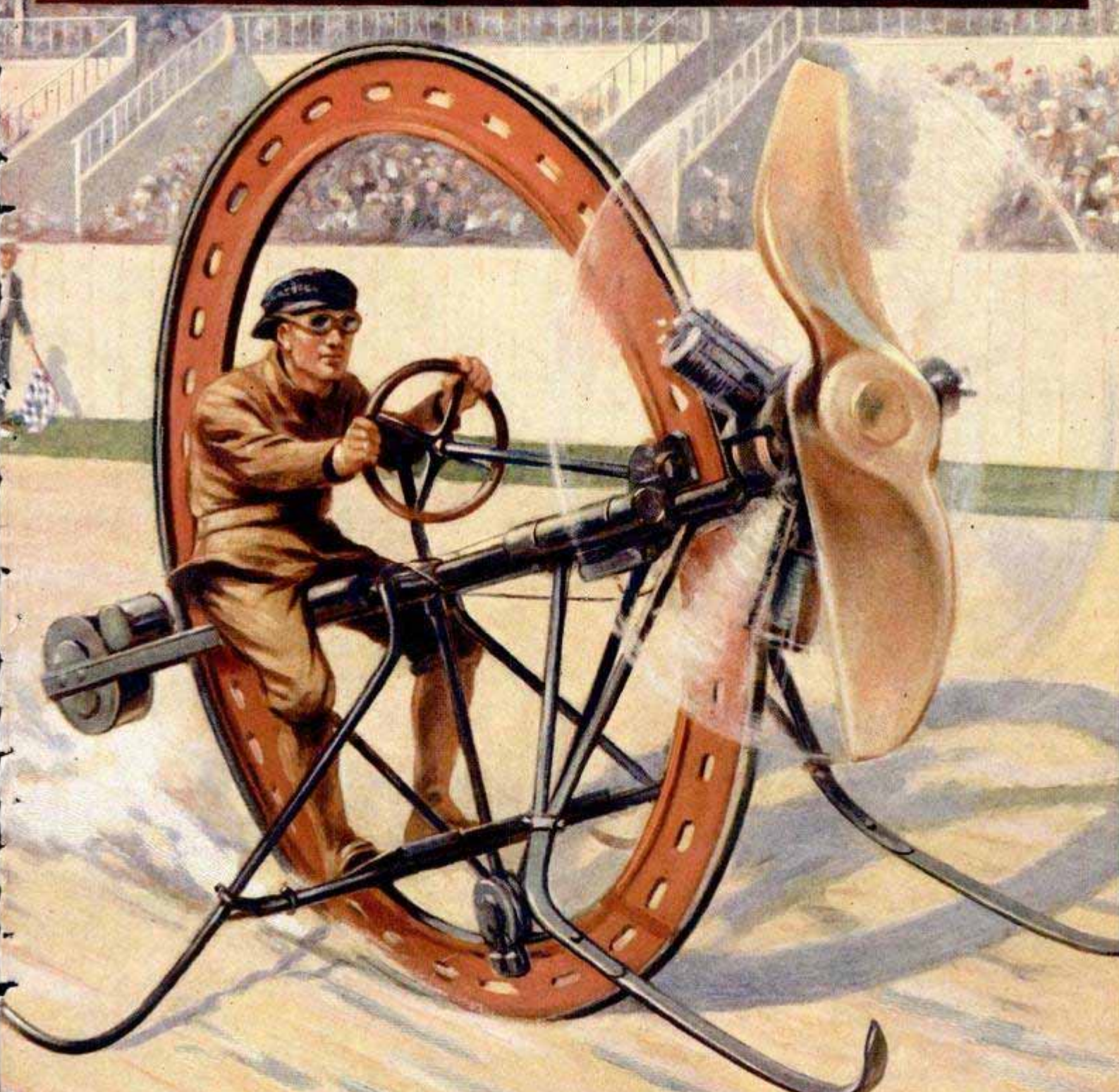


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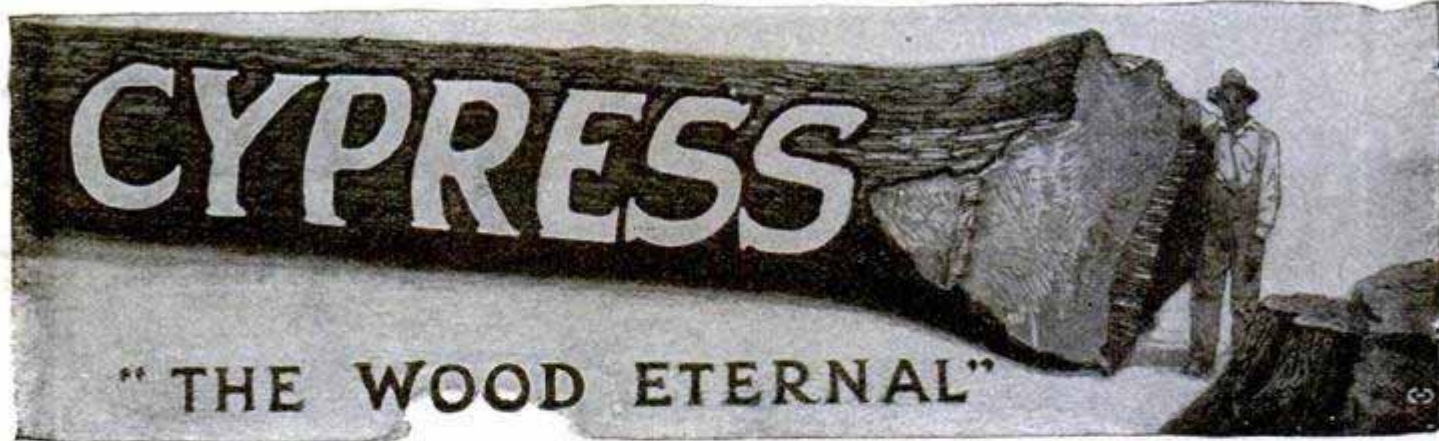
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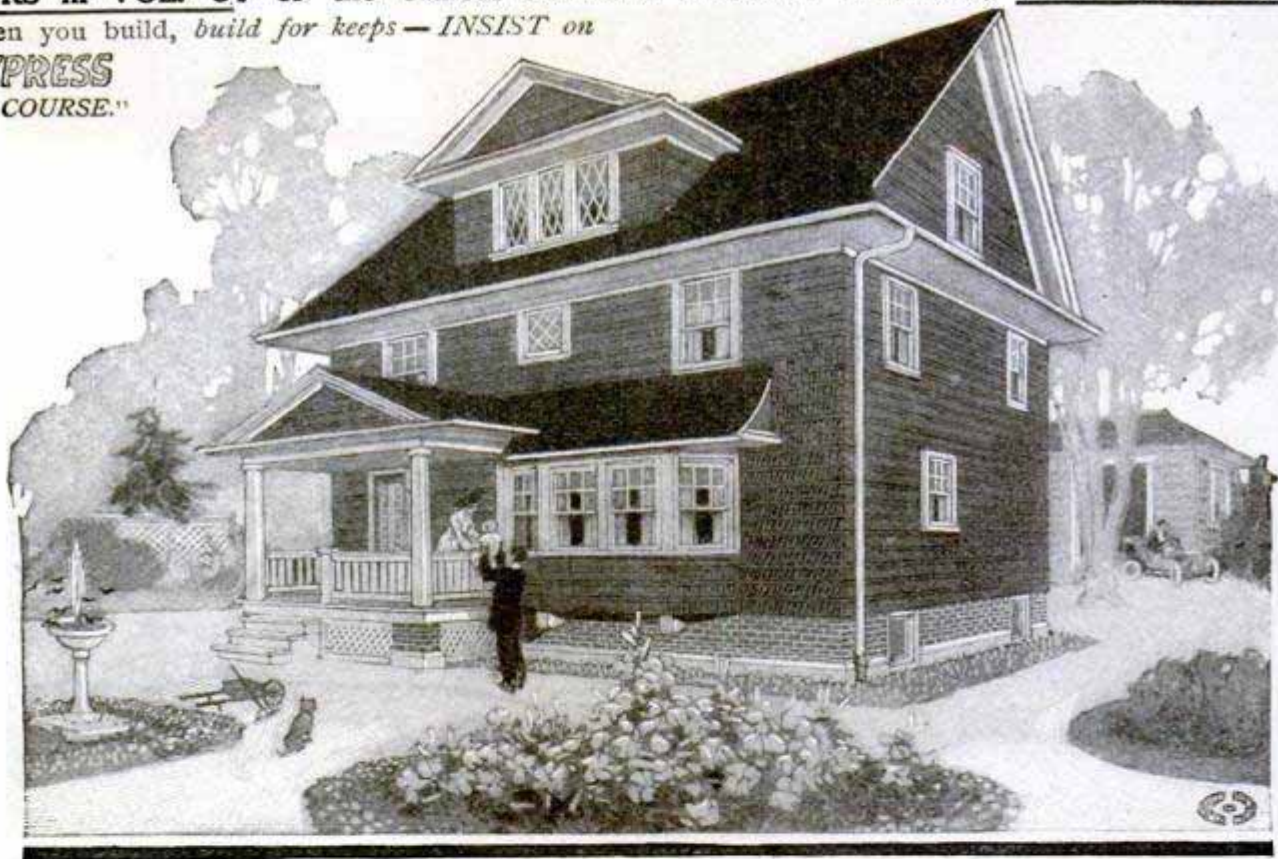
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EDITED BY H. H. WINDSOR

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## Contents for April, 1914

Accident, Odd, to French Airman.....	469	Finger-Twisting Machine to Aid Musicians.....	465
Aeroplane Message, Carrier for.....	510	Platiron, Novel, Saves Buttons.....	549
Aeroplane, Mouse Builds Nest in.....	532	Floating on Water with and without Aid.....	522
Aeroplane Passenger Service.....	579	Flying Record, Airman Sets New.....	533
Airman, Long Glide Made by English.....	497	Foreign Languages, System for Teaching.....	468
Airmen to Circumnavigate the Globe.....	489	Furnaces, Public, to Burn Rubbish.....	564
Airmen, What the, are Planning.....	576	Garage on Railroad Car.....	472
Anchor, Stern, on British Warship.....	469	Garden, Japanese, in America.....	568
Antarctic Continent, Across the.....	533	Glass Cooking Utensils Promised Soon.....	571
Armor, Modern Suit of, Advertises Wares.....	575	Glass for Spectacles, Ideal, Sought.....	510
Ash Cans, Rollers for, Facilitate Handling.....	548	Harnessing Science to the Factory.....	474
Australian Capital, New, Construction of Begun.....	582	By Frank Parker Stockbridge	
Automobile, Crippled, Casters for.....	553	Hatrack, A Top for the Top of.....	542
Automobile Road to the Yukon.....	524	High School Heated by Electricity.....	574
Ballot, "Movie" Films Show How to Cast.....	535	Horse Breathes through Brass Tube.....	523
Ballroom on Springs, Hotel Plans.....	581	Horses Stabled in Ice in Greenland.....	471
Boats, Native, of Anam Made without Metal.....	522	Horses, Wild, Make Raids on Canadian Farms.....	484
Bolts, Split, Handy in Cramped Places.....	539	House Plan—An Attractive Cement-Stucco Cot-	
Breeches-Buoy Apparatus, New.....	518	tage.....	616
Bridge Construction, Novel, in Pennsylvania City.....	516	Ink, Phosphorescent, Now Used in Printing.....	553
Building Damaged When Wet Wood Swells.....	562	Interchangeable Blades for Office Knives.....	547
Burglar Alarm, Door-Knob, Something New.....	542	Iron, Cast, Curious Designs Formed in.....	568
Camera, New, Photographs Flying Shell.....	493	Iron, Wrought, Making at Low Cost.....	562
Canal, Carrying a Great, over a Railway Cut.....	575	Irrigation System, Modern, Uses Cement Pipes.....	567
Canal, Columbia River, Completed.....	504	Japanese Picture Brides in America.....	552
Canal, New Welland, Has Only Seven Locks.....	566	Kerosene Motor, France Offers Prize for.....	531
Car Ferry to Havana Planned.....	517	Kitchen, Portable, Used by French Soldiers.....	483
Center of Universe, Altar of Heaven Called.....	536	Lamp-Posts, Temporary Decoration for.....	564
Circus Tent, Pitching by Machinery.....	562	Lamp Standard, Street, Made of Pipe.....	536
Coast Defense by Rail to Solve Problem.....	505	Lamp Which Tells if It has been Used.....	538
Coffin-Shaped Bottles to Hold Poison.....	565	Lantern, Blizzard, Not Affected by Winds.....	541
Collision in Dense Fog Sinks Steamer.....	492	Life Preserver, New, That Covers Whole Body.....	546
Conduits, Threading, by Air Pressure.....	541	Lights, Curious Use of Colored.....	551
Cools House with Air from Deep Well.....	578	Limousine de Luxe for Russian Nobleman.....	572
Culverts, American, in Africa.....	508	Lining Pipes with Wood to Prevent Corrosion.....	543
Curious Vehicles in Use the World Over.....	506	Lock Screw for Furniture Joints.....	551
Dam, Concrete Undermined and Wrecked.....	490	Locomotive Plunges into Coal Mine.....	486
Demonstration Against a Cruel Practice.....	493	Lookout Tower, Forest, Built of Logs.....	519
Derelicts, Finding and Destroying, at Sea.....	488	Lumber Made of Straw Used in Building.....	542
Dish-Washing Machine for Home Use.....	549	Lungmotor Equipment, Sidecar for Carrying.....	491
Dolls, Boarding House for, Built of Logs.....	524	Magnetic-Survey Vessel Sails 80,000 Miles.....	570
Door for Mine, Automatic, Operates Electrically.....	572	Mail Carrier, Swimming, of the Pacific.....	512
Dress Made of Newspaper Printed on Silk.....	481	Military Auto, Six-Bladed Propeller on.....	558
Electric Light, Portable, German Invention.....	571	Milk, Novel Top Protects, When Bottle is Opened.....	544
Electricity, Superheating Molten Metal by.....	544	Miners, Mexican, Weighed with Loads of Ore.....	485
Emery-Wheel Guard, New, Catches Fragments.....	542	Mission Paper Published on Lonely Island.....	469
Employment Bureau, Mechanical.....	464	"Moonshine" Outfit in Use among Eskimos.....	469
Engine, Gasoline, That can be Reversed.....	545	Motion Pictures Show Army in Action.....	481
Eruption, Destructive, of Japanese Volcano.....	500	Motor Car, Three-Wheeled, for Delivery Work.....	574
Excavator, Gravel, Worked by Traction Engine.....	517	Motor-Car Top Folds and Disappears.....	523
Fans, Electric, Used for Disinfectants.....	550	Motor Plow and Tractor for Farm.....	561
Fender, New, Sets Brakes Automatically.....	579	Motor Truck, Bucking, Dumps Load.....	532
Field Gun, New, of U. S. Army.....	499	Motor Trucks, Time-Saving Device Loads.....	569
Files, Curved, Used in Automobile Work.....	579	Motorcycles, Package Carrier for.....	483
Finger Bowls, Individual, of Paper.....	537	"Movie" Tickets Reward Good Conduct.....	508

