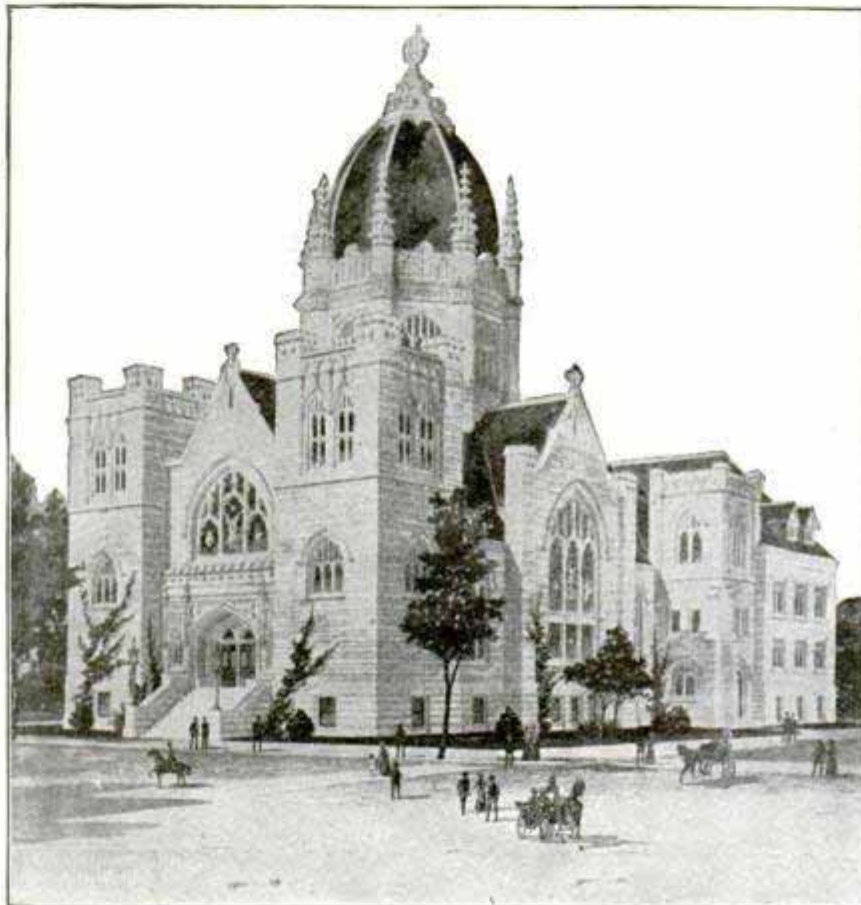
A road for automobiles leading from the main volcano road, down 500 ft. into the crater of Kilauea, is a novelty planned for the island of Hawaii by its acting governor. At the bottom of the pit the road will cross a cooled lava bed two or three miles in expanse and lead to the edge of Halemaumau, the pit where subterranean fires constantly burn. Convict labor will be requisitioned for the construction of the road.

TWO NEW BATTLESHIPS TO OUT-CLASS "DREADNOUGHT"

It is reported that the British naval authorities are about to begin the construction of a huge battleship which will surpass the formidable "Dreadnought" in tonnage by at least 50 per cent. The policy of secrecy which was in vogue when the latter was constructed will be maintained during the construction of the new vessel. By following this course the admiralty keeps British naval construction at least two

years ahead of that of the other powers, which is an important item when it is considered that a warship often becomes obsolete in five years' time.

It is understood that the new vessel will be of 30,000 tons displacement, against the 20,000 of the "Dreadnought." An innovation will be the

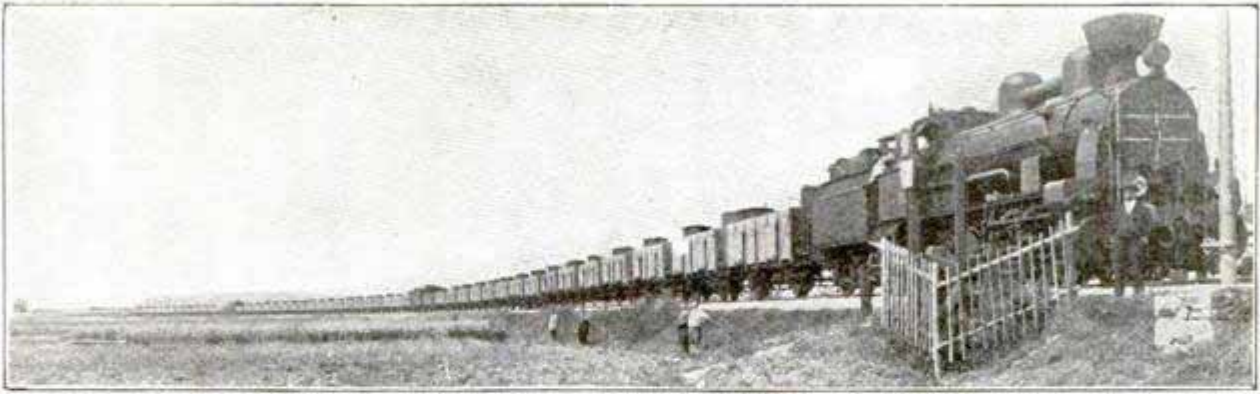


Handsome Edifice of Cement Blocks

placing of three 12-in. guns in the turrets, where formerly only two were situated. As there are six turrets this will give a main battery of at least eighteen 12-in. guns, which will be capable of firing a terrific broadside.

Some U. S. naval engineers are advocating the building by this government of an even larger vessel of 40,000 tons displacement. Such a warship would cost \$20,000,000, but it is believed that this cost would be offset by the predominance it would give the United States.

Blocks of concrete made with very fine stone can be planed, sawed or turned with machines, just as the softer quarried stones are handled, producing almost perfect stone imitations.



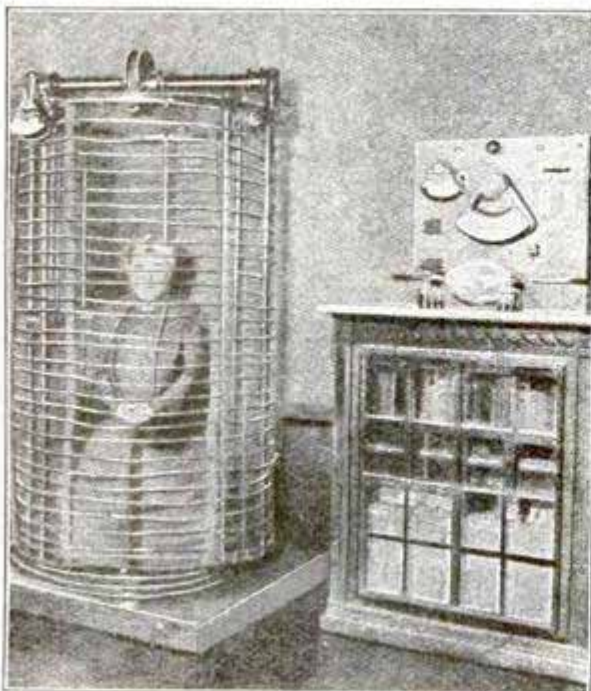
Train of "Goods Wagons" Austrian State Railways

BIG BLAST MOVES 500,000 TONS

The biggest blast ever let off in Europe was recently exploded at the marble quarries at Carrara, Sicily. Preparations had been made for weeks, including the filling of a chamber 12 ft. wide and 38 ft. long with high explosives. The event was witnessed by a multitude, and 500,000 tons of rock were loosened.

ELECTRIC CAGE FOR PATIENTS

Two noted French physicians have found that high-frequency electrical currents produce beneficial results in treating hardening of the arteries. Three treatments are claimed to effect a cure. The patient sits within a cir-

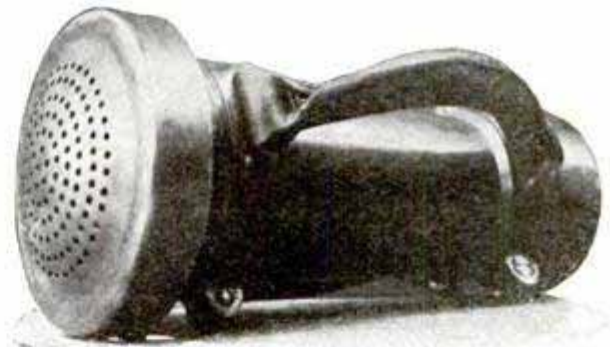


The Doctor's Prisoner in a Cage

cular cage built of bars and wires through which the electrical current passes.

RAIN NOZZLES TO FIGHT FIRE

On the principle of a mammoth sprinkler, the recent invention of a nozzle for fire department use may result in some radical changes in fire



The Umbrella Nozzle

fighting. Its action is that of a cloud burst, spreading the water in the shape of a mammoth umbrella, 50 to 100 ft. in diameter and 100 ft. in advance. The individual streams as they leave the nozzle are about the size of a slate pencil. It is said the same amount of water used in this manner will extinguish a larger fire area than the large, solid and often destructive streams now thrown by the big nozzles in use. A not heavy rain, if continued for any length of time, will put out a large forest fire.

One of the best features of the rain nozzle is that the curtain of water it makes protects the pipemen from the heat and enables them to approach much nearer than is possible otherwise.

DIRECT DRIVEN DIRT LOADER

It is said that the loader shown in the illustration is the only one in the world having a steam engine mounted on a rear platform and operating the apron. Ordinarily the two large rear

8 in. When the window is closed it lies flat. The top has numerous small holes with fine wire mesh to keep out the dust, and pieces, A B, at each end, also exclude dust. When not in use, or to raise the window to full height, the ventilator can be unhooked and laid on a



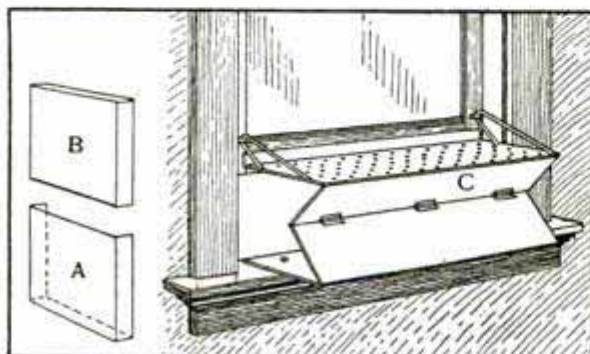
The Apron Operated by Its Own Engine

wheels operate the loading mechanism by means of a chain drive or train of gears.

These loaders are very numerous on the Pacific Coast. Twenty-four horses are required to move them, while a dozen wagons follow closely under the apron. Each wagon holds $1\frac{1}{2}$ yd. and is filled in less than 30 seconds.

A COLLAPSIBLE WINDOW VENTILATOR

A new fresh-air device for homes and offices is the collapsible ventilator. It is fastened by hooks to the inside of the window at the bottom of the sash. As the window is raised the ventilator, C, opens like an accordion to the limit of



Air without Dust or Draft

shelf or in a drawer. It is designed to furnish abundance of air without any breeze.

LAUNCHING BATTLESHIPS EXPENSIVE

It costs about \$15,000 simply to launch an English battleship, some of the items being: Grandstand for invited guests, \$1,000; hire of eight tugs to hold the ship after launching, \$1,000; four huge wood and steel cradles, \$10,000; tallow, oil and soap to grease the ways, \$500; souvenir invitations, \$500; present for the lady who launches the vessel, \$500, and the banquet which follows uses up the balance.

The launching is accomplished by cutting a cord which releases four iron weights, and these, falling quite a distance, knock out the "dog shores" which hold the cradles. The critical instant is when the vessel is almost water-borne with the fore end still on land. The friction from the weight is so great that the false keel is sometimes fused, even under water. Eight chains, weighing about 600 tons, hang from the sides of the ship and drag along the ground to retard the ship.

Farmer's Boy Builds a Telescope and Discovers a Comet

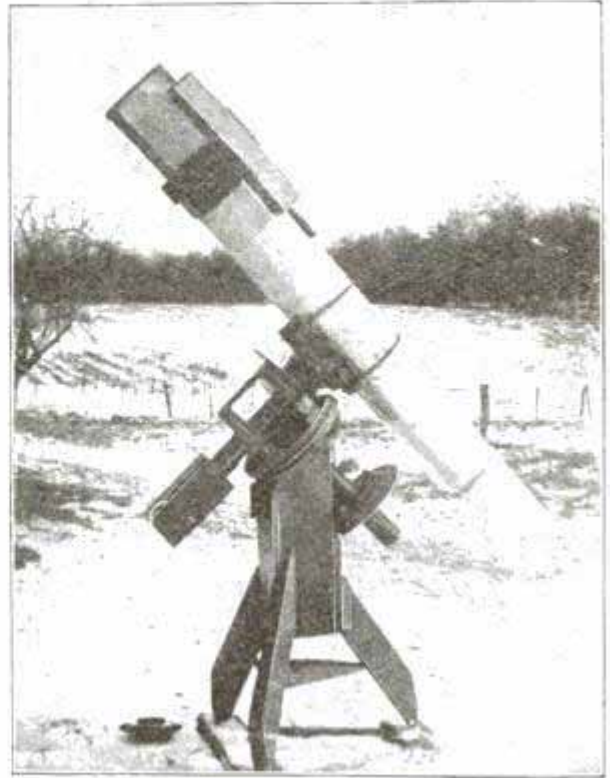
[A young farmer boy living near Cottage Grove, Wis., with his own hands and such tools as are usually found on a farm, built a telescope, and with it recently discovered a comet which had escaped the watchful eyes of the big observatories. He describes how he made the instrument.—Editor.]

First, get two pieces of plate glass, 6 in. square and 1 in. thick, and break the corners off to make them round, grinding the rough edges on a grindstone. Use a barrel to work on, and fasten one glass on the top of it in the center by driving three small nails at the sides to hold it in place. Fasten, with pitch, a round 4-in. block of wood in the center on one side of the other glass to serve as a handle.

Use wet grain emery for coarse grinding. Take a pinch and spread it evenly on the glass which is on the barrel, then take the glass with the handle and move it back and forth across the lower glass, while walking around the barrel; also rotate the glass, which is necessary to make it grind evenly. The upper glass or speculum always becomes concave, and the under glass or tool works convex.

Work with straight strokes 5 or 6 in. in length; after working 5 hours hold the speculum in the sunshine and throw the rays of the sun onto a paper; where the rays come to a point gives the focal length. If the glass is not ground enough to bring the rays to a point within 5 ft. the coarse grinding must be continued, unless a longer focal length is wanted.

Have ready six large dishes, then take 2 lb. flour emery and mix in 12 qt. of water; immediately turn the water into a clean dish and let settle 30 seconds; then turn it into another dish and let settle 2 minutes, then 8 minutes, 30 minutes and 90 minutes, being careful not to turn off the coarser emery which has settled. When dry, turn the emery from the 5 jars into 5 separate bottles and label. Then take a little of the coarsest powder, wetting it to the consistency of cream, and spread on the glass, work as before (using short straight strokes $1\frac{1}{2}$



The Telescope

or 2 in.) until the holes in the glass left by the grain emery are ground out; next use the finer grades until the pits left by each coarser grade are ground out. When the two last grades are used shorten the strokes to less than 2 in. When done the glass should be semi-transparent, and is ready for polishing.

When polishing the speculum, paste a strip of paper $1\frac{1}{2}$ in. wide around the convex glass or tool, melt 1 lb. of pitch and turn on to it and press with the wet speculum. Mould the pitch while hot into squares of 1 in., with $\frac{1}{4}$ -in. spaces, as in Fig. 1. Then warm and press again with the speculum, being careful to have all the squares touch the speculum, or it will not polish evenly. Trim the paper from the edge with a sharp knife, and paint the squares separately with jeweler's rouge, wet till soft like paint. Use a binger to spread it on with. Work the speculum over the tool the same as when grinding, using straight strokes 2 in. or less.

When the glass is polished enough to reflect some light, it should be tested with the knife edge test. In a dark room, set the speculum against the

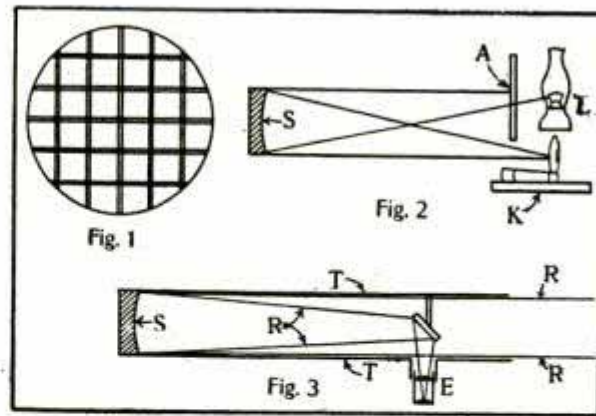
wall, and a large lamp, L, Fig. 2, twice the focal length away. Place a large sheet of pasteboard, A, Fig. 2, with a small needle hole opposite the blaze, by the side of the lamp, so the light from the blaze will shine onto the glass. Place the speculum, S, Fig. 2, so the rays from the needle hole will be thrown to the left side of the lamp (facing the speculum), with the knife mounted in a block of wood and edge-ways to the lamp, as in K, Fig. 2. The knife should not be more than 6 in. from the lamp. Now move the knife across the rays from left to right, and look at the speculum with the eye on the right side of the blade. When the focus is found, if the speculum is ground and polished evenly it will darken evenly over the surface as the knife shuts off the light from the needle hole. If not, the speculum will show some dark rings, or hills. If the glass seems to have a deep hollow in the center, shorter strokes should be used in polishing; if a hill in the center, longer strokes. The polishing and testing done, the speculum is ready to be silvered. Two glass or earthenware dishes, large enough to hold the speculum and 2 in. deep, must be procured. With pitch, cement a strip of board 8 in. long to the back of the speculum, and lay the speculum face down in one of the dishes; fill the dish with distilled water, and clean the face of the speculum with nitric acid, until the water will stick to it in an unbroken film.

The recipe for silvering the speculum is:

Solution A:	
Distilled water.....	4 oz.
Silver nitrate.....	100 gr.
Solution B:	
Distilled water.....	4 oz.
Caustic stick potash (pure by alcohol).....	100 gr.
Solution C:	
Aqua ammonia.	
Solution D:	
Sugar loaf.....	840 gr.
Nitric acid.....	39 gr.
Alcohol (pure).....	25 dr.

Mix solution D and make up to 25 oz. fluid with distilled water, pour into a bottle and keep for future use, as it works better when old.

Now take solution A and set aside in a small bottle one-tenth of it, and



Details of Telescope Construction

pour the rest into the empty dish; add the ammonia solution drop by drop; a dark brown precipitate will form and subside; stop adding ammonia solution as soon as the bath clears. Then add solution B, then ammonia until bath is clear. Now add enough of the solution A, that was set aside, to bring the bath to a warm saffron color without destroying its transparency. Then add 1 oz. of solution D and stir until bath grows dark. Place the speculum face down in the bath and leave until the silver rises, then raise the speculum and rinse with distilled water. The small flat mirror may be silvered the same way. When dry, the silver film may be polished with a piece of chamois skin, touched with rouge, polishing with a light spiral stroke.

Fig. 3 shows the position of the glasses in the tube, also how the rays, R, from a star are thrown to the eye-piece, E, in the side of the tube. Make the tube, I, of sheet iron, cover with paper and cloth, then paint to make a non-conductor of heat or cold. Make the mounting of good seasoned lumber.

Thus an excellent 6-in. telescope can be made at home, with an outlay of only a few dollars. My telescope is 64 in. long and cost me just \$15, but I used all my spare time in one winter in making it. I first began studying the heavens through a spy glass, but an instrument such as I desired would cost \$200—more than I could afford. Then I made the one described, with which I discovered a new comet not before observed by astronomers.—John E. Mellish.

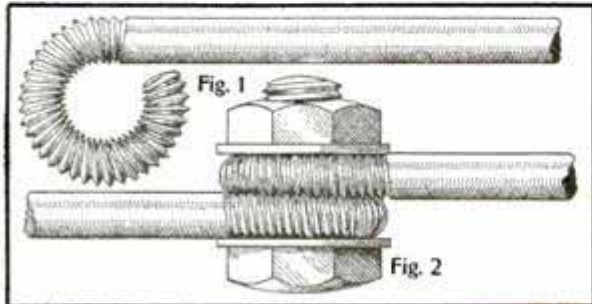


SHOP NOTES



A Hinge Joint That Will not Slip

To make a hinge joint that will not slip, yet must be adjustable, use round stock and cut threads on one end of

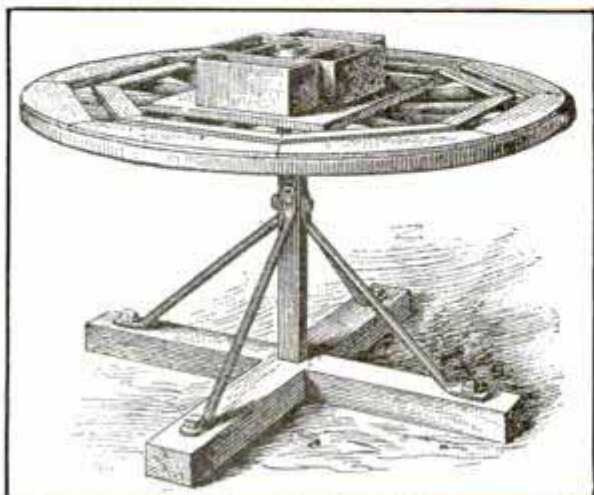


Adjustable Hinge Joint

each of two pieces. Bend an eye in the end, as shown in Fig. 1, where the threads have been cut. Clamp the two ends thus bent together with a bolt, as shown in Fig. 2.

A Blacksmith's Tool Table

A very handy revolving tool table can be made by using an old buggy wheel fixed on a pedestal as shown in the illustration. Nail two $\frac{1}{2}$ by 2-in. pieces parallel, which are cut mitering to fit between three spokes, leaving a space for hammers, hot and cold cutter, top and bottom swages, etc. Around the hub nail four small, wooden boxes



The Revolving Table

for your punches and chisels, says the Blacksmith and Wheelwright. The spokes provide a fine place for tongs. Your tools are all in sight, and when you can't reach what you want catch the rim and turn it to you.

Home-Made Water Cooler

A cheap and serviceable cooler for shop use can be made in the following way: Take a nail

keg and a pickle jar, the jar being about three-fourths the size of the keg, and pack a layer of old newspapers in the bottom of the keg. Set the jar in the keg and fill up the space between

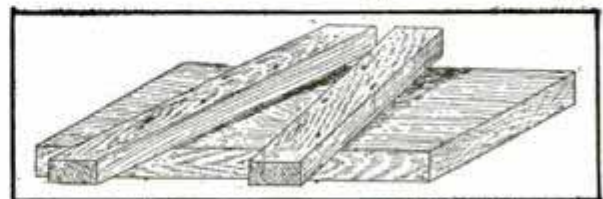


with old newspapers, packed tightly with a stick. Make a heavy wooden cover for the top and you have a first-class cooler that will save ice.—Contributed by J. H. Hecker, New Orleans, La.

Door Holder for Carpenters

The accompanying sketch shows the construction of a door holder that I use while fitting them.

When I want to hang a door I get



It is Quickly Made

a piece of board (any scrap will do) about 10 by 24 in., and two pieces of 2 by 4 about a foot long, and nail them across the board, using eight-penny or

ten-penny common nails, and have the nails go through the board so that the points of the nails will catch the floor when the door holder is laid flat on the floor, says a correspondent in *Wood-Workers' Review*.

This sort of door holder can be made in a very few minutes, and the material can be found in any scrap pile; can be moved around the room with ease, and will stick to the floor wherever it is placed. By placing a little strip of board or block under the other end of the door, keeps it off the floor out of the sand and dirt.

An Alarm for a Break in Line Wire Circuit

Use an ordinary magnet, M, from an electric door bell in series with an 8-cp. lamp, L, as is shown in cut. The magnet will hold the small lever, A, while the lamp is lit. When the current is broken by opening the switch at the

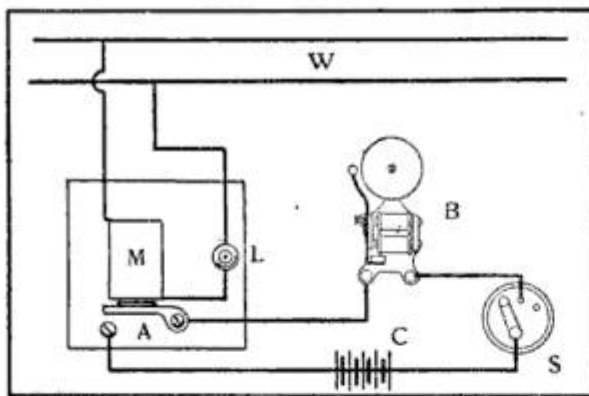


Diagram of Wiring

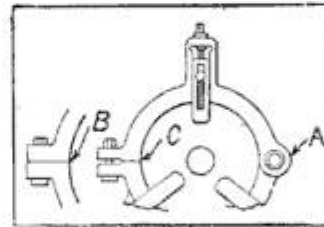
plant, or from any other cause, the lever, A, is released, making contact with the line in which an ordinary door bell, B, is in the circuit, ringing bell until circuit is restored on power line or switch is opened in bell circuit.—Contributed by B. C. Thomas, Valparaiso, Ind.

Black Mortar for Concrete Blocks

To obtain black concrete mortar add 2 lb. excelsior carbon black to the mixture, for every 100 lb. of cement used. To make it dark gray, add only $\frac{1}{2}$ lb. black to each 100 lb. of cement.

Method for Reducing Play in Steady Rest Hinge

The steady rest as at B, you will notice, is machined straight across, while the bolt at A is usually a loose fit, says the *American Machinist*.

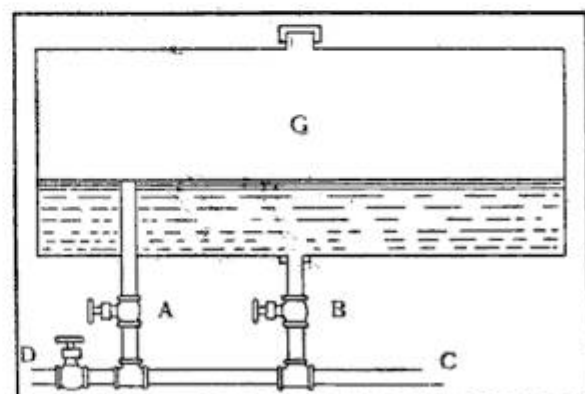


Therefore, to take up the lost motion it requires the upper jaw to be screwed down very tight; whereas, if it should be cast or cut away in the manner illustrated at C, the mere act of tightening the bolt in C would take up the lost motion at bolt A. Thus the upper jaw need only be tight enough to hold the work in place.

A Gasoline Reserve Supply

It is well to have some simple means of fitting a reserve tank in an automobile so that an emergency supply of gasoline can always be carried. The accompanying sketch shows how a reserve can be kept in the same supply tank.

There are two connections or supply outlets from the tank, one of which reaches up 3 in. above the bottom of the tank, while the other is level with it; the latter constitutes the draw-off for the reserve supply while the former is the regular supply outlet. The valve A is allowed to remain open at all times, while that in the emergency pipe is kept closed. By turning the valve B, a 6-gal. reserve supply is tapped, which is usually sufficient to reach a



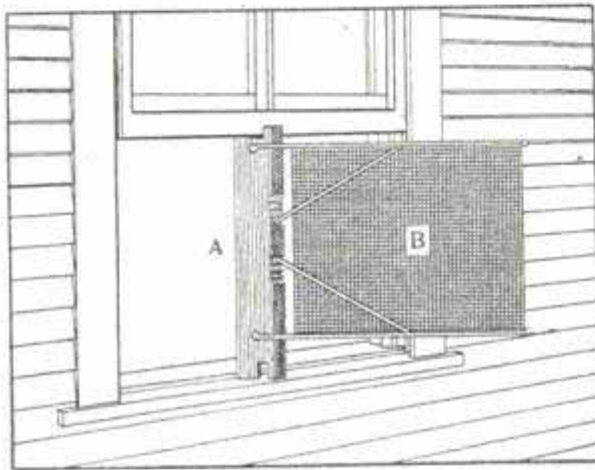
Valve B Taps Reserve Supply

supply station, says Automobile. The pipe C is connected to the carburetter, while D is used for a drain.

A Device for Turning Breeze Through a Window

The accompanying sketch shows how an arrangement can be made that will be appreciated by those who have to work in a room where the windows are all on one side and where the breeze at times passes the windows instead of coming into the room.

The post A is a piece of wood 1 by 3 in. and is cut as long as the distance that the sash can be raised. A notch



Turns Breeze into Window

is cut in both ends to fit the bottom of the sash. These notches are cut opposite each other in order to give different angles to the wing.

The wing, B, is a piece of close woven cloth fastened to a rib of an old umbrella at each end. Notches are cut in the edge of wood, A, as is shown, to adjust the short part of the rib, which will stretch the cloth. When not in use it can be folded and laid aside.

How to Color Old Window Shades

Mix a sufficient quantity of wall paint, which may be of any color desired, and after placing the shade on a flat surface paint two coats with a brush, putting it on with strokes cross-wise. When dry the shade will be like new.

A Paint Brush Keeper

After using a paint brush it should be cleaned and placed in water so it will be ready the next time when needed. A correspondent in

The American Blacksmith says: We took a common ordinary candy pail, which we secured from the grocer,



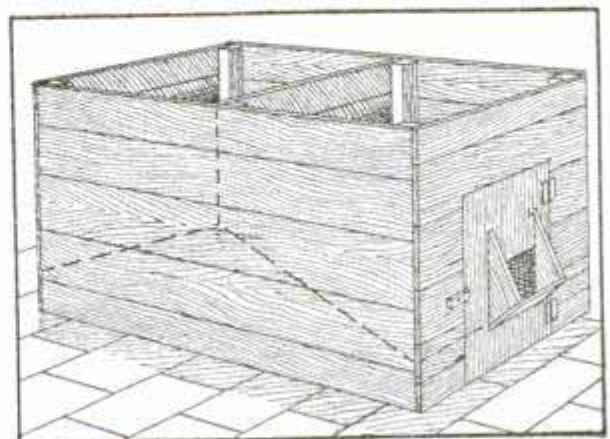
and painted it inside and out with two coats of paint. We then put a row of hooks on the inside of the pail about 2 or 3 in. from the top. When through using a brush we simply hang it in the pail into which a sufficient quantity of water has been poured to just cover the bristles.

It is well to say that to place a brush in water before it has been touched by paint is to ruin it. The water will make it soggy and practically unfit for painting use.

A Handy Coal Bin

Where small quantities of coal are purchased at a time the usual way is to put it in a corner of the basement, a stall in the barn, or on the ground. A good plan is to make a bin constructed as shown in the illustration.

The dotted lines show how the bottom of the bins are made sloping toward the doors. One bin may be used for hard coal and the other for

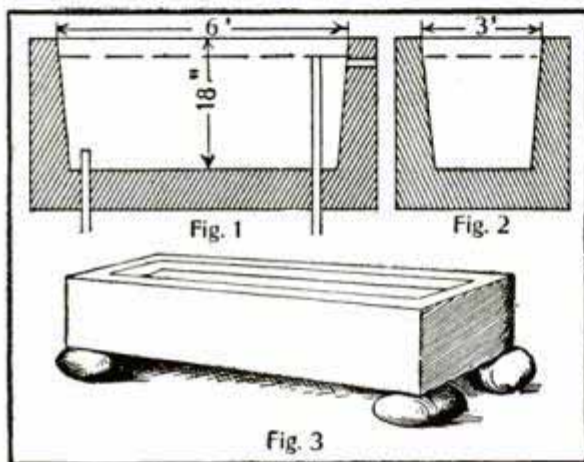


Combination Coal Bin

soft coal, while the space beneath the bottoms of the bins will make a place for wood or kindling and a door can be provided for it. A spout of suitable size is made on each coal bin door, which prevents the coal from dropping on the floor and still have a supply in the spout.—A. H. Osterman, Sandusky, Ohio.

A Cement Watering Tank

For a number of years we had to go to the well and pump water by hand, and drive the stock there through the storm and mud, but now we have a



Cement Watering Trough

cement trough built near the barn which is kept full of water by a windmill, says a correspondent in Hoard's Dairyman.

It took two of us one day to make the form and build the trough complete with pipe connections. It required $\frac{1}{2}$ ton of Portland cement, $\frac{1}{2}$ load of

gravel and $\frac{2}{3}$ load of sand. The entire cost of the trough, not counting work, was \$5.55.

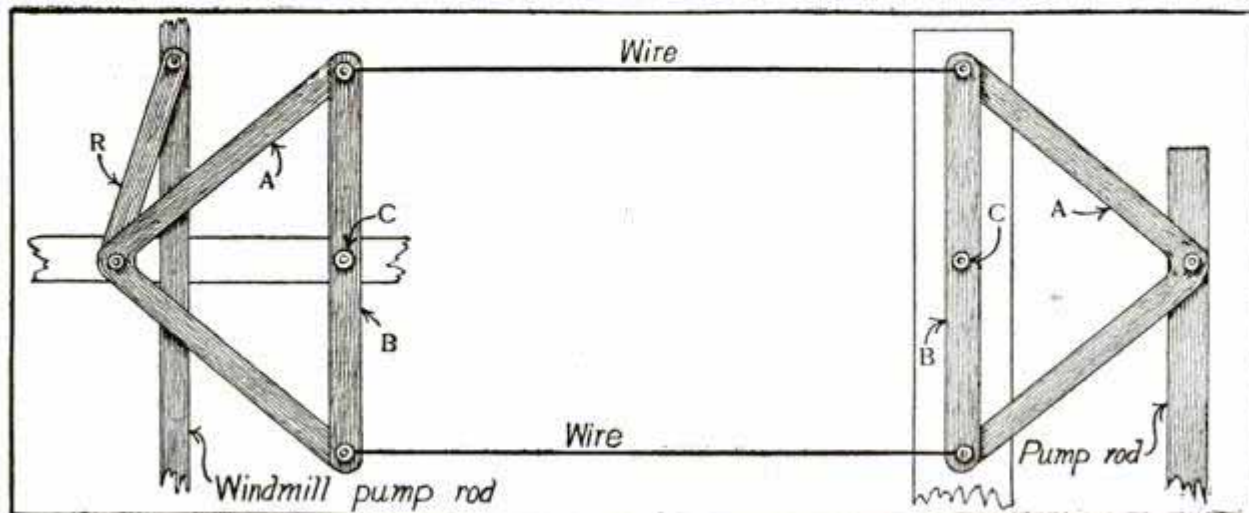
Figs. 1 and 2 show the trough in section, which is 6 ft. long, 3 ft. wide and 18 in. deep, inside measurements. The top edge of the cement should be 4 in., while the bottom is 10 in. thick. The intake pipe, A, Fig. 1, does not project in the tank more than 3 in., while the overflow pipe, B, comes within $\frac{1}{2}$ in. of the top.

How to Bore a Conical Hole

When you have a conical hole to bore, such as for a handle hole in a wooden maul or other similar places, leave the cutter of an expansive auger bit a trifle loose and begin boring at the side where the smallest end of the hole is wanted. The inner edge of the cutter lip being angular, the cutter will gradually draw itself out from the body of the bit, making the hole larger as the bit goes into the wood.

How to Make a Windmill Quadrant

When it is necessary to pump water at a distance from the windmill a quadrant may be used, constructed as shown in the sketch. Out of a piece of wagon tire iron form the angle piece, A, and with another piece of iron, B, connect the ends of A. These should be securely fastened with bolts.

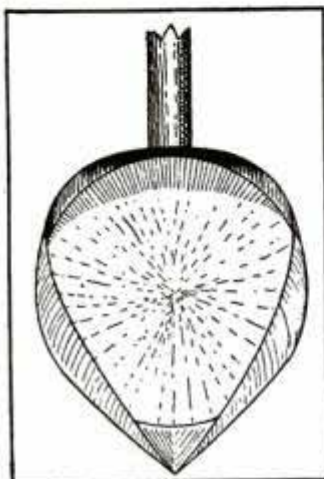


Quadrant for Working Pump at a Distance

Drill holes at the centers, C, and bolt onto a cross timber or to a post. Connect one to the windmill rod with a connecting piece, R, also made of a piece of the same iron. The other may be connected to pump rod as shown.

How to Make a Ladle for Melting Lead

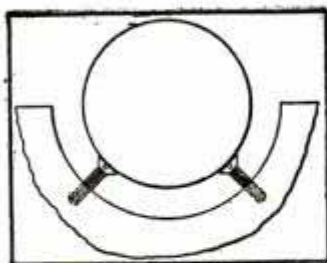
The illustration shows how a baking-powder can cover can be used for melting lead when no ladle or iron spoon is available. Bend the edges of the cover inward, as shown, until the proper point is secured. This will make the opposite side flat. Make a handle of hardwood, or some wood which



will not burn easily, and drive two small nails through the flat side into one end of the handle. This makes a very durable ladle.—Contributed by Stephen B. Mastick, Lake Bay, Wash.

Support for Shaft when Babbitting

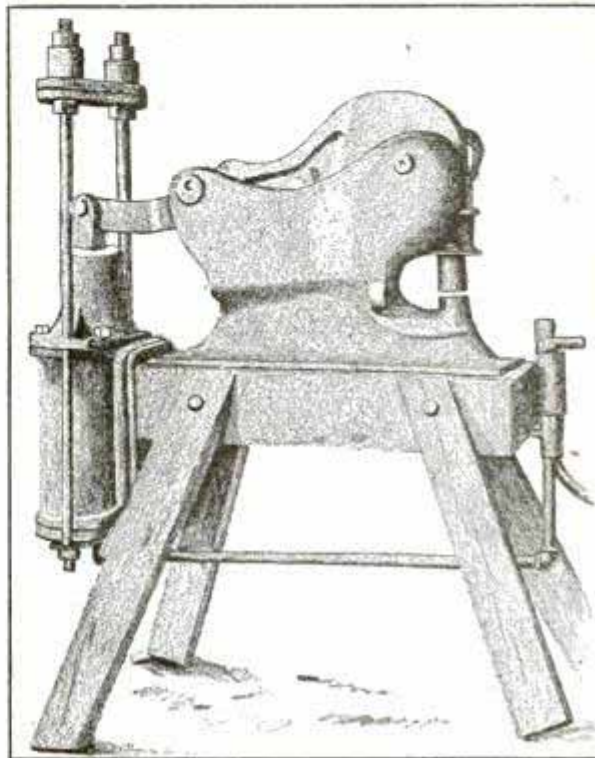
To babbitt boxes for shafts drill two holes about 90° apart and about $\frac{1}{4}$ in. from the outside end of the boxes. Tap these holes for countersunk head screws. When the shaft rests on the heads of these



screws it can be lined up by turning the screws. After the babbitt is poured, the screws can be removed, says Machinery. The convenience of this method is that after lining up shaft it can be taken out, warmed up and replaced before pouring the babbitt with the assurance that it will be in line.