[Continued on Page 6]

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# The "Efficiency" of the Fire-fly

**P** RIMITIVE man once used lanterns holding swarms of fireflies to guide him when he went forth at night. Today, as Waldemar Kaempffert points out in an article on "The Light of Our Descendants" printed by the *Outlook*, the illuminating specialists of two continents are studying the firefly for a solution of one of mankind's greatest problems—artificial light.

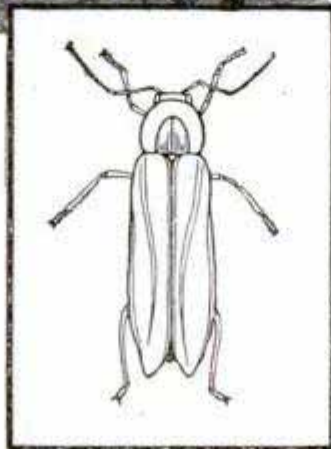
To imitate the firefly—to get a great deal of light with but little heat waste—has been the steadfast aim of technical experts in electric lighting since the study of electric light became a science. Step by step science has advanced in its search for this *economy in the fuel of light*.

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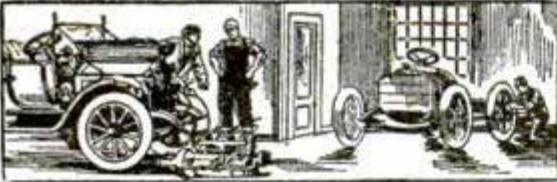
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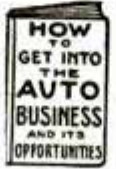
is something new. We use *real* working models—not just one, but *five*. On these models you get actual practice, see the actual operation and learn more than you could from the auto itself—it's easy and quick. You don't have to study hard with this system—we teach through the eye—a new idea. We are the originators of the system of teaching by mail with models. We also use charts—268 of them and a 16 page manikin. Our 40 instructions and Repairman's Instructions are simplicity itself—simple as A B C.

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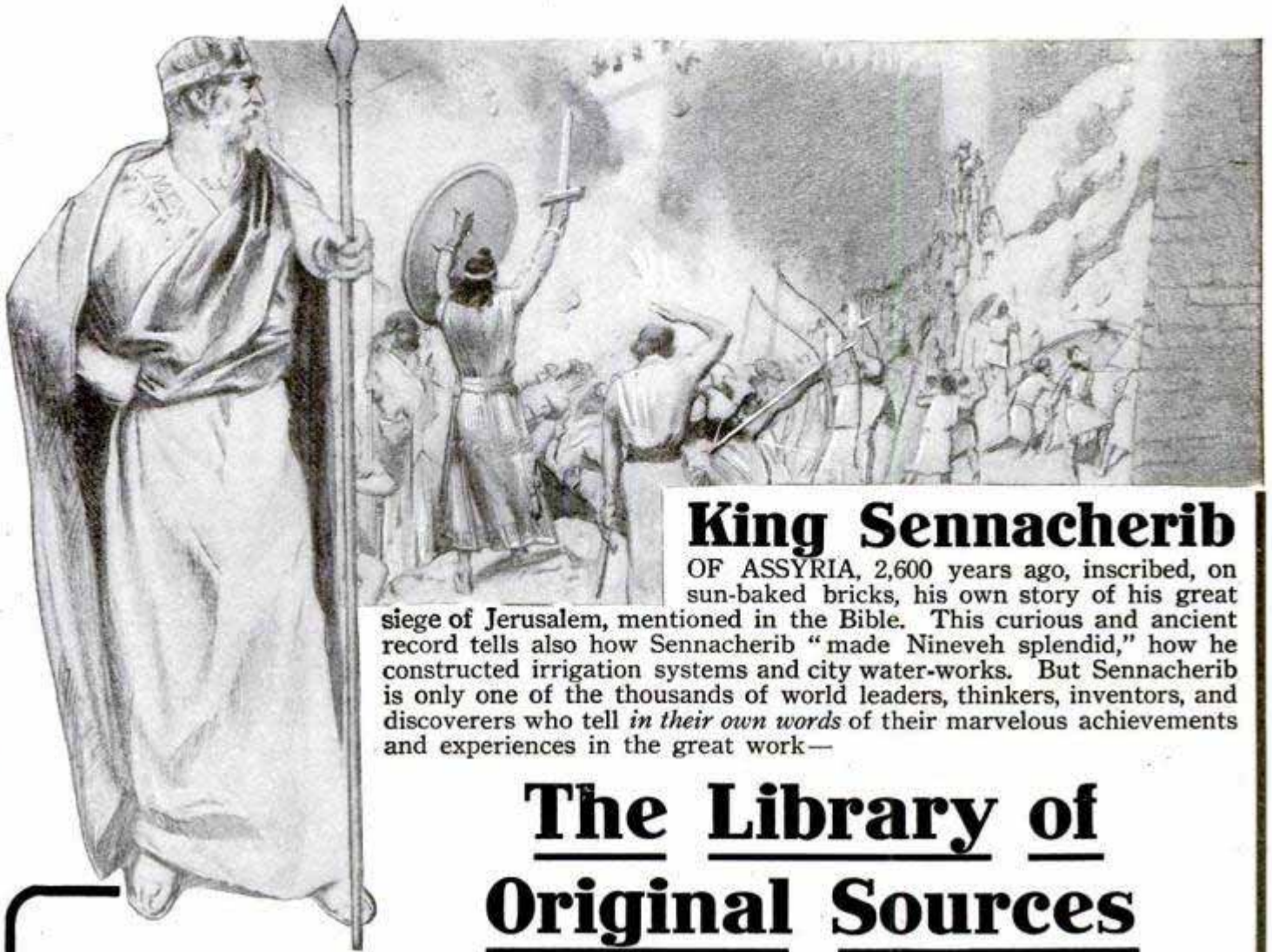
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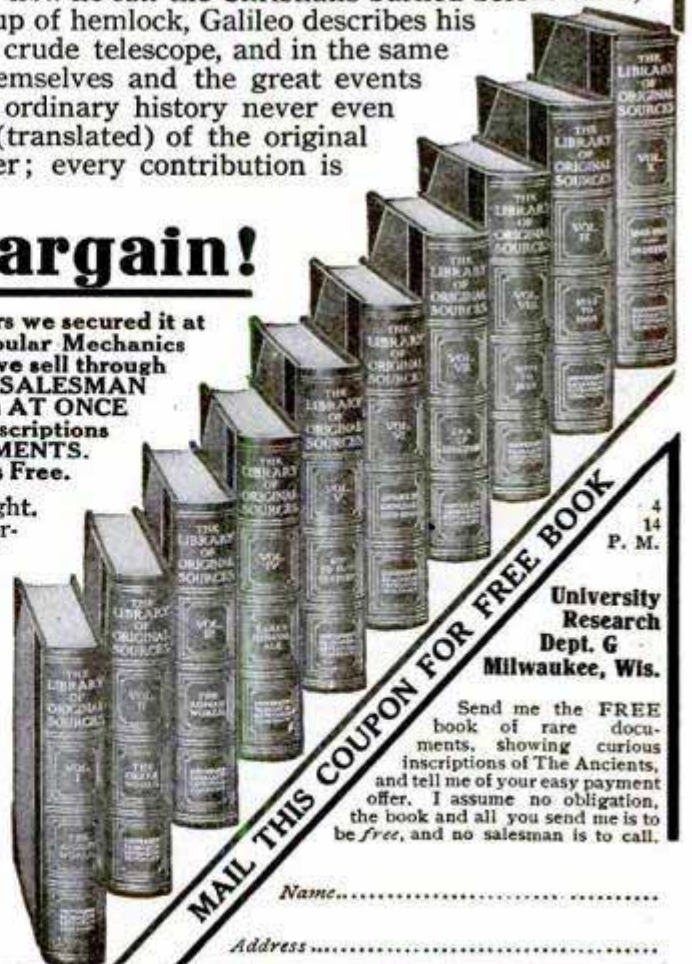
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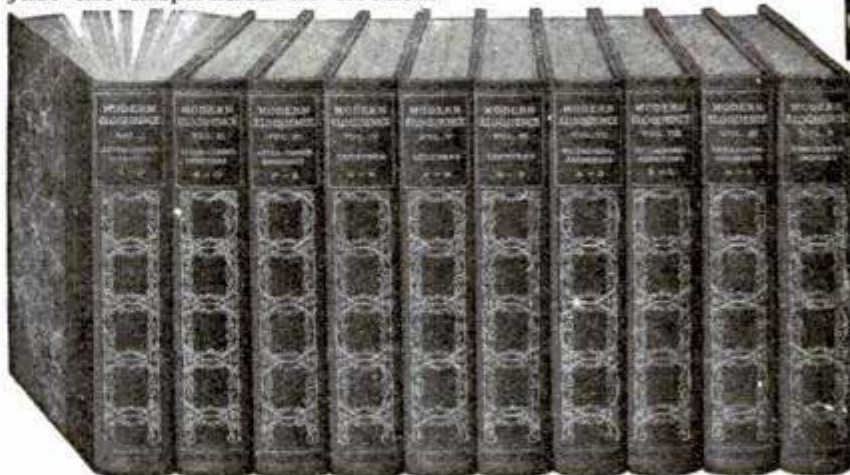
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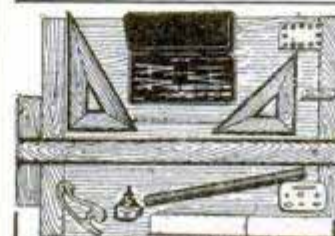


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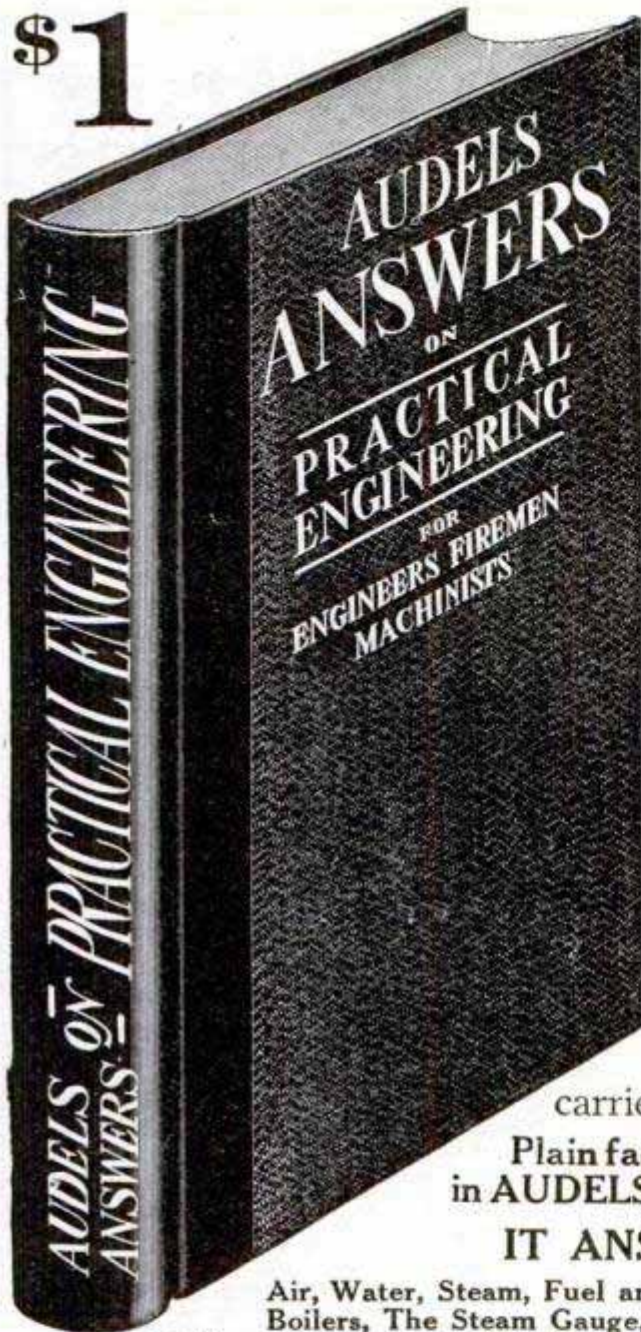