Iron Punching Machine

The accompanying illustration shows how an old hand punch was converted into an air operated machine by means of a 7-in. brake cylinder. The power is controlled by a straight air engineers'



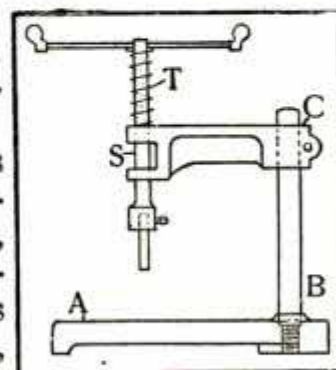
Home-Made Power Punch

valve placed in a convenient position for the operator. This machine, says Street Railway Journal, was formerly operated by a man and a boy. The man now attends to it alone.

A Hand Tapping Device

A simple device which I have found to be a very efficient fixture for the tool room was built as shown in the sketch, says a correspondent in American Machinist. This design can be made in various sizes.

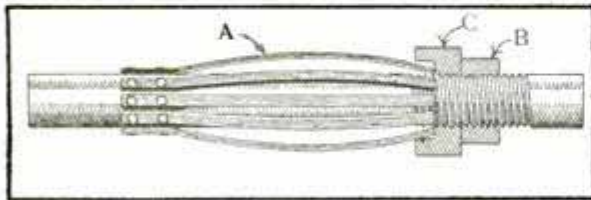
The base, A, is of cast iron, having the upright, B, firmly fastened to it as shown. The arm, C, is clamped to the upright, but can be adjusted if special length of tap or height of work



necessitates. The spindle, S, is a free fit in the arm, C, and the spring, T, is simply stiff enough to carry the weight of the spindle with ordinary chuck and tap.

How to Wind Irregular Shaped Springs

Some time ago the question, "How to wind springs shaped like those on



Making Irregular Springs

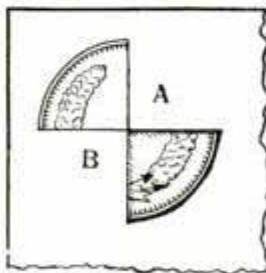
stove lifter handles, stove doors, etc.?" was asked. I have made a tool as shown in the illustration and used it in my lathe with good results.

Each piece A is made of spring steel and riveted to a shaft with two rivets on one end, while the other end fits into an individual notch in the collar, C. This collar is kept from turning on the shaft by a key. Turning nut B up against the collar pushes on the ends of the springs, causing them to bulge outward in the middle. When the proper size is secured on these springs one end of the wire is fastened to it and the coil is wound.

When through winding loosen the nut and slip the finished coil over the opposite end of the shaft from the collar.—C. T. A.

How to Enclose Coin in a Letter

Cut through the writing paper with a knife a cross, making the cuts no longer than the diameter of the coin to be enclosed. This will make four points of paper, two of which, A and B, are raised up, and the coin inserted, as is shown in the sketch, and the other two points remain back of the coin, holding it firmly in place.



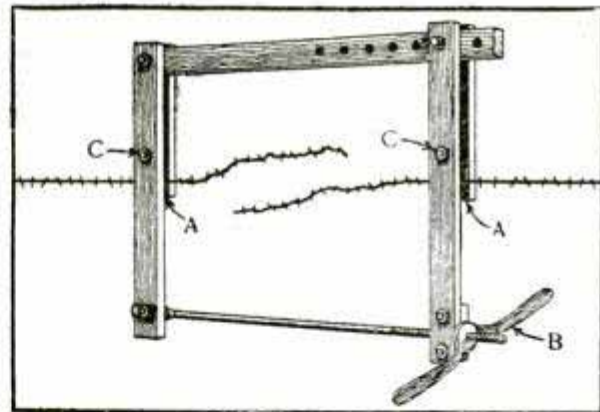
shown in the sketch, and the other two points remain back of the coin, holding it firmly in place.

Painting an Old Brick Wall

The first thing to do is to get every particle of loose stuff from the walls, which may be done with a coarse fibre brush; then dust off clean. If you have a lot of old paint and enough to do the job, thin it down with oil and a little benzine, strain, and apply quite thin to the wall, says Master Painter. Brush this well into the surface, and let it have several days to become hard. The next coat should be a lead paint, of fresh materials, with raw oil and just enough driers to dry it well in reasonable time. A little turps also will be an advantage. This will now give you a good foundation for whatever color of paint you may want to apply.

A Wire Fence Splicing Tool

Where a wire on a fence breaks after it has been securely fastened at the



Splicing a Break

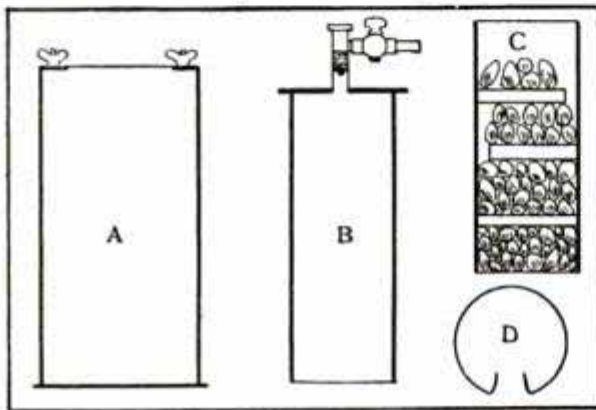
end or corner post, it causes a great deal of work if one end must be loosened and the wire spliced and then stretched again and fastened to the posts. A tool for pulling the ends together and holding the wire tight while it is being spliced can be made as shown in the sketch.

The frame may be made of iron or wood, which depends on the tools at hand. If made of wood then iron plates must be placed at A, where the wires are held in the clamp. The hand burr, B, is then turned to the end of the rod and the loose ends of the wires are inserted in the clamps, which are

Place an oil stone on the table and hold the fork so the needle will rest lightly on it. Take the air brush in the other hand and blow at the top of the wheel, J, to make it spin.—Contributed by E. Stanton King, Minneapolis, Minn.

A Home-Made Generator

An acetylene generator for use in an automobile may be constructed as shown in the sketch at small expense. It can be made by a good tinsmith from galvanized iron. The tank A is 5 in. square and 10 in. high, the top has a circular hole $3\frac{3}{4}$ in. in diameter. The



Plan of Generator

bell B, which contains the carbide holder, is open at the bottom, is $3\frac{1}{2}$ in. in diameter and about $9\frac{1}{2}$ in. high. A tube, fixed in the top with stop cock, takes the gas to the burner; solder a wire across this tube, placing a wad of absorbent cotton above it to prevent any water passing to the burner, says The Motor Way.

The carbide is placed in a tin cylinder C, 3 in. in diameter and 7 in. high. Pierce three or four holes in the bottom of the tin to let the water in; place the carbide in as shown with discs of wood in between to prevent all the carbide getting wet at once. Fix carbide holder C in the bell B by spring D made of a strip of brass bent into a circle; by pinching the end with the fingers, it is inserted in the bell. A reserve carbide holder can be kept ready charged in the car for use when needed.

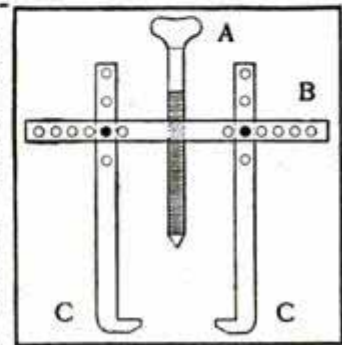
The bell B is attached in tank by two screws and thumb nuts at opposite

corners of tank A, which will leave an open joint allowing any superfluous gas to escape. Fill the tank half full with water; as gas is generated, it forces the water out of the bell holding the carbide and gradually works up as the carbide is used.

A Handy Clamp for Die-Makers

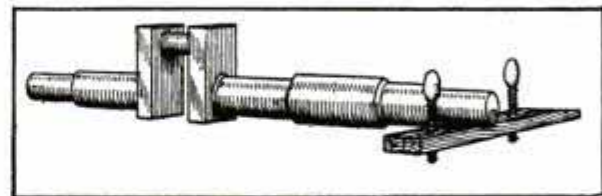
For holding work of different sizes and diameters a correspondent in the

American Machinist constructed a clamp which could be adjusted to the work in a few minutes' time. Referring to the sketch, the clamp screw, A, passes through a threaded hole in the metal, B. The jaws, C C, have holes in their upper ends, as well as the ends of the metal, B, for adjustment. Two pins or bolts fitting these holes complete the device.



A Surface Plate Jack

In laying out keyways at different angles on a large shaft, about 7 ft. long, which weighed several hundred pounds, I did not have a suitable jack to use in lifting the out-bearing end on the sur-



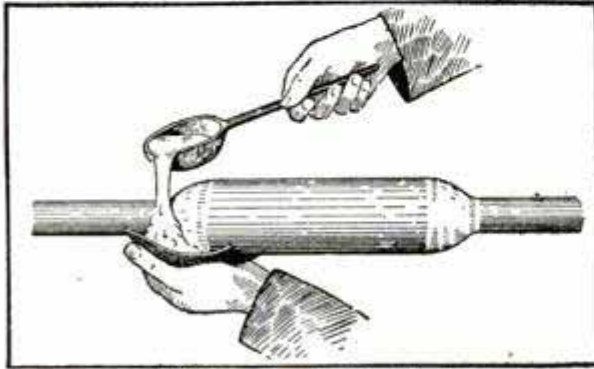
A Handy Jack

face plate. I used for this purpose an ordinary carpenter's wood clamp, removing one jaw and placing both screws in the other, which made a quick way to center up and a very sensitive adjustment.—Contributed by F. V. T., Lansing, Mich.

If a round brush spreads too much, slip a rubber band over the upper part of the bristles.

How to Make a Wiped Joint in Cable Splicing

When the cables are in position and ready for splicing, the ends should be marked at the point to which the lead is to be removed and scored or cut entirely around. This may be accom-



Wiping the Cable Joint

plished by a plumber's chipping knife and hammer, marking the lead, but being careful not to cut entirely through to the insulation, which might thus be damaged.

The lead is then cut lengthwise from the circular score to the end by the chipping knife and is removed with a pair of pliers. In making this longitudinal cut great care should be used not to injure the insulation, cautions the American Telephone Journal. The knife should be held at such an angle as to pass between the lead and the insulation, but not cut the insulation.

When the lead has been removed the parts where it has been scored should be examined carefully and all rough or sharp edges removed. It will be well also to "bell" the lead slightly with the handles of the pliers or some other blunt instrument.

When the lead covers of the two sections of cable have been prepared, as described, the lead sleeve is slipped over the more convenient end and pushed back along the cable far enough to be out of the way. This lead sleeve should be at least as thick as the sheathing of the cable, and in view of its exposed condition may be somewhat heavier to give it greater mechanical strength. Before slipping it on the cable each end of the sleeve is thor-

oughly scraped with a shave hook or a knife for a length of about 2 in., and the cleaned portion thoroughly smeared with some convenient flux, preferably a tallow candle, which, by preventing the formation of the usual film of lead salts, insures a close union of the lead and the wiping metal which is used to make the joint between the sleeve and the cable sheath.

The internal diameter of the sleeve should exceed the external diameter of the lead sheath of the cable by from 1 in. to 1½ in., so as to allow for the splicing and paper sleeves.

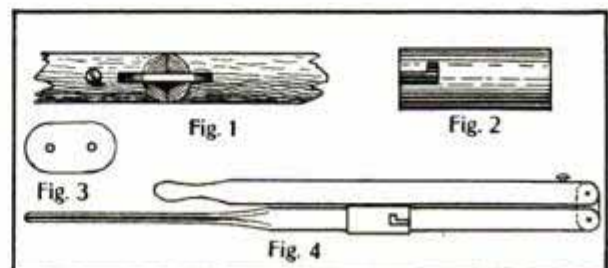
After the conductors have been properly spliced, the lead sleeve is brought into position so as to extend equally over the lead on each cable end, and the ends of the sleeve are dressed down close to the lead of the cable, care being exercised to have the lead sleeve concentric with the cable.

The sleeve and the lead of the cable are then joined together by molten solder, as shown in the illustration.

The solder is poured on the joint in the manner shown, and is wiped smooth with the cloth wiper, which is usually made of several layers of ticking sewed together in convenient size. The wipes must be absolutely watertight and should be carefully inspected, especially underneath the joint, which may be accomplished by means of a small mirror, to insure smoothness, solidity and absence of air-holes, as the presence of small blow-holes in wiped joints causes more trouble than any other feature in cable splicing.

How to Make a Folding Oar

For convenience in motor boats a folding oar can be made so as to be



Parts of Folding Oar

carried under a seat or in a locker. Cut a 7-ft. oar in the middle and then make a slot $\frac{1}{2}$ in. wide by $1\frac{1}{2}$ in. deep in both of these ends. Each end must be cut round or in a half circle, as in Fig. 1. A piece of brass $\frac{1}{8}$ in. thick is cut the same width as the diameter of the oar and both ends rounded, as shown in Fig. 3. A hole is punched or drilled in this brass $\frac{3}{4}$ of an inch from each end. The brass is then inserted in the slots that were cut in the oar and riveted, as in Fig. 1. Take a piece of brass tubing the same size as the oar and about 5 in. long and cut a slot in it as shown in Fig. 2 and slip this on the oar with slot end toward the handle. Place a round head screw in the handle end, as shown, which serves as a lock for the brass tubing and also to keep it from coming off the oar.—Contributed by C. F. Hussey, Portsmouth, N. H.

How to Make a Temporary Street Bridge

City officials in small towns are often called upon to face the problem of providing clear streets for parades, races, etc., yet at the same time not block foot traffic on the main thoroughfares. Temporary bridges are used in Europe and the following is a brief description of how to make one that will serve the purpose very well:

Suppose the street is 40 ft. from curb to curb, and it is desired to have a clear passage 14 ft. high for the procession. Take four 2 by 12 in. planks 28 ft. long, if they can be procured in that length. If they cannot be obtained, secure shorter ones together and they will serve just as well. Cut risers in these long planks for as many steps as desired, and then nail in pairs in the shape of a letter A. Raise them in the air, with one leg on

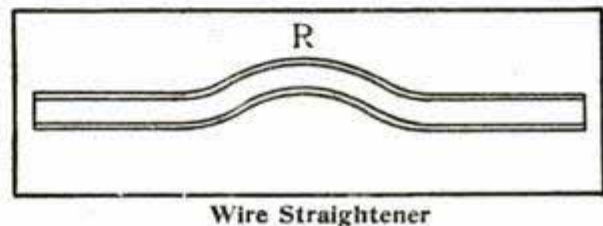
one curb and the other leg on the opposite one.

Nail a horizontal 2 by 8 in. plank 20 ft. long at a height 14 ft. above the ground. This will leave about 5 ft. projecting on each side of the A. Run a vertical brace to the ground from each extremity. Brace the structure laterally and add a floor as wide as desired, and for safety, put a temporary hand-rail on each side. The result is a substantial bridge which serves its purpose and can be taken down and laid away for future use.

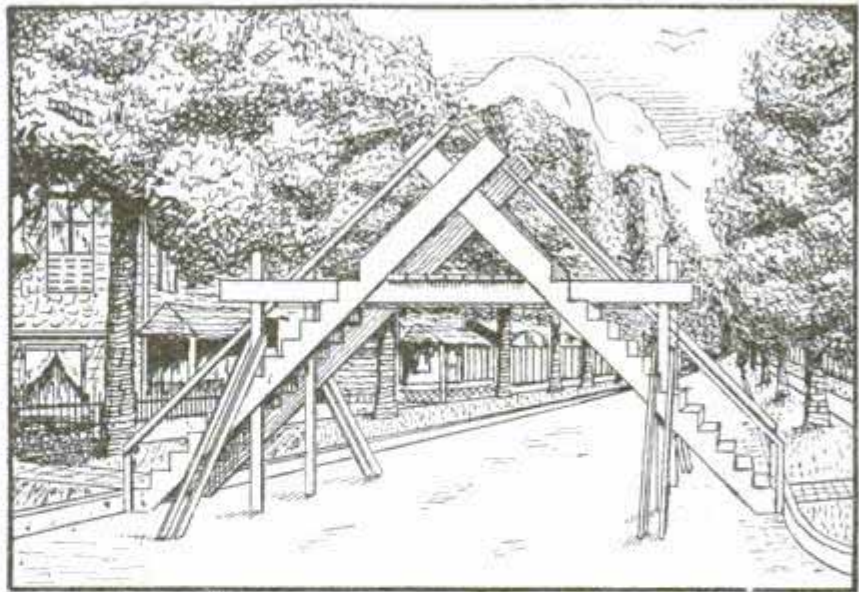


How to Make a Wire Straightener

Secure a piece of $\frac{3}{8}$ -in. brass tubing about 14 in. long and round out the



sharp edges inside the ends. Fill it with lead or rosin and make a bend in it that has a radii of $2\frac{1}{2}$ in. at point R



Procession Can Pass Under Bridge

in the sketch. After removing the lead or rosin place one straight end in the chuck of a lathe. Speed the lathe to 400 or 500 revolutions and start the wire to be straightened into the tubing

by clamping the wire in a hand-vise about 15 in. from the end. Push the wire through the tubing until it protrudes through the spindle of the lathe. Stop the lathe and remove the hand vise and clamp it on the end of the wire that comes out, then pull the entire length through the tubing while the lathe is running.—Contributed by Chas. R. Vollmer, Brooklyn, N. Y.

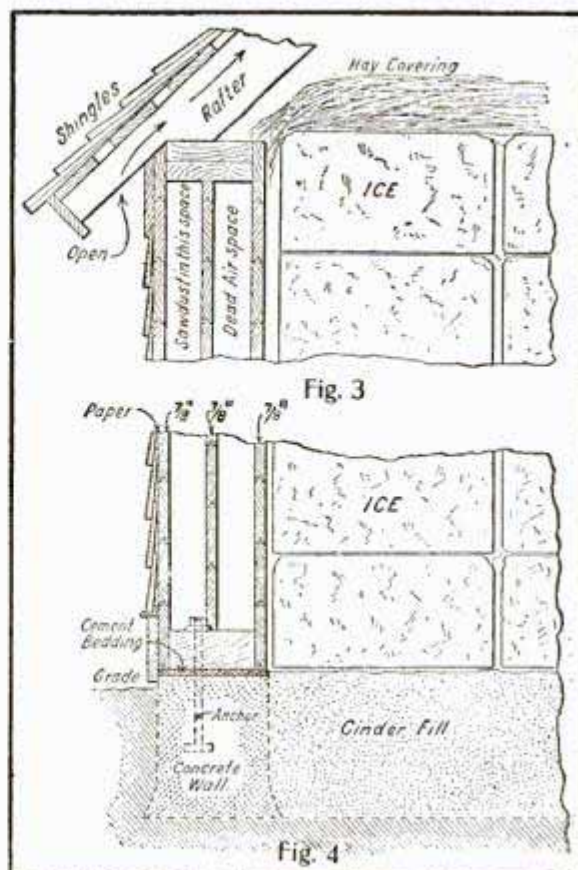
Soldering Brass to Lead

Scrape the lead clean and tin the brass, using tallow as flux, and muriatic acid for the lead. Use copper cleaned with sal ammoniac and tinner's solder. Be careful not to melt the lead.

How to Build an Ice House

The use of sawdust or any other light non-conducting material is a benefit to the keeping qualities of a wall. In constructing an ice house the walls should have two spaces, the outer one filled with sawdust and the inner one a dead air chamber, says the Metal Worker. In the illustrations, Fig. 1 shows a horizontal section of the corner. The heavy felt paper shown between the sheathing and siding and under the inside set of studding should be lapped solid at the angles.

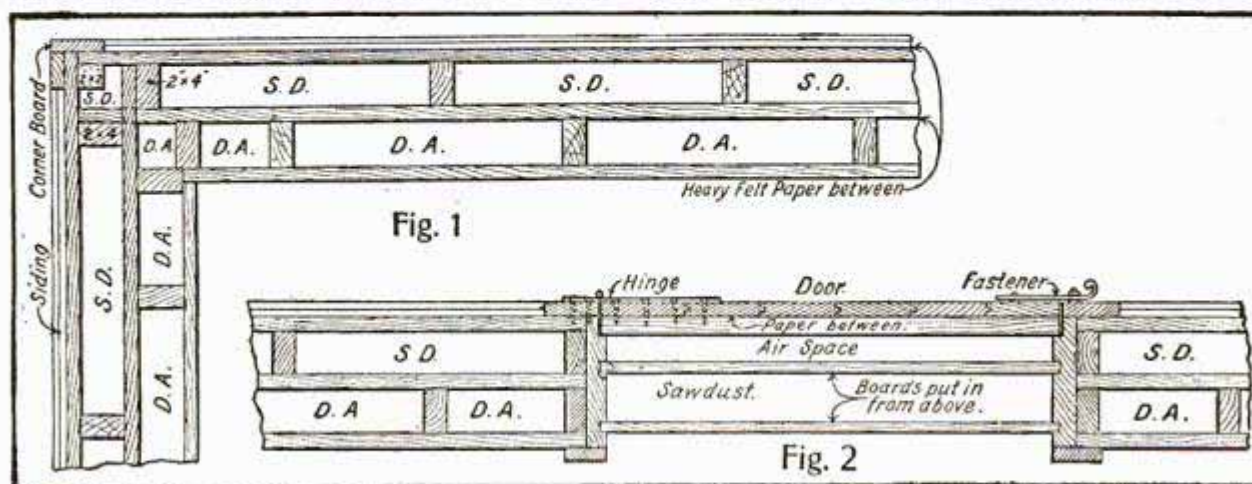
Fig. 2 shows a horizontal section through the door and frame. The outer boards are shown to fit into a groove plowed in the jambs. This is much better than cleats, as the latter are apt



Details of Ice House Construction

to become damaged by the ice in taking out and filling the house. These boards may be put in at the top of the opening, and as the ice is lowered into the house they may be removed and stored for future use. It is a good plan to have the tops of these boards a little higher than the top of the ice.

Fig. 3 shows a vertical cross-section at the plate and Fig. 4 a vertical cross-section at the sill. The boards used in making the partitions are 3/4-in tongue and grooved material, which makes a tight joint. The cinder filling absorbs any moisture there may be.



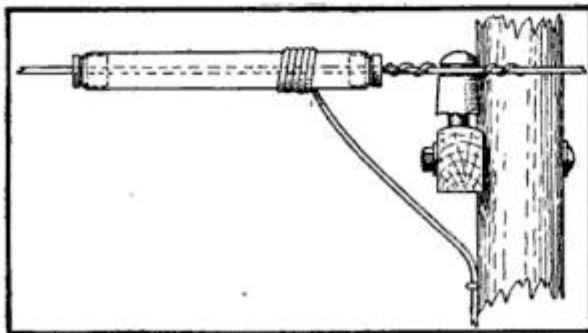
Plan of Constructing Air Chambers

Pipe Joint Mixture

For ordinary pipe joints use a mixture of plumbago and vaseline instead of white lead. This mixture does not dry out and the joint is easily separated when needed.

A Home-Made Line Lightning Arrester

On rural telephone lines where protecting devices are not used in the exchange and where trouble is frequently caused by lightning, a simple and easily applied arrester can be made by any



Lightning Arrester on Rural Line

village tinsmith. All the materials necessary are a tin tube 20 in. in length, two No. 4 porcelain knobs and a ground wire.

The tube should be fastened in the same manner as a stove pipe and just large enough to admit the porcelain knobs, says the American Telephone Journal. Insert a knob in each end of the tube and with a pair of pliers or a hammer gently force the tin down into the grooves of the knobs at each end. This will secure the knobs in position.

The completed arrester is then placed on the line wire, one section from the head, by slipping the line wire through the screw holes of the porcelain knobs, in the manner shown. The ground wire should be wrapped around the tube tightly about six times and soldered. It is then run down the pole to a well-made ground. A No. 12 galvanized iron wire serves this purpose the best. All of the arresters on the pole may be connected to the one ground wire.

This comparatively crude arrester, while not making an extraordinarily

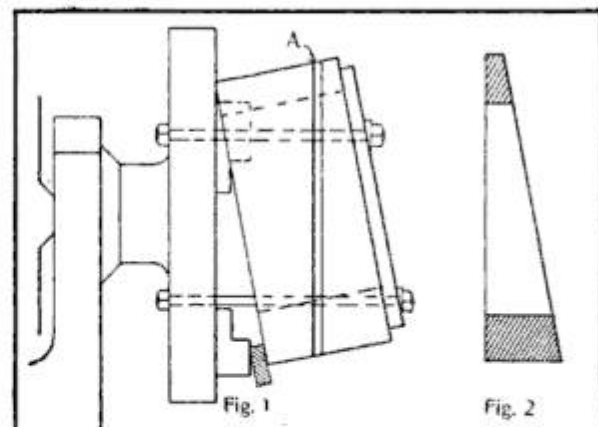
handsome appearance, serves the purpose of keeping the line discharge below the striking point and of diverting the major portion of any such discharges away from the exchange arresters and the arresters on the telephones.

Making a Bevel Pipe Fitting

In a certain place where they used water to prepare coal for the market it became necessary to change one of the large water lines that furnished the water. It had to be fixed in a certain length of time and, not having regular standard length of pipe, when they came to finish they had to have a bevel ring to make the right elevation. There was no time to have one cast in town, and something had to be done and done at once.

After looking around they found a piece of casting that would fill the bill with a lot of work, says a correspondent in the American Machinist. The casting, which was 19 in. outside diameter by 7 in. inside diameter, was placed in the lathe and the inside diameter increased to 13 in. The outside was finished down to 17 in. in diameter and then faced. It was then turned around in the chuck and faced on the other side.

It was then ready to be cut for the



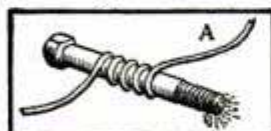
Bevel Pipe Flange

angle, which was done by placing it in the chuck, as is shown in Fig. 1. One edge was placed up close to the face of the chuck and the opposite edge was placed on a block of wood cut to the right size and placed on one of

bolts, as shown. A cutting-off tool was placed in the tool post and a cut taken on line A. The result was a bevel fitting like that shown in Fig. 2, with one side an inch in width and the other $5\frac{1}{2}$ in.

A Current Indicator

Some time ago I wanted to find out whether a certain wire had a current passing through it or not, and having no instrument and not wanting to cut the wire, I picked a piece of iron out of the scrap heap and wrapped the slack of the wire, A, around it and used a handful of iron filings to try the magnet thus formed.



Pounding of Engine Heard Through Teeth

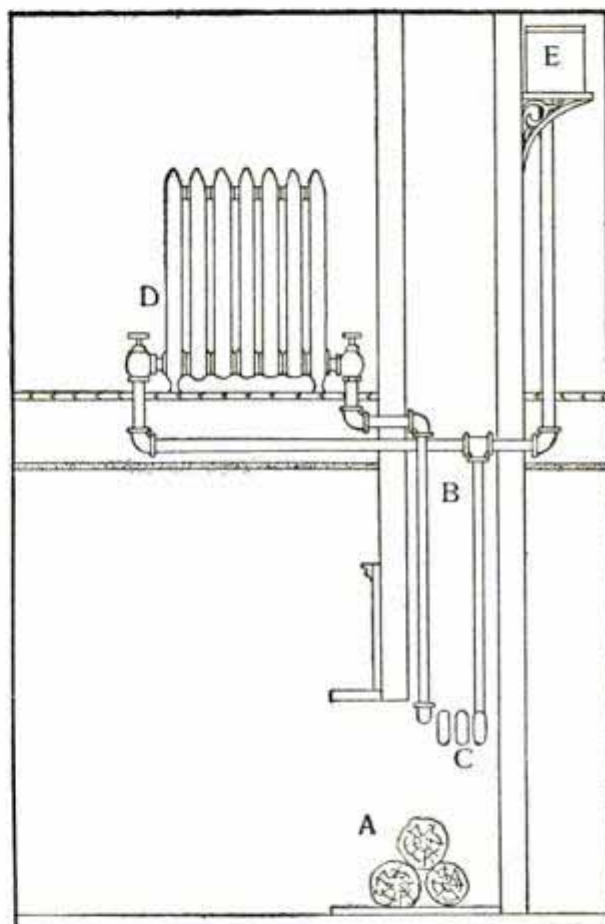
A good many years ago the writer was employed in a mill where a great amount of noisy machinery was running night and day. Among other things were four Westinghouse single acting vertical engines, which ran continuously for six days in the week. These engines have a closed crank case in which is kept a mixture of oil and water to lubricate them. The word mixture is unfortunate, perhaps, but the water was used to bring the oil level up to the cranks and the action of the cranks did make a pretty good mixture after all.

Well, the point is that I was over with an old hand to look over the engines and see that they were running smoothly. He wanted to know whether the engine was pounding or not, and I didn't see how he could tell with the whole plant running full blast. It didn't bother him, though. He took a 2-ft. rule out of his pocket, put it between his teeth with one end against the crank case and by stopping up his ears with his fingers he shut out the sounds of the other machinery and could hear through the medium of the rule a steady thump, thump, which in-

dicated that the crank brasses needed tightening up.—Contributed by W. E. Morey, Chicago.

Utilizing Heat from a Chimney

The wasted heat in a chimney of a fireplace may be turned into service without much trouble. Where rooms are directly above the fireplace it may be possible to by-pass the hot gases



Radiator Heated by Fireplace

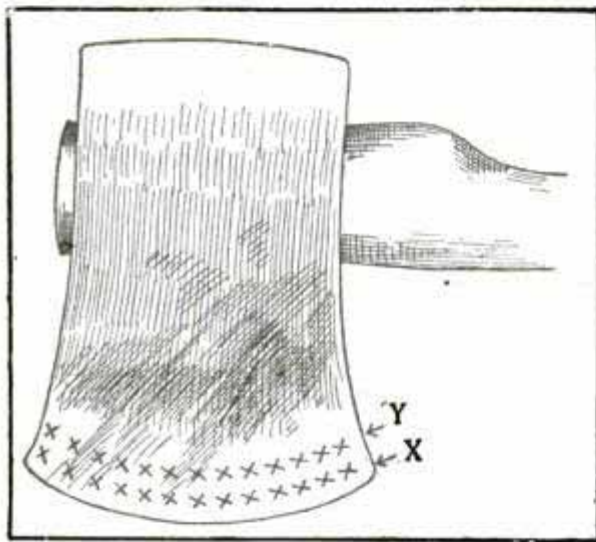
in the chimney through an old-fashioned drum, and if the size of the chimney would admit it, it would be a very easy matter to tear out some of the chimney wall and locate a pipe coil right over the fireplace in the chimney so that one or more radiators may be connected with the coil. It will be necessary to use care in placing the coil so as not to obstruct the draft, says a correspondent in the Rural New-Yorker.

The accompanying illustration shows how a hot water system may be installed. A is the fireplace; C, the coil; B, the connecting pipes; D, the

radiator, and E, the expansion tank. The pipe connections should be made from one end of the radiator to the top of the coil, and the other end to the bottom of the coil. Any series of radiators in the same manner. The expansion tank is for the expansion of the heated water as well as to keep a head of water above the radiators to keep them full.

How to Harden and Temper an Axe

A good clean fire, well coked, large enough and with plenty of depth so no cold air from the blast is likely to reach



Tempering an Axe

the blade, is necessary. Heat the cutting edge of the axe to a strong yellow. Exercise care, cautions The American Blacksmith, so that the heating will be done evenly and uniformly. Now hammer along the edge of the axe as shown by the little crosses at X in the engraving. After hammering across one side turn your blade and proceed with hammering on the other side. In hammering draw the blade out toward the edge and continue your pounding until the heat begins to get low, but not after that. Now reheat the cutting edge to about the same color as before and for a distance of from $1\frac{1}{2}$ to 2 in. from the edge. After heating proceed with hammering as before, but at line Y, or about $1\frac{1}{2}$ in. back from the edge of the blade. After hammering one side turn

and hammer on the other side of the blade.

At this stage of the hammering the smith will notice that the blade has widened considerably. Do not under any circumstance attempt to hammer it down to the desired width. In fact, it is best to not touch the edges of the axe with the hammer at all.

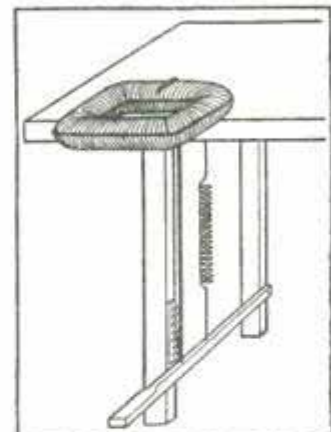
Heat the blade for the third time and hammer again across both sides at the line Y. This third heat is a very low one, and should be such, so that the hammer will leave a bright gloss on the blade. The superfluous metal at the sides of the blade is now cut off and the edges filed smooth. The blade is now ready to harden.

Heat the axe to a cherry red from its cutting edge for a distance of about $1\frac{1}{2}$ to $1\frac{3}{4}$ in. back. Then dip the blade into the hardening bath and move it up and down. Polish the blade so that the temper color can easily be distinguished, and heat very slowly over the fire until the blade shows a blue. Then cool the blade and grind.

Device for Holding Field Coil While Varnishing

To hold a field coil in one hand and apply varnish by means of a brush in the other is not only a sticky job, but dirt and foreign substances are liable to be picked up and to give trouble.

A correspondent in Electric Traction Weekly says that he rigged up a device as shown in the illustration



to hold the coil. A narrow strip of iron bent in the form of an L passes up through the work bench and holds the coil at the edge of the brush. The strip of iron is attached to a foot pedal which is hinged to one of the back legs of the bench. The strip of iron has a tooth which engages in several saw

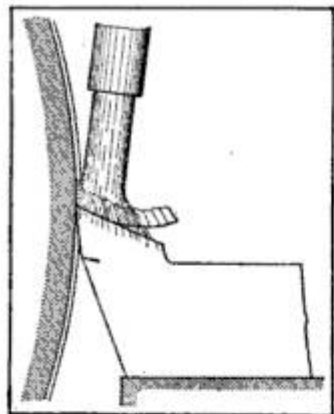
tooth projections on a metal piece which is fastened to a front leg of the bench.

A coil spring furnishes the pressure for holding the clamp in position. By this device it is possible to apply the brush to about half the surface of a field coil without changing the position. This done, the operator releases the pedal, turns the coil over and applies the varnish on the other side.

Where a large number of field coils are to be varnished it is better to dip them in a tank that has enough varnish to cover the coil and hang over a return drain board with a piece of metal the shape of an S to a hanger bar.

Cooling a Metal Cutting Tool

Cooling the nose of a cutting tool by the application of some fluid to the point where the chip is being removed by the tool enables the operator to increase the cutting speed.



Different methods have been employed and the most satisfactory results are obtained from a stream of

water falling at rather slow velocity, but with large volume, directly on the chip where it is separating from the metal. A stream of this sort covers a large area of the tool and is much freer from splash.

About 3 gal. of water per minute is required for adequately cooling a very large roughing tool, say, 2 in. by 2½ in. section, and proportionally smaller quantities for the smaller tools.

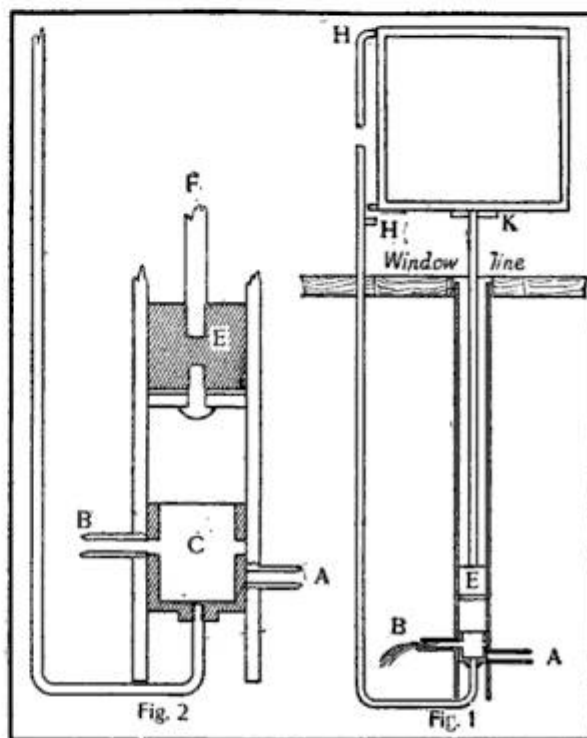
For economy, the same water should be used over and over again, and it should be supersaturated with soda to prevent the machines from rusting.

A series of experiments has demonstrated that water thrown on the chip, as shown in the illustration, will give an increase in the cutting speed of

about 40 per cent.—Extract of a paper read before the American Society of Mechanical Engineers.

Hydraulic Elevator for Window Display

A moving device in a show window attracts attention, which, creating interest and criticism, actually sells more



Window Elevator

goods than an ordinary display of stock, even though the model is something foreign to the business.

The following cuts show an hydraulic elevator that moves up and down the guides continually as long as the water cock is open. The device is comparatively simple and inexpensive, can be constructed by anyone, and made as elaborate as the maker desires. The operating valve is the most important part and is plainly shown in Fig. 2.

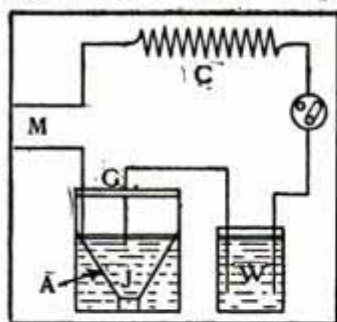
The jacket is made of ¾-in. brass pipe, as long as the rise is intended to be. The top end of pipe can be flush with the window line, which leaves all the mechanism out of sight, the only visible parts being the plunger rod, valve rod and guide bars for the car, which are made of ¼-in. square brass rod.

The valve rod can be made of $\frac{1}{8}$ -in. round steel rod run in brackets soldered on the car guides, also having two steps, H and I, at the required distances. The plunger rod can be made of $\frac{3}{16}$ -in. steel, screwed into brass cap, K, and the other end into E, which is brass with leather washer and plate. The valve is brass pipe, $\frac{3}{4}$ -in. outside diameter, with hole drilled in straight line through both walls. Solder a plate on bottom for the plunger rod to screw into. The inlet is at A, which is now closed, and the water is escaping from outlet, B. The car is about to strike step, H, which will reverse the proposition. As the water fills cup C and the jacket the car will rise.

The inlet and the outlet may be coupled to the faucet and sink with a small rubber tube. A tin funnel at the bottom of plunger tube will catch any leakage. The speed of car can be controlled by the inlet cock, which should feed about the same amount of water as will escape through the outlet in the same length of time.

Home-Made Electrolytic Interrupter

It will be recalled that an electrolytic interrupter consists essentially of an aluminum and a platinum electrode



immersed in a solution of ammonium phosphate. It was found necessary to make such an instrument on short notice and with the materials at hand. The ammonium phosphate solution was placed in a 5 by 7 in. battery jar, J, and an aluminum electric light shade, A, as shown in drawing, inverted and placed in the bottom of the jar formed the aluminum electrode. Platinum wire was not to be had, and therefore a piece of German silver wire, G, was fed through a hole in the cover until the end projected about $\frac{1}{4}$ in. below the surface of the solution. The interrupter was

then connected in series with the primary of the induction coil, C, and a water resistance, W, the latter being necessary, as the circuit, M, was 110 volts alternating current. Due to the chemical action, the German silver wire was very slowly eaten off, making it necessary to gradually feed in more wire. This simple instrument gave good service, however, and is still in use.—Contributed by the Auburn Utility Company, Chicago.