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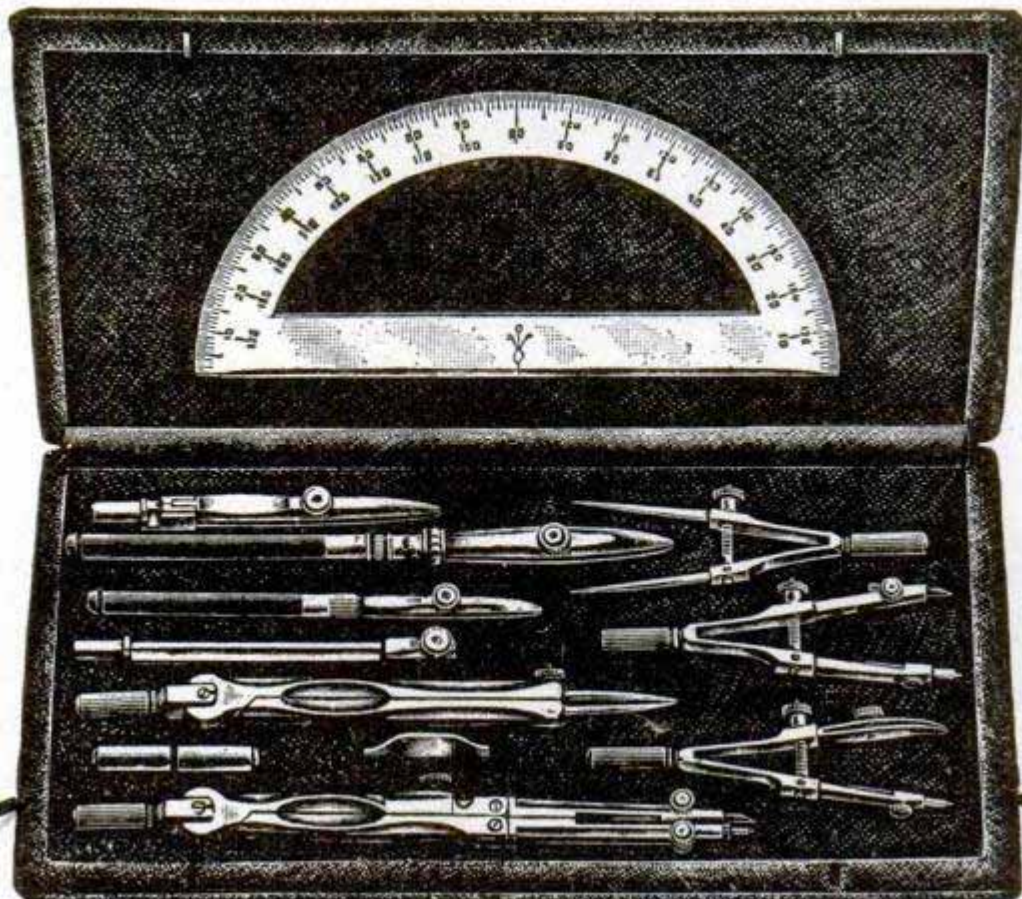
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BLACK Foxes are being bred in captivity in Prince Edward Island, Canada. Government report says, "Thousands of shareholders are receiving 25 per cent to 200 per cent yearly on investments of \$100 to \$1,000 each." A company is now being formed to purchase 3 pairs of P. E. Island registered foxes and to ranch them with the most successful fox breeder in the world, on a percentage basis. A free booklet and prospectus will be sent upon application to Dr. E. A. Randall, Truro, N. S., Canada.

BIG money made. Baseball and football machines. Sullivan Amusement Co., St. Albans, Vt.

YOU will collide with golden money-making Opportunities, Plans and Knowledge by simply sending 10c for two issues of the Agents Magazine, Chicago.

\$3,000 YEARLY in your back yard. No Ginseng, Mushroom dope. New ideas never before published; particulars free. Metz, 306 East 88th St., New York.

ASK Bode! Anything! Especially about Business and Adwriting! Get Particulars "Now"! Bode, 2889p Main, Hartford, Conn.

MAKE \$25 weekly growing mushrooms in cellars, sheds, etc. Booklet free. North Shore Mushroom Farm, Dept. 12, Hubbard Woods, Ill.

EVERY Advertiser Needs our New Advertising Rate Book. Lists 2,000 best advertising mediums in America. Gives circulation and rates. Contains special lists and advertising snaps, including "Ads That Pay," sent prepaid for 10c. Dearborn Advertising Agency, 521 Dearborn St., Chicago.

WOULD you like to own a good-paying mail order business? We have a line that gets repeat orders all the time. You can start in spare time; invest a dollar or two a week and soon own a nice business of your own; write for particulars. Nadico, 1664 Belmont Ave., Chicago.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

INDEPENDENCE and fortune quickly attained in the Manufacturing Mail Order business. I furnish Formulas, Manufacturing Processes and Trade Secrets in all lines. Sold under positive guarantee; 18 years' practical experience. Revision and improvement of Formulas and Processes—reduction of manufacturing cost—utilization of waste materials, etc., a specialty. Booklet, Formula List, and Valuable Information Free. W. L. Cummings, Ph. D., 127 Standard St., Syracuse, N. Y.

FOR recreation and profit raise Buttercups, adapted to any climate. Stamp for particulars. H. V. Meeker, Toledo, O.



**CASH** for your business or property. I bring buyers and sellers together. Write me if you want to buy, sell or exchange any kind of business or property. Established 1881. Frank P. Cleveland, 1308 Adams Express Building, Chicago, Ill.

**YOUR Own Business**—Planned especially for your own needs and circumstances. Let us give you expert service in planning a spare or whole time business for you. Taylor Service, Dept. P P, 220 Broadway, New York.

**WE Sell Patents.** Established 1900. If you wish to add a new product to your line, write us. Charles A. Scott Co., 596 Central Bldg., Rochester, N. Y.

**STOP Here!** Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

**LET** the parcels post help you. Add (\$15 to \$25 weekly) to your present salary or income. Start during spare time and build up a permanent mail-order business of your own. We show you how and help you make good. No canvassing. Experience unnecessary. The Parcels Post makes success doubly sure. Our new ideas and up-to-date plans bring the money. No so-called "Course of Instruction" to sell. We give that free. Write today. Address Pease Mfg. Co., Inc., Dept. A, 70 Broadway, Buffalo, N. Y.

**\$1 STARTS** you in Big Money-Making Business. Men and women. Experience unnecessary. Circulars mailed free. Post Office Box 158, Chicago.

**START** a Chemical Garden. Instructions \$1.00. C. C. White, Hazelhurst, Miss.

**BETTER Business**—Magazine of Opportunity for those interested in Mail Order—Light Manufacturing Business. Trial three months 10c. Better Business, Dept. B P, 220 Broadway, New York.

**WILL** furnish model, instruct how to build and sell an efficient outdoor Fly-Catcher. Reasonable. D. J. Spangler, Elkhart, Ind.

**THIS** beats all the jobs going. A new camera, just out, completely finishes 3 photo post cards of any subject in 5 minutes. No experience necessary to do it. Strong money maker, big profits, simplicity itself; complete outfit, \$3.75. Get a circular quick. Autovac Co., 300 Temple Bldg., St. Louis.

**200% PROFIT.** We trust you and start you in business for yourself. A postal brings particulars. Brown & Hetrick, Franklin, Pa.

**INCORPORATE;** let us tell you why 9/10 big business concerns America organized Delaware and New Jersey instead Arizona, Dakota or elsewhere. America Guarantee and Trust Co., 1530 Chestnut St., Philadelphia, Pa.

**WOULD** you pay \$10.00 to achieve independence in Business? There is an opportunity in the Light Manufacturing Business for you whether you have capital or not. One plan to each city. Write for booklet. Taylor Service Corporation, Dept. I P, 220 Broadway, New York.

**GET** into the Penny Slot Machine Business. Make \$26 to \$50 weekly in your spare time. I made thousands. My free illustrated booklet tells how. Let me start you. Address "Money-Maker Chandler," 326 D Cranston St., Providence, R. I.

#### MAIL ORDER SUPPLIES

**MAIL** Order Dealers. Agents Supply Houses. Get our circulars. Best plated specialty in years. Tremendous demand; or, enclose 25c for two samples; refunded first order. Douglass Mfg. Co., 1230 Fulton St., Brooklyn, N. Y.

**TWO** staple articles for the mail-order dealer and general agent, exclusive territory, few openings; \$200 a month. Address Phelps Specialty Company, Dept. M, Caro, Mich.

**THE** best mail-order proposition on earth. Particulars free. Luther Gordon Co., Chicago.

**INCREASE** your sales. Place your proposition before the readers of "Cartoons Magazine," 23,000 copies every month. Classified rate 2c per word. Mail in a trial ad today. Cartoons Classified Dept., 6 No. Michigan Blvd., Chicago.

**MAIL** Dealers—My joke-novelties are paying big profits. Imprint catalogue supplied at actual printer's cost. Joseph Methieu, 203 Court St., Brockton, Mass.

#### FOR ADVERTISERS

**START** an original mail-order business. Honest, independent, Small Capital, New Methods. Sole rights. Big money. R. Clement Moore, Business Specialist, New Egypt, N. J.

**ADVERTISERS**—Special,—5c per word places your ads in 133 different magazines. Send copy now for next issue. King's Magazine, Box 13-P, Little Silver, N. J.

**YOUR** 70-word display advertisement in 16-page 7x10 magazine reaching 7,000 boys, 40c. Yonths Magazine, Chicago.

**30 WORDS** in our big Postcard Monthly 25c. Display 50c inch. Elite Exchange, 3827 North Kenneth, Chicago.

**ADVERTISERS** to reach boys use Boys' Companion, circulating among 16,000 boys. Special rate, 40 words 50c. Boys' Companion, Chicago.

**YOUR** 125-word ad on 2,000 circulars, 1,000 mailed to interested people and 1,000 sent prepaid (or all mailed) \$1. Meehan's, Gage St., Worcester, Mass.

**BARGAINS**—15-word ad, one year's subscription 25c; extra words one-half cent. Guaranteed 25,000 circulation. Digest, Grand Rapids, Mich.

**I WANT** to send you proof of the wonderful pulling power of Popular Mechanics classified pages. What's your proposition? Write me today. F. W. Johnson, Classified Dept., Popular Mechanics Magazine, 6 No. Michigan Blvd., Chicago.

**ADVERTISERS**—Here's your opportunity. Your proposition placed before the readers of "Cartoons Magazine" for only 2c per word. Circulation 23,000 copies. Send a trial ad for our next issue. Cartoons Classified Dept., 6 No. Michigan Blvd., Chicago.

**THE** Classified ad pages of the Denver Weekly Post will sell or swap anything that the human family uses. Reaches over 115,000 subscribers every week by Uncle Sam. No street or news-stand sales. A circulation not duplicated by any other medium. The largest and newest weekly newspaper between the Missouri River and the Pacific Coast. Classified ads—3c per word. Display—30c per line, \$4.20 per inch. One ad convinces. Write for sample copy. Subscription price 35c the year.

**YOUR** 25 word advertisement in 100 Monthly Magazines, 3 Months, \$1. Bennett, 442 East 184th St., New York.

#### TO MANUFACTURERS

**THOMAS** Camp, 37 Norcross Street, Atlanta, Ga., offers newly patented motor harrow and road machine to manufacturers one year without royalty.

#### AGENTS WANTED

**GENERAL** Agents—Capable of calling on the big trade themselves and handling canvassers for the house to house and office to office business, to sell the newest electric specialty on the market; sold everywhere there is electricity, in the home, office, factory, store, hotel, liberal profits; sales-driving sample; weighs a pound; no experience or knowledge of electricity required; shows how to use one light instead of two and get the same results; sells for \$2.50, \$3.50, \$5.00 and saves the purchaser an investment of \$25.00. Write for particulars. The Handy Light Co., 153 Handy Light Block, Cincinnati, Ohio.