Tinting a Cement House

It frequently happens that in building a concrete house the cement will dry out in several colors or shades. It may be desirable to tint the entire surface of a uniform color that shall not be paint, but practically a part of the house itself. This result may be secured by washing the whole house with cement, but there is a trick in doing this properly that is not always understood. The cement wash is made by mixing two parts of Portland cement and one part of marble dust with enough water to reduce it to about the same consistency as whitewash, and is applied with a whitewash brush. The wall must be thoroughly wet with water for several hours before the wash is applied and kept constantly wet during the application, and for at least a day afterward, says American Carpenter and Builder. The important thing to remember is that the wash must not be applied to a dry wall, as it will not adhere. This work will be worth at least a dollar a square yard, or more, according to the price of labor, but the result will fully justify the cost.

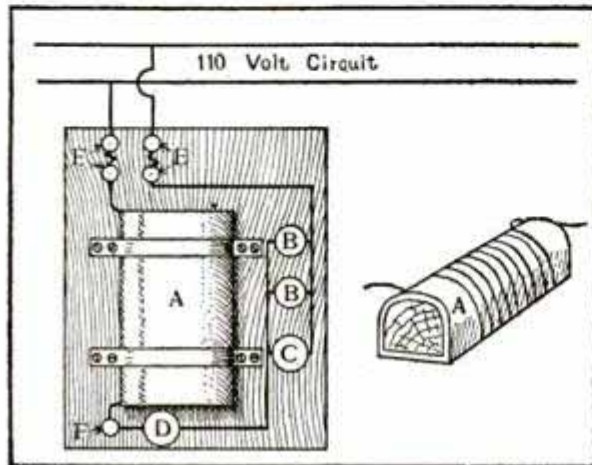
Pasting Cardboard to Glass

To fasten cardboard to glass, apply good 30° B water-glass with a soft rag or sponge to the glass (not the paper), and stick the card on immediately while dry. When the solution is dry, the paper cannot be detached. The silicate should be somewhat diluted.

Amateur Mechanics

How to Make a Small Electric Furnace

Take a block of wood and shape into a core. One like a loaf of bread, and about that size, serves admirably. Wrap a layer of asbestos around it and cover



Electric Furnace

this with a thin layer of plaster-of-paris. When the plaster is nearly dry wind a coil of No. 36 wire around it, taking care that the wire does not touch itself anywhere. Put another course of plaster-of-paris on this, and again wind the wire around it. Continue the process of alternate layers of plaster and wire until 500 ft. or more of the latter has been used, leaving about 10 in. at each end for terminals. Then set the whole core away to dry.

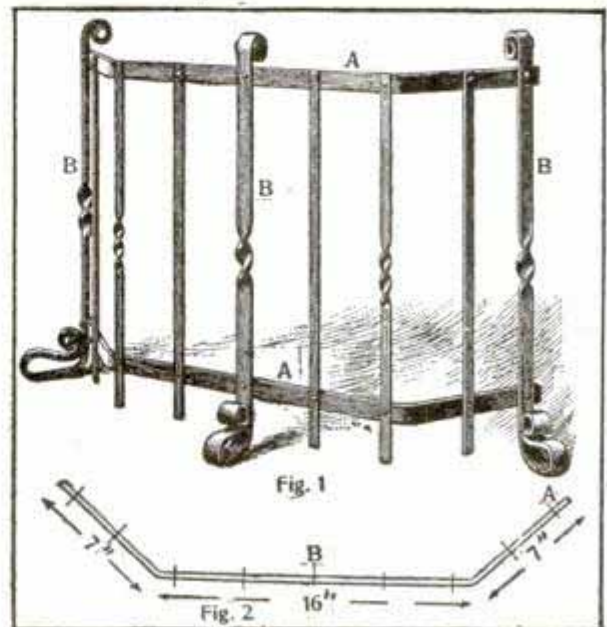
For a base use a pine board 10 in. by 12 in. by 1 in. Bore four holes at one end for binding-posts, as indicated by E E. Connect the holes in pairs by ordinary house fuse wire. At one side secure two receptacles, B B, and one single post switch, C. Place another switch at I and another binding-post at F. The oven is now ready to be connected.

Withdraw the wooden core from the coils of wire and secure the latter by bands of tin to the board. Connect the ends of the wire to binding-posts E and F, as shown. From the other set of binding-posts, E, run a No. 12

or No. 14 wire, connecting lamp receptacles, B B, and switch, C, in parallel. Connect these three to switch, D, in series with binding-post, F, the terminal of the coil. Place 16-cp. lights in the receptacles and connect the fuses with a 110-volt lighting circuit. The apparatus is now ready for operation. Turn on switch, D, and the lamps, while C is open. The coil will commence to become warm, soon drying out the plaster-of-paris. To obtain more heat open one lamp, and to obtain still more open the other and close switch, C.—Contributed by Eugene Tuttle, Jr., Newark, Ohio.

How to Make a Fire Screen

A screen which will not interfere with the radiation of the heat from the fire, and will keep skirts and children safe can be made at little expense out of some strap iron. The screen which is shown in Fig. 1, stands 20 in. high from the base to the top cross-piece and is made of $\frac{3}{4}$ by $\frac{1}{4}$ in. and $\frac{1}{2}$ by $\frac{1}{4}$ in. iron. The top and bottom pieces marked AA, Fig. 1, are $\frac{3}{4}$ by $\frac{1}{4}$ in. and are 30 in. long, bent at an angle to fit the fireplace 7 in. from each end,



Made of Strap Iron

as shown in Fig. 2. The three legs marked BBB, Fig. 1, are of the same size iron and each leg will take 34 in. of material. In shaping the feet of these three pieces give them a slight tendency to lean toward the fire or inside of screen, says a correspondent in the Blacksmith and Wheelwright. In the two cross bars 1 in. from each end, A in Fig. 2, mark for hole and 3 in. from that mark the next hole. Take the center of the bar, B, 15 in. from

each end, and mark for a hole, and $3\frac{1}{2}$ in. on each side mark again and $3\frac{1}{2}$ in. beyond each of these two, mark again.

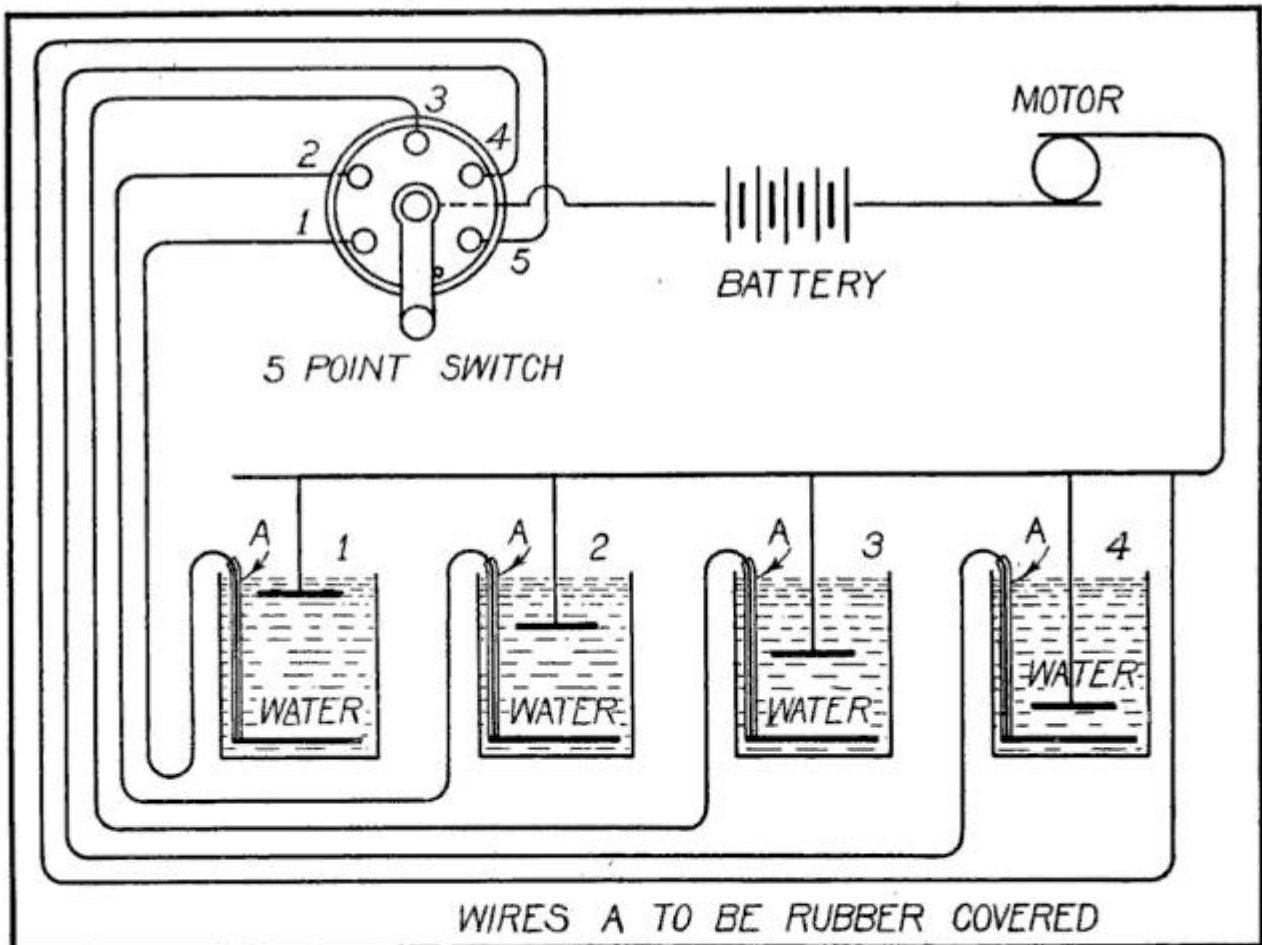
Mark the legs $2\frac{3}{4}$ in. from the bottom and 2 in. from the top and make rivet holes and rivet them to the cross bars, AA, Fig. 1.

Cut six pieces, $17\frac{1}{2}$ in. long and punch holes to fit and rivet onto the remaining holes in cross bars, AA, Fig. 1. Clean it up and give it a coat of black Japan or dead black.

How to Make a Simple Water Rheostat

The materials necessary are: One 5-point wood base switch, 4 jars, some sheet copper or brass for plates, about 5 ft. of rubber covered wire, and some No. 18 gauge wire for the wiring.

light current of 110 voltage it will be necessary to use large jars or wooden boxes made watertight, which will hold about 6 or 7 gal. Each jar to be filled with 20 parts water to 1 part sulphuric



Wiring Plan for Water Rheostat

The size of the jars depends on the voltage. If you are going to use a current of low tension, as from batteries, the jars need not be very large, but if you intend to use the electric

acid. Jars are set in a row in some convenient place out of the way.

Next cut out eight copper or brass discs, two for each jar. Their size also depends on the voltage. The discs

that are placed in the lower part of the jars are connected with a rubber covered wire extending a little above the top of the jar.

To wire the apparatus, refer to the sketch and you will see that jar No. 1 is connected to point No. 1 on switch; No. 2 on No. 2, and so on until all is complete and we have one remaining point on switch. Above the jars place a wire to suspend the other or top discs in the solution. This wire is also connected to one terminal on the motor and to remaining point on switch. The arm of the switch is connected to one terminal of battery, or source of current, and the other terminal connected direct to remaining terminal of motor.

Put arm of switch on point No. 1 and lower one of the top discs in jar No. 1 and make contact with wire above jars. The current then will flow through the motor. The speed for each point can be determined by lowering top discs in jars. The top disc in jar No. 2 is lower down than in No. 1 and so on for No. 3 and No. 4. The connection between point No. 5 on switch, direct to wire across jars, gives full current and full speed. — Contributed by W. J. S., Emsworth, Pa.

Enlarging with a Hand Camera

Every person that owns a hand camera has some pictures he would like enlarged. It is not necessary to have a large camera to do this, as the process is exceedingly simple to make large pictures from small negatives with the same hand camera.

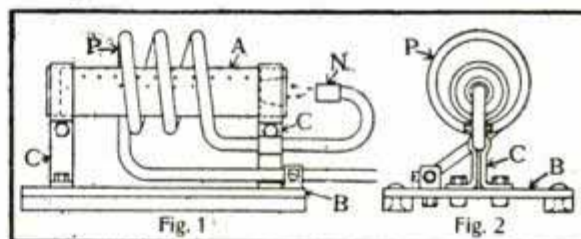
A room from which all light may be excluded and a window through which the light can enter without obstruction from trees or nearby buildings with a shelf to hold the camera and a table with an upright drawing board attached, complete the arrangement. The back is taken out of the camera and fitted close against

the back of the shelf, which must be provided with a hole the same size and shape as the opening in the back of the camera. The negative used to make the enlarged print is placed in the shelf at A, Fig. 1. The rays of the clear, unobstructed light strike the mirror, B, and reflect through the negative, A, through the lens of the camera and on the board, as shown in Fig. 2. The window must be darkened all around the shelf.

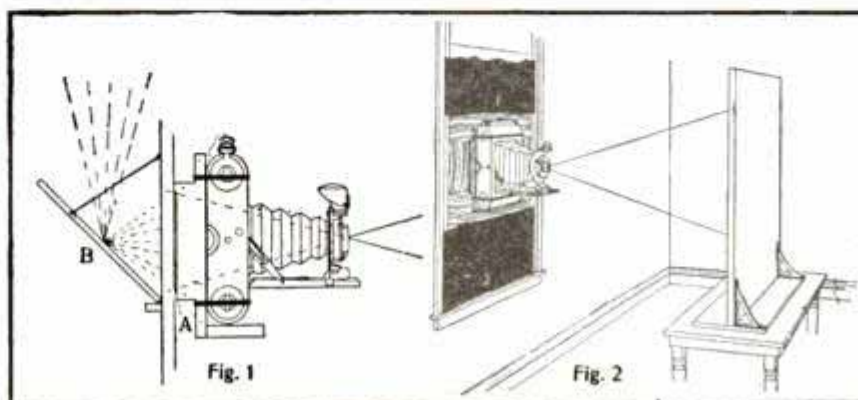
After placing the negative and focusing the lens for a clear image on the board, the shutter is set and a bromide paper is placed on the board. The paper is exposed, developed and fixed by the directions that are enclosed in the package of bromide papers.

Gasoline Burner for Model Work

When making a small model traction engine or a locomotive the question arises, "What shall the fuel be?" If

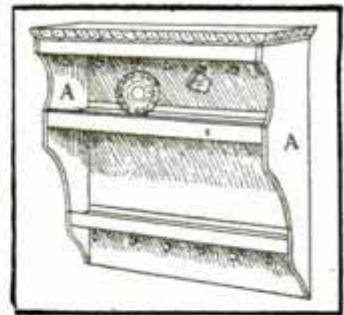


you have decided to use gasoline, then a suitable burner is necessary. A piece of brass tubing about 3 in. in diameter and 6 in. long with caps screwed on both ends and fitted with a filling plug and a bicycle valve makes a good gasoline supply tank, says the Model Engineer, London. The bicycle valve is used to give the tank an air pressure which forces the gasoline to the burner.



The burner is made from a piece of brass tube, A, as is shown in the illustration, $\frac{1}{2}$ in. in diameter and $2\frac{1}{2}$ in. long, which is plugged up at both ends, one end being drilled and reamed out to $\frac{5}{16}$ in. Three rows of holes $\frac{1}{8}$ in. in diameter are drilled in the brass tube. One row is drilled to come directly on top and the other two at about 45° from the vertical. It is then fitted to a sheet-steel base, B, by means of the clips, C C, Fig. 1. A piece of $\frac{1}{8}$ -in. copper pipe, P, is then coiled around the brass tube, A, which forms the vaporizing coil. This coil should have a diameter of only 1 in. One end of the copper tube is bent around so it will point directly into the reamed out hole in the end of the brass tube, A. A nipple, N, is made by drilling an $\frac{1}{8}$ -in. hole half-way through a piece

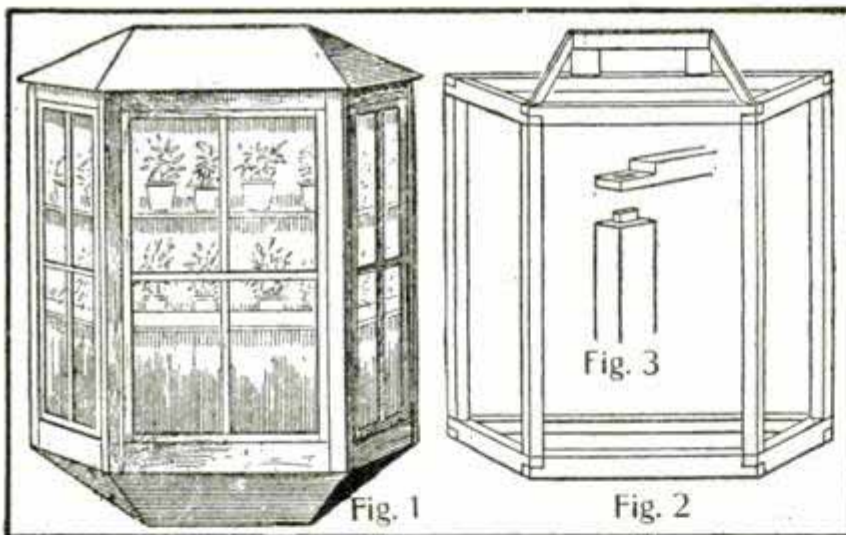
to fit the sides at the places where they are wanted. The number of shelves can be varied and to suit the size of the dishes. Cup hooks are placed on top and bottom shelves. It is hung on the wall the same as a picture from the moulding. —Contributed by F. B. Emig, Santa Clara, Cal.



A Window Conservatory

During the winter months, where house plants are kept in the home, it is always a question how to arrange them so they can get the necessary light without occupying too much room.

The sketch shows how a neat window conservatory may be made at small cost that can be fastened on the house just covering a window, which will provide a fine place for the plants. The frame (Fig. 2) is made of about 2 by 2-in. material framed together as shown in Fig. 3. This frame should be made with the three openings



Showing Construction of Window Conservatory

of brass and tapping to screw on the end of the $\frac{1}{8}$ -in. copper pipe. A $\frac{1}{64}$ -in. hole is then drilled through the remaining part of the nipple. The other end of the copper tube is connected to the supply tank. The distance between the nipple, N, and the ends of the tube, A, should be only $\frac{5}{16}$ of an inch. Fig. 2 shows the end view.

of such a size that a four-paned sash, such as used for a storm window, will fit nicely in them. If the four vertical pieces that are shown in Fig. 2 are dressed to the right angle, then it will be easy to put on the finishing corner boards that hold the sash.

The top, as well as the bottom, is constructed with two small pieces like the rafters, on which is nailed the sheathing boards and then the shingles on top and the finishing boards on the bottom.

How to Make a Cup and Saucer Rack

The rack is made of any kind of wood suitable, of which sides, A, are cut just alike or from one pattern. The shelves are made in various widths

Deposits of copper netting \$40 a ton were recently discovered in southwest Africa.

THE ST. LAWRENCE RIVER BRIDGE WRECK



From Engineer's Drawing Showing How Completed Bridge Would Have Looked

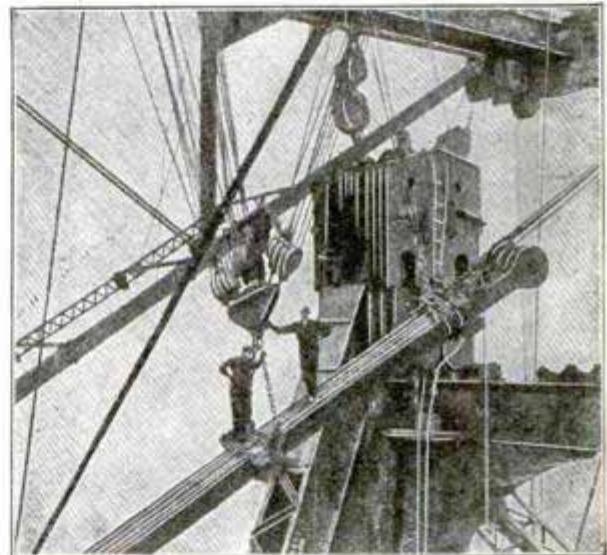
The south section of the cantilever steel bridge being built across the St. Lawrence river 6 miles above Quebec fell on August 29. Seventy-eight men were killed or drowned. The river at this point narrows to 2,000 ft. at low water. The bridge would have been 2,800 ft. long with towers 375 ft. high, and 150 ft. clearance at high tide. The central span of 1,800 ft. would have been the longest ever attempted, being 200 ft. longer than the Firth bridge, Scotland.

The channel span of 1,800 ft. consisted of a cantilever arm extending from each shore 562 ft. 6 in., and a suspended span between the two of 675 ft.

It was near the extreme end of the suspended span extending from the south end which gave way, the breaking following to the foundation pier. The noise was terrific and was heard in Quebec, 6 miles distant. The disaster is supposed to have been caused by the load at the extreme end, 900 ft. out from shore, of a locomotive and cars of material which were being run out. Although the workmen on the structure had a fall of 180 ft. into the swift

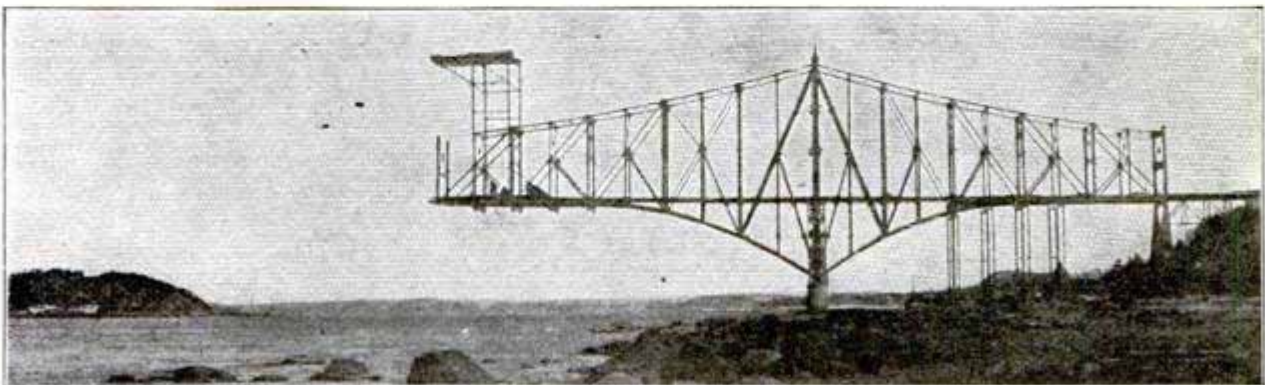
stream, several were saved, including the engineer of the locomotive.

The bridge was to cost \$7,000,000 and was being built by the Phenix Bridge Co. of Pennsylvania.



At Work 350 Ft. above the River

On account of the wide channel no bridge is likely ever to be built below the one in question across the 825 miles of river between Quebec and the ocean. The bridge at Montreal is 165 miles farther up stream.



South Arm on December 1, 1905—At Time of Wreck it Extended 900 Ft. out over the River

LESH FLIES THREE MILES IN AEROPLANE

L. G. Lesh is conducting experiments at Montreal, Canada, his latest machine being 22 ft. wide, 14 ft. from front to tip of tail and decks 4 ft. apart. The framework is white spruce, the main spars and uprights being round rods $\frac{3}{4}$ -in. diameter; steel piano wire with breaking strength of 800 lb. is used for trussing; the wings are covered with tough unbleached muslin. His theory is to study the behavior and control of the aeroplane by having it pulled by an independent power before installing a motor. Of his latest flight he writes:

"Today I accomplished the second longest flight ever made in a 'heavier than air' flying-machine.

"This morning I made a flight of three miles over the St. Lawrence river, in tow of a motor boat. I equipped the machine with a small seat, as I knew I would be in the air some time. I started off a wharf and flew straight into the wind, down the river, for about a mile without interruption. Then one of the ropes holding the seat broke and I had to do some repair work while still in the air. I did not come down, and soon had the seat fixed and again got into position. The flight continued for about a mile and a half farther and the same rope broke again. The second time I could not fix it, and this left me supporting my entire weight on my arms.

"I found I could not endure that very long and signaled the men in the boat to turn slightly toward shore, hoping that I could get near enough to land in shallow water. The pilot misin-

terpreted my signal and quartered too far into the wind. I was compelled to drop into the water three miles from my starting point. The machine was unfortunately ruined through the carelessness of the boatmen in getting it to shore. I will build another."

Octave Chanute, in regard to the French experimenters who are making "grasshopper" jumps, starting from hilltops, says: "They are driving the horse by the tail and have chosen the longest route to success"; and Mr. Lesh adds:

"They are trying to figure out the problem of equilibrium on paper when the only possible way to keep a flier in balance is by the use of muscles or nerves that have been trained through years of experience to make just the right moves instinctively. Some time in the future we may invent an equilibrium machine, but first we must find out personally just what the machine will have to do and how it will have to go about doing it. This will take time."

BIG WATER MAIN BURSTS

A 36-in. water main in a business street not far from one of the pumping stations in Chicago burst and threw a geyser 40 ft. high. Before it could be controlled it had torn up the street making a hole 12 ft. wide and 20 ft. long; drowned 9 horses; ran into basements, destroying thousands of dollars worth of goods, and forced a factory of 500 hands to shut down for two days. Seven fire engines pumped all night getting the water out of the basements.



Condition of Street after Break Was Controlled

WONDERFUL NEW GLIDING BOAT

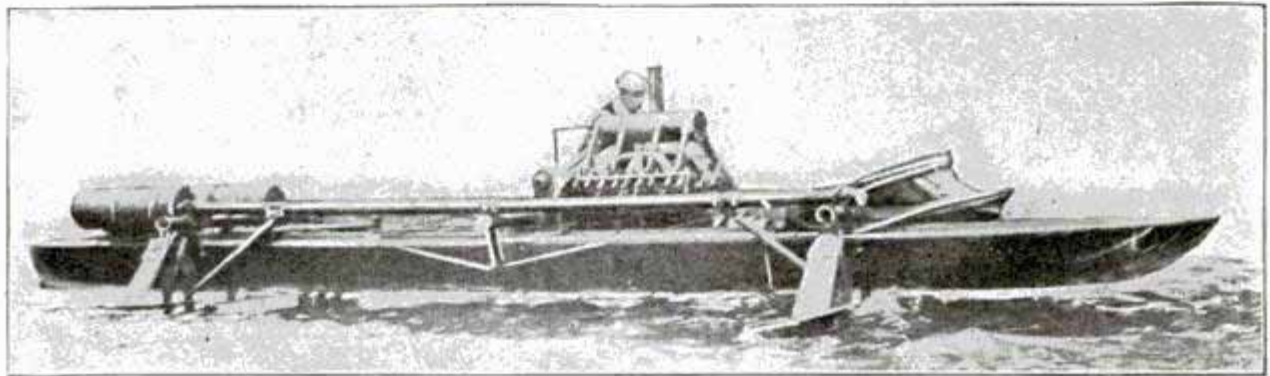
By Emmett Campbell Hall

A mile a minute at sea—New York to Liverpool in 30 hours—these are the astonishing claims made by expert marine engineers who have seen in operation what is declared to be the most stupendous invention in the annals of speed—the new gliding craft invented by Peter Cooper Hewitt.

This new craft can scarcely be designated as a boat, for the reason that it does not cut the water as do all other

and skims the water with the lightness and speed of a swallow has a hull of mahogany, very shallow, merely a shell to carry the machinery when the craft is not moving. Mr. Hewitt's original plan called for two long, hollow air tanks mounted on a frame, Catamaran fashion, but he found the shallow shell better for experiments. A strong steel frame, similar to that of an automobile, extends over the sides of the shell and across either end, the cross sections of the frame being equidistant from their respective ends of the craft.

From each corner of the frame there



"At 16 Miles or More per Hour the Planes Support the Boat Proper Which is Practically Lifted Out of the Water"

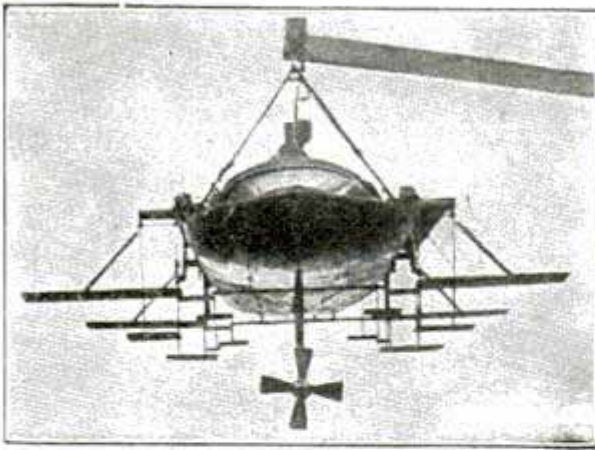
vessels, but actually flies or skims over the surface, the body of the craft being forced high enough to permit free play of the waves. Although the one craft so far constructed is in the nature of a rough model, the inventor has attained with it a speed of 38 miles an hour on Long Island Sound, and engineers state freely that the few improvements which further experiments will doubtless suggest will mean the mile-a-minute sea-going boat.

At first glance the strange little craft gives the impression of a discovery rather than an invention. The model is scow-built, 27 ft. over all, with a 4½-ft. beam, and is equipped with an 8-cylinder gasoline engine. In appearance the craft is about as suggestive of speed as a ferry boat. Like many other great inventions, this craft was the result of accident—the inventor started out to construct a flying-machine, stumbled upon the idea of the gliding craft, and brought it to its present degree of perfection.

The device which looks like a scow

are dropped into the water perpendicular steel arms, extending 18 in. below the bottom. To the arms are fastened steel planes having a slant upward in front of about 1 in 8. The bottom submerged planes have 2 sq. ft. of surface, those above it being something larger. The total supporting surface of the four principal planes is, therefore, about 8 sq. ft. The motor is set forward, and the single screw, instead of being placed under the stern, turns just back of the front set of planes. On either side of the shell is a gasoline tank.

In operation, the screw driving, or rather pulling the craft forward forces the slightly slanted planes through the water and, on account of their slant, the craft is forced upward, the greater the speed, the greater the rise. When a speed has been attained which forces the topmost vanes out of the water, or partly out, part of the supporting surface is of course lost, and the craft settles lower, this principle constantly operating to maintain a perfect level



Stern View of Boat Suspended in Air to Show Arrangement of Planes

for the shell at a given distance above the surface of the water. At from 12 to 16 miles per hour the topmost planes leave the water, and at 35 miles an hour all the planes are driven upward and out of the water with the exception of the bottom ones.

When moving at more than 16 miles an hour the craft proper—that is, the shell—does not touch the water at all, but actually flies above it, a space being left between the bottom of the craft and the surface of the water, and this space is made great enough to allow play for the waves. As the waves do not touch the shell itself, and as the supporting planes are beneath the surface and below the trough, there is presented the astonishing sight of a small boat moving forward without the slightest rocking or pitching. The principle applied to larger vessels would absolutely eliminate sea-sickness from ocean travel.

The arms on which the planes are carried are made with a keen edge to the front, so as to offer a minimum of resistance, and as the shell does not come in contact with the water, there is practically no resistance except from air pressure. An idea may be gained of the wonderful speed possibilities of the gliding craft when it is taken into consideration that in the case of an ordinary steam ship it requires eight times, or the cube of the power, to double the speed, while with the Hewitt craft it requires but double the power to double the speed.

The present model of the Hewitt craft weighs 2,630 lb., but a boat of

the same power and strength can be made having a weight of but 1,500 lb. Such a boat would carry a weight of 1,500 lb. It is estimated that the craft may carry 60 lb. a horsepower at a speed of 30 miles an hour, or even more. The gliding craft can be steered around sharp curves at the highest rate of speed with no loss of equilibrium, but the stern "skids" as do the wheels of an automobile at high speed on a sharp curve.

One of the most obvious uses to which the new form of craft could be put would be as a torpedo boat, for naval experts assert that it is very difficult to use guns, excepting small arms, upon a vessel moving at a speed of more than 30 miles an hour, so that a torpedo boat moving at 60 miles an hour might be regarded as almost immune from harm by gun fire. Mr. Hewitt said:

"On careful consideration of the art of flight, with reference to producing a flying-machine, it becomes necessary to solve certain problems practically before it is possible to design a flying-machine heavier than air that will be certain of success and be safe.

"With this purpose in view I turned my attention to water as a medium for my experiments, instead of air, and concluded that they could more advantageously be made in it than in air. Water possesses the advantage of greater weight. The weight of water is approximately 800 times the weight of air, therefore the supporting surfaces such as wings or planes would need only to be one eight-hundredth the size in water that would be required for the same effective lift and power as in air, and substantially the same rule applies to the propeller.

"The water device being so much smaller brought the experiment within my available means at the time. I constructed a craft designed to run in water, which when finished had flotation means secured to it to support it while at rest, but in motion was lifted clear of the water and exercised no friction in the action of the device except as so much dead load or weight."

FISHING WITH SET NETS

In both the waters of the Great Lakes and along the Atlantic coast vast fishing industries are operated which, with nets and power fish boats, involve an investment of millions of dollars. The set nets, those anchored permanently in one place, are of two kinds; gill nets and weirs.

The gill net extends from the bottom to the surface and often hundreds of feet long in a straight line. The bottom of the net is weighted and the top floated with buoys to hold it in position. Fish large enough for market in trying to swim through the net can get their head, but not the body through, and in trying to retreat are caught by the gills.

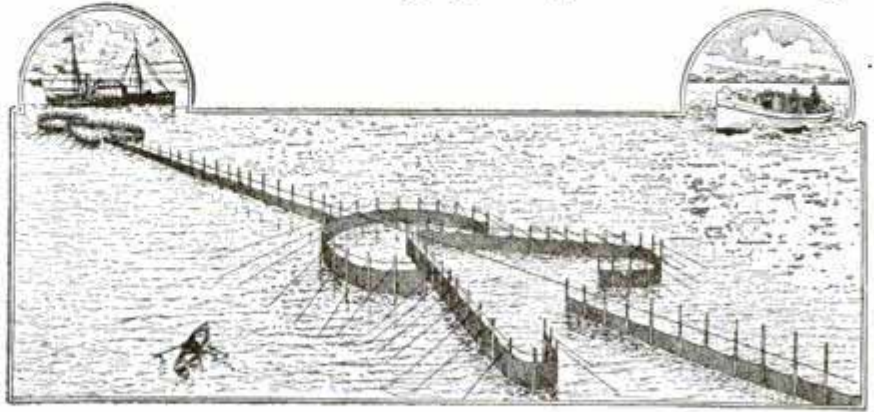
The weir is a series of nets set as shown in the illustration. The nets are so placed to take advantage of the habit of a fish to swim in a straight line. When they are stopped by the long straight leader net half of them will turn toward the weir, the wings of which are turned back, directing the course of the fish back into the inner weir, from which escape is very unlikely. This net is drawn every day or two and is gathered up to form a pocket or basket from which the fish are emptied into a small boat, which in turn transfers its load to a larger one.

In salt water sharks and other large fish frequently do great damage to the nets. The weir in the illustration, being set in shallow water, is held in place by poles, the engraving being made from a photograph taken at low tide.

The new scout cruiser "Salem" recently launched is designed for watching and reporting the movements of the enemy in time of war. The vessel is 423 ft. 2 in. long and 46 ft. 8 in. wide, with a draft of 19 ft. 1½ in. Her speed will be 24 knots. Turbine propelled.

RAILROAD SUPPLIES TIE UP MILLIONS OF DOLLARS

The supplies constantly on hand at various points on its line, of every big railroad, are little dreamed of by the average passenger. The storekeeper



These Nets are Often Several Thousand Feet Long

is supposed to be in position to fill a requisition on an instant's notice for anything from a lead pencil or bottle of mucilage up to all the materials necessary to reconstruct miles of track.

To avoid censure for delay in filling orders he naturally lays in supplies in plenty, with the result that thousands and even hundreds of thousands of dollars are invested in materials over and above any ordinary requirement.

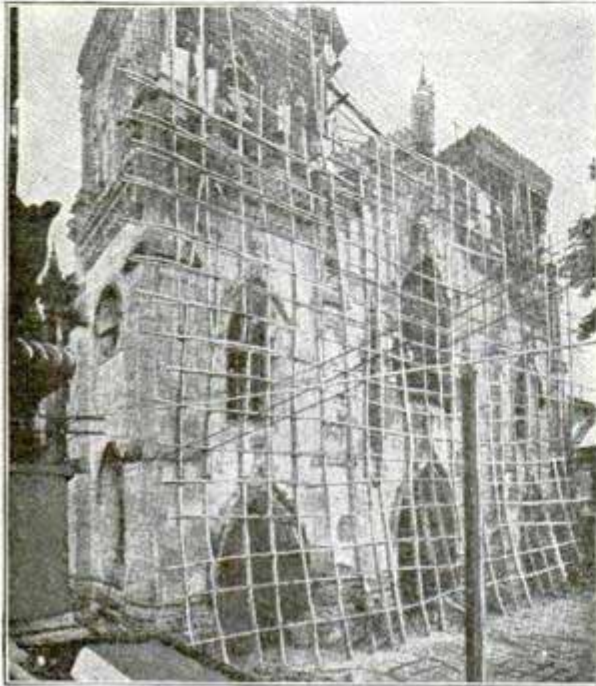
The assistant to the president of the Wabash road has made a study of these conditions and in an address before the Railway Storekeepers' Association stated that from figures he had recently compiled he found that in the case of 33 roads there was at the present time invested in supplies the enormous amount of \$104,000,000.

He further found that if all the 33 roads could reduce their stock of supplies to the basis of one of the roads which carried on hand barely enough to meet ordinary current demands, that the \$104,000,000 would be cut in half, or reduced \$52,000,000. As the money thus tied up costs the railroads 4%, the annual interest saving would be \$2,080,000.

In the first half of this year already more people have been killed by accidents and convulsions of nature than in the whole of 1906.

TO CULTIVATE BAMBOO IN AMERICA

The Japanese of British Columbia have recently begun the cultivation of bamboo on a large scale. The experiment is proving quite successful. Bamboo roots are being brought in large



Bamboo Scaffold: Manila

quantities from Japan and transplanted in British soil.

The cultivation of bamboo is very profitable in Japan, the returns varying from \$20 to \$90 per acre. With a successful cultivation of the plant in British Columbia the Japanese hope to work up a big trade in bamboo furniture. Willow is the best that can be secured in this country, but bamboo is far superior to the willow that is now used.

Another industry which the Japanese will endeavor to work up will be the use of bamboo for water pipes. In Japan bamboo is largely used as water pipes, and the growers see no reason why it could not be used in this country.