**"BOOSTER"** will show you how to make more money! Why not operate a good, substantial "Income Mail Business?" Every issue of "Booster" contains propositions that can easily be worked evenings. Don't invest any money until you read "Booster"—the magazine that has, for years, actually and accurately placed men like you in business for themselves by publishing money-making propositions that get the dollars. Send 10c today for two months' trial—it's worth cold cash to you. Booster Magazine, Northwestern Bldg., Chicago.

**EVER** hear of selling popular 25c sheet music at 5c? You can, and make big money. Four samples and proposition, 10c. Chicago Book & Music Co., 535 S. Wabash Chicago.

**REPORT** information, news, names, etc., to us. We have established markets. Particulars free. "Nisco"—HDB—Cincinnati.

**MANUFACTURER** of new exclusive linen heel and toe guaranteed hosiery wants agent in every county. Sales enormous. Re-orders insured; permanent, increasing income. Protected territory. Credit. N. Parker Mills, 720 Chestnut St., Philadelphia, Pa.

**DON'T** be an agent—You take the money; be your own master. Dave Crawford, W. Va., writes: "Made \$42.75 first week." Smith, Pa., writes: "\$301 in two weeks." Bostwick, N. Y., writes: "Make an average of \$10 a day." We have started hundreds of others. Gray's outfits, \$15 and up. Plate Gold, Silver, Nickel, Metal, etc. We furnish recipes, formulas, trade secrets and teach you the art; work easy. Royal new dipping process. Every family, hotel, restaurant, shop has tableware, jewelry, metal goods of all kinds to be replated. Every other business overcrowded, few plating shops. Send postal, free sample plating. Gray & Co. Plating Works, 19 Gray Bldg., Cincinnati, O.

**WHITE** Slavery, standing expose of traffic in white women as disclosed by Vice Commissioner of Chicago; 25c sample and agents' prices, 15c. Chicago Book & Music Co., 535 S. Wabash, Chicago.

**AGENTS**—Three new games for Cigar Stores, etc. Retail \$1. Also line of new office specialties. Easy sellers. Particulars free. Poola Co., Dept. PM., Harrisburg, Pa.

**AGENTS** everywhere, join us. Best and neatest ball-bearing nickel-trimmed combination vacuum cleaner on market. Low prices and freight paid. Reliance Specialty Co., 1754 Berneau Ave., Chicago.

**LIVE** Agents Wanted: Universal Polishing Cloth. Sells wherever shown. Full size sample and particulars 25c. Universal Specialty Co., Plainfield, N. J.

**START** a mail-order business of your own. Small capital. Spare time. 27 plans. Send for particulars. Mutual Opportunities Exchange, Buffalo, N. Y.

**ANSWER** this and get our free sample case offer. \$10 a day easy with our complete line of household necessities. Men or women. E. Roberts, 110 Roberts Bldg., St. Louis, Mo.

**YOUR** address on postal brings you the biggest money-making proposition you ever received. Try it. X. L. Products Co., 117 Worth St., New York.

**SCIENTIFIC** Wonder. Gigantic Agents' Success. Millions want quick delivery. Territory now free—means fortune. Brilliant home invention—just out. Mighty labor, drudgery saver. Gives every home advantages of \$75.00 stationary wash tubs, boilers—self-filling, self-emptying—for \$3.75. No plumbing. Works automatically—while you rest. No operating expense. Saves 90% labor, 50% time. New, startling, fascinating. No competition. Field untouched. Investigate quick. Security Mfg. Co., Dept. 11, Toledo, Ohio.

**AGENTS** make \$5 profit daily; Name Plates, House Numbers, Signs. Particulars free. Roscoe Lynch, Bausman, Pa., Dept. B.

**AGENTS** wanted in every city and town, to sell high grade household specialties. Write for particulars. Mutual Sales Co., 1542 McCausland Ave., St. Louis, Mo.

**FOUR** New Household Necessities. One a sure repeater. Easy sellers. Big money-makers. Investigate. The Logan Manufacturing Co., 2314 Lyndale, Chicago.

**PLUCK** the juiciest big cash profit plums selling our superfine products. Brief demonstrations produce sales. 100% profit. "Live wires." Address Box 424 Chicago, Ill.

**PORTRAIT** Agents—Deal direct with the artist; better picture, better terms; send for price list and samples. The Combined Artists, 519 New Era Bldg., Chicago, Ill.

**AGENTS** to take orders for Visiting and Business Cards; large profits; outfit free. Forman Printery, Waterbury, Conn.

**I AM** the manufacturer of Face-O-Clean and want to employ a Sales Manager in every locality, man or woman. Must have \$25 to carry stock. Opportunity to control a big money-making business of your own. Address G. A. Landwehr, Manufacturer, 316 Majestic Bldg., Indianapolis, Ind.

**LISTEN!** You can make \$15 weekly easy selling high-grade Jewelry 50c weekly. Washburn, 417 West 128 St., New York.

**OPPORTUNITIES**—Mail order, agency or local business, write us. Adolph P. Schmitt Co., Seattle, Wash.

**PARCEL** Post and Income Tax mean hundreds government jobs now available. "Pull" unnecessary. \$65 to \$150 month. Write immediately for free list of positions available. Franklin Institute, Dept. E, 22, Rochester, N. Y.

**AGENTS**—500% profit, free sample Gold and Silver Sign Letters for store fronts and office windows. Anyone can put on. Big demand everywhere. Write today for liberal offer to agents. Metallic Letter Co., 406 N. Clark, Chicago, U. S. A.



**AGENTS Wanted**—If you know a chance when you see it you'll see this one now. Big money—stylish, nifty clothes—little work—no experience or capital needed—can you beat that? We want agents everywhere to take care of our business in their localities and to advertise our nobby, nifty suits by wearing them. We furnish everything complete and charge nothing for agents' outfit. The swellest dressers everywhere are our agents and all we ask is that you tell people who inquire about your fine clothes where and how they can get them. You make big money—\$10 a day—without trouble. Just a postal brings you full outfit free. Big, new sample book of up-to-the-minute suitings sent so you can pick out your first suit; also measuring blanks and everything you need. We pay express on everything—not a penny for you to pay. Send quick before some one else gets the agency there—mail postal today to American Woolen Mills Co., Dept. 414, Chicago, Ill.

**AGENTS**—Over 1,000% profit easily made. Formosa, Thibodaux, La.

**HIT of the year.** New invention—Simplex Family Dishwasher. Sell one a day, make \$5 daily; five a day \$600 monthly. Washes, dries, sterilizes dishes, glasses, pots, pans, milk bottles, without wetting the hands, three to five minutes. Saves money, time, labor, temper. Child can run. Not sold in stores; how to demonstrate. Description. Selling plans. Simplex Mfg. Co., Dept. D, Cincinnati, Ohio.

**JUST invented**—Immense money-maker for agents. 2c to mail. Sample furnished. General Supply Co., 212 E. 5th St., Cincinnati.

**LIVE Agents** in every town. Best selling articles. Start now. Big demand for goods. \$25 to \$50 a week. Write today. York Specialty Co., Dept. D, York Village, Maine.

**WE are absolutely making agents** the best proposition of any manufacturer on our new Vacuum Sweepers; largest profit; sell easiest. Act quick. Manufacturers Home Supply Company, Detroit, Mich.

**AGENTS**—\$50 weekly. We manufacture the best needle case made; a wonderful seller; 200% to 500% profit; talking unnecessary; our "Trust Scheme" Envelopes do the work; general agents can make \$100 weekly; particulars free; 25c sample outfit for 10c; buy direct from the factory. Paty Needle Co., 102 Davis Sq., W. Somerville, Mass.

**EARN \$15 to \$25 a week** or more as our mail-order dealer. Right from your own home. Hold your position until entire time is required. We are manufacturers and owners of patented just-in-season, repeat-order specialties. If you are just starting a mail-order business or if already established, you can't afford not to handle our patented money-making getters. We sell exclusively to our mail-order dealers. We carry stock and furnish everything. Small capital. Experience unnecessary. Write today for latest and manufacturers' easy-selling mail-order plan, backed up by the "whole truth," positive proof and sworn statement. Kimo Mfg. Co., 221 Kimo Bldg., Buffalo, N. Y.

**AGENTS**—Men and Women—Big money selling aluminum shake-less salt and pepper sifters. Write today; particulars free. The Oster-Barr Co., Rockford, Ill.

**AGENTS Wanted**—Right here is the one big chance of your life. If you want to make good money—\$10 a day or more, as easy as rolling off a log, and get your swell clothes free besides, you can do it by acting as our agent. We are the biggest people in the business and want our agents to make big money and be nifty, stylish dressers. Send a postal today for free \$10 outfit, including a big book of nobby suiting samples to select your swell agent's suit from. Then take orders from people who admire your nifty clothes. They come to you—not you to them. This is the way to get rich—the sure, easy way. Remember, you need no money—everything is furnished by us free. We pay express on everything. Just send a postal, but do it today. You can't get started too quick, making this big money and wearing these stylish clothes. Address card to Paragon Tailoring Co., Dept. 414, Chicago, Ill.

**AGENTS, make more money.** Handle the Imperial Self-Heating Iron. Oldest and best. Every housewife wants one. Exclusive territory. Write today for interesting proposition. Imperial Brass Mfg. Co., Dept. 734, Chicago.

**200% PROFIT.** You can't beat it. Free pocket sample. Sells everywhere. Everyone buys. Our reputation and big capital back you. Wm. J. Dick, Mgr., Dept H4, 20 W. Lake St., Chicago.

**RAY'S total commissions for 1913** over \$12,000. New Feeny Vacuum Cleaning machine has got all others skinned forty ways. Good men wanted for general agents. Exclusive territory. You risk nothing. If wise, you will write before tomorrow. Feeny Manufacturing Co., Dept. B65, Muncie, Ind.

**AGENTS, earn \$10 per day,** sell three 50c ties \$1. Free Monogram gold cuff links and stick pin. Bowden cleared \$71—5 days. Cooper \$40—4 days. Free samples. Comer Neckwear Co., 2 Eighth St., Dayton, Ohio.

**YOU are looking for me—you are seeking an opportunity to connect with large manufacturing concern,** selling through exclusive agencies, line of goods in big demand; proposition you can make money with right from the start and has unlimited opportunity for future development. I have it; write me, Manager, Dept. 4, 1336 W. Bancroft St., Toledo, O.

**WANTED**—Hustlers to take orders for made-to-measure, high grade men's tailored suits from \$9.00 to \$22.00. Make \$25.00 to \$50.00 weekly. Elegant large book outfit free. Experience unnecessary. No pocket folder affair. Splendid opportunity to make money. Handy Dandy Line, Dept. S, Sangamon St., Chicago.

**IF we had your address we'd send free sample and show you how to make \$25, not one week, but weekly.** G. Mfg. Co., 20H Warren St., N. Y.

**PHOTO Pillow Tops, Portraits, Frames, Sheet Pictures, Photo China Plates.** Rejects credited. Prompt shipments; samples and Cat. free to agents. 30 days' credit. Jas. C. Bailey Co., Desk A1, Chicago, Ill.

**AGENTS—Both Sexes**—We manufacture and control fastest selling household article ever invented. Connolly, 123 Liberty St., New York.

**THEODORE Roosevelt is again writing for Scribner's Magazine** subscription solicitors can earn big commissions. Inquire Desk 15, Scribner's Magazine, 597 Fifth Ave., New York.

**AGENTS sell guaranteed Hosiery, Underwear, and Sweaters** for largest manufacturer in America. Easy work. Big pay. Complete outfit free. Write Madison Mills, Dept. 7A, 590 Broadway, New York City.

**HONEST man wanted** in each town to distribute free advertising premiums; \$15 a week to start; experience unnecessary; references required. Address McLean, Black & Co., 11 S. Beverly St., Boston, Mass.

**TO the agent our perfected acetylene generating and storage system offers** great possibilities. Field includes automobiles, motorcycles, horse-drawn vehicles and motor-boats. The Tank-O-Gas Co., 23 St. Ann St., Forest Hills, Mass.

**FULLER Dustless Floor and Wall Mop,** with adjustable handle, and hand duster, are indispensable to housekeepers. Sells at sight—100% profit to agents. Write today. Fuller Brush Co., 55 Hoadley Place, Hartford, Conn.

**AGENTS**—Just out. Unique invention. World's handiest home massager. No mechanical power required. Small but powerful. Inexpensive; delights both sexes. New business. Big profits. Aztec Remedy Co., Dept. E, Toledo, O.

**AGENTS wanted to call on garages, machine shops, factories, mills, etc.,** selling extensively advertised welding apparatus. Demand already created. Will give exclusive territory together with co-operation to right parties. Exceptional commission. Cox Press Mfg. Co., Albany, N. Y.

**AGENTS and salesmen wanted to sell small hardware article.** Big profit, no competition. P. Slustrop Specialty Co., Cincinnati, O.

**AGENTS wanted to handle remarkable money makers; easy to handle; easy to sell; many repeat orders; write quickly.** H. Warwick, Dept. S, Box 306, Bridgeport, Conn.

**AGENTS, everywhere, sell Penny Gift Gum to stores; big demand; sample box to start, 10c.** Austen Co., Cranston, R. I.

**SELL new patented 120-day guaranteed gas mantles.** Exclusive territory. Large sales. Big profits. Send for particulars and enclose 10 cents for sample. Phoenix Light Co., Manufacturers, Milwaukee, Wis., Est. 1899.

**\$50.00 A WEEK** guaranteed selling Pure Spun Aluminum Cooking Utensils. We are manufacturers of the largest line in the world. First Aluminum Cooking Utensils made bear our trade mark. Wanted live men at once for protected territory. Answer quick. Divn. PM, American Aluminum Mfg. Co., Lemont, Ill.

**WATCH protector sells on sight; 100% profit.** Sample 25c. Worth \$1 to anyone having a watch. N. Appenzeller, 2799 8th Ave., New York City.

**SELL Art Show Cards.** Everybody buys. 400% profits. Catalogue free. Powell Bros., 4150 Madison, Chicago.

**AGENTS**—A free course in General Salesmanship is given to every man of our Sales Organization. This organization is a body of successful men selling the Handy Light; that unique electrical device which cuts the cost of electric lighting in half. Sells for \$3.50, is used in home, office, store, factory; weighs only one pound. Sold by demonstration. All agents furnished with well planned methods for gaining interviews. A high-grade business for a man of ability and standing in his community. General Agents preferred. Inquire for our full proposition by addressing The Handy Light Co., 1101 Handy Light Block, Cincinnati, Ohio.

**MY check protector, the best.** Price fifty cents. Holt Sales Co., Gainesville, Ga.

**MAKE money renewing old dry batteries.** We guarantee you can at cost of one cent each! Send 25c for guaranteed formula and instructions; regular price \$1.00. If dissatisfied we'll send your quarter back! Northern Supply Co., 154 Randolph, Chicago.

**GET in the \$50 a week class; enjoy independence and prosperity.** Two issues of great money-making information, 10c. Agents Magazine, Chicago.

**AGENTS**—Here's a money-maker. New, low-priced portable oil gas stove. Light in weight, compact, practical. Every home a possible customer. Cooks, bakes, heats. Sells both in summer and winter. Write today for our money-making proposition. The World Mfg. Co., 4027 World Bldg., Cincinnati, O.

**AGENTS**—Red hot summer seller. Concentrated soft drinks, orangeade, grape, raspberry, etc. 7 kinds—Small package—enormous demand. Whirlwind sales; astonishing profits. Get it quick, while it's new. Write today for full particulars. American Products Co., 3011 Sycamore St., Cincinnati, Ohio.

**OUR Wonderful Luminous Crucifix.** Shines all night in darkest room. Some territory still open. Pioneer Portrait Co., 1259 W. 63rd St., Chicago.

**VALUABLE Premiums and Big Profits** to Agents selling our order getting line of Guaranteed Pure Aluminum Goods. Our \$200,000 capital backs you. Write today for territory. Wm. J. Dick, Mgr., Dept. 21 (key) 20 W. Lake St., Chicago.

**LET us start you in a permanent business** of your own selling guaranteed Planto-silk Hosiery and Underwear direct from factory to the homes. Capital and experience not necessary. We help you. Our representatives are making \$3,000 to \$5,000 a year. Write for spare time and full time plans. 406 Grandville Ave., Grand Rapids, Mich.

**DAZ-E-LITE patented lamp burners** with wonderful new oil feeder and filler makes great big clear light. Scientifically feeds oil and fills lamp without smearing. Quick seller, \$5 day easily made. Agents' outfit 35c. Internat'l Mfg. Co., Dept. 427, Toledo, Ohio.

**400% PROFIT,** selling our high grade work. Samples free. Gordon Co., Northwestern Bldg., Chicago.

**AGENTS**—High-grade auto necessity. 150% profit. The Perfect Auto License Holder, weighs 8 ounces. Every auto owner a prospect. Placed on car without tools in 2 minutes. 25 sets daily sold easily. Send 25c for agents' sample pair to The Cornelia Auto Sales Co., Toledo, O.

**BIG money selling Automatic Telephone Disinfectors.** Write us. Eucalyptus Parfeno Co., New Bedford, Mass.

**\$15 DAILY** selling \$20 Soda Fountain. Manufacturer, O-1764 Aberdeen, Philadelphia.

**10,000 AGENTS** wanted. New article. Sells on sight. Record-breaking sales everywhere. Sample free. Allen Manufacturing Co., 202 East 99 St., New York City.

**VACUUM Cleaner Agents**—See the U. S. first, new design wheel-operated, nicked extended nozzle, guaranteed five years. Popular price. Large profit. Exclusive territory. U. S. Manufacturing Company, Warren, Ohio.

**\$1.50 SELF-FILLING Fountain Pen.** Never leaks. Gold plated pen. Sample, 25c. Dozen small size, \$1.50; large, \$1.75. Everything postpaid. Money refunded if unsatisfactory. Agents coming money. Rollins Co., Dept. 27, Box 5272, Boston.

**AGENTS Wanted**—Canvas mail box. Good seller. Write for price. Mail Box Man, 1303 N. Fairfield Ave., Chicago, Ill.



**MR. Mail-Order Man:** Get quick returns. Established corporation supplies fast Mail-order sellers; factory prices. Classy proposition. Beginners or established firms. Copyrighted Prospectus free. Mississippi Valley Co., Inc., Box 9629, Pittsburg, Kans.

**AGENTS—New Automatic \$2.00 Adding Machine.** Sell 10 a day easy. Make 100%. Absolutely no competition. Everyone buys. T. Bassett, 5921 Indiana Ave., Chicago.

**AGENTS—Salary or commission.** Greatest seller yet. Every user pen and ink buys on sight. 200 to 500 per cent profit. One agent's sales \$620 in six days; another \$32 in two hours. Monroe Mfg. Co., X 6, La Crosse, Wis.

**\$5,000 YEARLY** for you selling the Universal Telephone Holder. Entirely new invention. Just marketed. Every phone subscriber buys at sight. Nothing similar for sale. Territory going fast. Beautiful copper oxidized sample, 50c prepaid. International Mfg. Co., Dept. 375, Toledo, Ohio.

**IDEAL** trunk strap binds trunk both ways with one turn. Big seller. Send 50c for sample. Union Mail Order Co., Middleboro, Mass.

**AGENTS—Transfer pictures on paper, linen, leather, wood, etc.** Sample bottle 15c prepaid. R. Yost, Watkins, N. Y.

**WANTED—Agent to act as manager in each county.** \$150 month easily made. No canvassing. Success guaranteed. Big, expensive samples. Instructions, plans and starter, all 10c postage. Manager (Dept. 48), Myers & Co., Cambridge, Ohio.

**AGENTS—Repeater; costs 5c; sells for \$1; sample 2c.** Dr. Thornber, Ferris, Ill.

**AGENTS—Attention!** New invention, a quick selling little article that gets the money. Why? Because it's an absolute necessity with every man—enuf sed. 10c brings sample, etc. H. A. Kane, 4317 W. Henderson St., Chicago, Ill.

**AGENTS—Make money sure, quick, easy.** New low-priced self-heating iron. The season is now on. Sells itself. Every home a prospect. Three sales a day means \$40 profit a week for you. Write today for money-making plans. Address C. Brown Mfg. Co., 2017 Brown Bldg., Cincinnati, O.

**AGENTS—To sell the newest electric appliance on the market sold everywhere there is electricity, in the home and office; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results; sells for \$3.50 and saves the purchaser an investment of \$25. Write for particulars.** The Handy Light Co., 15 Handy Light Block, Cincinnati, Ohio.

**AGENTS—Streetmen—Eleven New money-makers.** Profits exceed 50%. Latest "Live Wire Bulletin" free. Act quick. United Sales Factory, Newburgh, N. Y.

**AGENTS, big money selling pictures, Abraham Lincoln or Wilson's family, sample postpaid, 15c, (stamps) 15x20%.** Barker's Store, 60 Fulton St., New York City.

**WIDE-AWAKE** agents are coining money with our easily demonstrated specialties; write today for particulars and new catalogue. F. B. Probst, 43 Exchange Pl., New York.

**AGENTS** wanted in every town and city to sell high-grade household specialty. Sells on sight. Write for particulars. Samuels Co., 210 Spring St., Jeffersonville, Ind.

**SELL Metler's Ink Compounds.** Big profits; protected territory. Particulars, samples, three colors, 6c. A. D. Metler, New Brunswick, N. J.

**AGENTS—Here's a whirlwind seller.** Every family needs one. Big profit on every sale. Western Specialty Co., Bismarck, N. D.

**MAKE** and sell your own goods. Formulas by Expert Chemists. We obtain your Government Serial Number. Catalogue for stamp. B. Mystic Company, Washington, D. C.

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**FREEMAN** Springs for Letter Carriers. Good article. Fair profit. Freeman Mfg. Co., Long Island City, N. Y.

**AGENTS** wanted—Send us one dollar and we will send you one set of "Sept. Morn" goods, consisting of one pair link cuff buttons, one pin and one watch fob, and also send you sample and full particulars of a good mail-order plan. A. S. Mankin & Co., Alexandria, Va.

**WARREN** cleared \$19.50 in three days with our staple line. Our free booklet tells how. Barker Chem. Co., 20 Center, Auburn, Me.

**AGENTS** Wanted—Agents make 500 per cent profit selling "Novelty Sign Cards." Merchants buy 10 to 100 on sight. 800 varieties. Catalogue free. Sullivan Co., 1234 Van Buren St., Chicago, Ill.

**MEN** Wanted, Handle Branch Agencies paying \$5 day upward. Give references, experience. Modern Specialties, Racine, Wis.

**I NEED** one energetic, dependable, representative in every county to take orders for our new Popular Mechanics book for boys called "The Boy Mechanic." This is not a story book, but a wonderful and interesting collection of 700 things boys love to make and experiment with. A very large attractive book for the price, \$1.50. Every boy's father or mother will want to buy it for their son. It sells itself. Good liberal commission and exclusive territory. You don't have to be a professional agent to be successful with this highly meritorious proposition. Work in and around your home town during spare time only if you cannot devote all your time to it. Write today for full particulars to Manager Book Dept., Popular Mechanics Co., 6 No. Michigan Blvd., Chicago.

**IF** you live in a small town and have a little spare time, get our offer. Easy to make \$100 profit each season; still easier to get your own clothes out of the profit on a few orders. No extra charges for fancy styles, golf bottoms, pearl buttons, etc., makes sales easy. Write for free samples and our new offer. Knickerbocker Tailoring Co., Dept. 56, Chicago.

**GET** in the big income class. Learn how to enjoy Independence and Prosperity. Read the Agents Magazine, 2 issues 10c. Agents Magazine, Chicago.

**AGENTS, Salesmen, Canvassers:** Sell goods put up under your own name; permanent business; 300% profit. Investigate. W. B. Williams, Montclair, N. J.

**AGENTS** in all trades to sell Hygienic hose supporter. Recommended by physicians. Pair 25c. Hygienic Hose Supporter Co., Toledo, Ohio.

**YOUNG** Man, would you accept and wear a fine tailor made suit just for showing it to your friends? Or a Slip-on Raincoat free? Could you use \$5 a day for a little spare time? Perhaps we can offer you a steady job. Write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Co., Dept. 703, Chicago.

**AGENTS** in every city to handle our Triplex Folding Handbag; big profits; exclusive territory. Write for terms and free catalog. Other big sellers. S. V. Diamond & Bro., 35 West 21st St., New York City.

**RURAL** Agents write for our "10-day free trial offer to prospective agents" on our New Improved 1914 Model Vacuum Cleaner. We pay all express charges. Best and strongest suction cleaner made. Gets both germs and dirt. Guaranteed 5 years. Postal will bring offer. Warner Vacuum Cleaner Company, Dept. "Z," Muncie, Ind.

**AGENTS** would you take a steady job where you can clear \$20 to \$30 weekly to start and work up to yearly profits of \$3,000 or more? No experience required. Great crew managers' proposition. We manufacture. Middlemen profits saved. Get posted on our 1914 exclusive territory—business-building selling plans. Act quick. E. M. Davis, Pres., R64, Davis Bld., Chicago.

**AGENTS—\$5** daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 462 Third St., Dayton, Ohio.

**WIDE-AWAKE** active agents or crew managers can secure special concession and reap the benefit from the best money-making agency proposition on the market by writing immediately for full particulars. Hugro Manufacturing Co., Chicago, Ill.

**500% PROFIT** selling our wonderful sign letters for office windows, store fronts and glass signs; resembles finest gold leaf; easily applied; samples free. Metallic Letter Co., 406 N. Clark St., Chicago.

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**SOAP** and Perfume Agents, write us. Big Profits. Goods Guaranteed. Hopfinger and Roth, 212 N. Second St., St. Louis, Mo.