Bamboo stalks are very hardy. They grow from 70 to 100 ft. in height, straight and erect, with trunks sometimes 1 ft. in diameter. The growth is rapid and the shoots will thrive in a dry, arid country with an elevation anywhere from sea level to 15,000 ft. The roots of some varieties are edible when

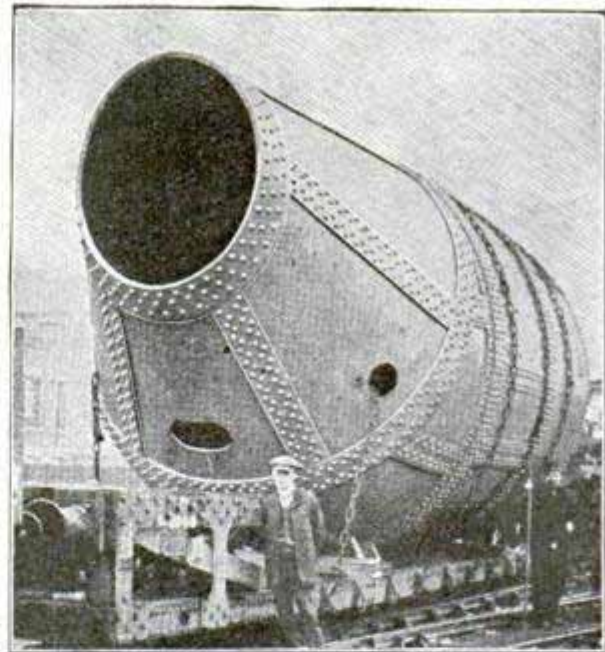
prepared like asparagus. Split bamboo is used for many common articles. In China the natives utilize the leaves for clothing, hats and paper.

20 MILES OF WARSHIPS

In seven lines, aggregating 20 miles in length, the home fleet of the British navy passed in review before the king. Every type of fighting craft, from the "Dreadnought" down to submarines, was represented. At night, on a signal from the royal yacht, each ship flashed its outline in brilliant electric lights, while the searchlights played over the waters and upon the clouds.

BIG STEEL CONVERTER

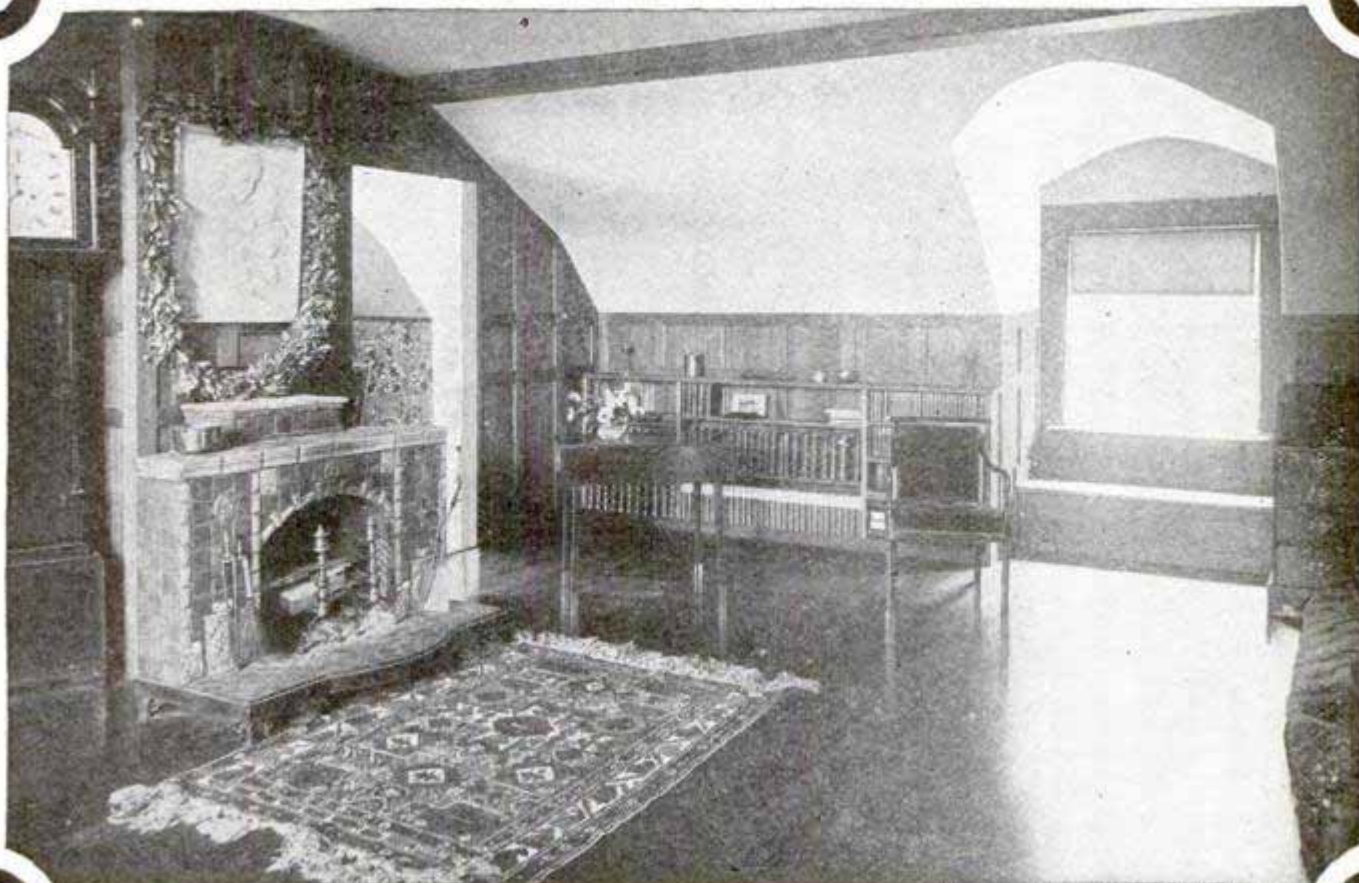
Steel is made by pouring molten iron into a mixer or converter, where other elements are added and the carbon burned out by blowing air under pressure through the mass. The cut shows one of these giant kettles loaded on a



Holds 200 Tons

car for shipment. The mixer is 25 ft. long, 13 ft. in diameter, weighs 31 tons, and will contain 200 tons of molten metal.

Stock and grain quotations are posted every hour in the buffet car on one of the overland trains leaving Chicago.



LOIS L. HOWE, Architect, Boston.

LIQUID GRANITE

and the Home Beautiful

Varnish occupies a conspicuous place in the making of modern homes, and **Liquid Granite** is the most desirable, durable and satisfactory varnish yet produced for **Floor Finishing** and all other domestic purposes. ❁ ❁ It is invaluable in restoring Oilcloth and Linoleum. ❁ ❁ It is easy to apply and difficult to deface. ❁ ❁ Put up in cans of convenient size from $\frac{1}{2}$ pint to 5 gallons.



Send for samples of Finished Woods and information on Wood Finishing and Home Varnishing, — *Free on request.*

DEALERS EVERYWHERE

New York
Boston
Philadelphia
Baltimore

BERRY BROTHERS, Limited
Varnish Manufacturers
Department A, DETROIT

Canadian Office and Factory: Walkerville, Ont.

Chicago
Cincinnati
St. Louis
San Francisco

Learn Telegraphy

The demand for good telegraph operators is greater than the supply. I guarantee good paying positions to all my graduates, because my school is the only one graduating thoroughly qualified telegraph operators. Railroads invariably prefer "Dodge School Graduates," because they are proficient.

Unlike many other schools, my instructors are practical telegraph operators and teach practical telegraphy. Mine is the only school owning a building



G. M. Dodge

devoted exclusively to the teaching of telegraphy. My methods of instruction are copyrighted. My text book on telegraphy is recognized as superior to all others. Living expenses in Valparaiso are very low and can be earned while learning. Easy payments. Correspondence instruction if desired. Write me today personally for illustrated descriptive catalog and interesting testimonials.

GEO. M. DODGE, Pres.
DODGE'S INSTITUTE OF TELEGRAPHY
 Eighth Street, Valparaiso, Ind.

Good Positions Guaranteed

Let there be Light



RELIANCE ACETYLENE GAS GENERATOR

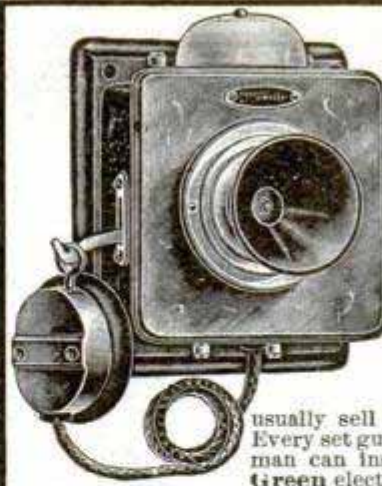
MAKES LIGHT
FOR THE
Home, Factory,
Church, School,
Etc.

Automatic Water-Shift — Water-Feed Valve

Reliance Generators are equipped with a rotary water-valve which, not being directly connected to the water feed-pipe conveying the water to the carbide, absolutely prevents the water from reaching the carbide until this valve is brought into operation, automatically, by the downward movement of the bell, which occurs when the gas becomes sufficiently low to require an additional supply. This positively prevents any waste of gas after lights are turned off.

WRITE FOR FREE ILLUSTRATED CATALOG
 Giving full information regarding all
 styles of RELIANCE Generators.

The Gem City
Acetylene Generator Company
 DAYTON, OHIO



A SECRET

Young men earn from \$10.00 to \$30.00 a day by installing our fine telephones in private houses, offices, factories, etc. Here is the secret: Insert a small "ad" in your local paper saying that you will install a complete telephone line up to 200 feet, for \$10.00. Then watch the results.

We sell you two complete stations, as per above cut, for \$4.75. This is the greatest value ever offered, as these 'phones usually sell for \$5.00 to the Trade. Every set guaranteed for 1 year. A layman can install them. Send for our Green electrical catalog No. 3—it's free.

ELECTRO IMPORTING CO., 87 Warren St., New York City



DIAMONDS ON CREDIT

20% Down
 10% Per Month

Reliability—that greatest of business builders, is building our business.

We satisfy our customers and in satisfying them hold their good will.

The determination to please, goods of highest quality, prices the lowest in the market, have earned their reward. Our business has more than doubled in the last twelve months.

We never sell a diamond without giving a written certificate guaranteeing its value and quality, and agreeing to take it back any time in exchange for a larger stone. If any other dealer can duplicate our stone at the same price, we will take it back and refund the money paid.

Goods sent prepaid for examination. Send for illustrated Catalogue No. 3

J. M. LYON & CO.
 ESTABLISHED 1843
 71-73 Nassau Street,
 New York

"I won't have anything else"

says the engineer who has tried it

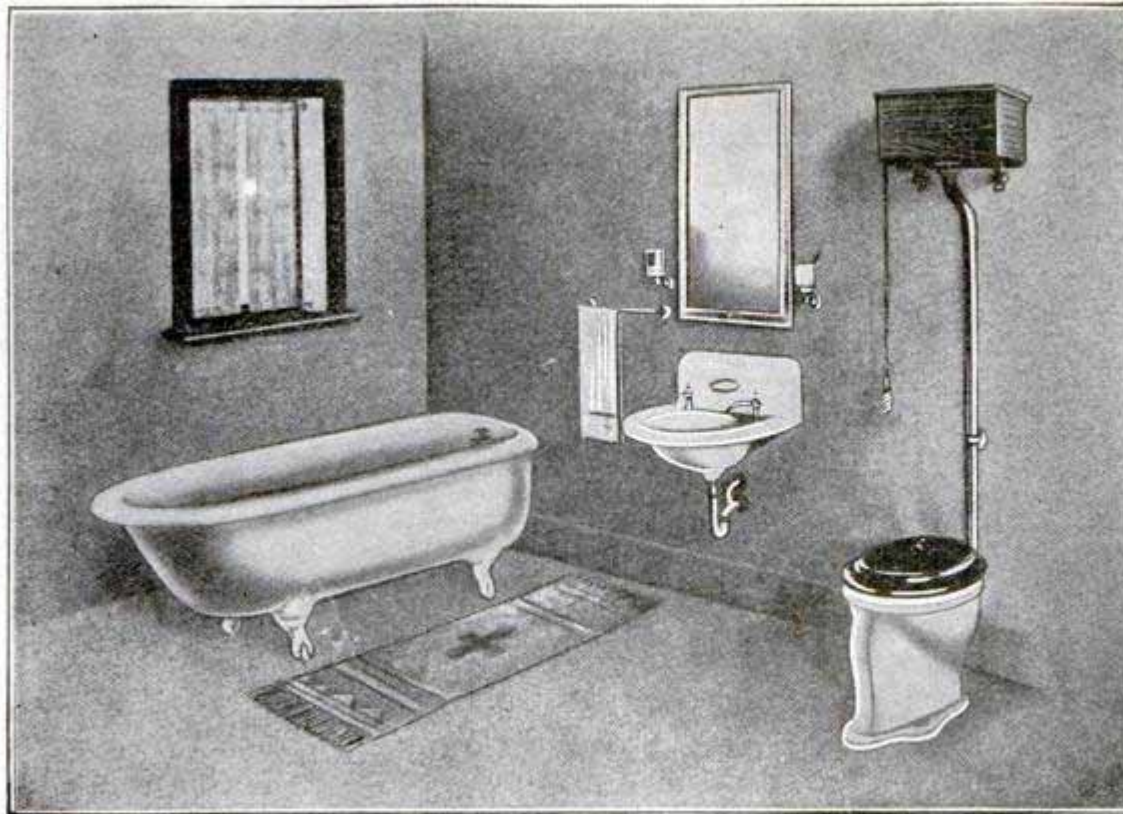
"NOTHING ELSE
 SO SIMPLE"



"NOTHING ELSE
 SO RELIABLE"

Manufactured only by

THE RANDLE MACHINERY COMPANY
 1761 Powers Street, Cincinnati, Ohio



Plumbing Material

DIRECT TO THE
CONSUMER

At less than
wholesale prices
you also save the
plumber's profit.

Send us a list of
your needs. All
we ask is an op-
portunity to figure
on your wants.

We carry every-
thing necessary for
installing this class
of work. Soil pipe,
lead and water pipe
and fittings of all
kinds, etc., etc.

All Goods are
Brand New, High
Grade and Perfect.

Complete Bath Room Outfits only . . . \$36.50 Laundry Tubs only . . . \$5.00
White Porcelain Enameled 18 x 30 Sinks only \$ 2.00 Bath Tubs only . . . \$6.00

SEND US YOUR BILL FOR OUR ESTIMATE

WRITE FOR OUR FREE ILLUSTRATED **CATALOG No. 35**

CENTRAL MACHINERY & SUPPLY CO., 547-559 State St., Chicago, U. S. A.

25c.

A BOOK FOR BOYS

25c.

How to Make a Paper Boat—
How to Make a Barrel Boat—How
to Make a Water Wheel—How to
Make Your Own Fishing Tackle—
Temporary Camps and How to
Build Them—Permanent Camps
and How to Build Them—How to
Build an Imitation Street Car
Line—How to Make a Water Bicy-
cle—How to Make a Miniature
Windmill—How to Build an Ice
Boat—A Novel Burglar Alarm—A
Mechanical Ventriloquist and
How to Make It—How to Make a
Boot-Blackening Cabinet—Renew-
ing Dry Batteries—How to Make
Water Motors—How to Make
"Antique" Clocks from Up-to-date
Materials—Lettering a Clock Dial
—How to Make a Windmill of One
or Two Horsepower—How to
Make a Trap for Rabbits, Rats
and Mice—How to Make a Small
Searchlight—Kites of Many
Kinds and How to Make Them—
Jug Fishing—How to Do Orna-
mental Iron Work—Ornamental
Metal Guards for Open Fireplaces
—How to Make a Propelling Ve-
hicle—How to Make a Water Tel-
elescope—How to Make Paper Bal-
loons—How to Make a Hecto-
graph—Useful Articles and Orna-
ments Made of Old Bicycle
Parts—Devices for Winter Sports,

Your Newsdealer will
order it for you,
or sent postpaid for
25cents by
THE PUBLISHERS

MECHANICS FOR YOUNG AMERICA

How to Build

BOATS, WATER MOTORS, WIND MILLS, SEARCHLIGHT,
ELECTRIC BURGLAR ALARM, ICE BOAT, WATER
BICYCLE, CABINS, CAMPS, CLOCKS, FISH-
ING TACKLE, KITES, IMITATION
STREET CAR LINE, ETC.

The Directions are Plain and Complete

Reprinted from Popular Mechanics
COPYRIGHT 1911
POPULAR MECHANICS
CHICAGO

PRICE 25 CENTS

How to Make and Use Them—
Coasting Sleds, Chair Sleighs, To-
boggan Slides and Skis—How to
Make Rubber Stamps—How to
Make a Baggage Carrier for Bicy-
cles—A Water Candlestick—Boy's
Hand-Power Auto, How Made—
How to Make a Pair of Dumb-
Bells—How to Rid Your Yard of
Cats—How to Make an Easel—To
Light a Gaslight Without Matches
—Things a Boy Can Make Out of
Old Bicycle Parts—How to Make
a Wind Propeller—Photograph-
ing from a Captive Balloon—How
to Make a Simple Burglar Alarm
—To Make a Binder for Popular
Mechanics—How to Make a Ham-
mock—Electric Rat Exterminator
—How to Make a Miniature Steam
Turbine—How to See Through
Your Hand—How to Make a
Wood-Turning Lathe Out of An
Old Sewing Machine—How to Re-
move Stains from Marble—How
to Make a Turbine Engine—How
to Make a Lead Cannon—How to
Make a Wireless Telegraph Sys-
tem—How to Make a Toy Battery
Motor Lift a 10-lb. Weight—To
Renew Old Dry Batteries—Weath-
erproofing for Tents—How to
Make an Electric Furnace Regu-
lator—How to Make a Simple Fire
Alarm—How to Make a Bell Tent.

Published by
POPULAR MECHANICS
160 Washington St.
CHICAGO

YOUR INTERESTS AND OURS ARE IDENTICAL

You Want Practical
WELL DRILLING MACHINERY
to develop that
Mineral, Oil or Water

**proposition; we have it. Guaranteed
it to work satisfactorily.**

Tell us about the formations, depth, diameter holes; will send
printed matter and can save you money.

**THE AMERICAN WELL WORKS,
AURORA, ILL., U. S. A.
CHICAGO, ILL. DALLAS, TEXAS**

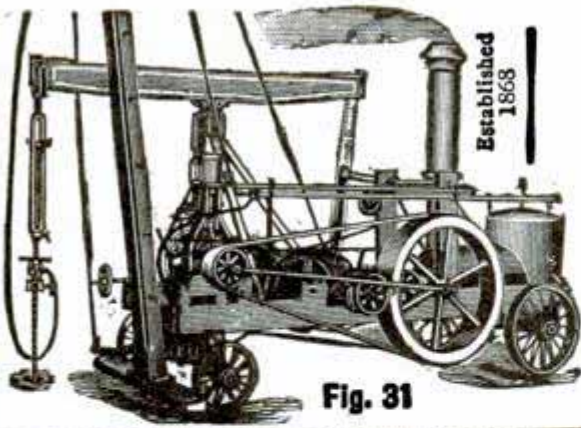
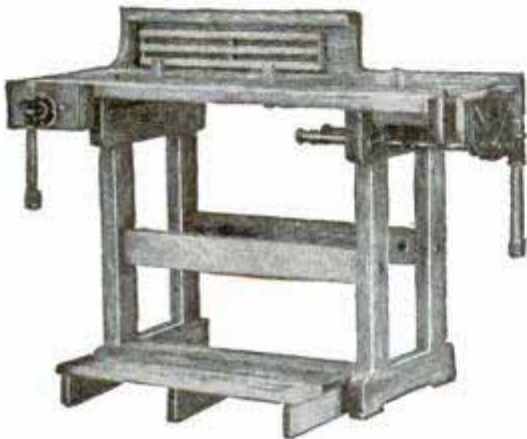


Fig. 31

Home Benches



No. 55

A good Bench is the first requirement
for the home shop.

Be sure you get the one with the
Saw-Cut Threaded Screw. Makes the
vise work easier and lasts much longer.

GET A CATALOG!

GRAND RAPIDS HAND SCREW CO.

146 South Ionia St.

GRAND RAPIDS, MICH.

**HYDROGEN GAS BALLOON RETAINS INFLATION
FIVE DAYS.**—A very interesting line of experiments have
recently been conducted by Prof. Carl E. Myers at his
balloon farm, nine miles east of Utica. They have in
view the better retention of hydrogen gas in balloon fab-
rics, the handling or decanting of hydrogen from one vessel
to another speedily without loss, and the operation of
captive balloons and airships for long periods, exposed to
all varieties of weather, good and bad. The extreme hot,
cold, rainy days, with wind and thunder storms of the
past few weeks, which wrecked farms and buildings
throughout this section, have been utilized to test the
balloons which have been exposed outdoors almost con-
stantly to whatever weather happened.

The extension of the use of captive balloons in the
army, to which Professor Myers has contributed over a
hundred, and the late attempts of the French and German
governments to make longer flights than two hours with
airships, have demonstrated the necessity of approved
methods for retaining hydrogen in balloon fabrics.

During the week of July 4 Professor Myers operated
his captive balloon, carrying hundreds of passengers, and
concluded with a cut loose voyage by himself and assist-
ant, landing an hour later, and anchoring till morning,
when the same balloon arose again, carrying Mr. and Mrs.
Myers, who made a 6-hour journey. This continuous use
of a hydrogen gas balloon during five days, both as a
captive and free, has never been equaled. Since July 6
this balloon and another like it have been almost con-
tinually inflated outdoors at the balloon farm, exposed to
all weather.

On Monday morning, July 29, a motor airship was sub-
stituted, with which, the same evening, Mr. Coughlin, of
Dayton, O., made several flights to learn its control, fol-
lowed by three cut loose trips above the balloon farm
plateau for practice. Tuesday evening the same airship
made several flights over the balloon farm grounds with
Mr. Coughlin, for further practice. Wednesday morning
the hydrogen from this airship was decanted into another
of exactly the same pattern, and Mr. Coughlin, who had
bought the former airship, left with it for Columbus, O.,
where he expects to use it for exhibition. Professor
Myers' latest airship remains anchored outdoors at the
balloon farm, exposed without harm to the rain and thun-
der storms which have prevailed since, which prove the
worth of this airship in all weather. Although these ex-
periments have been open, free to the public, none of the

(Continued on page 1142.)

THE BRAND "OHIO" ON A TOOL IS A SAFEGUARD



against inferior goods. "Ohio" Tools are the best money
and skill can produce. They have been on the market a
great many years and with the experienced
mechanic the brand "Ohio" has become
a synonym for "Quality."

They are decidedly economical from the user's standpoint, and well worth insist-
ing upon.

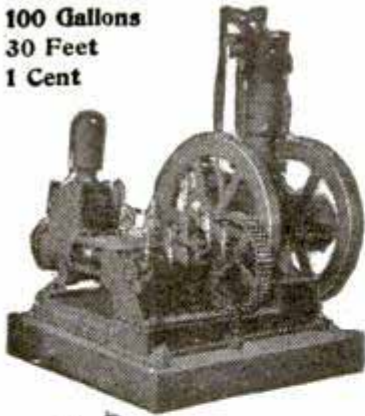
Every "Ohio" tool covered by a broad guarantee

Our complete Illustrated Catalog No. P may be had for the asking

OHIO TOOL COMPANY - COLUMBUS, OHIO



100 Gallons
30 Feet
1 Cent



Fairbanks-Morse Domestic Water Supply

Provides all the conveniences of city water works at moderate cost.

Gas, Gasoline or Kerosene Engines for all purposes from 2 h. p. up.
Cut out complete advertisement and send to

Fairbanks, Morse & Co.
Monroe Street, Chicago, Ill.

Please send me Illustrated Catalogue No. W 449 Gasoline Engines.

I may want.....h. p. to.....

Name..... Street No..... State.....
Town.....

BEWARE OF IMITATIONS

For the protection of our customers we advise that Klein's Pliers are being imitated, to look like Klein's. This, however, does not make them Klein's.

CAUTION Look for this stamp. M KLEIN & SONS, on the inside of handles—none are genuine without this stamp. Use only genuine Klein's. They are the product of years of experience and have stood the test of time.



Send 2c stamp for 60-page catalogue

MATHIAS KLEIN & SONS 96 W. VAN BUREN ST. CHICAGO, ILL.



Some of the people can be fooled some of the time, but most people who use Hack Saw Blades are not fooled long. After experimenting with various kinds, they usually settle down on the good old **STAR** brand which can be relied upon every time.

The Star is made in the right way, from the right stock, and does the right amount of work in the right time.

Send for Catalog C illustrating our full line.

MILLERS FALLS COMPANY
27 Warren Street NEW YORK

NEVER-LOSE RULE CLAMP

Where's my rule?
Another rule to buy



The Never-Lose Clamp is easily adjusted to fit any rule and is always ready to take or give up your rule instantaneously. Every mechanic should have one of these very useful articles, which we send to any address on receipt of 15 cents. **MONEY BACK** if dissatisfied with it.

State and County Rights for sale by our new plan. Write.

Mr. J. T. MOYER, :: Milford Square, Penna.

CUTS BAR IRON, SOFT STEEL QUICK

For Repairmen, Blacksmiths, Tanners, Machinists, and all Metal Workers who cut rods of soft steel or iron. A little wonder for strength, capacity, speed and durability.

"THE KID CUTTER"

is only 17 inches long and weighs only 75 pounds. Cuts bar-iron or soft steel 1 1/2 in. x 3/8 in. round and under. For descriptive circular and price, address

G. N. & H. S. KINGSLAND
Box 15, Keesville, N. Y.



"YANKEE" TOOLS

ARE WITHOUT EQUAL IN QUALITY OR EFFICIENCY IN PRACTICAL USE

RATCHET AND SPIRAL-RATCHET SCREW DRIVERS also DRILLS

ASK YOUR DEALER TO SHOW THEM

SEND FOR OUR "YANKEE" TOOL BOOK SENT FREE

NORTH BROS. MFG. CO.

PHILADELPHIA, PA.



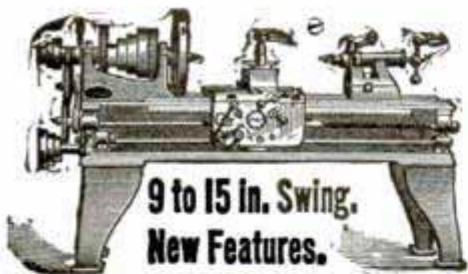
Armstrong's Hinged Vice

Slip the pipe in sideways *not* endways and save no end of time and trouble. Made of strong malleable iron, with finest crucible steel interchangeable jaws.

A vise like this will outlast two cheap vises and will not break at the time you need it most. Every shop needs one. Write for special circular.



The Armstrong Manufacturing Co.
Bridgeport, Connecticut



9 to 15 in. Swing.
New Features.

If It's a Sebastian, It's a Good Lathe

BUILT UPON HONOR—ACCURACY, EFFICIENCY, MODERATE PRICES.

Foot and Power Lathes, all sizes. Send for Catalogue.

Sebastian Lathe Company, 107 Culvert St., Cincinnati, O.

FOOT and POWER

AND TURRET LATHES, PLANERS
SHAPERS AND DRILL PRESSES ::::

SHEPARD LATHE CO.

A131 W. 2d St., Cincinnati, Ohio

When You Want Anything and
Don't Know Where to Find It,
Write Popular Mechanics.

Greatest of all Scissors
EIGHTEEN TOOLS COMBINED
AND EVERY TOOL
PRACTICAL
KEEN EDGE

6. Ruler	12. Hammer
1. Scissor	11. Penknife
7. Measure	14. Glass Cutter
8. Nail File	15. Glass Breaker
9. Screw Driver	16. Marking Wheel
2. Buttonhole Scissor	11. Cartridge Extractor
3. Gaspipe Tong	10. Cigar Box Opener
4. Cigar Cutter	17. Ink Eraser
5. Wire Cutter	18. Stereoscope

MUCH HANDIER THAN A KNIFE

Just the Article for Office men, Clerks, Bankers, Traveling salesmen, or the House wife.

Made of 1st quality of steel—fine workmanship—nicely finished. Nickel plated. Put up in elegant leather sheath.

AN EXCELLENT GIFT

Postpaid upon receipt of \$1.00

WM. C. HOCKING & CO., 152 Lake St., Chicago

BUSINESS OPPORTUNITY

Men of Business interested in a new field for making money will find in our proposition what they are seeking. We have a **New Plan** in the Mail Order Line that will please those seeking a good investment with large profits. **A Fortune** for the right person. **The F. H. Alden Co., 139 E. 4th St., Cincinnati, O.**

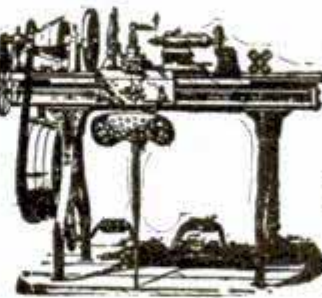
EMERGENCY PIPE CLAMP



To Repair Splits and Rust Holes in Pipes

Made of malleable iron, all sizes, 1/2 in. to 12 in. Send for CATALOG on Pipe Repairs.

JAMES McCREA & CO., M'rs.
63 Washington St., Chicago



LATHES

9 to 13 inch Swing

List price, \$65.00 and up according to size. When ready to buy send for Lathe Catalog and prices

W. F. & John Barnes Co.
100 Ruby St., Rockford, Ill.

passing events have been scheduled thus far, as their purpose has been simply for experiment or instruction, the balloon farm being the only institution in this country for this work.

Later—August 2, 1907.—The fierce storm of wind, rain and hail which struck the balloon farm this forenoon did no harm to the new airship, anchored to test its endurance. Not a puncture was made by the thousands of hailstones of all sizes dancing on and rebounding from the elastic envelope retaining the still more elastic hydrogen, not a particle of which was lost. Half an hour later the warming sunshine had re-expanded the contents which had been shrunken by the chilling storm, and the gas bag had now to be allowed more space within its netting to avoid possible rupture. This test is regarded as the most marvelous in this line of experience.

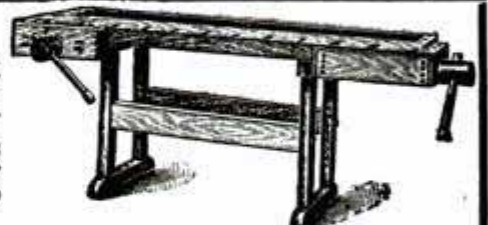
The nimble airship "No. 22," advertised for sale in Popular Mechanics for \$1,000, including complete hydrogen gas plant, was sold to Ohio parties by Carl Myers, after demonstration of its qualities by the purchaser in flights July 29 and 30. July 31 Professor Myers began creating his latest airship, "No. 23," completing it entire, including gas bag, net, car, motor and screw propeller, with rudder, August 15, and transported it with gas generating plant at a total expense of \$8 to Saginaw, Mich., where it was assembled on arrival and exhibited during the entire week of the Semi-Centennial Celebration on the open grounds daily, and made one cut-loose flight on the afternoon of Friday, August 23, in a wind blowing 18 1/2 miles per hour, all the wind previous to this having been not less than 20 to 30 miles during the entire week, and impracticable for airship flights.

The ascent was very hazardous because of closely surrounding electric wires of high voltage and high trees barring the exit to the leeward, which had to be mounted at a steep angle. Professor Myers made the ascent at 6:30 p. m., facing the wind and slowly drifting backward while expending all the force of a 7-hp. gasoline motor and screw propeller making 700 revolutions per minute. This did not interfere with the various evolutions executed at a height of about 300 ft. above the Saginaw

(Continued on page 1144.)

The Good Old Reliable Work Bench

That never gets out of style. For many years made exclusively by



C. CHRISTIANSEN, 792 Grand Avenue, CHICAGO

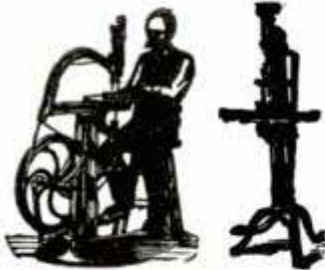
THE AMERICAN COMBINED LEVEL AND GRADE FINDER

Something Altogether New All progressive and up-to-date Mechanics, Machinists, Carpenters, Bricklayers, Masons, Plumbers, Millwrights, Road Supervisors, Track Foremen, Surveyors, Architects, Civil Engineers and others will find this an INDISPENSABLE INVENTION. A CIVIL ENGINEER THAT YOU MAY HAVE WITH YOU AT ALL TIMES.

The Most Practicable, Durable and Convenient Instrument of the Day

In addition to ordinary mechanical work the American Combined Level and Grade Finder will prove serviceable to all forms of grading, laying out roads, landscape gardening, placing of pipes for drainage, getting fall of water, getting grade of hills for automobilists, cutting of rafters, laying off and leveling buildings, getting height of any object, etc. Write for book of testimonials. Agents wanted on liberal terms. Apply at once to **EDWARD HELB, Railroad, Pa., Manufacturer**





Wood Working Machinery

Foot, Hand and Light Power

For ripping, cross-cutting, mitering, rabbeting, grooving, dadoing, boring, scroll and band sawing, edge moulding, beading, mortising, etc. Built for hard work, accurate work and long service. Send for catalogue "A."

SENECA FALLS MFG. CO. 102 WATER ST. SENECA FALLS, N. Y.



The "KICKDRIVE" is for driving all kinds of light machinery by foot power. The following articles are built complete with the "KICKDRIVE":

Circular Saws, Polishing and Buffing Machines and Forges.

Get a Booklet **MAYER SLOTKIN, 210-212 A Canal St., NEW YORK, N. Y.**

WRITE FOR Part Pay Terms

THE "IDEAL" HAND PLANER.

Ideal Machine Works
Brooklyn, N. Y.

A—Open Feed Grip
B—Automatic Feed
C—Tool
D—Vise or clamp
E—Sawed Sliding Bar
F—Vise, Separate

B. F. BARNES' ELEVEN-INCH SCREW CUTTING LATHE

For foot or power as wanted. Has power cross feed and compound rest. A strictly high-grade modern tool. We also build a 9-inch lathe. Descriptive circulars of each lathe upon request.

B. F. BARNES CO., Rockford, Ill.

EYE BENDERS

We make hand power benders for forming eyes from stock 1 1/4 inch thick and under. Any size eye, 7 inches outside diameter and under.

WALLACE SUPPLY CO.
19 S. Jefferson St. Chicago Illinois

ELECTRICIAN AND MECHANIC A finely illustrated monthly magazine publishing practical educational articles on all branches of electricity and mechanics. Complete directions and working drawings for making steam and gasoline engines, dynamos and motors, furniture, wiring instruction, wireless telegraphy, mechanical drawing, etc. Three months' trial, twenty cents. \$1.00 a year. Catalogue of electrical and mechanical books free. **P. M. Sampson Publishing Co., 6 Beacon St., Boston, Mass.**

LUFKIN TAPES AND RULES ARE THE BEST

FOR SALE EVERYWHERE SEND FOR CATALOG No. 26

THE LUFKIN RULE CO.
SAGINAW, MICH., U.S.A.
NEW YORK, LONDON, ENG., AND WINDSOR, CANADA

Just What You Need Lightning Wrench

Pipe and Nut Wrench, Screw Driver, Wire Cutter, Tack Puller in one tool

Ideal tool for mechanics, no adjustments. Works in places inaccessible with other wrenches. Strong and durable. Mailed postpaid. 6 inch nickel plated 38 cents, 7 inch 48c, 8 inch 58c, 12 inch 88c. Money back if not satisfactory. **SPECIALTY MANUFACTURING CO., JAMESTOWN, N. Y.**

THE OLD RELIABLE JESSOP STEEL

IS YET ON TOP AND THE VERY BEST FOR ALL FINE TOOLS

WILLIAM JESSOP & SONS, LIMITED
91 JOHN STREET, NEW YORK

STEEL BRASS BRONZE } BALLS BALL BEARINGS

"Knife" Pat.

1/2 in. Shaft and up. No fitting, just push them on. 10 cts. in stamps for sample.

PRESSED STEEL MFG. CO.
454 The Bourse, Phila., Pa.

Cement Machines

Big money in making Blocks or Bricks. Save money on your buildings. Write for circulars.

CHICAGO CEMENT STONE MACHINERY CO.
North Chicago, Ill.

HOW TO MAKE MONEY

Send today for our FREE book and descriptive matter telling all about the profits that can be made in the manufacture of concrete building blocks. With a **FRANCIS BLOCK MACHINE** any man of ordinary ability can make from \$5 to \$15 a day. No capital or experience necessary. Building blocks made with the Francis Machine under the Berlin System are guaranteed damp proof, frost proof, fire proof and will not crack or crumble. Contractors and builders in your town need your entire output. Write today.

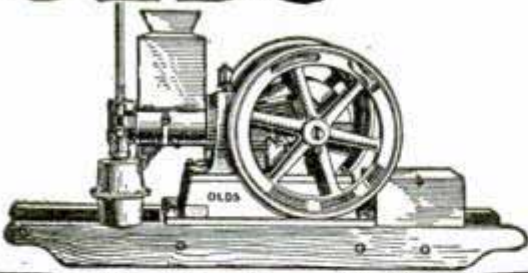
FRANCIS MACHINERY COMPANY
Room 40, 710 N. 8th Street St. Louis, U. S. A.

GASOLINE SOLDERING IRON AND BLOW TORCH

EMMELMANN BROTHERS MFG. CO., INDIANAPOLIS, IND., U. S. A.

PERHAPS YOU have never seen this unique tool. It's a regular time splitter—a great fuel saver; puts the heat right to the spot. There's no smoke, no ashes, no dirt; a well tinned iron, just the right heat. Loosen one screw you have a No. 1 Blow Torch. Get the Booklet; its free.

OLDS ENGINES



"Best by Every Test"

—U. S. Gov't Report

You take no risk in buying an Olds Engine, because you are protected by the strongest guarantee made by any engine maker.

It is the lowest priced good engine made by a factory 25 years in the business.

There is an agent near you to see that everything is right and kept so.

We have a liberal proposition to anyone wanting a good engine.

Be sure to write us about it before you buy elsewhere.

Send for our catalog showing Type A Engines, 3 to 8 h. p. and Type G 8 to 50 h. p. for gasoline or distillate.

OLDS GAS POWER CO.

Main Office, 955 Chestnut St., Lansing, Mich.

Boston—69-75 Washington St., N.

Binghamton—23 Washington St.

Philadelphia—1816 Market St.

Kansas City, Mo., 1226 11th St.

Omaha, Neb., 1018 Farnum St.

Minneapolis, Minn., 313 S. Front St.

"GET THE BEST"

which means

The Clipper Water Motor



We do not claim it THE CHEAPEST, but we do claim it THE BEST.

Buy one for the boy and watch him "get busy." Send for circular with full description and price.

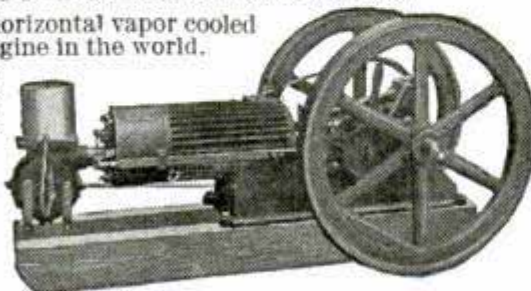
L. E. RHODES
HARTFORD, CONN.

WATERLOO VAPOR COOLED GASOLINE ENGINES

The only horizontal vapor cooled gasoline engine in the world.

Absolutely frost proof and cannot freeze.

Patented May 15, 1906



The king of all gasoline engines. Our catalog will tell you all about them, also our power and sweep feed grinders. Send today.

WATERLOO GASOLINE ENGINE CO.
1021 Cedar Street Waterloo, Iowa

—1½ H. P. \$58⁰⁰

Look at the Neat Design!

The finest little 1½ H. P. Engine on the market.

Handsomely finished.

Bore 3½ inches; stroke 3 inches.

These engines will develop over 2 H. P.

Write for Catalog "P" of 1½ to 16 H.P. Motors.



AMERICAN MOTOR CO. EAU CLAIRE, WIS.

(Continued from page 1142.)

river and the banks on each side, the river being crossed four times, and a landing safely found about six miles away at 7 p. m., where the airship was safely anchored under shelter of a high embankment until the wind went down and the full moon arose to light the return to Saginaw, where the airship easily resumed its former location at 11 p. m. while the carnival was still in progress. During Saturday the airship continued its exhibit in a fierce wind, fully inflated till late afternoon, when its gas bag was emptied and packed within a space of about 2 ft. square, its car forming another package 20 by 20 by 30 in., and its frame or keel 36 ft. long reduced by telescoping within itself to form a rack 8 ft. long by 22 in. triangular section, weighing only 32 lb. All left by rail Saturday, 6 p. m. train, arriving at Frankfort, N. Y., the following noon. These facts fairly represent the possibilities in practice with the new motor airship, "No. 23," "Skiddoo," and the eclipse of any previous feats in this line, in every way.

August 26 Professor Myers began operating his 4-man passenger airship as a captive, carrying passengers during the entire week, ending with a free flight September 2 at Sacandaga Park, Gloversville, N. Y.—Contributed by E. S. G., Frankfort, N. Y.

NEW CHEMICAL ENGINE FOR COAL MINE FIRES.

—The Delaware, Lackawanna & Western Railroad is using a new type of chemical engine to fight fires in its anthracite coal mines. It is mounted on a truck, which is of the same gauge as the system of mine tracks, and is hauled to wherever a shaft is on fire, by an electric mine locomotive.

When fighting a mine fire with water, suffocating gases are formed, which drive the firemen away from the flames. The chemicals of the new engine form very heavy gases, which cling to the floor and blanket the flames. These gases are not exceptionally annoying to the firemen, who can approach up to the fire line and thus do more effective work.

"QUESTIONS AND ANSWERS."—Sixth edition; size, 5x7 in. Contains all rulings of the American Railway Association on train rules and train orders and all questions on train rules and train orders used in examinations and their correct answers. It is a valuable book of reference.—Train Dispatchers' Bulletin, Toledo, Ohio.

Perfection

MARINE MOTORS

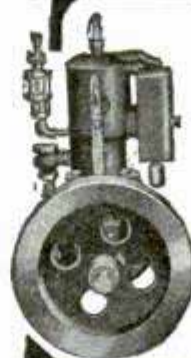
2 H. P. \$45

complete and better fitted and finished finer than any other at any price

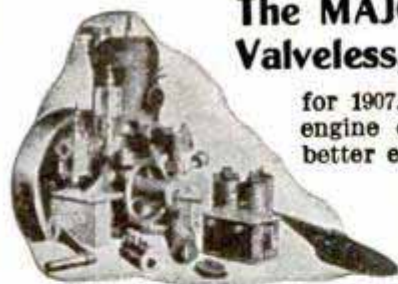
Reversible—No Cranking

No valves nor cams. Highest grade material throughout. Our broad GUARANTEE covers replacement of any engine that does not give complete satisfaction and is backed up by the largest and most complete factory in the business. Can you afford to take chances or buy on any other terms? Price includes everything ready for installing except gasoline tank and piping.

Handsome catalogue illustrating and giving all sizes FREE.
The Caille Perfection Motor Co.
1311 SECOND AVE., DETROIT, MICH.



The MAJOR Reversible, Valveless, Marine Engine



for 1907. $1\frac{1}{2}$ H. P., \$33.15, engine only. New features, better engine, stronger, more horsepower. MAJOR engine can be used for stationary work. We built and sold 5,000 engines last

year. We are building 10,000 engines this year, from $1\frac{1}{2}$ H. P. to 20 H. P. Write at once for our special inducement to one agent in each locality.

— Ask for new 1907 Catalogue —

Detroit Gas Engine & Machinery Co.
28 E. Congress Street, Detroit, Mich.

SKIDOO!

MARINE ENGINE

The 2-Cycle-Engine-Sensation of the Year. Entirely new and improved design introducing many exclusive features. Runs on Gasoline, Distillate, Kerosene or Alcohol.

Pats. Pend.



2 H. P. Engine \$23
COMPLETE ENGINE
With Fresh Water Boat Fittings, \$39.90
With Salt Water Boat Fittings, \$43.90

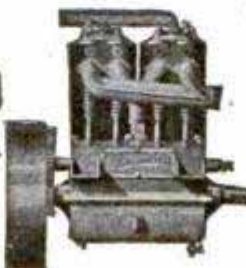
Swiftest, most powerful, efficient and reliable engine of its size on earth. Drives Canoe, Row-boat or 14 to 20 ft. Launch, with load, 6 to 10 miles per hour. Reversible, easy to install and operate, unfailing endurance powers, economical and FREE. safe, cannot back-fire. Sold under 5-yr. Guarantee.

Belle Isle Motor Co., Dept. 10, DETROIT, MICH.

MOTORS

For Marine and Vehicle Use

Williamson Motor Co.



$1\frac{1}{2}$ to 60 H. P. (Air and Water Cooled)

Experimental Work Solicited

8-12 S. 39th St., Phila., Pa.

REVERSIBLE MARINE ENGINES

$1\frac{1}{2}$ to 30 H. P.

Send for Catalog. Prices right.

TERMAT & MONAHAN CO.
Oshkosh, Wis.

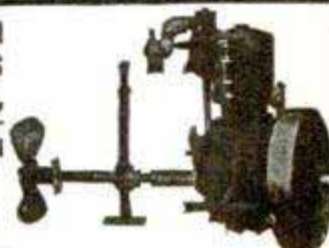


High-grade MARINE and AUTOMOBILE ENGINES

2 to 30 H. P. 2 and 4-cycle, latest improvements; best material; lowest prices. Also sell castings, with drawings.

State your want.

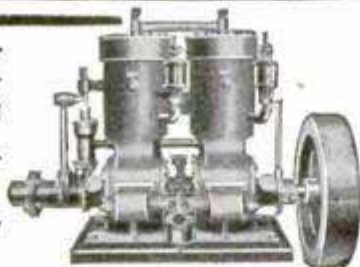
HOULE MOTOR WORKS,
580 East St., Holyoke, Mass.



The CROUCH MARINE MOTOR

The name signifies quality.
Ask for Catalog.

THE CHAS. P. CROUCH CO.
CHICAGO, U. S. A.

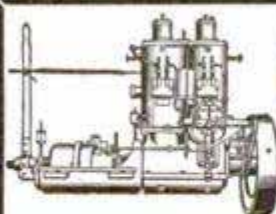


The ECONOMIZER carries any load up to 2 h. p.

That name means something. Five years' sales and not a single dissatisfied customer, means something. It's all in the engine—no shoddy goods. Want to know more?

Address,

H. L. CHAPMAN, Lock Box 595, Marcellus, Michigan



THE MIETZ & WEISS OIL AND GAS ENGINES

Stationary, 1 to 150 H. P.
Marine, 1 to 120 H. P.
Over 30,000 H. P. in operation.
GENERATOR SETS, PUMPS,
HOISTS, ETC.

A. MIETZ, 128-138 Mott St.
New York

SEND FOR CATALOGUE P. M.

THE VICTOR MARINE ENGINE

$1\frac{1}{2}$ H. P. up to 20 H. P.

The Engine you have been looking for; safe, sure and noiseless. A new and perfect model. Distinctly new and prominent features.

BUILT BY

R. S. HILL, 27 Woodbridge St., E. Detroit, Mich.



When You Want Anything and Don't Know Where to Find It,
Write Popular Mechanics.

Gies Reverse Gear

Successor to the reversible propeller Solves the Reversing Problem.

Gives absolute control of the motor-boat at all times.
1 to 80 H. P.—\$15 to \$90.
More made and sold than all other reverse gears combined.
Catalogue on request.

GIES GEAR COMPANY, Detroit, Mich.



GEARS

INTERNAL and EXTERNAL of all kinds

Ask for Catalog

Grant's "Treatise on GEARS" a dollar

Philadelphia GEAR Works, Inc.

7th and Cherry Sts. :: :: Philadelphia

DON'T BUY GASOLINE ENGINES

Until you investigate "The Master Workman" a two-cylinder gasoline, kerosene or alcohol engine, superior to any one cylinder engine; revolutionizing power. Its weight and bulk are half that of single cylinder engines, with greater durability. Costs Less to Buy—Less to Run. Quickly, easily started. Vibration practically overcome. Cheaply mounted on any wagon. It is a combination portable, stationary or traction engine. SEND FOR CATALOGUE.

THE TEMPLE PUMP CO., Mfrs., Meagher and 15th Sts., Chicago. THIS IS OUR FIFTY-THIRD YEAR

Copy-
righted,
1906, by
A.
Rosenberg



OPERATED BY WATER from Ordinary House Pipes

Motors for every conceivable purpose, adjustable every way while running to tighten belt

For Household use, for Sewing Machines, Washing Machines, Churns, Egg Beaters, Coffee Mills, etc. For Jewelers, Bakers, Butchers, Barbers, Blacksmiths, Druggists, Dentists, Physicians and *everybody who wants to save time and LABOR*. Circulars gratis. Copyrighted booklet 10 cents. Agents wanted.

Send for prices

A. ROSENBERG MOTOR & MFG. CO., Dept. PM, BALTIMORE, MD.

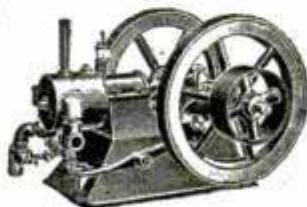


No Better Gas or Gasoline Engines made than the

FOSS ENGINES,

Simple, Substantial, Efficient. Catalog on request.

Foss Gasoline Engine Co., Kalamazoo, Mich.



\$49 Little Giant

3 to 5 H. P. (BARE)

GASOLINE MOTORS

Guaranteed for One Year.

Our Free Catalog C4 is worth your having.

Send 10 cents in stamps for our book "Ignition, Vaporization, Installation and Operation of a Motor."

UNITED MFG. CO., DETROIT, MICH.



BUILD YOUR OWN MOTOR!

Complete sets of Castings, with blue print working drawings, for your Auto, Launch or Motor-Cycle Engine.

Our Remarkable Offer!

6-Actual Brake Horse Power—2 Cycle—3 Port Engine. \$100 complete with accessories. IT'S GUARANTEED! We sell Blue Print Working Drawings—2 or 4 Cycle. Send for Catalog.

THE GEBHARDT MOTOR CO.

27th Street, above Dauphin, Philadelphia, Pa.



GOES LIKE SIXTY
SELLS LIKE SIXTY
SELLS FOR SIXTY

\$60

GILSON
GASOLINE
ENGINE

For Pumping, Cream Separators, Churns, Wash Machines, etc. FREE TRIAL

Ask for catalog—all sizes

GILSON MFG. CO. 20 Park St. Port Washington, Wis.



If your water pressure is 25 lbs. or over, buy a **WATER MOTOR, 5-in., \$2⁵⁰**

Larger Sizes Proportionately Low

Attach to any faucet, and will run fan, lathe, sewing and washing machine, air compressor, etc., etc. Reliable agents wanted.

A **SAMPLE MOTOR FREE**

to the right person in each town. Write for terms, stating water pressure.

ENGINEER WANTED

to send for catalog of Indicators, Reducing Wheels, Planimeters, Address,

LIPPINCOTT M. S. CO.,

Newark, :: :: New Jersey



THE PROPHET NAHUM AND THE MOTORCAR.—A German humorist quotes Nahum I., v. 4, in support of his contention that the appearance of the motorcar is prophesied in the Bible. The verse in question runs as follows: "The chariots shall rage in the streets, they shall jostle one against the other in the broad ways; they shall seem like torches, they shall run like lightnings." There seems to be a touch of motorphobia about the Elkoshite, judging by the former part of his prophecy, but he gets home tolerably well in the latter half.—Motor, London.

SAFE FERRY SERVICE.—It is estimated that during the forty years of regular ferry service across San Francisco Bay that 300,000,000 passengers have been carried. During this time but three lives have been lost. The monthly average of passengers now being carried is above the 2,000,000 mark.

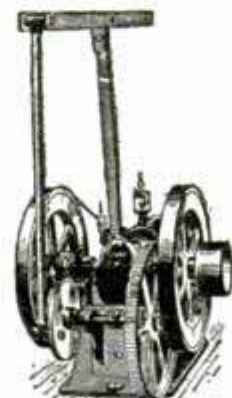
LIFE-SAVING BOATS.—In all its varieties of boats larger than ordinary skiffs and rowboats, which are not enumerated, the life-saving service has 686 in commission. Two hundred and seventy-seven are open surf boats, 254 self-baling surf boats, 72 self-baling and self-righting life-boats with centerboards, sail and oars; 49 district and station supply boats, 7 self-baling and self-righting life-boats propelled by gasoline, sails and oars, 7 power surf boats, 8 other power boats of various kinds and 2 floating stations.

SAYS GYROSCOPE WILL WORK.—I notice an article on gyroscopes in the September number (page 993) which is evidently a mistake. In the first place, gyroscopic action does not depend on centrifugal force, but on inertia and it will resist any force (either oscillating or revolving) which tends to disturb its plane of rotation.

Twenty years ago the gyroscope was successfully applied for taking astronomical observation at sea and anyone may easily observe its action by trying to change the plane of rotation of a rapidly revolving bicycle wheel. It will be found that a wheel revolving in a horizontal plane cannot be turned so as to revolve in a vertical plane without expending considerable strength. The lower end of the shaft may be a fixed bearing or not, but the results will be the same.—E. W. Davis, Chicago.

ENGLAND'S GIANT CRUISER.—The British armored cruiser "Invincible" was recently launched at Elswick shipyard. It is one of a trio of the largest cruisers in the world. Their displacement is 17,250 tons and their length 530 ft. A speed of 25 sea miles per hour will be obtained by the use of turbine engines. The armament is very heavy, including four 12-in. guns. Strict secrecy about the details of this vessel were observed, by orders of the admiralty.

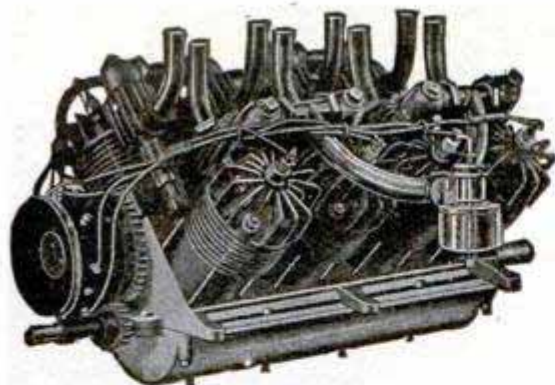
HORIZONTAL AIR-COOLED MOTORS



1½ and 2½ H. P. Equipped with short connection for spray pump or walking beam attachment for pumping from wells. Will work against 150 lb. pressure. Gasoline in base of engine or outside. Write for agency.

AIR-COOLED MOTOR CO., LANSING, MICHIGAN.

Airship Motors and Engines for Mechanical Devices



30 HORSE POWER, 8 CYLINDER
WEIGHT 150 LBS.

Where light weight and great power are required. 3½ to 40 horse power air cooled motors. Larger motors to order. Send for Catalogue C. Our motors have been adopted by the United States War Department.

G. H. Curtiss Manufacturing Co.
Hammondsport, N. Y.

The Pathfinder \$1 A YEAR
EVERY WEEK
THE NATIONAL NEWS REVIEW.

YOU want **The Pathfinder** of Washington, no matter what other periodicals you may read. It is "different"—sprightly, informing, inspiring, entertaining, yet dignified and sane. No axe to grind. A non-partisan illustrated weekly from the Nation's Capitol for the Nation—15th year of steady growth. Send \$1 for 1 year. Or test it 13 weeks for 25c.

THE PATHFINDER, Washington, D. C.

Write to-day.

Catalog free with full information.



Motsinger Auto-Sparker

Starts and runs
GAS ENGINES WITHOUT BATTERIES

No other machine can do it successfully for lack of original patents owned by us. No twist motion in our drive. No belt or switch necessary. No batteries whatever. for make and break or jump-spark. Water and dust-proof. Fully guaranteed.

MOTSINGER DEVICE MFG. CO.
128 Main St., Pendleton, Ind., U. S. A.

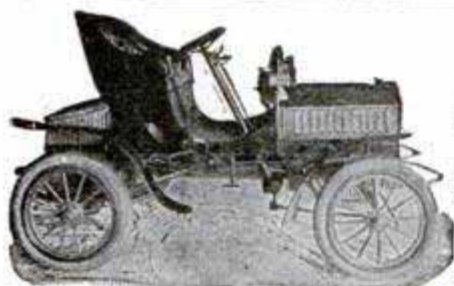
IT'S THE SERVICE
YOU GET OUT
OF AN ENGINE
THAT COUNTS

Stover Motors



Easy to start. Develop full power. Run quietly and smoothly. Nothing "trappy" in their appearance. Nothing complicated. Not a "cheap" motor, but a low priced one. Write for catalogue and prices to
STOVER MOTOR CAR CO.,
Freeport, Ill.

2 cycle
3 port
4 6 8 and 12 H. P.



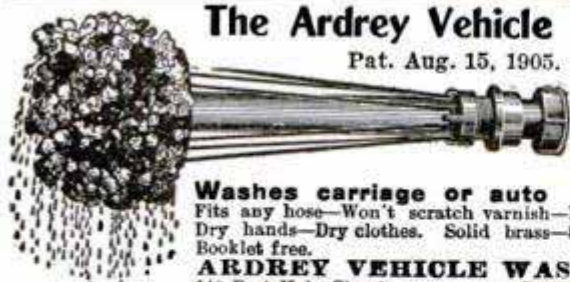
AUTOMOBILES \$100 AND UP

We will mail our large Illustrated Bargain Sheet of new and slightly used Automobiles on receipt of your name and address. This sheet shows accurate photographic views of more than 50 Automobiles offered as low as \$100. Write plainly to

H. GRAHAM AUTOMOBILE CO.
Established 14 years. 601-603-605 Madison Street, CHICAGO, ILL.

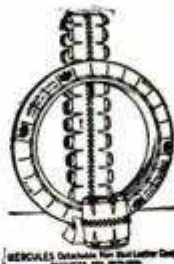
The Ardrey Vehicle Washer

Pat. Aug. 15, 1905.



Washes carriage or auto perfectly. Fits any hose—Won't scratch varnish—No splashing—Dry hands—Dry clothes. Solid brass—\$3.00 Prepaid. Booklet free.

ARDREY VEHICLE WASHER CO.
140 East Main Street ROCHESTER, N. Y.



"Hercules Detachable Cover"

The most wonderful invention in the Automobile Tire Industry. Agents wanted everywhere. This is a big seller. Territory being rapidly taken. Write today for booklet and prices. Special inducements to dealers and supply houses.

THE REPUBLIC RUBBER TIRE & SHOE CO.
449-451 West 53d Street, N. Y. City

TRY YOUR



"Rich Spark" Plug

COMPLETE ELECTRIC LIGHT PLANTS.

Richardson Engineering Co.,

You will not regret it. Highest Grade. Every Plug Guaranteed.

CIRCULARS FREE.

PRICE \$ Riverside Place, Hartford, Conn.

THE TURNER BRASS WORKS

SYCAMORE, ILL. CHICAGO, ILL.

Manufacturers of Marine Hardware and Motor Boat Specialties. Sole Manufacturers and Licensees of Harroun Auto Bumpers, Martin Alarm and Reserve Valves, Martin Gasoline Separator and Strainer. Write for Catalogue No. 28, Dept. I.





SAVE 30% TO 100%

Save Your Burnt-Out Electric Fuses



Have them refilled by us, thereby saving on the cost of maintenance of your Electric Lighting or Power System. Repetition orders are a pretty good indication that we satisfy our customers. Can we not interest you? We take orders large or small. It makes no difference what the number of fuses in any one capacity you have, whether it be only one fuse of one capacity or fifty of another, we take them in any quantity making up an order. Give us a trial.

E. W. SNOW & CO., Office and Factory: 187 West Ave., Rochester, N. Y.
 SEND FOR CATALOGUE No. 7, JUST OUT.

Current When You Want It



You can have ignition current for your automobile or motor boat at any time for starting, running or reserve by installing an **Apple Battery Charger**. Attached to fly-wheel of engine, it generates enough current to keep storage batteries always charged and to maintain electric lights. Specify this outfit on your automobile boat and stationary engine.

THE DAYTON ELECTRICAL MFG. CO., 179 St. Clair St., Dayton, O.

READ DR. DYKES' BOOKS ON AUTOMOBILES PRICES REDUCED

DR. DYKES' "DISEASES OF A GASOLINE AUTO AND HOW TO CURE THEM." 225 pages, fully illustrated. Price **\$1.00**

DR. DYKES' "ANATOMY OF THE AUTOMOBILE." 750 pages, fully illustrated. Shows different type of cars and how to operate them. Price **\$1.50**

If both books are bought at once, price for both... **\$2.00**

The Phoenix Auto Supply Company
 3392 OLIVE STREET, ST. LOUIS, MO.



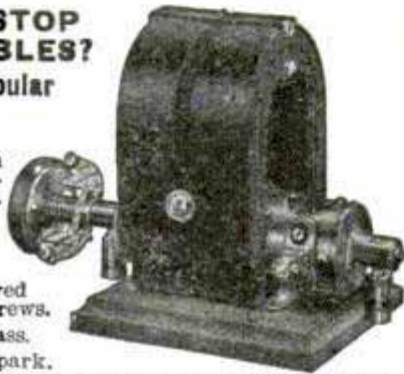
WHY NOT STOP YOUR TROUBLES? A "Wizard" Tubular Does It.

Armature incased in **WATER-PROOF** non-corroding brass tube.
 All brass screws.
 Friction, Belt or Governor drive.

Brush holders removed without loosening screws.
 All parts polished brass.
 Contact and Jump Spark.

A TRIAL WILL CONVINCE YOU.
 Most popular and satisfactory Magneto on the market. Price as popular as machine. Governor does away with Batteries and Switches.

HERCULES ELECTRIC & MFG. CO., INDIANAPOLIS, IND.
 30 DAYS' FREE TRIAL. 724 Langsdale Ave.



Eldredge Battery Volt-Meter

Reading 0 to 3 Volts in $\frac{1}{10}$ Divisions

A convenient and practical instrument for those who use Primary and Storage Batteries. Its range will cover two cells of primary or one cell of storage battery; is **DEAD BEAT** in its readings. Non-removable nuts on strong contact posts.
 Price **\$4.**

ELDRIDGE ELECTRIC MFG. CO., Springfield, Mass.



A WEST INDIAN SHARK STORY.—According to a letter received from a young sailor at St. Thomas, in the West Indies, the harbor there is troubled with the presence of a number of sharks which, except in shallow water near the shore, are a hindrance to bathing, which is deemed necessary during hot weather. Two negroes were recently devoured by sharks, and the engineer of an American training ship anchored at St. Thomas hit upon the idea of killing the sharks by means of dynamite. Accordingly an iron fishing hook was baited with a 5-lb. piece of bacon in which was concealed a dynamite cartridge, which was connected with electrical conductors and an igniter. The bait was lowered into the water by a strong rope, and the other end of the wires connected to a battery. It was not long before a shark 12 ft. long made its appearance at the stern of the ship, when it turned on its back and the bait was swallowed. The shark killer switched on the current, and at the same moment the dismembered pieces of the animal flew into the air with a column of water. In ten days no fewer than eight large sharks were destroyed in this manner. Encouraged in this way the engineer endeavored to kill the animals by electric shock. A thin cable, which was capable of being connected with a lighting circuit on board the vessel, was got ready with the hook at one end, and having the usual form of bait which was lowered into the sea. The other end of the cable, according to the story, was placed in connection with the dynamo. A large shark soon pulled at the hook, and a current at 200 volts was sent through the cable, but this only made the animal lash the water with fury. It was possible to raise the pressure to 750 volts, and when this had been done the shark shot out of the water almost vertically, and then fell down motionless and dead.—Elec. Review, London.

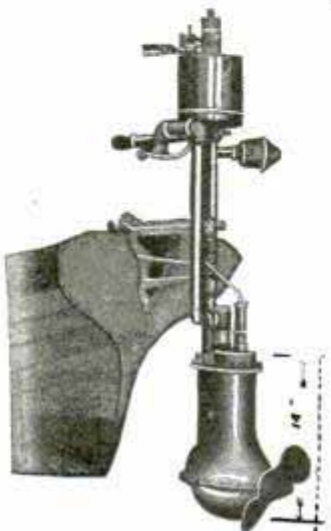
New Portable Gasoline Submerged Propeller

Lightest, most practical, easiest applied (and most powerful for weight), 4 cycle Gasoline Motor Propeller in existence. Can be attached and detached to any boat in a moment, and can be raised or lowered to run in shallow water when necessary. When in operation the engine is entirely submerged, the water in which it operates forming the cooling jacket, which is a most effectual one. It is fully $1\frac{1}{4}$ H. P. and will propel a 16-foot boat at a speed of about 7 miles per hour. Can be operated easily by any boy or girl and run for 1 day with 1 gallon of gasoline, but the tank on engine holds only enough for a little over a half day's run.

Write for Catalogue "L" for full description and price.

SUBMERGED ELECTRIC MOTOR CO.

L. W. PIETSCH, Gen. Mgr. MENOMONIE, WIS.
 Chicago Office, 1229 Michigan Ave.



Everybody is Talking!

About the **"DOLLAR"**

WET or DRY

"LIVELY AS A KITTEN!"

Storage Battery

E. VAIL CHURCH
368 Livingston St., Brooklyn, N. Y.

For sending Wireless Messages any great distance, use our **No. 470 Induction Coil** which gives 3-inch Powerful Spark on six dry cells.
Price, complete, \$30.00
NEW ENGLAND COIL WINDING CO., Atlantic, Mass.

EVERYTHING FOR THE AUTOMOBILE

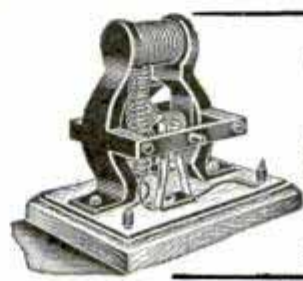


INVENTORY FLYER NO. 17

(Just Issued, Write for it)
\$25,000.00 OVER STOCK

Automobile Parts and Supplier Knifed
NEUSTADT AUTOMOBILE & SUPPLY CO.
3954 Olive Street, St. Louis, Mo.

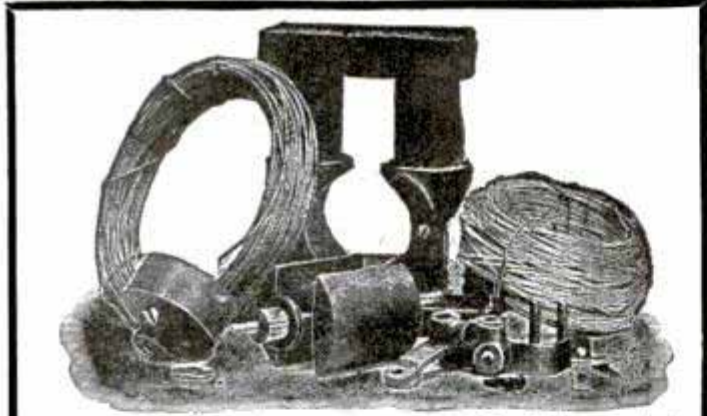
MORE MONEY FOR YOU



THE White Eagle Electric Motor
Postpaid, 75c

We make working models of inventions. Send for illustrated catalogue of Model Supplies.

The Pierce Model Works
134 Pierce Avenue Chicago, Ill.



BUILD YOUR OWN DYNAMO. We furnish complete sets of castings. Also Electric Railways, Trolley Cars, Track and Switches. Send for Catalogue "B."
THE GARLISLE & FINCH CO., 262 E. Clifton Avenue, CINCINNATI, OHIO

Automobile Rechargeable Dry Cell Battery

Battery the Strongest and Longest Life Fat Spark Generator made, can be easily and quickly recharged many times . . .

PRICE 75 CENTS EACH

The Railway Safety Service Co.

2d Floor Front, Besse Building

SPRINGFIELD, - MASS.



98¢ FAN MOTOR COMPLETE

This electric fan is substantial and practical in all details and nicely finished, fan is removable so motor may be used separately. We furnish extra grooved pulley with each. We are Cut Price headquarters for everything electrical. Send for large free catalog. Dealers wanted everywhere.

THE VIM 68 LAKE ST. DEPT. E 19 CHICAGO



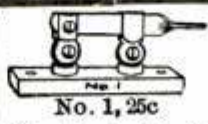
BATTERY FANS

A big bargain! We have left over this season a few P. & W. Fans, and will sell them at \$4 each, complete, as shown in cut (former price \$7). This motor is strictly first-class and carries a 9-inch fan, which gives fine breeze on 2, 3 or 4 cells dry battery. Better send \$4 and get in on this bargain before it is too late!
Parsell & Weed, 129 W. 31st St., N. Y. City



"Quick Action" IGNITING DYNAMOS and MAGNETOS

The most Reliable Sparkers on the Market.
Take the Place of Batteries



"Quick Action" BATTERY SWITCHES

Discount to Trade



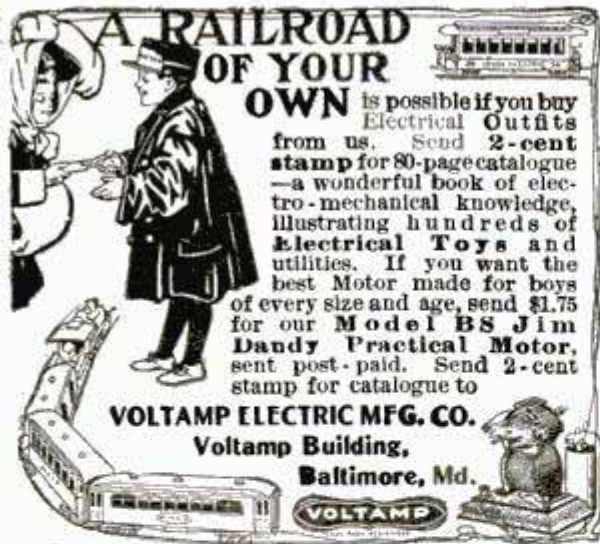
Jump Spark Coils FOR ALL PURPOSES

Single, Double, Triple and Quadruple for Stationary Engines and Automobiles. Guaranteed in every particular. Fine Vibrator.

SEND FOR CATALOGUE D.
The Knoblock Heideman Mfg. Co.
SOUTH BEND, IND.

A RAILROAD OF YOUR OWN is possible if you buy Electrical Outfits from us. Send 2-cent stamp for 80-page catalogue—a wonderful book of electro-mechanical knowledge, illustrating hundreds of Electrical Toys and utilities. If you want the best Motor made for boys of every size and age, send \$1.75 for our Model BS Jim Dandy Practical Motor, sent post-paid. Send 2-cent stamp for catalogue to

VOLTAMP ELECTRIC MFG. CO.
Voltamp Building,
Baltimore, Md.



THE SEALED BONNET MAXWELL CAR which has just accomplished the great run of 5000 miles without a single adjustment was equipped with a

SPLITDORF COIL C. F. SPLITDORF
261-5 Walton Ave., New York

The Coil of unequalled Reliability and Economy

Ask Dept. M, for Catalog

\$1.00 THE "READY" Draughting Instrument combines Compass, Protractor, Rule, Square, etc., all in one, and you can carry it in your vest pocket. Made of special grade of aluminum. Send for it now. You need it. Money returned if you aren't pleased.

READY MANUFACTURING COMPANY
604 Livingston Bldg. Rochester, N. Y.

Graduated in
10ths or 20ths

MAKE A MOTORCYCLE OF YOUR BIKE



at small cost by using our Attachable Outfit. It fits any bicycle. Send stamp for catalog. Send 15 cents for "The Motorcycle Manual." It treats of the motorcycle; how to get more power, etc.

SHAW MFG. CO., Dept B, Gatesburg, Kan.

A MOTOR-CYCLE OR LAUNCH



at SMALL COST by using one of our Attachable Outfits. A complete line of Finished Motors and Rough Castings for Bicycle, Auto-Marine or Stationary. Send stamp for catalogue.

STEFFEY MFG. CO.
Girard Ave. & 30th St., Philadelphia

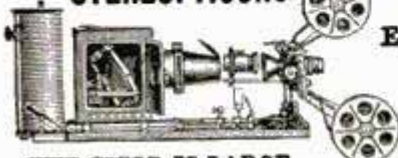


ACCURACY Not guess work with a patented **LEMON MEASURING-CALIPER**. Meets the requirements of and exceeds the limits of all other calipers. The only instrument for reaching over and measuring inside of reinforced edges or heavy rims. Sold Direct—Ask for Description and Price.

THE WEST MFG. CO., Columbus, O.
(Note—If you have a Patented Article to manufacture, write us.)

MOVING PICTURE MACHINES

STEREOPTICONS



You Can Make **BIG MONEY** Entertaining the Public.

Nothing affords better opportunities for men with small capital. We start you, furnishing complete outfits and explicit instructions at a surprisingly low cost.

THE FIELD IS LARGE

comprising the regular theatre and lecture circuit, also local fields in Churches, Public Schools, Lodges and General Public Gatherings. Our Entertainment Supply Catalogue and special offer fully explains everything. **Sent Free.**
CHICAGO PROJECTING CO., 225 Dearborn Street, Dept. 4 Chicago.

EUGENE DIETZGEN COMPANY

181 Monroe Street, CHICAGO
214-220 E. 23d St., NEW YORK

SAN FRANCISCO



NEW ORLEANS

Most complete line of
**Drawing Materials and
Surveying Instruments**

Our Rapid Printing Blue Print Paper has no equal. The Celebrated Vandyke Solar Paper for Blue and Black line prints. Send for sample prints.

ALL GOODS WARRANTED

WRITE FOR CATALOG "P"—480-pp, PROFUSELY ILLUSTR'D.

Electric

SUPPLIES, TELEPHONES
NOVELTIES. Catalog of 200
Free. If it's Electric, we have
it. Big Catalogue 4 cts.

OHIO ELECTRIC WORKS, CLEVELAND, OHIO.
The World's Headquarters for Dynamos, Motors, Fans, Toys, Batteries, Belts, Bells, Lamps, Books. WE UNDERSELL ALL. WANT AGENTS

MECHANICAL PUZZLE PICTURES

NO. 2.—This is not a rack for holding bottles of wine, although it can be carried about by the handle. It is quite popular in England at present. No prize is offered for correct solution, but the answer will be given next month.



ANSWER TO NO. 1.—Electric lamp for photographers.

Advertisers in our Classified Section get RESULTS.

Dynamo - Motor, \$3.50

[A Dynamo and Motor in One]

As a dynamo it will light four 6-c.p. lamps easily; operate induction coils; charge storage batteries; decompose water; electroplate, etc. As a motor it will operate sewing machine, jewelers' lathe, emery wheel, circular saw, advertising devices, and other useful appliances.

New Model Motor, 65c, postage 20c. A fine new motor at a bargain. Send stamp for new catalog.

ARROW ELECTRIC CO., 103 S. Canal St., Chicago, Ill



How to Judge Investments

Before you invest a dollar in anything, send for my book "How to Judge Investments."

This book tells you about everything you should know before making any kind of an investment, either for a large or small amount.

It tells how you may safely start on the road to wealth.

It explains the growth of capital and how small investments have brought wealth and fortune to others.

It tells how others have grown rich.

It tells how to select a 5 or 6% security.

It explains how an investment in a development enterprise may pay profits equal to 100%, 200% or even 500% on the money originally invested.

Stocks and bonds, both listed and unlisted, real estate, investments of different kinds and financial matters are fully described in simple language.

This book gives good, sound advice and will help you to invest your surplus earnings (if only a few dollars a month) in securities that promise the best possible returns.

A financial critic says of this book, "It is the best guide to successful investing I ever read."

The regular price is \$1.00, but to introduce my magazine, the "INVESTOR'S REVIEW," I will send the book postpaid on receipt of a two-cent stamp and in addition will send you the Review for three months free.

The Investor's Review is of interest to all persons who desire to invest their money safely and profitably. Address Editor,

INVESTOR'S REVIEW, 461 Gaff Bldg., Chicago, Ill.

POSTAL SCALE \$1.00

Tells at a glance postage in cents on all mail matter. Capacity, 1 pound by half ounces, 3 inches high. Cuts down the stamp bill. We make several styles for the office, store and large business houses, as well as the individual desk. All leading dealers sell them.

Catalogue P free, showing 12 styles.
PELOUZE SCALE & MFG. CO.
132 W. Jackson Boulevard CHICAGO



Plumbing Supplies

AT WHOLESALE

If you need anything in my line, and wish to

Save Money

on every article, write for my free illustrated Catalog. Shipments promptly made from a very complete stock of new latest pattern goods. Small orders are as carefully handled as large ones.

B. P. KAROL, 235 W. Harrison St., Chicago, Ill.

IF you are interested in any kind of a Firearm, write for our beautiful "Gun Guide and Catalog" for 1907. It's **FREE**

Gives more points on guns than any catalog published. Gives best prices and most complete line.

THE HOPKINS & ALLEN ARMS CO.
32 Chestnut St., Norwich, Conn., U. S. A.

How I Grew Tall

A Startling Story Which Will Interest All Who Are Short

The Height of Either Sex Can Quickly Be Increased from Two to Five Inches — These Marvelous Results Can Be Accomplished at Home Without the Knowledge of Your Most Intimate Friends

THE FREE BOOK TELLS YOU ALL ABOUT IT



MR. K. LEO MINGES.

Inventors, scientists and physicians have for years been trying to find some method whereby the height of an individual could be increased, and up to the last few years have met with failure. It remained for a comparatively young man, Mr. K. Leo Minges by name, to discover what so many others had failed to do.

Mr. Minges resides in Rochester, N. Y., and has devoted the best part of his life in studying and experimenting on the Cartilage, and his great efforts have at last been crowned with success. A large company, composed of Rochester's leading citizens, has been formed for the purpose of placing Mr. Minges' discovery and inventions before the public, so that now it is possible for any lady or gentleman who is short to increase her or his height from two to five inches. These results are absolutely guaranteed.

Mr. Minges has successfully used his method on himself, and has grown from a short, stunted boy to a handsome, robust man of six feet one inch in height. Thousands of people living in all parts of the world are using his method with equally as startling results. Let us send you the absolute proof of the above statements. We have just issued a beautifully illustrated book, entitled "How to Grow Tall," which contains information that will surprise you. Ten thousand of these remarkable books will be given away absolutely free of charge in order to introduce them. If you fail to receive a copy, you will always regret it. This great book tells how Mr. Minges made his wonderful discovery. It tells how you can increase your height and build up the entire system. It contains the pictures and statements of many who have used this method. After you receive this book you will thank us the longest day you live for having placed within your reach this great opportunity.