**WE** are the largest manufacturers of twisted wire brushes in America. Highest grade goods, best service, highest profit. Write for our new catalog. You are sure to win. Fuller Brush Co., 33 Hoadley Place, Hartford, Conn.

**AGENTS—250% profit.** Wonderful little article. Sells like wildfire. Can be carried in pocket. Write at once for free sample. H. Mathews, 1962 Third St., Dayton, Ohio.

**HOUSEHOLD** necessity recently invented sells at 75c. Costs distributors 25c. Nothing like it on the market. Tested and approved by Good Housekeeping Institute. Get your territory now. Hugro Mfg. Co., Chicago, Ill.

**AGENTS—150% Profit on Each Sale.** Show housewives how to do an hour's hard work in a jiffy. Unique household preparation and our original "Entering Wedge" plan makes easy sales and big profits. Excellent opportunity to control this in your territory. Jiffy-Brite Laboratories, Dept. M, Boston, Mass.

**LARGE** income selling Specialty Rugs. Colored illustrations and important information free. Sample rug forwarded prepaid, \$1.00. Reference, Boylston Nat'l Bank, Boston. Dundee Mfg. Co., 46 Chauncey St., Boston, Mass.

**\$1,000.00 OR \$400.00 a month—which?** Agents make \$20.00 a day. Start in small way, grow to big money class. Koehler made \$12.00 first day, \$16.00 second day. "Positive Proof Sales Plan," combined with "Shakit," makes big money certain. Make your friends wonder at your success. Act Quick; particulars for postal. Nat. Dist. Co., 1674 Belmont Ave., Chicago, Ill.

**STAMP** Names and Addresses on Key, Checks, Umbrella Plates, Watch Fobs, etc. We supply blank stock and stamping outfits, sample with name and address, 10c. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

**AGENTS:** We want, at once, a man or woman, one capable of earning good salary, in every community where we are not represented. Write us. Sun Mfg. Co., 309 Dean Bldg., South Bend, Ind.

**WE** have agents making \$200 weekly, selling our new specialty to merchants. Returns \$7.50, your profit \$3.00. No competition; exclusive territory. Samples and descriptive matter free. Sayers Co., 408 Olive St., St. Louis, Mo.

**MAIL-ORDER** Opportunities; 25 new Propositions. No competition! Make 95c profit on dollar order; complete outfit 10c. Mail Dealers Wholesale House, 521 Franklin Bldg., Chicago.

**STOP** Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

**\$5.00 RAINCOATS—Agents** wanted everywhere. You and many others in your section need Raincoats and would gladly pay Agent \$5.00 for one. Why not be that Agent? Boston Raincoat Company, Sales Dept., Boston, Mass.

**\$35 TO \$100** weekly made easily. Needed in every home and store; enables purchaser to save money and enjoy life. Rapid seller. Profit from \$10 to \$50 each sale. Experience unnecessary; exclusive territory to hustlers. Write for full particulars. C. Hemple, Sales Mgr., 174-C, No. Sangamon, Chicago.

**YOU** can be your own boss with our Key Check Outfit. Good for \$5 a day stamping names on pocket key checks, fobs, etc. Sample check, with your name and address, 15 cents. Pease Die Works, Dept. M, Winchester, N. H.

**AGENTS** make big money and become sales managers for our goods. Fast office sellers. Fine profits. Particulars and samples free. One Dip Pen Company, Dept. 2, Baltimore, Md.

**AGENTS** sell rich-looking imported 35x68 rugs \$1 each. Carter, Tenn., sold 115 in four days, his profit \$57. You can do as well. Write for sample offer and selling plan. Sample rug by Parcel Post, prepaid, 98c. A. Condon, Importer, Stonington, Maine.

**AGENTS** make \$5.00 to \$10.00 a day on the start. Atkinson writes: "The best proposition I have found in my forty years canvassing." Permanent work. Household necessity. Saving 80%. Write today for General or Local Agents terms. Free sample. C. H. Stuart & Co., 16 Union St., Newark, New York.



I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

300 TO 400% Profit to Agents selling our guaranteed U. S. Fire Extinguishers. Tremendous demand. Orders repeat. Exclusive territory to county and district managers. United Mfg. Co., 1025 Jefferson, Toledo, Ohio.

BIG Profits for You! Manufacture Barley Crisp. New confection. 5c package costs you 1c. Machine, instructions complete \$7.50 prepaid. Send 10c for samples. Barley Crisp Co., 1605 Hyde St., San Francisco.

AGENTS—Handkerchiefs. Dress Goods. Carleton made \$8 one afternoon; Mrs. Bosworth \$25 in two days. Free Samples. Credit. Stamp brings particulars. Freeport Mfg. Company, 59 Main St., Brooklyn, N. Y.

YOU can make \$\$\$\$ as our general or local agent. Household necessity; saves 80 per cent; permanent business; exclusive territory; salary or commission; free sample; credit. J. Pitkin, 113 Redd St., Newark, N. Y.

AGENTS Wanted—Mechanics and shopmen make over \$100 a month in spare time selling transparent handled novelty knives and razors. Big profits. Sales easily made. Write for terms today. Novelty Cutlery Co., 67 Bar St., Canton, O.

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AGENTS—Write for prices on Solar, Bromides, Convexed Prints and Pillow Tops. We ship orders back in 24 hours' time. Try us. Horne Copying Co., 113 S. Jefferson St., Chicago.

PERFECTION Pocket Adding Machine. Lightning seller. Agents wanted. Cincinnati Specialty Mfg. Co., Dept. R, Cincinnati, Ohio.

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LIVE Agents for the Excelsior Brad Set. dispenses with the brad-awl and nail-set. Sells to every carpenter, cabinet maker, pattern maker and picture framer. Send 25c (P. O. Order) for agents' sample. Standard Tool & Supply Co., Torrington, Conn.

SIGNMEN coining money—flashing—electric—changeable letter—sectional unit sign sells for \$10. Sells itself. Flashtrick Sign Works, Chicago.

OUR Agents make good money and get repeat orders easily. Dept. A, Consumers' Direct Supply Co., Boston, Mass.

CASH for ideas. Patent News, Dept. 4A, Washington, D. C. Only inventors' paper published. \$1 year, 25c three months, including complete course of instruction in mechanical drawing.

AGENTS make \$100 month selling kitchen sets, and other trade getting lines. Nice watch free. Write. Pemco, Louisville, Ky.

#### HELP WANTED

BE a detective. Earn big money. Write John J. Gilles, Licensed and Bonded N. Y. State Detective. Retired Member N. Y. Police Dept. 22 years Experience. 254 Huguenot St., New Rochelle, N. Y. Investigation solicited.

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FREE illustrated book tells of about 300,000 protected positions in U. S. Service. Thousands of vacancies every year. There is a big chance here for you, sure and generous pay, lifetime employment. Just ask for booklet 8-29. No obligation. Earl Hopkins, Washington, D. C.

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ACTIVE persons may earn \$25 weekly corresponding for newspapers. Particulars, News Press Bureau, 33 News Bldg., Medina, N. Y.

BE Detectives—Big pay. Easy work; Travel: Wonderful opportunities; Experience unnecessary. Write, Fidelity Secret Service, Dept. A, Wheeling, W. Va.

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REPORT information, news, names, etc., to us. We have established markets. Particulars free. "Nisco," HDB, Cincinnati.

START a mail-order business of your own. Small capital. Spare time. 27 plans. Send for particulars. Mutual Opportunities Exchange, Buffalo, N. Y.

PLEASANT Home Work—Ambitious persons wanted for copying, addressing. No mail-order course or trash to sell. Send today addressed, stamped envelope for particulars. Box 17, Station H. G., New York.

GET out of the rut; manufacture goods at home, spare time. Send for free particulars regarding my 24 formulas. All money-makers. Hill, 309 Lincoln, Denver.

ANY intelligent person may earn steady income corresponding for newspapers. No experience required. Press Corresponding Bureau, Washington, D. C.

WANTED—An Ideal Who can think of some simple thing to patent? Protect your ideas; they may bring you wealth. Write for "Needed Inventions" and "How to Get Your Patent and Your Money." Randolph & Co., Patent Attorneys, Dept. 144, Washington, D. C.

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RAILWAY Mail Clerk Examinations everywhere soon. \$75 month. Schedule and sample questions free. Franklin Institute, Dept. E 21, Rochester, N. Y.

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GOVERNMENT jobs open to men and women. Thousands of appointments coming. List of positions free. Franklin Institute, Dept. E 21, Rochester, N. Y.

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A MONEY Proposition—Co-operate with me in a profit-sharing mail-order business. Will place trial advertisement, furnish printed matter, goods to fill orders and divide the profits. Particulars. Desk 153, Hazen A. Horton, Tekonsha, Mich.

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GOVERNMENT Examinations. Most thorough preparation; \$5; returned if not appointed; particulars free. American Civil Service School, Washington, D. C.

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BETTER Light for 1/5 Cost of Electricity. Suitable for home or store. Easily installed; no experience necessary, big demand. Write for Free catalogue. Doud Lighting Co., 174-D, N. Sangamon, Chicago.

I WILL start you earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

LEARN automobile repairing, driving on up-to-date cars; electrical, civil engineering, surveying; methods most practical; room and board while learning; positions secured; satisfaction guaranteed; catalog free. National School of Engineering, 2110 West Seventh, Los Angeles.

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FOR Sale—Automatic Card Printing Press. In fine condition. Cost \$165; will sell it very low, as other duties occupy my time. A few hours practice will enable you to make good money. F. G. McNear, Newburgh, N. Y.

NO. 1 STEPTOE Plain Milling Machine. Swivel Vise and Arbor, \$190. 10 1/4" Universal Dividing Head, \$75. Box 216, Soldier, Kan.

VACUUM Cleaners. All makes at half regular prices. Send for list. New York Vacuum Cleaner Exchange, 215 Grand St., New York.

ONE Ohlen inserted tooth saw, 56-in., 4 hp. engine and boiler, good repair. Wood Bros., Glen Haven, Wis.

STANLEY model C power plant complete. Box 65, Osgood, Ohio.

AERO Vacuum Cleaning Wagon complete. Good condition. Might consider trade. Roy Creamer, Jeffersonville, Ohio.

MAGICIANS, big, showy, complete act. Extra quality; practically new; cost \$400; will take \$50. Write. Box 86, Carbondale, Pa.

FOR Sale—Established plumbing and heating business in town of 2,500. Good equipment. Small stock. Good building. Well located. Cheap rent. R. S. Lash, Lexington, Neb.

FOR Sale—Moose and Deer Heads. Reuben Saylor, Taxidermist, 497 S. Broadway, Dayton, O.

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OLD Pistols and Guns Wanted. Will buy or give in exchange almost any sort of modern revolver, rifle or shotgun. Stephen Van Rensselaer, West Orange, N. J.

HAMMERLESS D. B. 12-Gauge Gun and tools. Perfect, \$35. Stainforth, Winthrop, Mass.

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WANTED—Automobile accessory or specialty to manufacture and sell. Something of merit only considered. Submit your proposition. Crum Mfg. Co., Ottawa, Kans.

WANTED—Second-hand stone crusher to crush rock to size walnuts and smaller. Material wanted for building driveway on private estate. Machine must be in first-class condition and preferably in New England, as crusher will be used in Maine. Address with full particulars, "W." care Popular Mechanics Magazine, Chicago.



WE want articles of merit to handle by mail in this country. Kelvin Co., Brandon, Manitoba, Can.

WANTED—Second-hand steam vulcanizing outfit; give full description of same. Address J. G. Council, 108 W. Davie St., Raleigh, N. C.

WANTED to purchase complete file of magazine (Wayside Tales) year 1904. Address W. T. c/o Cartoons, 6 No. Michigan Blvd., Chicago.

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WANTED—Financial partner to obtain foreign patents on Ripping Implement. B. F. Sweeney, Neosho, Mo.

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REBUILT Leather Belting. Half the price, equal new in service, excellent appearance, all sizes, satisfaction guaranteed. Also new, 25 per cent under dealer's prices. Freadrich Belting Co., Manufacturer, St. Louis, Mo.

STEAM Engines for sale, 1/2 hp. to 250 hp. What do you want? Stainforth, Winthrop, Mass.

SCREW cutting lathe, five-inch chuck, \$35. Wm. Keck, Princeville, Ills.

YOUR name on steel stamp to mark your tools for \$1. Three initials for 50c. Gideon Pike, Attleboro, Mass.

FOR Sale—Brick machine and hydraulic, twenty-four bricks; practically new; bargain. Joliet Artificial Stone Co., Joliet, Ill.

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FOR Sale or Trade—One 9x14 Atlas automatic engine, \$100. Wanted—1 small air compressor, 1 small geared power pump, 1 pressure tank good for 50 pounds. R. L. Potts & Son, White's Station, Ky.

FOR Sale at low price, 36-in. new Fitchburg triple-gear engine lathes 12, 16 and 18 foot beds. W. H. Savage, Fitchburg, Mass.

PULLEYS, Gears, Sprockets, Shafting, Hangers; see page 132. W. A. Jones Foundry & Machine Co., Chicago.