Remember, a postal card will bring it to your very door, all charges prepaid. All correspondence strictly confidential, and sent in plain envelopes. If you wish a free copy of this book and the proof of our claims, write to-day. Address The Cartilage Co., 19A Unity Bldg., Rochester, N. Y.

EVERY INVENTOR

Who Wants to know

1. What are the most profitable inventions,
2. How to perfect inventions,
3. The first step to take in getting a patent,
4. How to protect himself from parties who might steal his invention before he can get a patent
5. How to find out what patents have been granted on inventions like his, or intended for the same purpose.
6. How much it costs to get a patent,
7. How long it takes to get a patent,
8. What protection a patent is,
9. How he can sell his patent after he obtains it
10. How to handle his patent to get the most money out of it,
11. Where and at what expense he can have working drawings made of his invention,
12. Where and at what expense he can have models or experimental machines made,

should send his questions to

**POPULAR MECHANICS PATENT
BUREAU,**

Journal Bldg. - - Chicago, Ill.

Patent What You Invent



Your ideas may bring you a fortune if properly introduced.

Our three books mailed free.

"U. S. LETTERS PATENT" gives full information in patent matters.

"THOUGHTS THAT PAY" gives list of what to invent.

"THOUGHTS THAT HAVE PAID" gives history of successful inventions.

Write for them.

\$1,000,000 offered for one invention! No charge for report as to patentability; send sketch or model.

Patent obtained or fee returned.

Patents advertised for sale, free.

WOODWARD & CHANDLEE

PATENT ATTORNEYS

1255 F Street, WASHINGTON, D. C.

INVENTIONS HOTEL MEN WOULD WELCOME.—The Hotel World, the organ of the hotel keepers, gives a list of inventions which are much needed in that business:

A noiseless elevator.

Dishes that will not chip.

Door keys that will resist kidnapping.

An electric light that can be turned low.

Carpets which, like oriental rugs, do not fade.

Water closet door lock that doesn't destroy itself.

A range that does not burn out or warp when red hot.

A brass bed finished so that it will not tarnish nor discolor.

A door that neither swells in summer nor shrinks in winter.

A varnish for woodwork that will withstand washing with water.

A faucet for hot water that does not sooner or later become leaky.

A gas mantle that does not need to be replaced every few weeks.

A window screen that can be left in place all winter without rusting out.

A better and more durable finish for hardwood floors than varnish or wax.

Inkstand and ink for writing tables in which the ink does not evaporate or dry up.

A dining room floor that is not slippery, is easily cleaned, durable, and looks well.

A window shade that will always wind up straight and not run toward the end of the roller.

A substitute for lace curtains; something that is less expensive, will wash better, and look just as good.

An automatic radiator air valve that is reliable and does not condense water and run it on the carpet.

A fastener for hanging pictures to the wall without marring it and without the use of picture molding, hooks or wire.

A practical machine for cleaning tile floors where one person would displace the woman scrub corps now employed.

A machine for carrying soiled dishes from the dining room in a noiseless and invisible manner to the scrap table and dishwashing department.

Some kind of finish for the walls of hotel rooms that can be washed or cleaned and always look as good as new, in place of calcimine, paint and paper now used.

Special Machinery and Models

We make Models, Perfect Inventions and Experimental Machinery. Our shop, with its splendid equipment, is at your service. When you are ready to have that model or experimental machine made, send us drawing or sketch and write us for estimates.

**Empire Machine Works, 210 3d Avenue,
PITTSBURG, PA.**

PATENTS PROCURED

OR NO FEE CHARGED

AMPHLET FREE
PROMPTNESS ASSURED

WRITE US IF YOU WANT RESULTS

COCHRAN & CO., 907 G Street,
WASHINGTON, D. C.

Room 40. Endorsed by 50 Members of Congress

PATENTS

SECURED PROMPTLY and with special regard to the Legal Protection of the Invention.

HAND BOOK FOR INVENTORS AND MANUFACTURERS SENT FREE UPON REQUEST.

Consultation Free. No charge for opinion as to the patentability and Commercial Value of Inventors' Ideas.

HIGHEST REFERENCES FROM PROMINENT MANUFACTURERS

C. L. PARKER, PATENT LAWYER

Patents, Caveats, Trade Marks, Copyrights, Validity Reports, Interference Contests
Patent Suits Conducted in All States

REFERENCES:—Globe Machine and Stamping Co., Murray Engineering Co., Morgan Machine and Engineering Co., Berkshire Specialty Co., Stewart Window Shade Co., Macon Shear Co., Acme Canopy Co., Lippencott Pencil Co., Sallsbury Tire Association of America, Oakes Manufacturing Co., By-Products Co., Alabama Brewing Co., National Offset Co., Antiseptic Supply Co., Richmond Electric Co., Railway Surface Contact Supplies Co., National Electric Works.

Mr. Parker on November 1, 1903, after having been a member of the Examining Corps of the U. S. Patent Office for over five years, resigned his position as Examiner to take up the practice of Patent Law.

Address 210 Dietz Building

WASHINGTON, D. C.

PATENTS PROTECT YOUR IDEAS

Send for INVENTOR'S PRIMER.

NO PATENT, NO FEE.

Patent Advertised FREE.

MILO B. STEVENS & CO., Established 1864.

885 Fourteenth St., WASHINGTON, D. C.
Branches at Chicago, Cleveland, Detroit.

I SELL PATENTS

The Oldest Exclusive Patent
Sales Business in America

CHARLES A. SCOTT

1096 Granite Bldg., Rochester, N. Y.



PATENTS THAT PROTECT AND PAY

WATSON E. COLEMAN

Registered Patent Attorney

626 F Street, N. W.

WASHINGTON, D. C.

Advice Free; Highest References; Best Service.

SPECIAL MACHINERY

We design and build special machinery to order in any quantity desired. Cut gearing.

CRARY MACHINE WORKS

35-41 Indiana Street, Chicago

PATENTS

Careful attention given to the prosecution of business before the patent office. Patents procured and no attorney fee called for until patent is allowed. (23 years experience.) Write for "Inventor's Guide." Address

Franklin H. Hough

Washington Loan & Trust Bldg., Washington, D. C.

LET ME SELL YOUR PATENT

Booklet explaining how mailed FREE. Sixteen years' Experience.

Patent Sales exclusively. If you have a PATENT for sale, call on, or write

WILLIAM E. HOYT

PATENT SALES SPECIALIST

290 J Broadway, New York City



Patent Processes Made Practical

There is a wide gap between the paper patent and the finished product. We help you to bridge that gap by working out a practical factory process for you in our specially equipped laboratories.

We also investigate and report on patent processes for investors.

The MINER LABORATORIES

355 Dearborn Street, Chicago

Chemical Analysis and Consultation for Manufacturers.

PATENTS that PROTECT

Our 3 books for Inventors mailed on receipt of 6 cts. stamps
R. S. & A. B. LACEY, Washington, D. C. Estab. 1869.

We give you PROOF of the money value of the patents we procure.—L. & L.

LET US BE YOUR FACTORY

We make anything to order—Stampings, Sheet Metal work—anything a good machine-shop should do—we do—because we're good ones. We publish "The Silent Partner." Ask for a sample copy. Write us.

THE GLOBE MACHINE & STAMPING CO.
3610 Hamilton Avenue, N. E. - Cleveland Ohio

PATENTS GUARANTEED. PATENTS SECURED OR FEE RETURNED.
 Send model or sketch for free report as to Patentability. Send for finest publications ever issued for free distribution "HOW TO OBTAIN A PATENT," with 100 MECHANICAL MOVEMENTS illustrated and described, and "WHAT TO INVENT," containing valuable LIST OF INVENTIONS WANTED.

ONE MILLION DOLLARS offered for one invention, \$16,000 for other. Patents advertised free in "WORLD'S PROGRESS." Copy free.

EVANS, WILKENS & CO., 615 F Street, WASHINGTON, D. C.

PATENTS

Valuable Book on Patents FREE. Tells how to secure them at low cost. How to sell a Patent and What to Invent for Profit. Gives Mechanical Movements invaluable to Inventors. Full of Money-Making Patent Information. NEW BOOK FREE to all who write.

O'MEARA & BROCK, Patent Attys.,

918 F. STREET.

WASHINGTON, D. C.

Patterns, Models, Inventions Perfected my Specialty. Can develop your inventions and manufacture same at lowest cost. Send sketch or rough model for estimate. Prompt attention given all orders.

ROBT. D. SIMPSON, 170 W. Long St., Columbus, Ohio

Perfect Patents

If your invention is not thoroughly covered by your claims your patent may be valueless. Fifteen years' extraordinary success in handling many large and intricate cases enables me to secure patents that are PERFECT. My mechanical knowledge insures a thorough understanding of mechanical and electrical devices of all kinds. Never had a failure. Write today for free booklet.

F. H. KING, 1654 Monadnock Building, Chicago, Ill.

MODELS and GEARS

INVENTIONS PERFECTED
CATALOGS FREE

UNION MODEL WORKS, 191 South Clark St., Chicago, Ill.

'MR. INVENTOR'

Our Business is to Perfect, Develop and Manufacture your invention. All modern facilities are ours, and we are at your service. We employ Expert Mechanics on

Specialties, Dies, Punch Work and Models

Send us your drawing or model and we will submit our lowest price.

MONARCH TOOL COMPANY, 124 Opera Place, Cincinnati, Ohio

A SNAP FOR INVENTORS

All your money back if patent is not allowed. For full particulars address SILAS C. SWEET, Patent Attorney, 724 I. L. & T. Bldg., Des Moines, Iowa.



PATENT YOUR IDEAS

\$100,000 for one invention; another \$8,500. Book "How to Obtain a Patent" & "What to Invent" sent free. Send rough sketch for free report as to patentability. We advertise your patent for sale at our expense. Patent Obtained or Fee Returned.

CHANDLEE & CHANDLEE, Patent Attys., 945 F. Street, Washington, D. C.

INVENT

ing? "HOW AND WHAT TO INVENT" and "HOW TO OBTAIN PATENTS" explained FREE. CHESTER W. BROWN, Patent Attorney 996 F Street Washington, D. C.

Sterling Novelty Mfg. Co.

SPRINGFIELD, OHIO Established 1890

Manufacturers of Metal Novelties and Specialties to order. We have facilities for making Metal Novelties and Specialties in large quantities on short notice and at reasonable figures. We solicit your order and guarantee satisfaction.

SHOES OF PAPER.—The new invention, "xylolin," or paper yarn, may create a revolution in the manufacture of the cheaper fabrics. This substance is made of wood fibre spun into a paper yarn and then woven into cloth closely resembling cotton. It is unharmed by water, and its varied use is wonderful, being excellent for sacking, and also suitable for sheets.

The spun paper fibre has been woven into outing hats for men and women. "Canvas" shoes and slippers have been made of it at nominal cost. Some idea of its adaptability for towels may be gathered from the fact that last year alone 7,000,000 pieces were made and sold, and it is likely that not one purchaser in a hundred but thought he was buying linen toweling at bargain prices. These are wholesaled at about 24 cents a dozen, medium size.

You may wonder why some rather bright appearing men never seem to advance, but if you could see their travel bags, you would read the inscription: "Bound for Nowhere in Particular."

THERE IS MONEY IN MONEY!

Some coins you handle are worth two to ten times their face value. Get informed on the value of United States money of different dates. It may be worth dollars to you; 25 cents in coin or stamps brings you book worth 100 times the price if it helps you find a rare coin.

Address XX,

Care R. F. D. NEWS

160 Washington St., :: Chicago



CUTS
 WE MAKE THEM CLEAN, BRIGHT, & SHOWY. TO ILLUSTRATE CATALOGS & ADVERTISEMENTS. SEND FOR SAMPLES
ACME ENGRAVING CO.
 155 WASHINGTON ST. CHICAGO.

Closing Out Sale. We have left a few automatic coin operated weighing machines (Caille Bros. weight-tellers) also a few Regina Music Boxes which we will sell regardless of cost in order to close out the business. These machines can be operated with penny or nickel and are guaranteed in perfect order.

MICHIGAN PENNY SALES CO.

Loyal Guard Bldg. : : : DETROIT, MICH.

FREE
TWO BOOKS:
68-Page
"Inventor's Guide"
AND
"Fortunes in Patents"
"What and How to Invent"

PATENTS

GUARANTEED

Protect Your Idea! Guide Book FREE. Send sketches and description of invention for **FREE SEARCH** of Patent Office Records and Report as to patentability. Highest references.

E. E. VROOMAN, Registered Patent Attorney
Box 71, Washington, D. C.

REFERENCES:
American National Bank,
Washington, D. C.
Popular Mechanics,
Chicago, Ill.
Little Giant Hay Press Co.,
Dallas, Texas.
Gray Lithograph Co.,
New York City, N. Y.

PATENTS and **TRADE MARKS** obtained, defended and prosecuted by Alexander & Dowell, Patent Lawyers. (Established 1857.) "P." 607 7th St., N. W., WASHINGTON, D. C. Book of Information sent **FREE**



IMPROVED
ROUGH RIDER
SEE-SAW
TRADE MARK
PATENTED AUGUST 1905—DECEMBER 12, 1905.
FOR HOUSE USE THE YEAR ROUND
THE NEWEST AND MOST ATTRACTIVE
AMUSER AND HEALTHFUL EXERCISER
FOR CHILDREN
STANDS UNIQUE
WRITE TO-DAY FOR CIRCULAR
EDWIN D. SMITH.
RE. DEPT 241 FOURTH AVE. PITTSBURG, PA.



TYPEWRITER BARGAINS

All Standard Makes, \$15 to \$65. Most of these machines have been only slightly used—are good as new. Shipped on approval. Don't buy a Typewriter before writing us. We will give you the best typewriter bargains that can be offered. Address

McLaughlin Typewriter Exchange
97 N. 9th St. St. Louis, Mo.

WE CAN SELL YOUR PATENT

We can form, finance, and promote corporations. Send \$0.25 for terms and three months' subscription to **LAMSON'S INVESTOR**, 153 Milk St., BOSTON, MASS.



Play the Game
POLITIX
That's never Tame

THE GREAT AMERICAN GAME
POLITIX, 52 cards, each representing a state, 4 suits, instead of hearts, diamonds, etc. 4 political parties, denoted by the regular party emblem. Keeps you busy, interested, excited. Every game played is a presidential election. The combinations are unlimited and surprising. No home should be without this great game. 50c postpaid. Circular free. **MILLER & GOULD, 605 D, Pullman Bldg., Chicago.**

PRINTING 100 Letter heads, 100 Envelopes, 100 Cards and Case all for \$1.50, postpaid. Visiting Cards, 100 for 35c; Shipping Tags, 100 for 40c. Samples, 2c.
RICHARD ELLIOTT, Box 1376, St. Louis, Mo.



TYPEWRITERS ALL MAKES
All the Standard Machines **SOLD** or **RENTED** ANYWHERE at 1/10 to 1/20 **RENTAL PRICES**, allowing **RENTAL TO APPLY ON PRICE**. Shipped with privilege of examination. Write for Illustrated Catalog **TYPEWRITER EMPORIUM 230 FIFTH AVE. CHICAGO**

25c. BOOKS 25c.

ELECTRICITY. The study of, and its laws for beginners, comprising the laws of electric current generation and flow, Ohm's law, galvanism, magnetism, induction, principles of dynamos and motors, wiring, with explanations of simple mathematics as applied to electrical calculations. By N. H. Schneider. With 55 original illustrations and 6 tables. 25 cents, postpaid.

DRY BATTERIES. A practical handbook on the designing, filling and finishing of dry batteries, with tables, for automobiles, gas engine, medical and coil work, electric bells, alarms, telephones, experiments, and all purposes requiring a first-rate battery. Fully illustrated with 30 original drawings. 25 cents, postpaid.

ELECTRICAL CIRCUITS AND DIAGRAMS. Being a selection of original up-to-date and practical diagrams for installing annunciators, alarms, bells, electric gas lighting, telephones, electric power light and wiring circuits. Induction coils, gas engine igniters, dynamos and motors, armature windings. By N. H. Schneider. 25 cents, postpaid.

ELECTRIC BELLS AND ALARMS. How to install them. By N. H. Schneider. Including batteries, wire and wiring, circuits, pushes, bells, burglar alarms, high and low water alarms, fire alarms, thermostats, annunciators, and the locating and remedying of faults. With 56 original diagrams. 25 cents, postpaid.

MODERN PRIMARY BATTERIES. Their construction, use and maintenance, including batteries for telephones, telegraphs, motors, electric lights, induction coils, and for all experimental work. By N. H. Schneider. 94 pages, 55 illustrations. The best and latest American book on the subject. 25 cents, postpaid.

EXPERIMENTING WITH INDUCTION COILS. H. S. Norrie, author of "Induction Coils and Coil Making." A most instructive little book, full of practical and interesting experiments, fully explained in plain language with numerous hints and suggestions for evening entertainments. Arranged under the following headings: Introduction; The Handling of Ruhmkorff Coil; Experiments with Sparks; Effects in the Vacuum; Induction and Wireless Telegraphy. With

36 original illustrations. [in the press.] 25 cents, postpaid.

ELECTRIC GAS LIGHTING. How to install electric gas igniting apparatus, including the jump spark and multiple systems for all purposes. Also the care and selection of suitable batteries, wiring and repairs. By H. S. Norrie. 101 pages, 57 illustrations, paper. 25 cents, postpaid.

THE LOCOMOTIVE, simply explained. A first introduction to the study of the locomotive engine, their designs, construction and erection, with a short catechism, and 26 illustrations. 25 cents, postpaid.

WOODWORK JOINTS. How to make and where to use them; including mortise and tenon joints, lap joints, dovetail joints, glue joints and scarfing joints. With a chapter on circular woodwork, revised and enlarged edition, 101 pages, 178 illustrations. 25 cents, postpaid.

SMALL ELECTRICAL MEASURING INSTRUMENTS, describing the making and using of the different instruments, fully illustrated. 25 cents, postpaid.

METAL WORKING TOOLS AND THEIR USES. A Handbook for Young Engineers and Apprentices. Shows how to use simple tools required in metal working and model making. Illustrated. 25 cents, postpaid.

THE SLIDE VALVE. Simply explained for working engineers. Fully illustrated. 25 cents, postpaid.

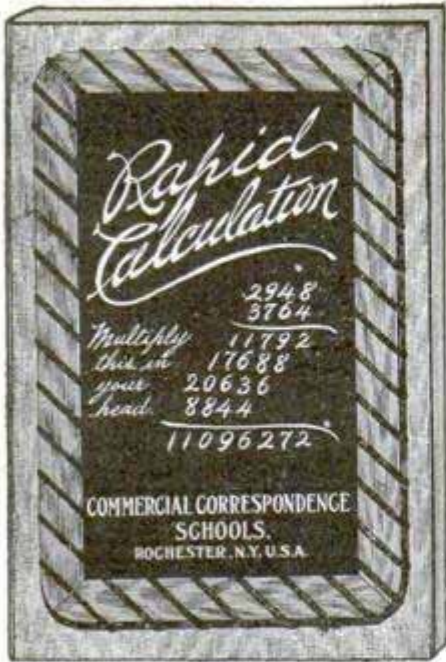
DIAGRAM OF CORLISS ENGINE. A large engraving giving a longitudinal section of the Corliss engine cylinder, showing relative positions of the piston, steam valves, exhaust valves, and wrist plates when cut-off takes place at 1/4 stroke for each 15 degrees of the circle. With full particulars. Reach-rods and rock shafts. The circle explained. Wrist plates and eccentrics. Explanation of figures, etc. Printed on heavy paper, size 13 in. x 19 in. 25 cents, postpaid.

INDUCTION COILS. A practical handbook on the construction and use of shock and spark coils. With 35 illustrations. 25 cents, postpaid.

JOINT WIPING. Practical hints for beginners in plumbing. Fully illustrated. 25 cents, postpaid.

POPULAR MECHANICS
160 Washington St., :: CHICAGO

THIS BOOK IS FREE



A Better Position, Shorter Hours and a Larger Salary await the Rapid Calculator. We will send free to the first 1,000 who apply, a copy of our new book fully explaining a system of

SHORT CUTS IN FIGURES

It tells how the work of hours may be done in minutes, and explains how you may become a rapid calculator. It is Free. Address

COMMERCIAL CORRESPONDENCE SCHOOLS

19A Commercial Bldg.

ROCHESTER, N. Y.

LEARN WATCHMAKING

Refined, profitable labor—Competent men always in demand. We teach it thoroughly in as many months as it formerly took years. Does away with tedious apprenticeship. Money earned while studying. Positions secured. Send for catalog.

ST. LOUIS WATCHMAKING SCHOOL, ST. LOUIS, MO



I TEACH SIGN PAINTING

SHOW CARD WRITING or LETTERING by mail and guarantee success. Only field not overcrowded. My instruction is unequalled because practical, personal and thorough. Easy terms. Write for large catalogue.

CHAS. J. STRONG, President.

DETROIT SCHOOL OF LETTERING
DEPT. PM. DETROIT, MICH.

"Oldest and Largest School of its Kind."

LEARN JEWELERS ENGRAVING

"The Engraving School that Graduates Experts"

A fascinating, high-salaried and easily learned trade, taught thoroughly and practically by correspondence. We will teach the beginner better engraving by correspondence than he can gain in years of rigid apprenticeship. We will improve the skill of any engraver one hundred per cent and make him master of the trade. The demand for competent engravers far exceeds the supply. Send for handsome illustrated prospectus.

Page-Davis School Dept. 112, 90 Wabash Avenue, Chicago.
Dept. 112, 150 Nassau Street, New York.

LEARN TO WRITE ADVERTISEMENTS

If you want to earn \$25 to \$100 per week, write for our beautiful prospectus, sent FREE upon request. We will teach you advertising thoroughly by mail.

PAGE-DAVIS SCHOOL,
90 Wabash Ave. Dept. 10112, Chicago.

LEARN SIGN PAINTING

Sign painters make \$5 to \$10 per day. My book of designs and instructions will teach you how to paint both advertising and commercial signs. No long period of instruction. My plan is complete and inexpensive. Price, complete by mail, only ONE DOLLAR. Remit with order, ONE DOLLAR. No correspondence solicited. Money back if you are not pleased. Address



WILLIAMSON SIGN SYSTEM

Delmar Blvd and Clara Ave., St. Louis, Mo.

ELECTRICIAN SURVIVES 11,000 VOLTS THREE DAYS.

—While working on the new electric overhead system of the New York, New Haven & Hartford Railroad, James McDonald, an electrician, lost his balance, and, to save himself from falling, seized one of the large feed wires with one hand and a signal rod with the other, with the result that 11,000 volts passed through his body. Other electricians, hearing his cries, hurried to his assistance and with the aid of their rubber gloves managed to break his hold on the wire. He survived the shock three days, although his hands and arms were badly burned and his body swollen to twice its normal size. When an examination was made on his body it was found that the electricity had ruptured nearly all the arteries in his heart. —Eng. Review.

Engineering

**MECHANICAL,
ELECTRICAL,
STEAM,
CIVIL,**

Complete and short courses. Thoroughly equipped engineering shops. SHOP WORK FROM THE BEGINNING. Short courses in Steam and Electrical Engineering. Expenses low. Accommodations the best. School all year. Students may enter any time. Correspondence steam and electrical courses. Send for catalogue. Mention course in which interested.

HIGHLAND PARK COLLEGE, Des Moines, Ia.

NEW YORK SCHOOL OF AUTOMOBILE ENGINEERS

\$25 to \$100 a Week

is paid to Chauffeurs, Salesmen, Garage Managers, Designers and Constructors. We equip you thoroughly for the highest-paid positions in the Automobile business through our Home Study Course by mail. No interference with present occupation. This School is recognized as the Standard—our graduates are recognized as experts and positions seek them. Write today for free prospectus. Personal instruction, with road practice if preferred, at our big New York School, day or evening.

NEW YORK SCHOOL OF AUTOMOBILE ENGINEERS, 130 West 56th Street.

LET US GIVE YOU FREE



A Standard-Make Perfect-Operating \$100 TYPEWRITER

This is an absolutely bona-fide offer—made by a responsible institution. We positively give you one of these typewriters as illustrated in our descriptive circular, sent you free upon request. And we do not charge you one cent for it.

EVERY STUDENT of our easy Home-Study Course

Expert Instruction in Stenography and Typewriting can secure one of these typewriters—making own selection from the well-known standard makes. Then—your spare moments devoted to pleasant home study for a short period will qualify you to accept one of thousands of positions now open, paying large salary, and which we are unable to fill. Write us at once for full particulars.

The Illinois Commercial Institute
"The School that Sets You Up in Business."
310 Howland Block, Chicago.

WHY GO TO COLLEGE

TO LEARN BOOK-KEEPING

WHEN I WILL MAKE A FIRST-CLASS BOOK-KEEPER OF YOU AT YOUR OWN HOME

in SIX WEEKS for \$3 OR REFUND MONEY. Fair enough? Distance and experience immaterial. I find POSITIONS, too, EVERYWHERE, FREE. Placed pupil Aug. 12 at \$120 WEEKLY. PERHAPS I CAN PLACE YOU, TOO! Have 8,950 TESTIMONIALS. SAVE THIS AND WRITE.

J. H. GOODWIN, Expert Accountant, ROOM 563, 1215 BROADWAY, NEW YORK.



Say, Do You Like to Draw? Draw Pictures That Sell

Others are making \$30 and more every week by simply drawing pictures, why not you? Study at home at your leisure with a successful cartoonist of national reputation. All lessons are valuable, no useless instruction. Send a drawing of this fellow today with 2c stamp for cartoon portfolio and terms.

The W. L. Evans School of Cartooning
621 Euclid Avenue, Cleveland

When You Want Anything and Don't Know Where to Find It, Write Popular Mechanics.

Learn Watch Repairing

Be a watchmaker—you can learn this profitable trade by correspondence in a few weeks in your own home by the DeSelms Chart System. After you complete the course you will know a watch from A to Z. You will know just what the matter is and how to repair one. When you graduate you will be a practical watchmaker and repairer and competent to fill any position. Positions for our graduates.

Ask for our Free Book. It explains our system and terms.

THE DeSELMs WATCH SCHOOL
23 Perry St. ATTICA, INDIANA



VENTRILOQUISM

LEARNED BY ANY MAN OR BOY AT HOME.

Small cost. Send to-day 2c. stamp for particulars and proof.

O. A. Smith, Room 443, 2040 Knoxville Ave., Peoria, Ill.

Read our Classified Pages. They'll interest you greatly.

STUDY High Grade Instruction by LAW Correspondence Fourteenth Year.

Prepares for the bar of any State. Improved method of instruction, combining the Text-Book, Lecture and Case Book methods. Approved by the bench and bar. Three Courses: College, Post-Graduate and Business Law. Uniform rate of tuition. Write today for Catalogue.

Chicago Correspondence School of Law,
Reaper Block, Chicago.



WANTED YOUNG MEN AND BOYS TO LEARN A TRADE

LEARN A TRADE AND BE INDEPENDENT

We have more positions at good pay, open for our boys than we can fill. You can in a short time fit yourself to earn more money than in years of apprenticeship.

Don't just happen into the first "job" that offers, and drift through life. Nine boys in ten do that, but you can be the tenth, and have something to say yourself about your future.

Our instructors are all picked men of skill and experience, and our shops are equipped with the latest and finest machines.

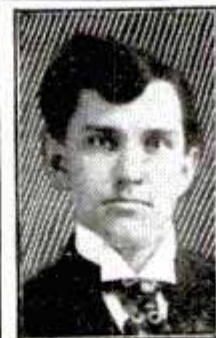
YOU CAN MAKE YOURSELF AN EXPERT Electrical or Mechanical Engineer, Foundryman, Printer, Lithographer, Carpenter or Painter.

You can pay us for your training out of your salary, after you have secured a good position. Let us tell you how some of our boys are doing. Write today for application blanks and particulars.

WINONA TECHNICAL INSTITUTE

1300 E. Michigan St.

INDIANAPOLIS, INDIANA



LET ME SEND YOU FREE MY TEST LESSON IN Cartooning, Designing or Illustrating

(Tell me which you want)

This Preliminary Test is distinctly an ORIGINAL FEATURE of the "Acme Way" of teaching these subjects, and is the ONLY WAY to determine what each student needs in the line of instruction. By its use just the right lessons suited to the individual requirements and possibilities of each and every student can be selected. It requires each student to make three special drawings, the examination of which by my Chief Art Instructor and myself will enable us to determine your present knowledge of the subject, your ability and prospects for future success. If it is advisable for you to continue, I will tell you so, and will be equally frank and honest in case your work doesn't show the requisite ability.

There is an enormous demand, constantly increasing, for commercial artists. I can place more people in positions now than I have students competent to fill them, that is why I offer to send you this Test free and tell you how great your success may be. I need more students to fill the demand that is being made upon us. As a competent artist you can command \$20 to \$100 a week, or if you prefer to run your own studio, you can get first price for your work; there is practically no limit as soon as you are competent. I will GUARANTEE to make you competent if I teach you at all, or refund your money. I will see that your training will enable you to make the kind of drawings to bring the money. You will be taught practical work, the kind you will do when you are actually employed or working for yourself.

From my experience I have learned that more people can succeed and earn splendid incomes at this work than think they can. It isn't always a matter of natural talent, for without careful training, and systematic development, talent alone would never make a genius of anyone. More people become successful by proper study, application and perseverance than by any other way.

Acme lessons are copyrighted and so arranged and prepared that you can complete a full course at home by mail during spare time, or you can put in part of your time studying in our Resident School under the personal charge of my Chief Art Instructor.

Write me to-day and I will send you the Test by return mail.
D. ELDRED WOOD,
President and General Manager, THE ACME School of
Drawing, 595 Acme Bldg., Kalamazoo, Mich.
Established 1898. Incorporated 1906.

SUCCESSFUL DRAFTSMEN

Drawing \$125 to \$250 Monthly require more than School Knowledge

As Chief Draughtsman of Engineering firm I know exactly the Quality and Quantity of experience and practical training you must have, and will prepare you in a few months home instructions for above paying salary. **I furnish free positions to my graduates.**
 Complete Highest Grade **Drawing Outfit**, everything included, with **German Silver Set of Tools**, value **\$13.85, FREE** next ten days. Address **Chief Draughtsman, Div. 19, Engineers' Equipment Co., Inc., Chicago.**

HOROLOGICAL DEPARTMENT BRADLEY POLYTECHNIC INSTITUTE

Formerly Parsons Horological Institute
PEORIA, ILLINOIS.
**LARGEST and BEST WATCH SCHOOL
 IN AMERICA**

We teach Watch Work, Jewelry, Engraving, Clock Work, Optics. Tuition reasonable. Board and rooms near school at moderate rates.
 Send for Catalog of Information.



SMALL BULLET KILLS BIG GAME.—By the invention of a Chicago sportsman a few months ago of an expanding or "mushroom" bullet a decided improvement has been made in ammunition for hunters. The new bullet in comparatively small calibre will instantly kill large game which heretofore required the largest sizes. This bullet upon striking animal tissue, such as the hide of a deer, bear or mountain lion, instantly expands to three or four times its original size, with corresponding deadly effect. In other words, this bullet produces fatal wounds in spots where the ordinary bullet would do comparatively little immediate damage to the game, which would escape and either recover or die in some distant and inaccessible place, and thus be lost to the hunter. As the cartridge is made in all the standard sizes it fits any rifle either single or magazine type.



Courtesy Boite Ammunition Co.

EXPLANATION.—This expanded steel jacket of a 33-calibre rifle was extracted from the beef about 4 in. from the surface, the lead of the bullet passing through, leaving a 3-in. rent where it passed out.

The British Dreadnaught is the first battleship to be driven by steam turbines, consequently the trial cruise of 10,000 miles, at an average speed of 18.6 miles, has been a subject of great interest.

HOW TO BUILD A SMALL KILN for firing China, at trifling cost, will be described in Popular Mechanics for November

The Sun Never Sets WHERE THE BRILLIANT LAMP BURNS

and no other light is half so good or cheap. It's economy to use them—a saving of 50 to 75 per cent over any other artificial light, which is demonstrated by the many thousands in use all over the world for the last nine years. Write for P. M. catalogue; it tells all about them and our systems.

BRILLIANT GAS LAMP CO.
 42 State St., Chicago, Ill.



We teach Furniture Designing, Rod Making, Stock Billing, Ornamental Drawing, Water Coloring and Interior Decoration by mail.

**GRAND RAPIDS
 SCHOOL OF DESIGNING.**
 A. KIRKPATRICK, Instructor.

544-545 Houseman Bldg. : : Grand Rapids, Mich.



BE A LOCOMOTIVE FIREMAN EARN \$100 TO \$185 A MONTH

Soon you will be an engineer and earn more. We teach you by mail. Only railway school in existence conducted by actual railway officials. Our students make good. Best roads represented. Positions guaranteed to those mentally and physically competent. Hundreds needed now. Write today for catalog, etc.
 The Wenthe Ry. Corres. School,
 Box 503, Freeport, Ill.



ARE YOU GOING TO ST. LOUIS?

The **HOTEL WINDERMERE** is a delightful place in the Best Resident Section and away from the noise and smoke; yet within easy access. Transient Rate: \$1.00 to \$3.00 a day, European Plan. Special Rates by the week. Write for Booklet.
 Address, **W. F. WILLIAMSON, Manager.**

MY BOOK
FREE



"HOW TO REMEMBER"
 Sent Free to Readers of this Publication

Stop Forgetting

You are no greater intellectually than your memory. Easy, inexpensive. Increases income; gives ready memory for faces, names, business details, studies, conversation; develops will, public speaking, personality. Send for Free Booklet.
Dickson Memory School, 705 The Auditorium, Chicago



Learn Bricklaying

and earn from \$5 to \$8 per day. Ours is the only thoroughly practical school in America. We teach bricklaying exclusively. Large, well lighted work-rooms. Instructors are men of wide experience in bricklaying and contracting. Only two or three months required to master the trade. Positions always open to our graduates. Demand greater than the supply. Day and evening classes. Write today for free illustrated booklet
CHICAGO SCHOOL OF PRACTICAL BRICKLAYING, 2115 W. Adams St. Dept. 1, Chicago



MECHANICAL DRAUGHTING

PRACTICAL WORKING DRAWINGS FOR SHOPS, DESIGNERS, INVENTORS
P. G. STEARNS, - 39 HENDRIX STREET, - BROOKLYN, N. Y.



INSTANTANEOUS WATER HEATERS.

Just light the gas, hot water instantly pours forth, 3 gallons a minute, continuous flow. No boiler or tank required. 1000 gallons hot water for 85c worth of gas. Greatest heater ever made.

AUTOMATIC WATER HEATERS

The kind that get busy when you "turn the faucet."

IRA J. O'MALLEY, 89 E. Lake St., Chicago

Retailer Mechanical Supplies, pipe, fittings, burners, plumbing sundries, pipe repair clamps, etc., etc.

CORPSE POSED FOR PHOTOGRAPHS.—A group picture with a corpse as one of the subjects was made at Independence, Pa., recently in order that the dead man's wife in Austria might have a natural appearing photograph of him. The corpse was propped against a tree near the grave and looked less concerned than the rest of the crowd.

SWIMMER TOWS SKIFF TWO MILES.—A remarkable exhibition of natatorial skill was made by a New York policeman recently when he swam more than two miles through the swirling waters of Hell Gate, towing a skiff with three men in it. The man passed the tow line over one shoulder and used the side stroke most of the way. Immediately on leaving the water he entered the skiff and rowed back against a stiff current. The stakes were \$10.

The newly organized School of Railway Engineering at the University of Illinois is this year under the direction of Prof. W. F. M. Goss, formerly of Purdue University, who will also act as Dean of the College of Engineering. To afford complete training for the railway service, including railway organization and operation, as well as railway engineering, is the aim of the school, which is expected to rank among the best in the United States.



DO YOU SHAVE YOURSELF?

Then get a brush, the hairs of which will never come out. Our new **EVERLASTING SHAVING BRUSH** has the hairs cemented and set in an aluminum ferrule by our patent process; guaranteed perfect for three years.

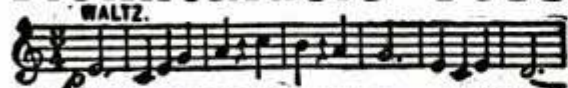
A new brush free if a single hair comes out.

SPECIAL: To introduce our catalog of razors and 25c supplies for home shaving, we offer this 75c brush for

Complete catalog on home shaving **FREE.**

HOME BARBER SUPPLY CO., 253 E. Madison St. Chicago

Violin Music Free



To introduce our New Violin Catalog and **SPECIAL VIOLIN OFFER** we will send for the next thirty days our 50 cent music book; contains 24 pieces of copyright music, such as Overtures, Waltzes, Two-steps, etc., printed on fine paper. We want to get our new handsome illustrated catalog of Violins, Guitars, Mandolins, Musical Supplies, Strings, Bows, etc., in the hands of every Violin player; so if you will send the names of four persons who play the Violin we will send you our music book, free, also our catalog. Write names and addresses plainly and enclose five 2-cent stamps to pay postage and mailing cost of your music book.

E. T. ROOT & SONS,
79 Patten Bldg. (Established 1887) CHICAGO

ELECTRICITY

Bliss Electrical School is the oldest and best school in the world teaching **ELECTRICITY** exclusively.

Theoretical and practical course complete **IN ONE YEAR**

Students actually construct Dynamos, Etc. Graduates hold good positions. *Fourteenth* year opens Sept. 26. Send for free Catalog to

Bliss Electrical School, 213 G St. N. W., Washington, D. C.



\$5 A DAY and over is earned by our graduates after 2 to 3 months' Practical Instruction in **PLUMBING, PLASTERING, BRICKLAYING or ELECTRICAL TRADES**

Free catalogue. Positions secured. Dept. P

COYNE TRADE SCHOOLS
New York Chicago San Francisco

Agents Wanted

\$100 weekly can positively be made selling and appointing agents to sell our Hydro-Carbon Lighting Systems and Lamps. Our Success Demonstrating System makes failure impossible. We offer a grand opportunity to make money. Wanted a good man in every town, village and city in the world
Light Dept.,

National Stamping & Electric Works
151-159 Jefferson St., Chicago, U. S. A.



AGENTS

\$100 A MONTH EASILY MADE selling our "LIGHT-NING SELLING" TRANSPARENT HANDLED POCKET KNIVES. Name and address on one side; photo and lodge emblem on the other. Just the right thing for a nice present. Write **TODAY** for agents' terms.
GOLDEN RULE CUTLERY CO., 40-9 Wendell Street, CHICAGO.

Geisha Diamonds

THE LATEST SCIENTIFIC DISCOVERY

Bright, sparkling, beautiful. For brilliancy they equal the genuine, standing all test and puzzle experts. One twentieth the expense. Sent free with privilege of examination. For particulars, prices, etc., address

THE R. GREGG MFG. & IMPT. CO.

Dept. H, 201 E. Van Buren Street, - Chicago, Ill.



The "NULITE" VAPOR GAS LAMPS

For Home, Store and Street

We also manufacture Table Lamps, Wall Lamps, Chandeliers, Street Lamps, Etc. 100 Candle Power seven hours **ONE CENT.** No Wicks. No Smoke. No Odor. Absolutely safe. **THEY SELL AT SIGHT.**

CHICAGO SOLAR LIGHT CO., 6 River St., CHICAGO



Exclusive territory to good agents. Write for catalogue and prices.

Increase Your Earnings

We have an attractive money-making proposition to make to those who would like to make **MORE MONEY**.

Our proposition offers an exceptional opportunity to men employed in manufacturing plants, machine shops, etc. Such men can easily make **MORE MONEY** without interfering with their regular work.

The work is pleasant. The compensation is liberal. What others have done you can do.

Write to us today and receive full particulars by return mail.

POPULAR MECHANICS

Desk A...160 Washington Street, Chicago

One Hoxie Bullet Kills

see that Ball!



The Hoxie Bullet is the most remarkable invention in modern ammunition. When it hits flesh it expands, as per illustration above, tearing wide, deep and instantly fatal wound or causing heavy blood trail. Gives far greater killing power to small calibre rifles than large calibres now have, thus saving ammunition, heavy recoil and rifle weight and giving greater range, velocity and accuracy. But above all it gets the game sure if you hit it. We do not sell Hoxie Bullets separately but supply U. M. C., Winchester, or any standard cartridge with Hoxitized Bullets and without disturbing original load. If your dealer does not keep standard cartridges with Hoxitized Bullets order from us



and give us his name. Book of full information for your name on a post card. Send for it today.

Hoxie Ammunition Co., 340 T. Marquette Bldg., Chicago, Illinois.

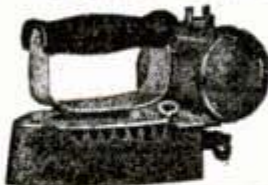
THE FIRST IRON SHIP.—One hundred and twenty years ago last July 14th the first iron ship was launched on a little river called the Winstler, in England, by an iron-master, named John Wilkinson. He had made many experiments on small boats, but when he proposed building a large vessel, people laughed at him, arguing that it was against nature, since iron would not float on water. In a letter John Wilkinson stated that 999 out of 1,000 people laughed at and opposed his idea.

He persisted, however, and built a small craft, whose tonnage is in considerable doubt, some saying it was 70, and others claiming only 40 tons. Whichever it was, the vessel floated lightly and was used for a long time. Wilkinson's faith was rewarded and his iron ships superseded the old wooden ones as surely as steel has superseded his iron.

July 14th seemed to have been his day of fate, for he launched his first iron ship on July 14th; he was publicly honored by the city of Paris on July 14th; he took out patents on a steam engine on July 14th; and he died on July 14th, 1808. A solid iron monument of 20 tons weight was erected to his memory.

ELECTRIC CAR BEATS FLOOD.—A motorman of the Butte Electric Railway Co. raced with a cloudburst in Elk Park Canyon recently and saved 60 lives. A dispatch says: "Pursued by a wall of water 15 ft. high, McDermott put on full speed ahead down grade, and, the car clinging to the track by a miracle, reached high land just as the flood, turning up the rails and sweeping all before it, obliterated the road behind him. The flood left 6 ft. of mud in the Great Northern tunnel. The damage to property at the foot of the canyon is heavy, but no lives were lost."

"COMFORT" SELF-HEATING \$5 FLAT IRON

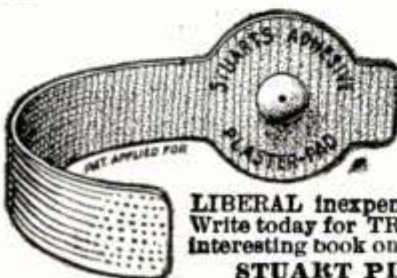


Safe Simple Economical AGENTS Wanted Everywhere

Costs ONE CENT per day. Makes its own gas. No hot stove. Most convenient and economical household article ever invented. For further particulars and printed matter, write

THE HAWKES FLAT IRON CO., 377 Dearborn St., Chicago

Stuart's Plaster Pads



DO AWAY with the TRUSS

AT ONCE. No buckles—no straps. We are making a LIBERAL inexpensive OFFER to introduce. Write today for TRIAL OF TREATMENT and interesting book on RUPTURE FREE.

STUART PLASTER PAD CO.,

102-K North Broadway

ST. LOUIS, MO.



Special Autumn Jewelry Offers

WRITE for our new fall circular—now ready—listing remarkable offers.

If now, or any time between now and Christmas, you contemplate the purchase of a diamond ring, a watch, a locket, cut glass, silver or jewelry of any kind, you should write at once for our special circular. If you want to be posted on latest styles and up-to-date quality, write at once. Our special circular, with its conservative, moderate, rock-bottom prices has been prepared to secure from each one at least a trial order; for we know that a trial order from you will mean a continuation of your patronage—we know the first purchase will prove to you that you save money, while getting the highest quality from Geo. E. Marshall. You will be surprised when you note our very moderate prices on really high-grade jewelry of all kinds—prices so far below those sometimes charged that there is hardly a comparison.

The Marshall guarantee of absolute standard goes with every article listed in our circular and in our catalog.

Diamonds!

If you are the kind of purchaser interested in the very finest pure white gems, perfect in cut and color, and of superior scintillating beauty, you should certainly send for our special Fall circular and note the quotations on the famous Marshall "F" grade diamonds. Our "F" grade is a far better grade than the best grade that nine out of ten jewelers ever carry in stock, and because of a large purchase, just before the last sharp advance in diamond market, we are able to quote well below the regular retail price. For instance: Here is a beautiful oval becher ring with a Marshall "F" grade diamond for only \$57.00; the becher ring in the center for \$78.00; the large and extra fine becher ring at the bottom, in very heavy and elegant setting, for only \$250.00. TERMS, if you desire—

\$5.70 a Month pays for the oval becher ring; **\$7.80 a month** pays for the becher ring in the center, and **\$25.00 a month** pays for the extra fine becher ring at the bottom.

For cash in full: 8% Discount—all diamonds on approval prepaid.

Send for Catalog

and extra discount sheet. If you are looking for quality and insist on quality at the lowest possible price do not buy a watch, ring, locket or any kind of jewelry until you have sent for our catalog and circular and note our prices.

Acquaint yourself thoroughly with the net prices offered by the best houses. Get the highest quality and save money.

Tear off this coupon and mail to us now, today. Don't delay.

Geo. E. Marshall, Inc.

W.S. HYDE, President

A. S. TRUB, Sec.

CHICAGO,

ILL.

Geo. E. Marshall, (Inc.)

108 State Street, Suite 607, Chicago.

Without any obligations on me please send me at once free, prepaid, your special Marshall catalog and full explanation of your no-money-down approval offer

Name.....

Address.....

No letter necessary; just sign and mail coupon.

Business Opportunities

We have had placed in our hands for negotiation patent rights on the following inventions:

A gas light flasher sign which has all of the advantages of an electrical flasher sign and is much cheaper to manufacture and operate. This sign is especially adapted to smaller cities where gas can be had, and where electric companies are disposed to charge high prices for motors to drive the electric flash signs. The inventor is a skilled machinist, who can superintend the manufacture of these signs, but needs the coöperation of a business man with sufficient capital to introduce the signs.

A pneumatic hammer which has proven by actual test to be superior in many respects to the pneumatic hammers now on the market. The cost of manufacture is no greater than the cost of making the other hammers, and at the prices at which said tools are sold there is a very wide margin for profit.

A combination tool, comprising pliers, wire cutters, wrench of different sizes, die stocks, etc. This is a high class tool to be made out of drop forgings and is especially suitable as an emergency tool for automobilists.

A hand-rake so constructed that if a tooth should be broken, a new tooth can be readily inserted by the user. The head of the rake is made of cast iron or can be made of wrought iron if desired.

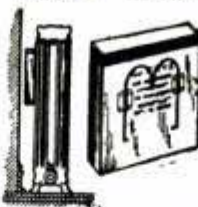
An amusement device made principally of wood on the general plan of a see-saw, which is capable of being made small enough to be used in the house or large enough to be used in public parks. A similar device is being extensively sold at this time.

An electrical soldering iron in which the copper is quickly heated and will retain its heat.

The inventions above named have all been thoroughly tested and are ripe for introduction to the public. The entire or controlling interest can be obtained at reasonable figures in any one of the inventions named. If you have from \$1,000 to \$5,000 to invest and are looking for a good opportunity, of engaging in the manufacture and sale of articles for which there is an established demand, we will be pleased to give further particulars in reference to any one of the above, or better still, would like to have intending purchasers call at our office and make such personal investigation as the circumstances may warrant.

Popular Mechanics Patent Bureau
160 Washington St. CHICAGO, ILL.

THE FAYE AIR MOISTENER



Hangs on back of steam or hot water radiators, out of sight, works automatically, preserves health; all doctors recommend it. Ask your's.
Send us \$2.00, use it 30 days, if not more than satisfactory, money refunded.
Descriptive Booklet No. 210, FREE.
ORR & LOCKETT HARDWARE CO.
Dealers and Agents Wanted. CHICAGO, U.S.A.



GROW MUSHROOMS

For Big and Quick Profits or For Your Own Use.

I can give practical instructions worth many dollars to you. No matter what your occupation is or where located, get a thorough knowledge of this paying business. Particulars free. **JACKSON MUSHROOM FARM, 3243 N. Western Ave., B-230, Chicago.**

REVIVING THE DROWNED.—We have received the following letter:

"On page 968 of Popular Mechanics for September there is an article on a 'New Method of Reviving the Drowned,' the theory advanced by Dr. H. K. Whitford of resuscitating by the heat method, etc. I have in my possession a book bearing the title, 'They are not Dead, Restoration by the Heat Method, of those Drowned or otherwise Suffocated,' by T. S. Lambert, A. M., M. D., L. L. D., New York, Wright & Schondelmeur, Publishers, 1879. At this time articles also appeared in the N. Y. Evening Post and the N. Y. Evening Express, corroborating the theory. This book contains 160 pages on this method and is profusely illustrated. As this theory was printed some twenty-eight years ago, it cannot be entirely 'a new one.' It is astonishing that so natural a method should have made such little progress and especially so by life-saving stations. Trusting that this may possibly recall this book and bring it into the eminence which it deserves, I am, sincerely, Albert E. Slevers, Cottey College, Nevada, Mo.

"August 27, 1907."

DON'T INVENT NON-SALABLE THINGS.—The following letter from one of the best known patent attorneys gives good advice to inventors:

"In view of the number of inquiries that we receive from parties who want to know what inventions are in demand, I suggest that you insert in the news columns from time to time paragraphs giving information along these lines. A certain class of patent attorneys send out circulars advising inventors there is a demand for certain inventions when, as a matter of fact, there is no such demand.

"It seems to me that your readers would appreciate honest advice along these lines. For instance, a certain Washington attorney, whose circular is before me, represents that there is a commercial demand for 'a nut and bolt lock.' The paragraph says: 'A locking device for preventing a nut from accidentally working loose or coming off of a bolt is much needed.' As a matter of fact, there are more than a thousand patents on such devices, all of which are more or less effective and in their various forms cover almost every conceivable shape and construction.

"If there was any commercial demand for a nut lock it could be met by at least a hundred different forms of devices which will effectively prevent the working loose of a nut on a bolt. To hold out to inventors that there is a demand for such an invention is a mere misrepresentation of the situation. I think you can serve your readers by giving publicity to the real facts. Yours truly, F. Benjamin."

Classified ads 3c a word. 300,000 readers. Best results for lowest cost.

Be A DOCTOR of Mechano-Therapy

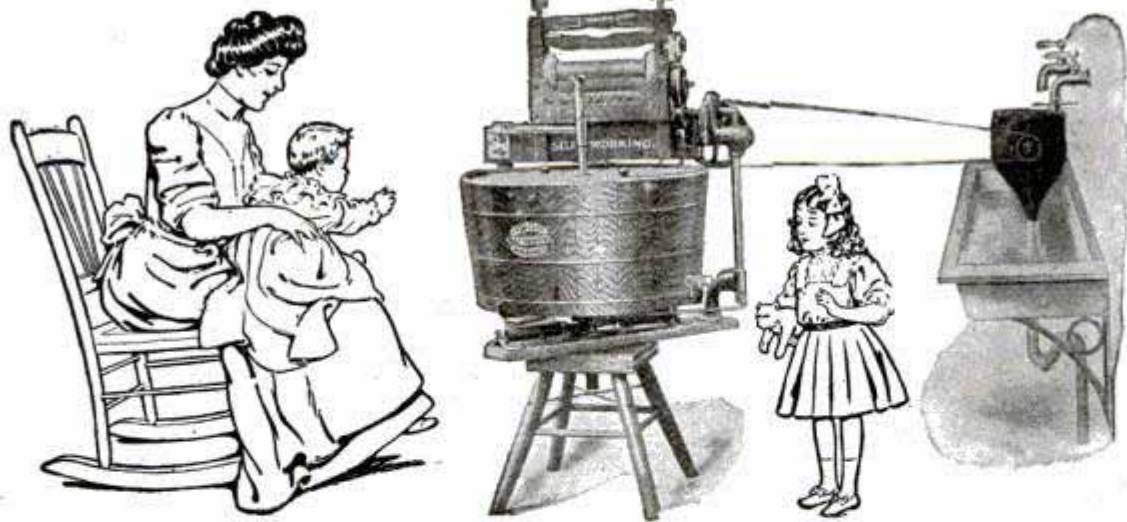
\$3000 to \$5000 A YEAR

WE TEACH YOU BY MAIL

In six months you can begin practicing Mechano-Therapy—an elevating and highly paid profession for men and women. More comprehensive than Osteopathy. Endorsed by physicians. A fascinating study, easy to learn and equal to college course—we guarantee success—an ordinary education and our course of instruction fits you for a professional life. Authorized diplomas to graduates. Work absorbingly interesting. Vast opportunities for social and financial betterment. Special terms now. Write today for prospectus—free.



AMERICAN COLLEGE OF MECHANO-THERAPY
Dept. 909, 120-122 Randolph St., Chicago



The "Self-Working" Washer Does ALL the WASHING

A twist of your fingers—

That's all it takes to start the "Self-Working" 1900 Motor Washer.

Turn on the water—or electricity—and, in six minutes, your tubful of clothes is clean.

The Washer does all the work—works by itself—while you attend to other duties.

Then—when the clothes are washed, another twist of your fingers switches power to the wringer to wring out the clothes.

50 pounds water pressure or a common electric light current—furnishes power, and 2 to 4 cents a week pays for all you need.

Could washing be made easier?

Another thing—your clothes are safe from wear in a "Self-Working" Washer.

For there is nothing about this Washer to pull, or haul, or beat, or pound the garments.

No complicated inside parts.

Nothing to rub and wear, or fray the fabrics.

Buttons are never cracked—nor torn off.

Seams are never ripped. "Wash tears" are unknown.

You can wash the finest linen, lawn and lace and not break a thread.

For—in the "Self-Working" Washer, the clothes are held still while the water and soap are forced through and over, and under, and around them by the motion of the tub.

Your clothes are washed quickly—thoroughly—safely. And the 1900 Motor Washer saves its own cost many times

over by keeping your linen, your undergarments and other washables from wash-day wear.

Servants are contented where there is a "Self-Working" 1900 Motor Washer.

They don't have to worry about "Wash-Day."

They don't leave and get other places.

Then the 1900 Motor Washer SAVES ITS OWN COST AND PAYS FOR ITSELF.

Don't believe this!

PROVE IT—AT OUR EXPENSE!

You can test a 1900 Motor Washer a full month without paying us a penny.

We will send one of these washers to any responsible party and prepay the freight.

All you do is—agree to test the washer.

Use it a month. Do four weeks' washings.

And—if the washer isn't all we claim, don't keep it. Pay nothing. **THE TEST IS FREE.**

If you keep the washer—as you surely will wish to, when you see all that it will do and all it will save—you can **LET THE WASHER PAY FOR ITSELF.**

Write today for our New Illustrated Washer Book, which shows just how this "Self-Working" 1900 Motor Washer works, and tells how it is made—how it Pays for Itself—and all about it.

A post-card with your name and address sent to us today brings you the book by return mail, postpaid.

Address—The 1900 Washer Company, 3100 Henry Street, Binghamton, N. Y.

Or—if you live in Canada, write to the Canadian 1900 Washer Co., 355 Yonge Street, Toronto, Ontario.

WORKMAN AND SNAKE BATTLE IN MID-AIR.—Suspended 75 ft. above the bottom of a pit, and 100 ft. from the top, John Hutchinson, a blaster in the huge quarries along the Delaware river, had a recent experience that will remain with him for many years to come. A hundred of his fellow-workmen watched him battle fiercely for his life against a huge pilot snake, and the sight so unnerved them that all work was suspended for the day.

Hutchinson had been lowered over the side of the quarry, which is 175 ft. deep, and had gone down 100 ft. from the top to do some blasting. Feeling a peculiar movement of the rope, he glanced upward and discovered, to his horror, that an immense snake had crawled onto the rope from some ledge, and was rapidly making its way toward him.

Escape was impossible. One hand was filled with stick dynamite; the other held a small rock drill. To drop the dynamite was to cause an untold disaster below. He finally succeeded, however, in stowing it away in his pocket, and proceeded to give battle with only the drill as a weapon. His first blow did not deter the serpent, but the second one, which was delivered at close quarters, stunned it, and a third one put a quietus to it forever. As the snake fell to the ground, Hutchinson's friends drew him to the surface above where it fell, completely unstrung, by his nerve-racking ordeal.

ELECTRIC LIGHT CIRCUIT KILLS TWO.—A death by electricity occurred in Buffalo, N. Y., on August 21, which was almost identical with the death of Miss Grace Dillon, as recorded in our September issue.

Gaspero Donanno, a laborer, started to enter a freight car in pursuance of his duties. He carried a portable electric light, with its attached wires, in his hand. Just as he reached the car door, and probably stepped on the iron plate from the door sill to the platform of the freight house, he uttered a piercing cry and fell to the ground. He died before medical assistance could be summoned, while the only external mark left by the current was a slight abrasion on the left wrist.

If the man was shocked by electricity he could not have received more than a 220-volt current. The probabilities are that he had a weak heart which was affected by the shock. An examination of the wire and light bulb he was carrying disclosed no defects in them.

L. H. Carter, son of Brigadier-General William H. Carter, U. S. A., commander of the Great Lakes Department, was instantly killed, August 27, by an incandescent lamp circuit at the University of Illinois. Mr. Carter was a student in the summer school of agriculture and was standing on an engine frame while repairing an electric chandelier. It is not understood how a 220-volt current could have caused death, but that was the unfortunate result.



BARODA DIAMONDS

Flash like the genuine—at 1/30 the cost
SOLID GOLD MOUNTINGS

Stand acid test and expert examination. See them first, then pay. Catalog FREE. Patent Ring Gauge included for 5 two-cent stamps.
The Baroda Co., Dept. M, 230 North State St., Chicago

Be Your Own Boss!

MANY MAKE \$2,000.00 A YEAR. You have the same chance. Start a small order business at home. We tell you how. Money coming in daily. Very good profits. Everything furnished. Write at once for our "Starter" and FREE particulars.

P. M. KRUEGER CO., 155 Washington Street, Chicago, Ill.

POPULAR MECHANICS

SHOP NOTES



These books are a perfect gold mine of information for every one interested in mechanics or who uses tools for pleasure or as an occupation. Of equal value and help to the professional mechanic and the amateur.



200 Pages	Vol. I, "Shop Notes for 1905"	385 Illustrations
228 Pages	Vol. II, "Shop Notes for 1906"	555 Illustrations
228 Pages	Vol. III, "Shop Notes for 1907"	580 Illustrations
	Vol. IV, "Shop Notes for 1908," Ready December 1	

THE PRACTICAL EXPERIENCE OF HUNDREDS OF EXPERTS CONDENSED IN THREE VOLUMES

*"Written so you can understand it"
Price 50 Cents per Volume, Postpaid
or Order From Your Newsdealer*

Each Volume Contains Entirely Different Matter From That in the Other. In Ordering State Which Volume is Wanted.

POPULAR MECHANICS
160 Washington St., CHICAGO





MASSAGE YOUR EYES WITH THE IDEAL EYE MASSEUR

The safest, surest and most scientific treatment for the eyes
 If you wear glasses, if your eyes smart or burn or get red and inflamed, if you have headaches or your eyes are glassy or strained, write for our illustrated Treatise on the Eye. It contains a wealth of valuable information about the eye.
 Indistinct vision, muscular troubles and chronic diseases of the eye successfully treated. A few minutes use of the Restorer each day will effect a steady improvement in the sight. English, German, or Spanish pamphlet mailed FREE.

THE IDEAL SIGHT RESTORER

treats the eye in nature's own way and permanently restores the sight to its normal condition. Read the testimonials, you probably know some of those whom we have wonderfully helped. Write to-day.

THE IDEAL COMPANY, 239 M, BROADWAY, NEW YORK.

DEEP WELLS THAT FEEL THE SEA.—In their investigation of the underground water resources of the Coastal Plain of Virginia the geologists of the United States Geological Survey have collected data relating to the many hundreds of artesian wells that yield excellent waters in large areas of the coastal region. Particular note has been made of the quantity and quality of the supply afforded by wells that give flows at the surface. The water of most of these wells is admirably adapted to household uses, though that of some of them contains enough mineral salts in solution to make trouble in boilers used for steam production.

The variation in flow exhibited by these wells with the rise and fall of the tide is of peculiar interest, the flow being notably greater at the flood than at the ebb tide. It is the general opinion among well drillers that practically all flowing wells near tidal rivers or inlets from open bays do feel the distant sea, but some of them so slightly that the variation in flow is not noticeable.

The geologist in charge of the ground-water investigations in Virginia states that changes in water level in wells, due to fluctuations in the height of the surface of some neighboring body of water, have been observed all over the world. It is customary to explain these changes by supposing a direct connection between the river, lake, or bay; but in many places, as in eastern Virginia, such connection is clearly impossible, owing to the depth of the wells and the nature of the intervening beds, some of them dense, tough marls and clays. These beds, however, though they do not transmit water, nevertheless contain it, and as water is practically incompressible, any variation of level on the river or bay is transmitted to the well through the water-filled gravels, sands, clays, and marls. When a porous bed is tapped by a well the water rises to the point of equilibrium and fluctuates as the hand of the ocean varies its pressure on the beds that confine the artesian flow.

SHIPBUILDING IN GREAT BRITAIN AND AMERICA COMPARED.—When the shipbuilding industries of Great Britain and America are placed side by side, our figures do not stand comparison. During the year ending June 30, 1907, there were 1,463 vessels, aggregating 510,805 tons, built in the United States. This figure comes second to that of the year 1855, which was the banner year of American shipbuilding—fifty-two years ago. It does us no credit.

On June 30 last the United Kingdom was building 564 ships with a gross tonnage of 1,250,318. While our vessels under construction are more numerous, by 2½ times, Great Britain's tonnage is 2½ times greater than ours. This is significant, for it shows that they are building large sea-going vessels to carry the world's trade, while American ship owners are content with small coasters which serve for inter-sectional transportation but do not bring the wealth of foreign lands to our shores.

Great Britain makes every effort to maintain supremacy as the world's greatest maritime power, and aids her shipbuilders in every possible way, as evidenced by the fact of her giving \$13,000,000 to the Cunard Company alone, to aid in building the giant liners "Mauretania" and "Lusitania," which fly her flag.



THE VACUUM CAP CURES BALDNESS 60 DAYS' TRIAL

Thousands cured. Our MODERN VACUUM CAP when used a few minutes each day draws the blood to the scalp and forces the hair into new healthy growth, cures baldness and stops the hair from falling out. Cures Dandruff. Harmless and healthful. We send it to you on trial. We only want pay if you are pleased. Is not this fair? Write for free booklet.

THE MODERN VACUUM CAP CO.
 664 BARCLAY BLOCK DENVER, COLO.



DYKEMA CONCRETE MIXER \$128

Measures and mixes 2 to 3 yards per hour by hand—3 to 6 yds. with engine. Price with engine \$260. Brick Machines \$35 up. Stone Machines, Sewer Pipe, Molds, etc. Catalog Free.

DYKEMA CO.
 501-7 Huron St. Grand Rapids, Mich.



A New Delight

awaits the smoker who has not discovered the exquisite aroma of

French's Mixture

"The ARISTOCRAT of SMOKING TOBACCO"

It pleases instantly and satisfies continuously. Only the choicest grades of ripe and mellow North Carolina Red and Golden Leaf are used. Blended by hand with a care that shames ordinary machine methods. Pure, clean, wholesome, and always in perfect condition, because it is sold only

Direct from Factory to Smoker

Send 10c. (silver or stamps) for large sample pouch and booklet.

FRENCH TOBACCO COMPANY
 Dept. 32 Statesville, N. C.

We never sell through dealers, but always direct to the smokers in perfect condition.

\$1 Enders' Safety Razor \$1

Saves Time and Money



No Stropping No Honing

Write for Catalogue

POMPER & FULTON, Inc.

Barber Supplies and Cutlery
 55 SO. CLARK ST. CHICAGO

Popular Mechanics

Shop Notes Series

of Year Books

☞ One of these books is issued the first of each year, and is a reprint of all the articles which have been published during the year past, in our "Shop Notes Department." Three volumes of the series are now ready.

200 Pages Vol. I, "Shop Notes for 1905." 385 Illustrations

228 Pages Vol. II, "Shop Notes for 1906." 555 Illustrations

228 Pages Vol. III, "Shop Notes for 1907." 580 Illustrations

THE PRACTICAL EXPERIENCE OF HUNDREDS OF EXPERTS CONDENSED IN THREE VOLUMES

☞ These books are a perfect gold mine of information for every one interested in mechanics, or who uses tools for pleasure or as an occupation. Of equal value and help to the professional mechanic and the amateur.

☞ These articles are the cream of the experience of years, of hundreds of the most successful mechanics in the country. There is nothing on the market equal to these books at five times their price.

☞ The Popular Mechanics Shop Notes Series TELLS EASY WAYS TO DO HARD THINGS, and like Popular Mechanics, is "Written so you can understand it."

☞ These books are indexed very fully and with great care.

☞ The subjects treated cover every department of mechanics, with useful time saving "kinks" for engineers, firemen, carpenters, machinists, plumbers, painters, iron and wood workers, electricians of all kinds, masons, and in fact all the trades. Special attention is devoted to the latest things, such as producer gas, cement working, etc., etc.

☞ Each volume contains entirely different matter from that published in the other. A set of these books covering several years will make an encyclopedia of priceless value to the owner.

Price 50 Cents per Volume, Postpaid

POPULAR MECHANICS,

CHICAGO

In ordering, state which volume is wanted.

"Want" and "For Sale" Ads. 3 cents per word, payable in advance. Replies may be sent to a number, care Popular Mechanics, and will be forwarded without extra charge. In answering such, let the number appear on your envelope.

AUTOMOBILES.

AUTOMOBILE SCHOOL—Chicago School of Motoring; the original automobile school in Chicago. Four hundred and fifty graduates the past year, to whom we refer upon request. Automobile owners, prospective buyers and young men wanting to become expert chauffeurs will save a great deal of money and a lot of worry by studying the mechanism, care and repair of gasoline automobiles in our shop, where all parts are open so you can see how they are made, and how they operate. We give thorough and practical instruction. Competent chauffeurs supplied. Address Chicago School of Motoring, Dept. B., 264 Michigan Ave., Chicago, Ill.

20" AUTO BOILERS, each \$50; 18" auto boilers, each \$45. J. L. Lucas, Bridgeport, Conn.

FOR SALE—5 sets wood wheels, \$18.00 set; 1 W. & M. rear axle, \$30.00; 1 auto car engine, \$80.00; 4 1/2x4 water cooled motor, new, \$90.00; 4 cyl. water cooled motor, \$200.00; Hulsman motor, \$90.00; transmissions, \$23.00; spark coils, \$3.00 each, new. Auto Parts Co., 975 Monticello Ave., Chicago, Ill.

WANTED—PRICES ON AUTO PARTS, new and second hand. Also Mora runabout, model 1907. State prices wanted. Address Gloucester Auto Co., 171 Main St., Gloucester, Mass.

AUTO SUPPLIES

GLASS FRONT for all cars. Get prices before ordering. Catalogue on request. H. S. Ross, 5607 S. Halsted St., Chicago.

MOTORCYCLES

FOR SALE—1 1/2 H. P. motorcycle engine, \$20; castings, \$6.50. C. E. Shook Manufacturing Company, Waterloo, Iowa.

BUSINESS OPPORTUNITIES.

THEY WORK WHILE YOU SLEEP. Talking Scales. "They Speak Your Weight." The invention of the century. Fortunes have been made operating automatic weighing machines. Write to-day. United Vending Machine Co., 629 Caxton Bldg., Cleveland, Ohio.

START a mail order business; we furnish everything necessary; only few dollars required; new plan, success certain; costs nothing to investigate. Milburn Hicks, 809 Pontiac Bldg., 358 Dearborn St., Chicago.

NEW INVENTIONS DESIGNED, PERFECTED, SIMPLIFIED and improved. We make them meritorious and patentable, give them commercial value and find parties to manufacture or finance. Address Engineering Dept., Industrial News Bureau, Ithaca, N. Y.

OUR BOOK, "1,000 Ways to Get Rich," contains 1,000 different, new, money bringers; success assured; 25c prepaid. Climax Publishing Co., 922 Mt. Vernon, Philadelphia, Pa.

LEARN THE HOT WATER HEATING BUSINESS AND WORK FOR YOURSELF—I teach you absolutely free of charge and enable you to make a good income while learning. Men handy with tools make big money. No expense. For full information write 10008, care Popular Mechanics.

\$3000.00 CLEAR PROFITS each year waiting for any energetic man who will start the operation of the "Thurman Portable House-Cleaning Machine." We proved it to many last month. Let us prove it to you now. Over three hundred operators all over the U. S. The "Dustless Method" is quick, thorough and sanitary. Pays in towns of 5,000 population or more. Amount necessary to start business from \$2,000 upwards. We own the patents and are prosecuting infringers. We also make the most efficient stationary cleaning plants. Send for catalog and testimonials. Address Gen'l Compressed Air & Vacuum Machinery Co., 4487 Olive St., St. Louis, Mo.

FOR SALE—Surveying business of the late B. E. Johnson, established nineteen years, average \$3,000.00 a year. Record plat book, sundry prints, plats of surveys and subdivisions outside St. Louis city limits. Field notes of St. Louis and Jefferson counties, Mo. Two outfits. Address F. J. O. Wilson, 210 Union Station, St. Louis, Mo.

START NOW and make money. We do it and we'll show you how. No canvassing; no agency. For full particulars send 2c stamp. Baxendale & Stowell, Box 302, Lonsdale, R. I.

ANYBODY CAN MAKE GOOD CUTS with my simple zinc etching process; price, \$1; specimens and particulars for stamp. T. M. Day, Box M, Windfall, Ind.

ELEVEN HONEST BUSINESS PLANS and trade secrets, including plating process. A chance to be "your own boss" and make from \$15 to \$75 weekly. Circulars free. Ohio Enterprise Co., No. 280 W. Jefferson St., Springfield, Ohio.

BUSINESS CARDS.

EVERY ENGINE works better when packed with "Eureka Packing." Your dealer will furnish it.

GEO. W. RICHARDSON, CONSULTING ENGINEER, 819 Chamber Commerce Bldg., Chicago—Machinery inspected and purchased for parties in and out of the city. Patents secured, expert information furnished, engines indicated, valves set, complete reports made on steam, electric lighting and power plants.

PATENTS FOR SALE

PATENTS—The Popular Mechanics Patent Bureau renders efficient service. Following letter is dated May 25, 1907:

Dear Sirs: Please allow me to acknowledge the receipt of yours of the 13th, the official notice of the allowance of my application for patent on Paper Clips. I wish to say I am highly gratified with the efficient manner in which you have attended to my interest in this matter, and that the drawings and specifications were far ahead of my expectations, and that if I ever have any other work, I wish you to do it. I beg to remain, respectfully yours, John H. Atter, 439 Main St., Conneaut, O.

Write for free booklet, "What to Invent." Address Popular Mechanics Patent Bureau, 160 Washington St., Chicago.

FOR SALE—U. S. PATENTS.—An entirely new idea in illumination. Produces from 16 to 200 candlepower. A concentrated white light of great brilliancy. This light is ideal as a library lamp; also it is the finest diagnostic lamp for physicians and surgeons. The larger c. p. is a therapeutic lamp and is the newest and best local treatment for rheumatism, sciatica neuralgia, lumbago, chronic ulcers, salt rheum, tuberculosis, etc., relieving pain immediately and curing by the heat and intense light, which penetrate the tissues and improve nutrition. These lights can be manufactured at home by any one with \$10.00 capital. I want a reliable person in every large city and county in U. S. to make and sell these on a royalty basis. No cash advance required. To anyone interested I will send cuts and literature with full information of manufacture for 25c. Or, a standard library and diagnostic lamp with full particulars for \$2.00. Or, a therapeutic lamp with information for \$4.00. These will be sent by express prepaid to any address in U. S. Dr. W. R. Cook, 1088 Bloor St. W., Toronto, Canada.

THREE PRACTICAL PATENTS FOR SALE—Rail joint, cooking stove and spring saddle; have other patents pending. Will sell for cash one of the above, cheap. Address S. S. Moore, Dodge, Tex.

FOR SALE—3 VALUABLE PATENTS, covering nature's system of slow sand water filtration by gravity. Intake dam and filter reservoir for municipalities, a great business for contractors. Screen filter for mill races. Household filter and cooler combined. An article of sheet metal or glass that would sell for three times cost of manufacture. G. W. Schultz, St. Davids, Pa.

FOR SALE—Patent No. 683320—Automatic musical instrument, \$250. Hiram McCrea, New Richmond, Ind.

PATENTS GUARANTEED—"PROTECT YOUR IDEAS." Handsome sixty-eight page guide book free to inventors. Address A. D. Middleton, P. O. Box 545, Savannah, Ga.

FOR SALE—PATENT NO. 739741—The Peerless flexible, non-rusting, electric galvanized steel door mats and mats for in front of the bar in saloons. Address B. Londkowski, 14 Wright St., Milwaukee, Wis.

INVENTORS—Let us work out your valuable ideas now while times are prosperous. A good idea is one thing, its development is another. We have the experience and your idea is safe with us. First class working or patent drawings made. Address 10004 Popular Mechanics.

FOR SALE—ALL RIGHTS IN PATENT NO. 847320. Just issued, on folding mushroom anchor; sell cheap. Address C. E. Crane, Lake City, Minn.

MACHINERY FOR SALE.

PUMPS! Of Every Description—Suitable for Home and Factory use. Illustrated Catalogue Free. H. E. Trotman, 107 N. Third St., Philadelphia, Pa.

FOR SALE—10 horsepower auto engine and boiler, gasoline burner and fittings, \$50. Warren J. Baumann, Lock Haven, Pa.

FOR SALE—Engine lathe, swings 9½ in., takes 25 in. between centers. Complete with full set change gears to cut all size threads, 3 to 40 in.; price only \$43.50. Address L. F. Grammes & Sons, Allentown, Pa.

RIFE AUTOMATIC HYDRAULIC RAM, pumps water by water-power—no attention—no expense—2 feet fall elevates water 50 feet, etc. Guaranteed. Catalogue FREE. RIFE RAM CO., 2191 Trinity Building, New York City.

FOR SALE—ENGINES. 1 inch stroke, ¾ inch bore, either marine or horizontal type, \$5.00, ready to run. Castings and material, \$1.00 per set. Blue prints, 25c. These engines connected to our automatic semi-flash boiler make the most powerful and reliable miniature power plant on the market many times over, and they are absolutely safe and dependable. They require no attention while running and will steam in two minutes. Price for boiler, engine, feed water pump, burner, valves, etc., all piped up on base ready to run, \$10.50. Boiler and accessories separate, \$5.00. O. N. Hansen, 183 Du Boise Ave., Elgin, Ill.

FOR SALE—Complete sets of casting for opposed motors or 4-cylinder vertical, water or air-cooled. Comet Motor Works, 47-49 Canal St., Chicago, Ill.

FOR SALE.

FOR SALE—Two coin-operated Regina music boxes with 48 pieces of music. Very cheap for cash. Address 6102, Popular Mechanics.

FOR SALE—Blue prints and instructions for making a jump spark coil, for 20 cents (no stamps). Address G. D. Cooper, Corydon, Ia.

FOR SALE—TELEPHONE AND PARTS; also electrical goods. Telephones, \$2.35 up. 2½ H. P. electric automobile motor, fine condition, cheap. Parts for 4" spark coil, \$14.65. Bulletin No. 2, on telephones, free. Murray E. Main, Delaware, Ohio.

ELECTRIC LIGHT PLANT FOR SALE—The electric light plant in Garnett, Kan., a city of 3,000, on three railroads; plant running and making money; satisfactory reasons for selling; will sell cheap for cash, or trade for income bearing property. Address J. A. Brownston, Garnett, Kan., or W. B. Kerns, Bunceton, Mo.

FOR SALE—200 Concrete post molds, cheap, A1; also a brand new block machine and two tile machines. H. L. Quick, Ashton, Ill.

DEPENDABLE WATCHES ON CREDIT. Cut prices. Keep jeweler's extra profit yourself and use while paying. No publicity. Satisfaction guaranteed. Booklet free. Berlin Co., Birmingham, Ala.

FOR SALE—1 500 Watt dynamo, lamp, sockets, shades, switches, etc.; cheap. W. J. Atkins, E. Orleans, Mass.

FOR SALE—FLYING MACHINE INVENTION. Guarantee to fly anywhere. Positive success. Safe and simple. Can build any size for commercial use. Address 10002, care Popular Mechanics.

WHITE COATS AND MUSIC—18 White duck coats and caps for band; also lot of music for sale very cheap. For particulars address L. R. Kittinger, 94 West Thornton St., Akron, Ohio.

FOR SALE OR EXCHANGE.

STOCK OF DRY POWDER FIRE EXTINGUISHERS. About six hundred tubes. Will consider real estate or good automobile. Edward, Box 838, Milwaukee, Wis.

TO EXCHANGE—Factory equipment iron and wood working machinery, no buildings. Must be in good condition, for brick business block in southern Minnesota. Railroad center. Title perfect from owner. Relerson Machinery Company, 184 Morrison Street, Portland, Ore.

FOR SALE OR TRADE—One upright Foos gas engine. In perfect order, rated 8 H. P. Price \$125.00. What have you for exchange? Address S. A. Davis, Urbana, Ohio.

TO EXCHANGE—For auto engine and boiler. Stationary engine and boiler; forge, combined anvil and vise, and other articles. Address 10000, care Popular Mechanics.

FOR EXCHANGE—A new \$50.00 gold watch for a foot-power screw cutting iron lathe. W. C. Martin, Belding, Mich.

TO EXCHANGE—3 horsepower marine eng., fourteen light dynamo, watches. Want air cooled engine, motorcycle, automobile. R. Hendley, Wolcottville, Ind.