FOR Sale—Two 250 K.W. Rotary Converters, type E. C., form E, class 6-250-500, 500 r.p.m., 600 volts, d.c.; d.c. amperes 416; a. c. end, 25 cycles, 3 phase, 360 volts. These machines are in A-1 condition and can be delivered at once. Price \$1,400 each f.o.b. cars (Penna. delivery). F. H. Herring, Inc., 30 Church St., New York.

10,000 FT. of belt at 5 cts. per ft. Send for list No. 27. Lucas & Son, Bridgeport, Conn.

HAVE for sale several sizes of lathes, milling machines, drill presses, punch presses, shapers, planers, boilers, steam engines, oil, gas and gasoline engines and wood-working machinery. Pinner, 122 Water St., New York, N. Y.

ENGINE Lathe, swings 9 1/2", takes 25" between centers. Complete set gears cutting all size threads 3" to 40", \$43.50. Grammes & Sons, Allentown, Pa.

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MARINE Motors—We have fifteen "Liberty" gasoline engines, various sizes, from three to six hp., brand new, complete except mixer. Regular price \$65.00 to \$150.00. Your choice while they last \$27.50 each or two for \$50. Half cash with order, balance C. O. D. Baird-O'Hara Co., 54-56 Jefferson Ave., Detroit, Mich.

FOR Sale—New 8 hp., 2-cyl. Cushman gasoline engine and Rochester generator, complete with all equipment, mounted on truck; guaranteed in perfect running order; first check for \$250 takes it. Plaza Theater, Box 432, Springfield, Minn.

60 HP. OTTO Gasoline Stationary Engine, fine shape, \$750 cash. Stainforth, Winthrop, Mass.

ENGINEERS—Do you want to utilize your exhaust steam for heating or drying purposes, without back pressure on your engine? If so, address Monash Engineering Co., 1403 W. Jackson Blvd., Chicago, Ill.

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COMPRESSION restored without rebor-ing. Motor boats, automobiles, pumping and agricultural engines. Willie Adjustable Piston Company, 1534 Fulton St., Brooklyn, N. Y.

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SPECIAL bargains in second-hand Attrition mills, burr mills, crushers, corn shellers, bran dusters, dust collectors, purifiers, reels, double, single, 2 and 3-pair high roller mills, sieve bolters, receiving separators, scourers, etc. Write for description and prices. Sprout, Waldron & Co., P. O. Box 429, Muncy, Pa.

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BUILD your own motor. Notched discs, castings and materials for small A. C. motors, instructions for winding. W. C. Houghton, 142 St. Jerome Ave., Holyoke, Mass.

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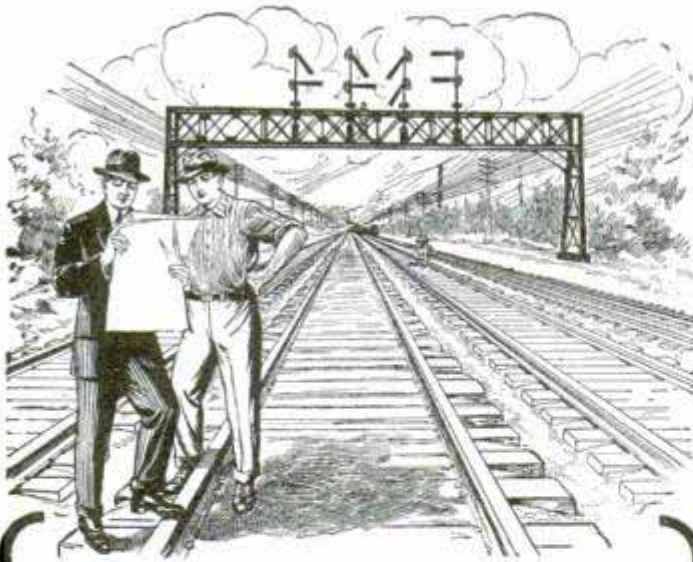
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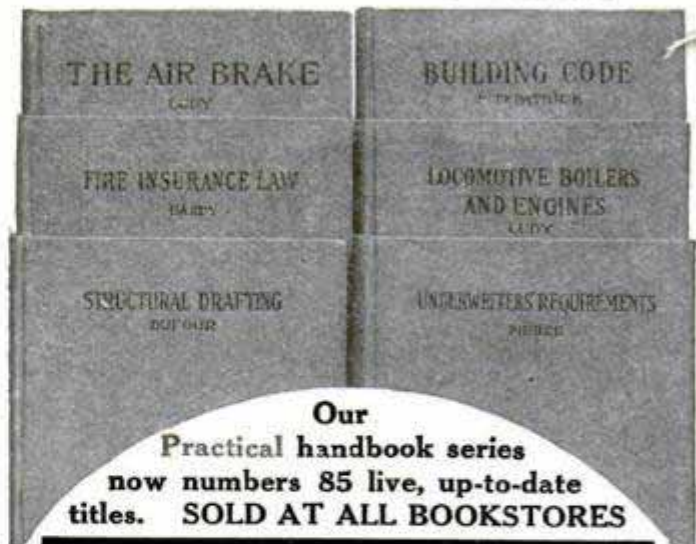


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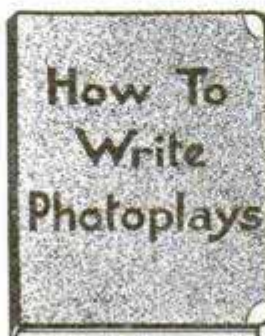
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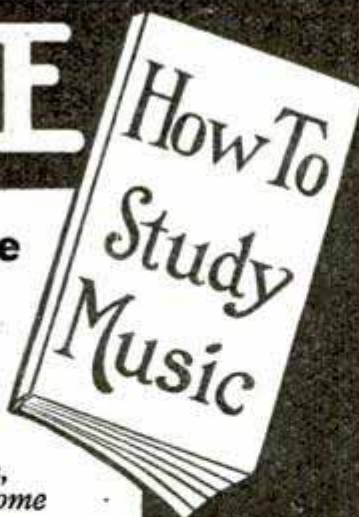
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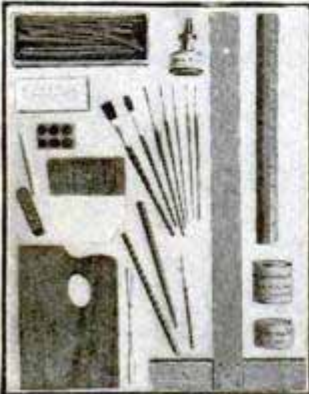
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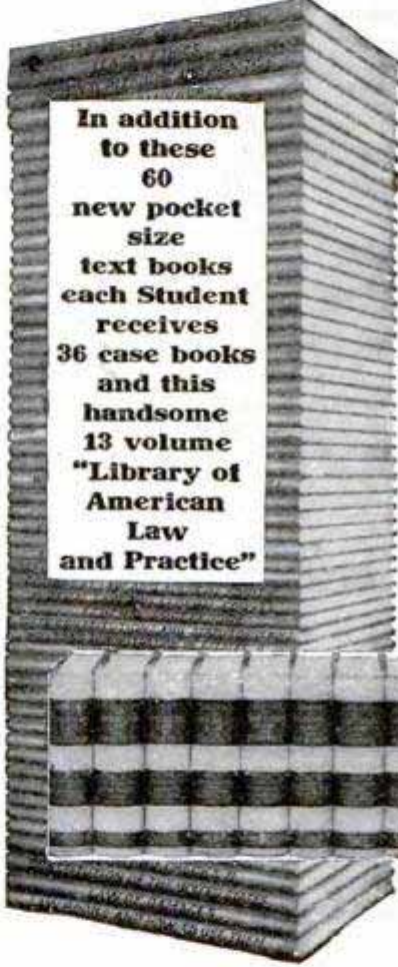
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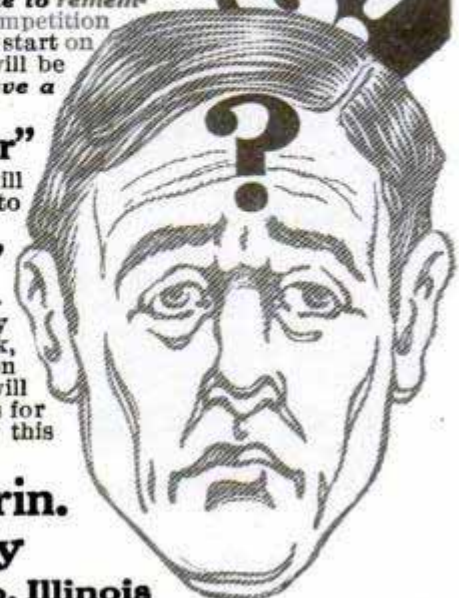
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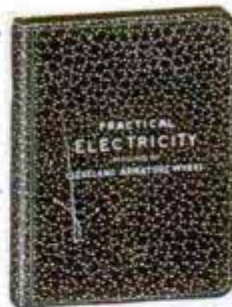
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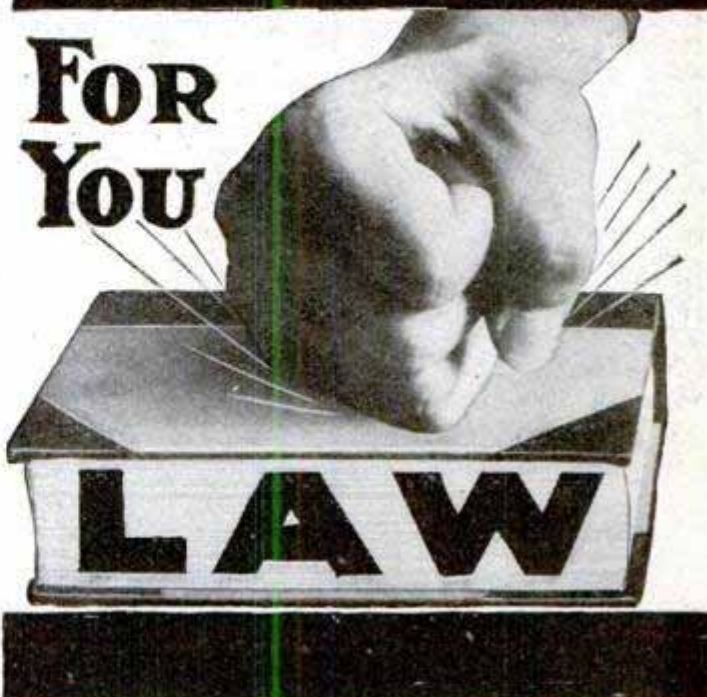
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# Popular Mechanics Magazine