TO EXCHANGE—Iver Johnson tandem, Spencer repeating shotgun, shoemakers' machine, Savage rifle, Colt pistol, turning lathe, 5x15x24, attachments, for marine motor. O. W. Allen, Trenton, Mo.

PLUMBERS' SUPPLIES.

COMPLETE LINE up-to-date plumbing and steam goods at wholesale to the public. Get catalogue. John Hardin, quarter century at 4542 Cottage Grove Ave., Chicago.

BLACKSMITHS.

BLACKSMITHING—First lessons; in three chapters, with 47 illustrations. Easy lessons, by a practical blacksmith. Chap. 1, Tools and Materials; Chaps. 2 and 3, Bending, Swaging and Welding. Price, 10 cents, postpaid. Popular Mechanics.

BLACKSMITHS—Young men who wish to become master mechanics and expert tool workers may do so in a very short time by using Toy's Treatise on new steels, explaining how to work them with 75 new methods for working all difficult jobs. Ten receipts for making your own compounds for welding different kinds of steel solid. Thermite welding fully explained; also two colored tool tempering charts; chart A explains all annealing and hardening; chart B explains both scientific and plain tempering to a standard. Neatly arranged in pamphlet form for the small price of \$1. Valuable sample free. W. M. Toy, Sidney, O. P. S.—Get in line for big salaries later; good blacksmiths are scarce.

BRAZE THAT AND SAVE \$\$. Cast Iron, Steel, Copper, Bandsaws, Bronze or Brass with our New Process Compound, 80c per lb. By express, with guarantee. Cummings Compound Co., 364 Avery Ave., Detroit, Mich.

WANTED.

WANTED—Back numbers Popular Mechanics previous to March, 1906. W. W. Billingslea, Macon, Ga.

SITUATION WANTED—Young man, 19, at present employed, desires position in the office of a mechanical engineer in New York City, where he can make himself worth \$10.00 per week to start and will have an opportunity to learn. Address 10005 Popular Mechanics.

WANTED—A PARTNER with \$300, in the mfg. of gasoline engines and motors from 1 to 6 H. P. Special machines and tools for rapid production of same. Address 10007, care Popular Mechanics.

WANTED—A good invention, patented or unpatented. Box 10003 Popular Mechanics.

PLUMBER, STEAM, HOT WATER AND GAS FITTER, installer of gasoline and acetylene gas plants, married man, 10 years' experience, sober and reliable, wishes position in Western town; best of references. Address Box 203, Somonauk, Ill.

WANTED—Patented specialties to handle as selling agents. General Specialty Co., Syracuse, N. Y.

WANTED—Work for two story w. p. saw mill in N. H.; the manufacture of simple article, hard or soft wood. W. H. Mellor, Waltham, Mass.

AGENTS WANTED.

WANTED—Agents, machinists, toolmakers, draftsmen, attention! New and revised edition Saunders' "Hand Book of Practical Mechanics" now ready. Machinist says, "Can't get along without it." Best in the land. Shop kinks, secrets from notebooks, rules, formulas, most complete reference tables, tough problems figured by simple arithmetic. Valuable information condensed in pocket size. Price, postpaid, \$1.00, cloth; \$1.25, leather with flap. Agents make big profits. Send for list of books. E. H. Saunders, 216 Purchase St., Boston, Mass.

AGENTS make big money selling our new sign letters for office windows, store fronts and glass signs. Easily put on. Write to-day for a free sample and full particulars. Metallic Sign Letter Co., 77 No. Clark St., Chicago.

WANTED—Capable agents to handle new, high-grade, up-to-date articles; lighting sellers in all homes, offices, stores, shops; \$3 to \$10 daily guaranteed. Promotion assured. P. Thomas Mfg. Co., 162 B, Dayton, Ohio.

AGENTS—Portraits, 35 cents; frames, 15 cents; sheet pictures, 1 cent; stereoscopes, 25 cents; views, 1 cent. 30 days' credit. Samples and catalog free. Consolidated Portrait Co., 290, 172 W. Adams St., Chicago.

AGENTS' MONEY MAKER—Sell the "Eureka Door-Knob Bell." Entirely new, Bronze Metal. Screw driver only required to replace regular door knob. F. B. Black Co., Kansas City, Mo.

WANTED—Hustling local agent for an electrical magazine in every city of the United States. Good opportunities now open. Write for liberal terms. Electrocraft, Detroit, Mich.

BURGLAR PROOF—Greatest thing of the age; windows locked with 6-inch opening, put on in one minute; send for sample, 15c each. Agents wanted. Cannon Mfg. Co., 388 La Salle Ave., Chicago, Ill.

WANTED—A good live agent in every factory in the U. S. to handle our Mechanics Hand-Soap KLENZOLA. The best preparation for dissolving grease and dirt from the hands, without injury to the skin. Agents can make from \$10.00 to \$50.00 per month in addition to their regular work. Can be used in the household as well. Write for sample and terms. KLENZOLA COMPANY, ERIE, PA.

AGENTS WANTED—CAST BRONZE DOOR PLATES, "The Finest Made." Jas. H. Matthews & Co., Dept. "S.," Pittsburg, Pa.

AGENTS WANTED—METAL POLISH for automobiles, Brass signs and fine work. \$\$\$ for hustlers. D. M. Hall, Rome, N. Y.

FOR SALE OR TRADE—14 ft. launch, \$100, 1½ horsepower gasoline engine with accessories, \$60; bicycle propelled boat, \$30; 5 horsepower Corliss engine; bass viol. Desire steam automobile engine. 1300 First Ave., Peoria, Ill.

MALE HELP WANTED

A HUNDRED FIREMEN AND BRAKEMEN wanted on railroads in Chicago and vicinity, to fill vacancies caused by promotions. Experience unnecessary. State age, height, weight. Firemen, \$100 monthly, become engineers and earn \$200. Brakemen, \$75, becoming Conductors earn \$150. Name position preferred. Railway Association, Room 174, 227 Monroe Street, Brooklyn, N. Y., employment headquarters for all railroads.

MANAGERS, Foremen, Superintendents for positions of responsibility with well known firms; good openings always on our lists for men of executive ability; service strictly confidential; write us today. Hapgoods, 305 Broadway, New York City.

SELL BRASS SIGNS to Doctors, Dentists, Banks. Jas. H. Matthews & Co., Dept. "S.," Pittsburg, Pa.

WANTED—TOOL MAKER—Also wood pattern maker, who would invest from one to two hundred dollars in the manufacture of gasoline engines and motors from 1 to 6 H. P. Address 10007, care Popular Mechanics.

SALESMEN—Write the Dayton Label Co., Dayton, O., for sample outfit and sell merchants 2,000 advertising stickers for \$1 "on the side;" 40 per cent commission and a square deal. Write now.

GOOD SALESMEN WANTED for a patented specialty selling for \$50 and \$75; needed in all manufacturing plants. May devote entire or part time. Some of our representatives average \$15 a day. Some more. Write at once to Power Specialty Co., 240 Fort St., Detroit, Mich.

WANTED—Mechanics to sell our fine line of Callipers and Levels. Good pay. Address E. G. Smith Co., Columbia, Pa.

SALESMEN WANTED—Must be experienced selling power transmitting, mill and factory supplies. Salary and commission. Give age, experience and reference. L. F. Grammes & Sons, Allentown, Pa.

\$100 PER MONTH SALARY—Paid weekly. Energetic man in each county to represent Hardware Dept. Established business. Expense money in advance. The Columbia House, H-7, Chicago.

EDUCATIONAL AND INSTRUCTION.

STUDY ELECTRICITY AT HOME—A complete electrical course at home, containing 30-page detail book, 220-page text-book, 200 experiments and over 100 pieces of apparatus. Price, complete, only \$5.60. Catalogue "PS" explains this and other remarkable offers. Thomas M. St. John, 848 Ninth Ave., New York.

FOR SALE—Chicago College of Advertising scholarship, value \$40; will sell for \$20. Graduates of this school are making from \$30 to \$75 per week. Address 6103, Popular Mechanics.

ARE YOU MAKING less than \$25 or \$30 per week? Mechanical and Structural Drawing taught by experts. Send for circular. Low tuition, including Free Books, Drawing Instruments, etc. Columbia Correspondence School, Drexel Bldg., Philadelphia, Pa.

MONEY IN NOVELTIES—Our advertisers and readers are looking for good new novelties to put on the market. They have money for the right inventions in utility, amusement and advertising novelties. What have you got that's good? Reach this field through "The Novelty News," 171-5 Washington St., Chicago. Trial 3 months, 25 cents.

FOR SALE—Complete course of Boyd's Syllabetic Short-hand Book Form; price, \$3.00. Learn in 30 days. Same system sells for \$20.00. Chas S. Weller, Mitchell, S. D.

FOR SALE—I. C. S. \$80 mechanical draftsman's course with three volumes, drawing instruments and \$5 drawing table complete. Price, \$45. Write for particulars. W. A. Bowers, 26 Hamden St., Westfield, Mass.

BOOKS AND PERIODICALS.

FOR SALE—Engineering Library. Ten volumes, bound in ¾ morocco. Covers completely the field of Steam and Electrical Engineering. Is in first-class condition. Cost, new, \$50. Will sell for \$15. Address T. A. Z., care Popular Mechanics.

FOR SALE—A thorough treatise on Electricity. Covers entirely electricity in all branches. Five volumes. Cost, new, \$19. Used but short time. Are in fine condition. Will sell for \$9. Address T. F. B., 4106, care Popular Mechanics.

IF IT'S PRINTED—MacDonald can supply it—Domestic and Foreign publications of every description—Plays—reading and recitation books—Dramatic Journals supplied by mail. "Catalogue P. M. sent free." Chas. MacDonald, 53 Washington St., Chicago, Ill.

FOR SALE—Cyclopedia of Engineering. Steam, electrical, mechanical. Bound in three-quarters red morocco leather. Four volumes. Cost new \$19. Used but slightly. Are in fine condition. Will sell for \$9. Address J. T. B., 4107, care Popular Mechanics, Chicago, Ill.

ELECTRICIAN AND MECHANIC—Practical monthly magazine for electrical and mechanical students and workers. Publishes illustrated directions for constructing dynamos, motors, gasoline engines, wireless telegraphy, electroplating, electrical wiring, mechanical drawing, using tools, furniture construction, photography, all kinds of mechanical work. One dollar yearly; single copy with book catalogue, ten cents. P. M. Sampson Publishing Co., 6 Beacon St., Boston, Mass.

FOR SALE—Engineering Library of twelve volumes. Steam, electrical, mechanical. Bound in three-quarters red morocco leather. Cost new \$60. Are in excellent condition. Used but short time. Will sell for \$18. Address P. M. R., 4105, care Popular Mechanics.

FOR SALE—"Cyclopedia of Modern Shop Practice." A complete reference work for machinists, foundrymen, etc. Leather binding, four volumes. Cost \$18. Will sell for \$6. Address P. M., Box 425, Chicago, Ill.

GET A GOVERNMENT POSITION—Our book fully instructs how. Failure if studied impossible. Address Frank B. Pergande, Publisher, Whitefish Bay, Milwaukee, Wis.

PICTURES AND POST CARDS.

ONE DOZEN PHOTO POST CARDS made from any photograph for 50 cents. Your photograph returned with order, postpaid. All work guaranteed. Enough said. Give us a trial. Photo Card Co., 395 W. 17th St., Chicago, Ill.

BEAUTIFUL SOUVENIR PICTURE, 12x20, entitled "King of the Forest," and new bargain sale lists of curios. All for 20c, prepaid. George J. Tills, Albion, N. Y.

10 SOUVENIR POSTCARDS GIVEN with a 6 mos. subscription for 25c to largest and oldest 100-page monthly on Coins, Stamps, Postcards, Curios, Minerals, Autographs, Photographs, Relics and Old Books. Organ of the largest Stamp, Curio, Postcards and Camera Clubs. Ads pay—1c per word. Phil. West and Camera News, Superior, Neb. Sample free. 3 Mos. trial, 10c. It's Nebraska's largest monthly.

SEND 15 cents for handsome set of Washington and Jamestown post cards. You will be delighted. Ever ready safety razor with 12 blades, \$1.00; a Waterman 14 kt. gold fountain pen, 95 cents. Money back if not satisfied. E. R. Melton & Co., Washington, D. C.

PRINTING.

ONE HUNDRED visiting cards, 35c; 100 business cards, in leather case, 50c; envelopes, 40c per 100. All kinds of printing and embossing. Stamp for samples and prices. H. O. Graves, Fortville, Ind.

CEMENT

IF YOU WANT the best information on cement and concrete construction subscribe for Concrete, leading cement and concrete monthly. Sample copy, 10 cents. Concrete, 135 Newberry Bldg., Detroit, Mich.

LAUNCH MACHINERY

EASY AND SAFE to operate, therefore NOT gasoline. Dependable and economical, therefore steam. Supplied by Flash Tube Generator to a compound engine. Nothing complicated. Nothing uncertain. Light weight and moderate space. Kerosene fuel. Marine Iron Works, N. Halsted Station, Chicago, Ill.

VULCANIZERS.

VULCANIZING done well and reasonably; 9c a pound paid for auto tires beyond repairs; repaired tires for sale. Vulcanizers—we make a full line of the most improved kinds. Single tube auto tires, first quality, 26x2½, \$9; 28x2½, \$10; 28x3, \$12; 30x3, \$13; seconds, \$2 less each; clincher tires, 20 to 50 per cent off; bicycle tires, \$3 per pair. Chas. E. Miller, Anderson, Ind.

MISCELLANEOUS.

NU-CELL, a preparation for renewing old dry batteries. Large package, 15c (no stamps). Address 2291, Popular Mechanics, Chicago, Ill.

1,450 REGISTRATIONS of motor vehicles in Nebraska. Name and address of owner, description of machine, mailed on receipt of \$1. Address Secretary of State, Lincoln, Neb.

YOUR FORTUNE LIES IN YOUR HAND. Read your future with my Fortune Telling Chart. Send 10 cents for one, NOW. J. Cecil Nuckols, Covington, Ky.

BOATS AND LAUNCHES—We build them. W. O. Tobias, Sales Agent, Clinton, Mo.

KELLARS MAGIC POKER CARDS, 10c; Eagle magic trick cards, 25c; both for 20c to introduce our puzzle list. Western Puzzle Co., St. Paul, Minn.

PUZZLES—Steel, wood and wire, 45c worth postpaid for 25c to introduce our list. Money back if not satisfactory. Western Puzzle Co., St. Paul, Minn.

METAL INK, for writing with ordinary pen on bright iron or steel. Makes a permanent letter and leaves surface smooth. For marking mechanics' tools, or any iron or steel article, it is invaluable. Ounce bottle, 75c; half ounce, 40c; sample bottle, 15c. Sample of writing free. M. Jewett & Co., Cleveland, Ohio.

FORMULA for dry fire extinguisher. Cheap; more effective than wet. Does not injure property. 25c stamps. J. G. F., Box 1383, Spokane, Wash.

CEMENTING metals upon glass, wood or marble; iron upon iron, leather or stone. Directions, 25c each. Address 10001 Popular Mechanics.

POCKET WIRELESS receiving apparatus. This is a remarkably small and light receiver, having been recently condensed. It is very convenient to use while boating, autoing, bicycling, etc., or may be used in a regular receiving station. The "Standard," prepaid, \$2.00, or the "Imperial," more sensitive, \$2.50 prepaid. Address International Wireless Co., Box 519, Lima, Ohio.

RECUT your old files with my cheap chemical formulas. 25c silver. Jno. Paddock, 168 Williams Ave., Brooklyn, N. Y.

I MAKE drawings and blue prints. D. Tappan, Watervliet, N. Y.

PERISHABLE PAPER, writing paper that crumbles to dust. Ink that disappears in 30 days. Transfer fluid. Engravings, designs, etc., transferred from printed paper to note book or handkerchief. Dry battery renewer. Pencils for writing on glass and 75 others, all for 25 cts. (silver). Box 12, St. Rock's, Quebec, Can.

BIG MONEY LECTURING on wireless telegraphy. Remarkable typewritten lecture given free with the most beautiful lecturing outfit ever devised. Takes wireless photographs of the crowd, blows firecrackers, etc. 5 lectures pay for the whole outfit. Exhibited 1650 No. Clark St., Chicago. Price only \$100. Address A. E. Joerin, R. 410, 171 Washington St., Chicago.

WIRELESS TELEGRAPHY—Something new. Make your own instruments. Instructions, with blue prints, for making, sending and receiving apparatus sent on receipt of 25 cents (no stamps). Address 7503, care Popular Mechanics.

NEW-CELL, a preparation for renewing old dry batteries. Large package, 10c (no stamps). Address 10006, care Popular Mechanics.

FREE—Names and addresses of manufacturers in any line of invention. Address Williams, 2341 N. Harding, Chicago.

WIRELESS TELEGRAPHY—The "Excelco" detector, most sensitive and reliable detector made. Will catch messages sent out from stations several hundred miles away. No battery required. Complete detector by mail, postpaid, \$1.50. Descriptive circular free for stamp. Agents wanted. Victor H. Laughter Co., Dept. E, Byhalia, Miss.

WORLD'S MEASUREMENTS—A blue print chart of the measurements of the world will be sent for 10c. Address Box 156, North Bend, Neb.

OUR TREATISE—"Practical Methods of Hardening and Tempering Steel," by an expert toolmaker, with 22 years of practical experience, will save you time, money and worry, will insure perfectly hardened and tempered tools. Sent prepaid for 25c. Write for particulars. Climax Publishing Co., 922 Mt. Vernon, Philadelphia, Pa.

MONEYMAKING FORMULAS—Six for ten cents in silver. Soap, toilet waters, perfumes and three winners. H. C. Burns, 569 Third St., Niagara Falls, N. Y.

GALL STONES, dangerous operations avoided. Don't suffer needlessly. Our combined treatment brings prompt relief. Permanent cure guaranteed. Price, \$5.00, express prepaid. Booklet free. P. Crandall Remedy Co., Fresno, Cal.

**WHEN YOU WANT ANYTHING
AND DON'T KNOW WHERE TO FIND IT
WRITE POPULAR MECHANICS**



AGENTS

Here is easy money for you. Shoes for flatirons. Sells itself. Goes in every home and laundry. Hottest seller on the market. Agents are making over \$50.00 weekly. Get busy. Address

DEXTER SUPPLY CO., Dept. M, Caxton Bldg., Chicago

TYPE-WRITER—A regular \$100 machine in first class condition for \$15. Taken on a debt. Address 9500, care Popular Mechanics.

CIGAR BANDS—Imported direct from Europe; entirely different from American bands; 3,000 kinds, all new, stamped with real gold, beautifully colored. Samples, 10 cents, or 40 cents per 100 (no duplicates), postpaid, including illustrated catalogue on professional plate making. Order quick. National Selling Co., Allentown, Pa.

AMBER EMBROCATION—A specialty for rheumatism, lumbago and stiff joints. Never known to fail. 50c and \$1.00 per bottle. Amber Embrocation Co., Highland St., Dorchester, Mass.

ELECTRICAL NOVELTIES AND SUPPLIES at wholesale prices to anyone. Large catalogue free. Agents wanted. Illinois Electrical Works, Kewanee, Ill.

MACHINIST AND DRAFTSMAN'S TABLE, U. S. standard, steam, gas and water pipe tapping sizes. Five cents in stamps. E. E. Meyer, Allegheny, Pa.

LAND FOR SALE

TEXAS IS BOOMING—Fine farming lands in the Texas panhandle, at from \$12.00 to \$20.00 per acre, and in other portions of North Texas, at from \$18.00 to \$25.00 per acre are bargains at present low prices. Values are bound to increase. Address Texas Farm Land Co., 277 Dearborn St., Chicago, Ill.

TOO LATE TO CLASSIFY

GAS AND ELECTRIC FIXTURES at wholesale prices to the public. Write for catalog sheets. Mention if gas only or combination gas and electric wanted. Western Chandeller Co., Mail Order Dept., 19 West Lake St., Chicago.

FOR SALE—1906 Indian Motorcycle with cyclometer and separate generator headlight. Has only been ridden 350 miles and is as good as when it came from the factory. Have been prevented from riding it by sickness and for this reason am selling it. Price \$150. Send bank draft for \$25 as guarantee of the freight both ways and I will ship the machine by freight with bill of lading attached to sight draft for balance. Reference, Bank of Gage, Okla. Dr. G. E. Irvin, Gage, Okla.

FOR SALE—2 cylinder 8 h. p. Orient Buckboard fitted with G. & J. clincher tires and 14 in. steering wheel with spark and throttle levers above it. Cost new, 2 months ago, with extras, \$590. Price \$400, \$50 with order, sight for balance with bill of lading. Reference, any bank or banker of this place. Ralph Workman, Woodward, Okla.

FOR SALE—Cyclopedia of Architecture. Ten volumes. First class condition. Worth \$60.00. Leaving city, will sell for \$12.00. Address R. O. M., Box 425, Chicago.

MANUFACTURERS—Have you any articles which we can sell in our mail order business? Ladies' articles wanted especially. Send sample, if convenient, otherwise description or circular, with your lowest cash with order quantity prices. Our years of experience will make your article a winner if your prices are right. Acme Mfg. Co., Dept. D., Cincinnati, O.

OPEN A MIRROR FACTORY; THERE'S MONEY IN IT—4c brings booklet; testimonials and full particulars, none without; \$5 to \$25 day sure; start NOW. Hullinger's Mirror School, Francesville, Ind.

STEEL RAILS—All sections New and Relaying. In stock for immediate shipment. Rails cut to length. M. K. Frank, Frick bldg., Pittsburg, Pa.

BEHIND THE SCENES WITH THE MEDIUMS.—By David P. Abbott. Cloth, gilt top; 328 pp. Price, \$1.50. The Open Court Publishing Co., Chicago. Mediums have long succeeded in keeping their secrets out of print and away from the public, but the most valuable secrets of mediumistic work are revealed in this book. The author is a practical performer himself—but not a medium, and some of the secrets he reveals were purchased at exorbitant prices. The honest spiritualist will welcome the work because its aim is to expose the magician and charlatan. Some of these secrets have sold as high as \$250, and the sum total of all contained in the volume is estimated at many hundreds.

HANDBOOK OF PRACTICAL MECHANICS.—By Charles H. Saunders. Pocket size. Price, postpaid (leather, with flap), \$1.25. Charles H. Saunders, Boston Mass. A work for use in the shop and draughting. Contains tables, rules and formulas, solutions of practical problems by simple and quick methods.

Train Load of Books

Books to be closed out at less than cost of paper and printing. Binding free.

Failed National Book Concern, Cash Buyers' Union, Merrill & Baker, Colonial Pub. Co.

I bought entire stock of three of these Big Bankrupt Book Houses and a big lot of the other. I am closing it out now at 10c to 50c on the dollar.

Sample Prices

Late copyright books, were \$1.50. My price 38c. List includes The Prospector, The Masqueraders, Conquest of Canaan, Richard Carvel. Hundreds of others at from 38c to 48c.

Encyclopedia Britannica, half morocco binding, installment price \$36.00. My price \$7.75.

Dickens Complete Works, 15 vols., regularly \$15.00. My price \$3.75.

I am closing out at less than half price the following complete works in half morocco bindings:—Dickens, Thackeray, Balzac, Scott, Irving, Dumas, Hugo, Bulwer, Carlyle, Eliot, Cooper, DeFoe, Fielding, Hawthorne, Poe, Reade, Ruskin, Smollett, Gibbon, Guizot, Green, Shakespeare, etc.

Millions of books, thousands of titles. Chance of a lifetime to get almost any book at a discount of from 50 to 90 per cent from regular price while stock lasts.

Books Shipped on Approval

subject to examination in your own home before paying. Every book guaranteed new and satisfactory, or subject to return at my expense. Write for my big Free Bargain List of this stock before ordering. It costs nothing. Will save you money. Postal card will bring it.

DAVID B. CLARKSON, The Book Broker, 1022 Bosch Bldg., Chicago.



LEARN TO MOUNT BIRDS and ANIMALS

We can teach you by mail at home during your spare hours to stuff and mount all kinds of birds, animals, game heads, etc. Also tax skins and make rugs. Be your own taxidermist. Decorate your home with your beautiful trophies; become a professional taxidermist and earn big income. Quickly learned by men and women. Thousands of successful students. Great Book "How to Learn to Mount Birds and Animals" sent FREE. Write now, today. N. W. School of Taxidermy, Box 68B., Omaha, Neb.

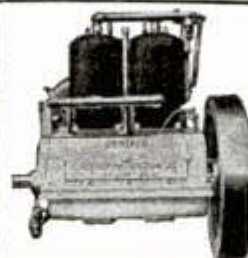
Fifty answers in one week from all over the country to a classified ad in Popular Mechanics. That is common.

Electrical Supplies

For the Amateur

Lowest prices :: Send Stamp for Catalogue

THE BRIDMAR CO., Chicago, Ill.



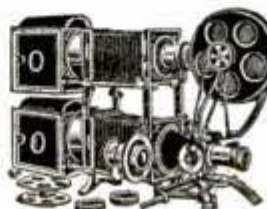
SCRIPPS

The most trustworthy of 4-cycle Marine engines, and the ONLY strictly high-class engine selling at a reasonable price. Unusually simple, no cranking, economical, handsomely finished. 2-cylinder, 8-10 H. P. 4-cylinder, 15-20 H. P. Write for catalog.

Scripps Motor Co., 602 Trumbull Ave., Detroit, Mich.

The Classified Rate in Popular Mechanics is very low—but three cents per word.

IT PAYS BIG To Amuse The Public With Motion Pictures



NO EXPERIENCE NECESSARY as our instruction Book and "Business Guide" tells all. We furnish Complete Outfits with Big Advertising Posters, etc. Humorous dramas brimful of fun, travel, history, religion, temperance work and songs illustrated. One man can do it. **Astonishing Opportunity** in any locality for a man with a little money to show in churches, school houses, lodge halls, theatres, etc. **Profits \$10 to over \$100 per night.** Others do it, why not you? It's easy; write to us and we'll tell you how. Catalogue free.

AMUSEMENT SUPPLY CO., 471 Chemical Bank Bldg., Chicago

GLASSES ARE NEEDLESS

in most cases. For weak eyes they are crutches—not a cure. For diseased eyes they are useless. Only a gentle *medicated massage* can strengthen weak eyes and cure optical diseases. The

NATURAL SIGHT RESTORER

applies a *soothing, strengthening treatment* that is *healing but harmless*; gently exercises the proper muscles and makes weak eyes strong by proper massage. *Brings eye-health by aiding nature. Young or old treated at home and normal eye-sight secured for the cost of a pair of glasses. Don't wear "specks," but write today for our free illustrated book. If we can't help you, we will say so.*

The Natural Sight Restorer Co.
104 Broadway :: Detroit, Michigan



Build This Boat Yourself

with Pioneer Perfect Frames, the **only** frames having ribs bent to **exact shape**, set up, trued, tested and beveled for planking — by skilled boat-builders — before being knocked down for shipment to you.

Pioneer Perfect Frames save **all** the hard work and **two-thirds** the boat-builder's price for a similar, complete boat.

Remember, with Pioneer Frames we furnish absolutely **FREE**, plank patterns and full instructions for completing.

Order your Frames **TODAY**, on the **Easy Payment** plan; see for yourself the simplicity of the Pioneer System. If you haven't time or cannot get material conveniently to complete your boat yourself, write us for Planking, Decking, Fittings, Engine, etc. All parts just as perfect and low-priced as our Frames.

By securing your Frames on the **Easy Payment** plan you pay for your boat as you build it. If Pioneer Frames weren't perfect in **every detail** we couldn't afford to make this liberal offer.

Write **TODAY** for **FREE** book telling how to build your boat from Pioneer Perfect Frames, Planking, etc., or from Pioneer full-size patterns of every part. Or, send 25c. for 104-page boat-builder's book, over 300 illustrations, and everything about boats, engines, etc. Money back if not satisfied.

The Pioneer Boat & Pattern Co. Wharf 145, Bay City, Mich.

BUILD YOUR OWN BOAT

BY THE **BROOKS SYSTEM**

Of Full Size Patterns and Illustrated Instructions

You need no tool experience—no previous knowledge of boats. Our big free catalog gives hundreds of testimonials—tells how a profitable boat building business may be established. Send for it. We sell knock-down frames with patterns to finish for less than it costs others to manufacture. 21,311 inexperienced people built boats by the Brooks System last year. Why not you?

SATISFACTION GUARANTEED OR MONEY REFUNDED

BROOKS BOAT MFG. CO.
ORIGINATORS OF THE PATTERN SYSTEM OF BOAT BUILDING.
371 SHIP ST. SAGINAW MICH. U.S.A.



KNOCK DOWN FURNITURE

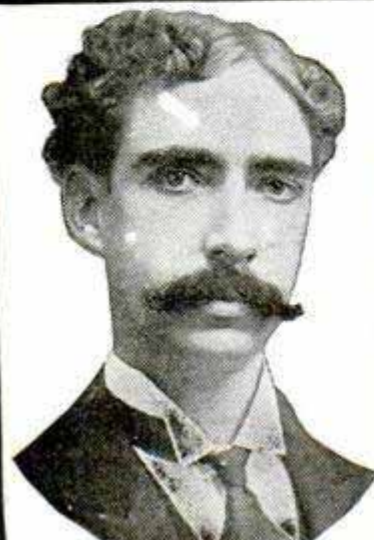
You Save $\frac{3}{4}$ the Cost

By putting together and finishing it at home. We furnish it—art and mission designs—heavy solid oak—every piece fitted and smoothed—includes stain and fastenings. You save $\frac{1}{2}$ manufacturing cost — $\frac{1}{3}$ the freight and all dealers' profits.

Send trial order for this \$4 chair. Bottom cushion cover of leatherette, \$1.50. Particulars of other pieces sent on request.



BROOKS MFG. CO.
ORIGINATORS OF THE K. D. SYSTEM OF HOME FURNISHING.
371 SHIP ST. SAGINAW MICH. U.S.A.



I STOP FALLING HAIR

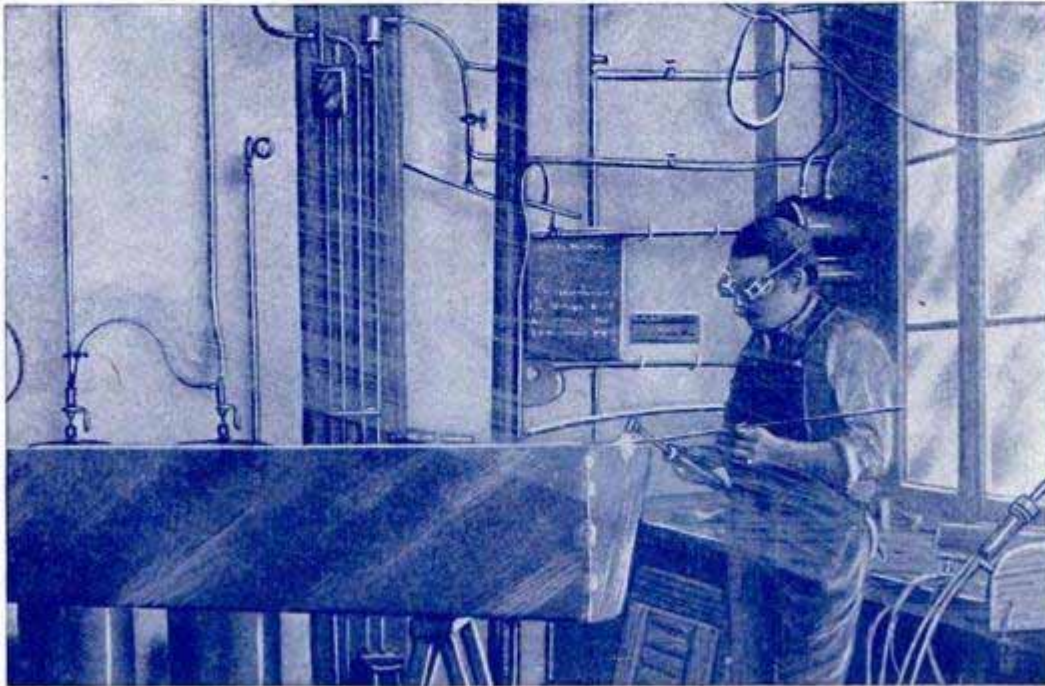
CONSULT ME BEFORE IT IS TOO LATE

There is but one way to tell the reason of baldness and falling hair and that is by a microscopic examination of the hair. The particular disease with which your scalp is afflicted must be known before it can be intelligently treated. The use of dandruff cures and hair tonics, without knowing the specific cause of your disease, is like taking medicine without knowing what you are trying to cure. Send a few fallen hairs from your combings to Prof. J. H. Austin, the celebrated Bacteriologist, who will send you, absolutely free, a diagnosis of your case, a booklet on care of the hair and scalp, and a sample box of the remedy which he will prepare specially for you. Enclose 2c postage and write to-day.



AUTOGENOUS WELDING EPURITE PROCESS

(PATENTED)



EASY

EFFECTIVE

ECONOMICAL

INDUSTRIAL OXYGEN CO., Hanover Bank Building, New York

Power Problems

with power users are all of the direct kind.

Is it reliable?

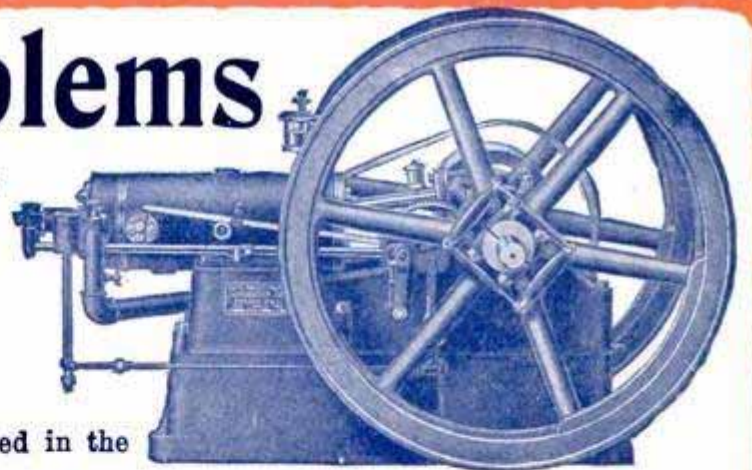
Can anybody run it?

Is the running cost low?

Is it safe?

Is it adapted to your purposes?

These questions are all satisfactorily answered in the



I. H. C. Gasoline Engines

They are built on correct mechanical principles and only the highest grade material and thoroughly skilled workmanship are used in their making.

They can be depended upon to respond promptly, with abundant power, whenever call is made on them. A combination of efficiency, dependableness and durability that is found in engines of no other make.

Made in the following sizes:

VERTICAL, 2 and 3-H. P.

HORIZONTAL, (Stationary and Portable) 4, 6, 8, 10, 12, 15 and 20-H. P.

Call on the local International agent or write the office for catalog.

International Harvester Company of America, 70 Monroe St., Chicago, U. S. A.

(Incorporated)

Save 20% on Electrical Goods



Whether you buy "Mesco" quality Electrical goods from your local dealer or direct from the manufacturers' complete stock makes no difference to us, **but YOU** save about 20% in cost or renewals, or both—Be sure, then to get "Mesco" quality goods—that lasting quality—those real values.

Look at these, picked from our latest Catalog, No. 22 P. A. We make the prices because we make the goods.

"Mesco" Dry Battery—2½x6 (for bells, etc.)	\$.15
"Red Seal" Dry Battery—2½x6 (for ignition)	.25
Iron Box Bell—fancy gong—(see cut)	.67
Jem Battery Motor—(runs on 1 Dry Cell)	.75
"Anti-Doc" Medical Apparatus—(see cut)	2.00
"Short Line" Battery Phone—(like cut)	2.50
"Mesco" Jump Spark Coil—(ask for circular)	4.50

We make and carry in stock "Something Electrical for Everybody"—Write for Catalog 22 P.A. (144 pages pocket size—750 illustrations—lowest prices.) Mention "Popular Mechanics."

Address nearest house.



Manhattan Electrical Supply Company
17 Park Pl. 188 Fifth Avenue
NEW YORK CHICAGO

Largest Exclusive Mfrs. of Electrical Supplies in U. S.



\$2.00



\$2.50

Hot Weather Comfort

May be easily obtained by screwing to any handy water faucet in your hall, kitchen or bedroom

Warner Little Breezer Water Fan.

This is run by the water from any regular faucet and revolves as fast as 5,000 revolutions per minute, creating a delightful, cooling and penetrating current of air which may be thrown in any direction. The "Little Breezer" costs nothing to operate, never gets out of order and will make the heat bearable wherever used. Furthermore, it is the lowest priced good cooling fan ever produced. Price complete, ready to attach to faucet, only **\$3.00**



We ship at once.
Remit by check or money order to

Warner Motor Co.
Inc.

Dept. 14, Flatiron Bldg.
New York City



Utica Giant Button's Plier

The strongest, the handiest, the most powerful and the easiest cutting tool of its kind.

Can be used as a pipe grip, a flat-nose plier, and a wire cutter. It has four wire cutters, two of which are so designed that the wire is held between the jaws after cutting.

A Handy Plier That Everyone Should Have

TOOLS OF QUALITY ARE STAMPED



Only the genuine bear this mark. It's a guarantee of quality

Write for Plier Palmistry and Catalog

UTICA DROP FORGE & TOOL CO.

73 Genesee Street, :: UTICA, N. Y.

HOW TO RUN AN AUTO

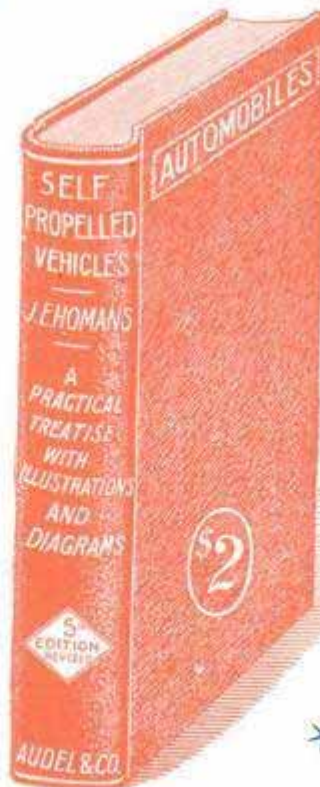
Are you interested in Automobiles?

If you are, an early purchase of the 1907 edition of "HOMANS SELF PROPELLED VEHICLES" will prove a good investment.

This work is now the accepted standard on the practical care and management of motor cars—explaining the principles of construction and operation in a clear and helpful way, and fully illustrated with many diagrams and drawings.

The presentation of subjects has been determined by consideration of the needs of the man behind the wheel. It is clear and concise in its treatment, and comprehensible to the most inexperienced automobilist, at the same time it is so thorough that the expert will learn much from its pages.

This good book will be sent to any address in the world, postpaid, upon receipt of two dollars, or if desired, will be sent on approval to be paid for after examination.



Contains 608 pages, over 400 diagrams and illustrations, printed on fine paper, size 5½x8½ inches, with generously good binding. Highly endorsed.

No money in advance required, sign and return
Theo. Audel & Co., 63 Fifth Ave., New York
Kindly mail me copy of "Homans' Auto," and if found satisfactory I will immediately remit \$2.00 return book to you

Name.....
Address.....
Date.....