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 21

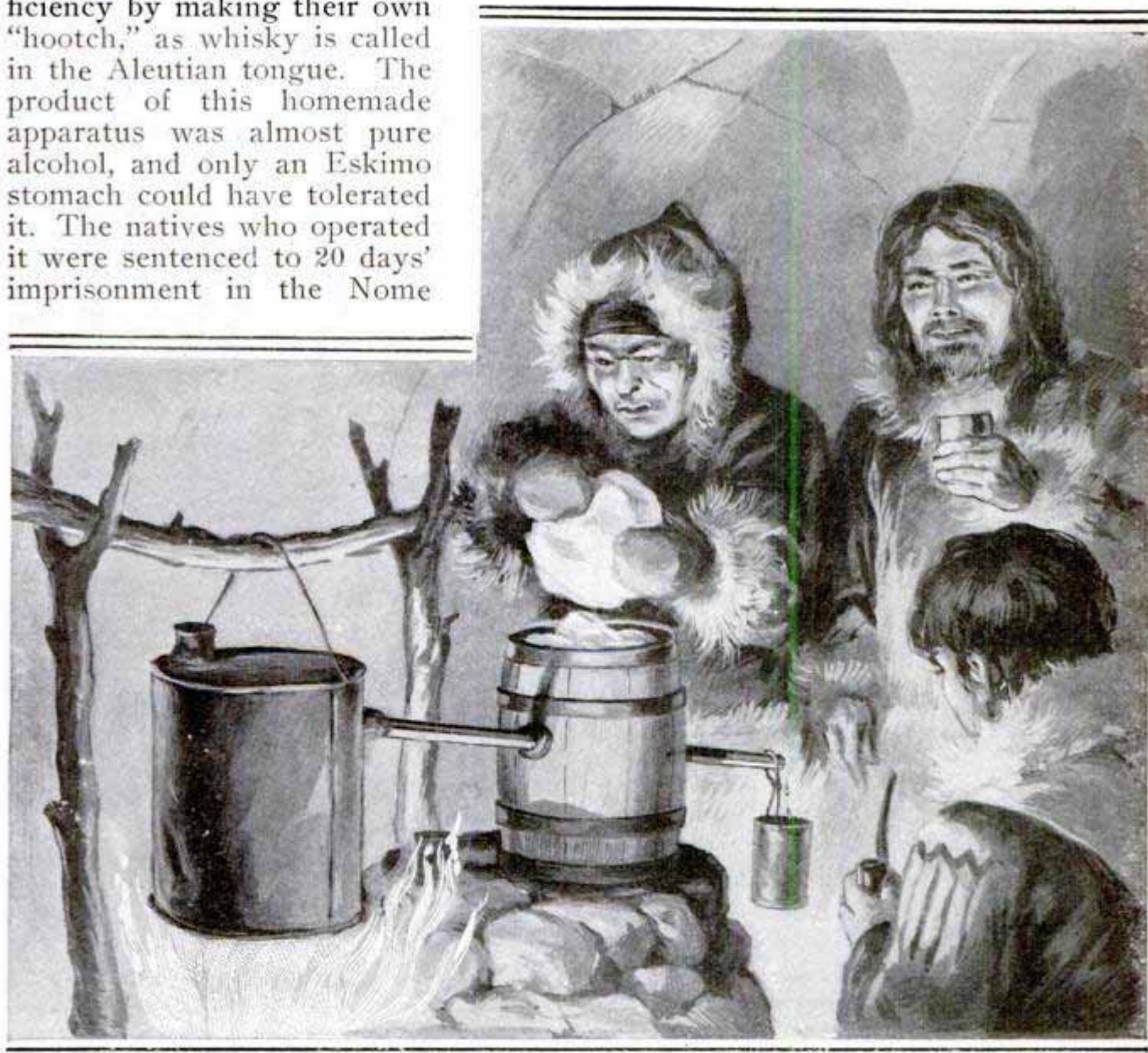
APRIL, 1914

No. 4

## "Moonshine" Outfit in Use among Eskimos

**T**HAT there are "moonshiners" even among the Alaskan Eskimos is proved by the recent capture by officers of the Revenue Cutter Service of the crude whisky still shown in the illustration. Since the Eskimos are wards of the government, it is against the law for anyone to sell or give them intoxicating liquors. But apparently the more enterprising of the natives are perfectly able to supply the deficiency by making their own "hootch," as whisky is called in the Aleutian tongue. The product of this homemade apparatus was almost pure alcohol, and only an Eskimo stomach could have tolerated it. The natives who operated it were sentenced to 20 days' imprisonment in the Nome

jail. Their still, which was found on one of the Diomedede Islands, was made from a powder can, a wooden keg and a rifle barrel. The distilling was done in the powder can, which was provided with a wire loop for hanging over the fire. The keg was packed with ice and served as a condenser, instead of the usual worm. The distillate passed into the rifle barrel, was chilled and condensed to a liquid as it went



"Moonshine" Still Used by Alaskan Eskimos in Making "Hootch," or Native Whisky



through the packed ice, and then flowed into the can suspended at the lower end of the rifle barrel.

### A MECHANICAL EMPLOYMENT BUREAU

A mechanical device for bringing together the man and the job has been



Slot Machine That Acts as Automatic Employment Agency

invented by a Californian. It consists of an upright cabinet with a number of glass-covered cases, each of which shows a card with an inscription something like this:

"WANTED—A Butcher. Wages \$3.00 a day, German preferred. References."

Enough information is placed on the card, and visible through the glass, so that the applicant can tell if he can fill the requirements. If so, he drops 25 cents in the slot, opens the cabinet and takes out the card, which carries the address upon the reverse. If he obtains the position, he has paid only a quarter instead of the exor-

bitant fee demanded by some agencies, while if he is unsuccessful, he can get his money back by taking the card to the main office. Only one card for each job is placed in the cabinet so there is no crush at the door of the employer, which is a good thing for both parties. The machines are placed in public buildings and on street corners, and in Los Angeles where they have just been installed, the first results are said to be satisfactory.

### OIL WELL PROTECTED BY SHRINELIKE CAP

In order to protect a highly productive Mexican oil well from destruction during the revolutionary period, a solid concrete cap, 15 ft. square and extending about the same distance above and below the surface of the ground, has been built over it. On the top of this block is built a semblance of the usual shrine and chapel, surmounted by a cross, giving it every appearance of being a place of worship. This design was adopted because of the deep reverence the Mexicans entertain toward objects associated with the church, and doubtless affords greater protection than the physical strength of the cap, which, reinforced with steel bars, is calculated to withstand charges of dynamite. An interesting feature of the oil well, aside from this adoption of a religious symbol to preserve property, is the fact that the oil from it, when in operation, is pumped through an 8-in. pipe to the port of Tuxpan, 33 miles distant on



This Oil-Well Cap, of Solid Concrete, was Built in the Form of a Chapel for Protection against Mexican Revolutionists



the Gulf of Mexico. Here the ships lie in the open roadstead, a mile or more off shore, and the oil is piped through submarine lines, the ships receiving it from flexible hose attached to the end of the lines.

### FINGER-TWISTING MACHINE TO AID MUSICIANS

After years of investigation a Russian music teacher has invented a ma-

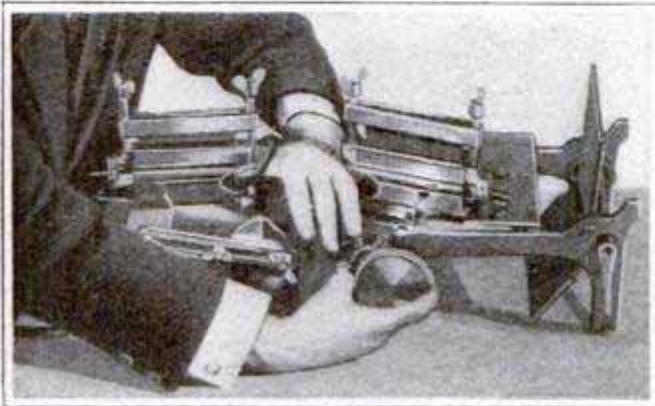


Photo by Underwood & Underwood  
Mechanical Appliance to Increase Manual Dexterity

chine to twist and stretch the finger joints, which he claims will obviate years of practice on the piano or violin. The suppleness and muscular vigor so necessary to proficiency in instrumental music may be obtained through mechanical means, the inventor argues, much more quickly and more certainly through the adoption of this device than by "exercises" on the instrument. The apparatus may be also used to advantage, so it is said, to straighten deformed fingers and to strengthen weak joints.

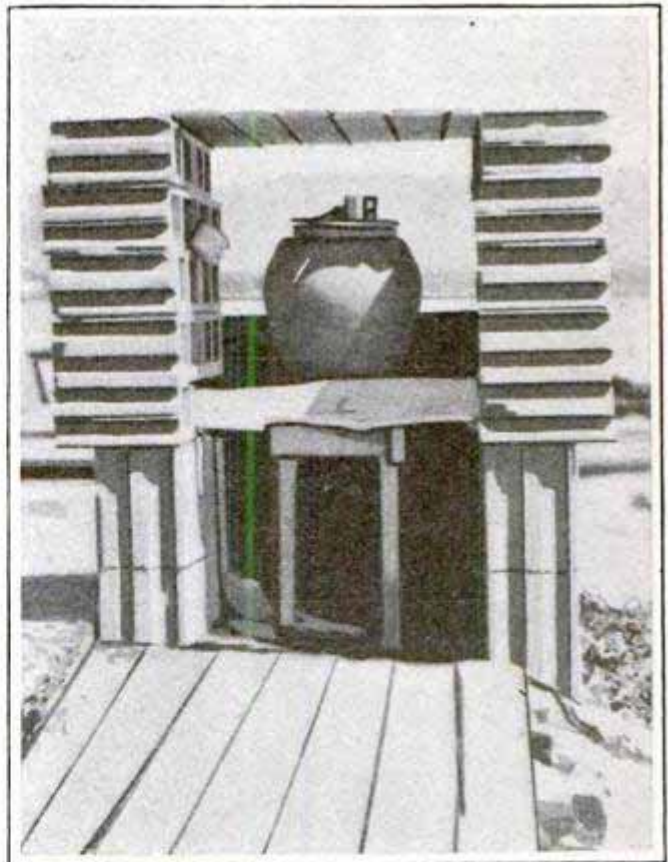
### MODERN PAPER MILL TO BE ERECTED IN CHINA

Of all the inventions credited to China, none seems more surely the product of that early civilization than paper. For many centuries paper has been made by hand in the Flowery Kingdom, and for excellence of texture and finish their product has not been surpassed by papermakers of any country in the world. Now modern methods have invaded China, and an

up-to-date paper mill has been built at Kongmun, a city on tidewater in the Pearl River delta. The equipment is modern German paper-making machinery, complete. The enterprise is Chinese, a number of orientals living in the United States being interested financially, while Japanese workmen erected the mill. Rice straw is practically unlimited in China, and will form the basis of the paper manufactured.

### PLASTER BLOCKS DIRECT AIR ON WATER JAR

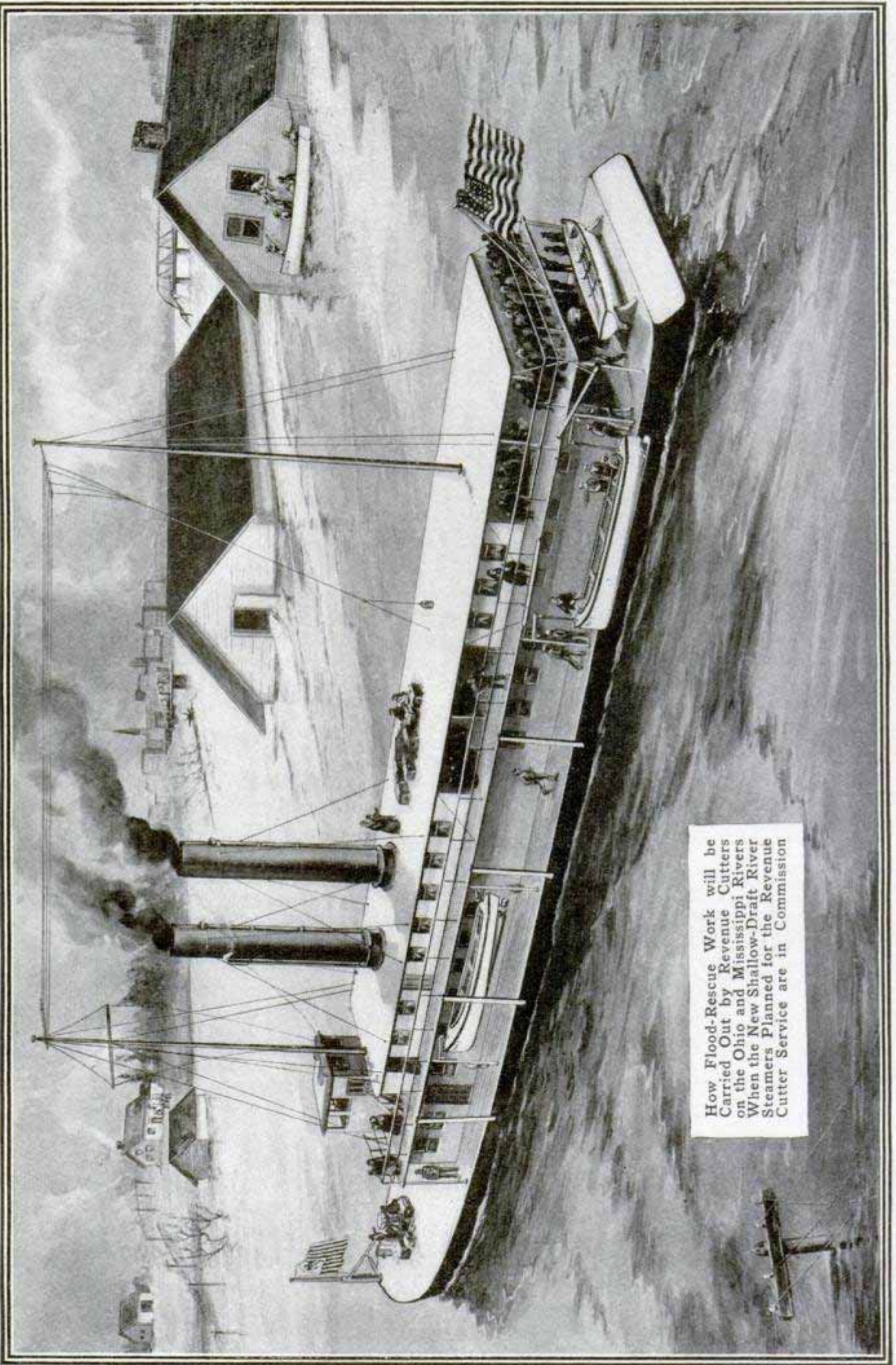
Hollow plaster blocks which permit the wind to blow directly upon the damp surface of a water jar, enable the inhabitants of the Mojave Desert to keep their drinking water cool. The jar is of porous clay, through which some water continually filters, wetting



Hollow Tiles Direct Air Currents toward the Olla,  
Cooling the Water More Quickly

the burlap wrapped about it. The air blowing strongly through the holes in the plaster blocks evaporates the water about the jar, lowering the temperature.





How Flood-Rescue Work will be Carried Out by Revenue Cutters on the Ohio and Mississippi Rivers When the New Shallow-Draft River Steamers Planned for the Revenue Cutter Service are in Commission



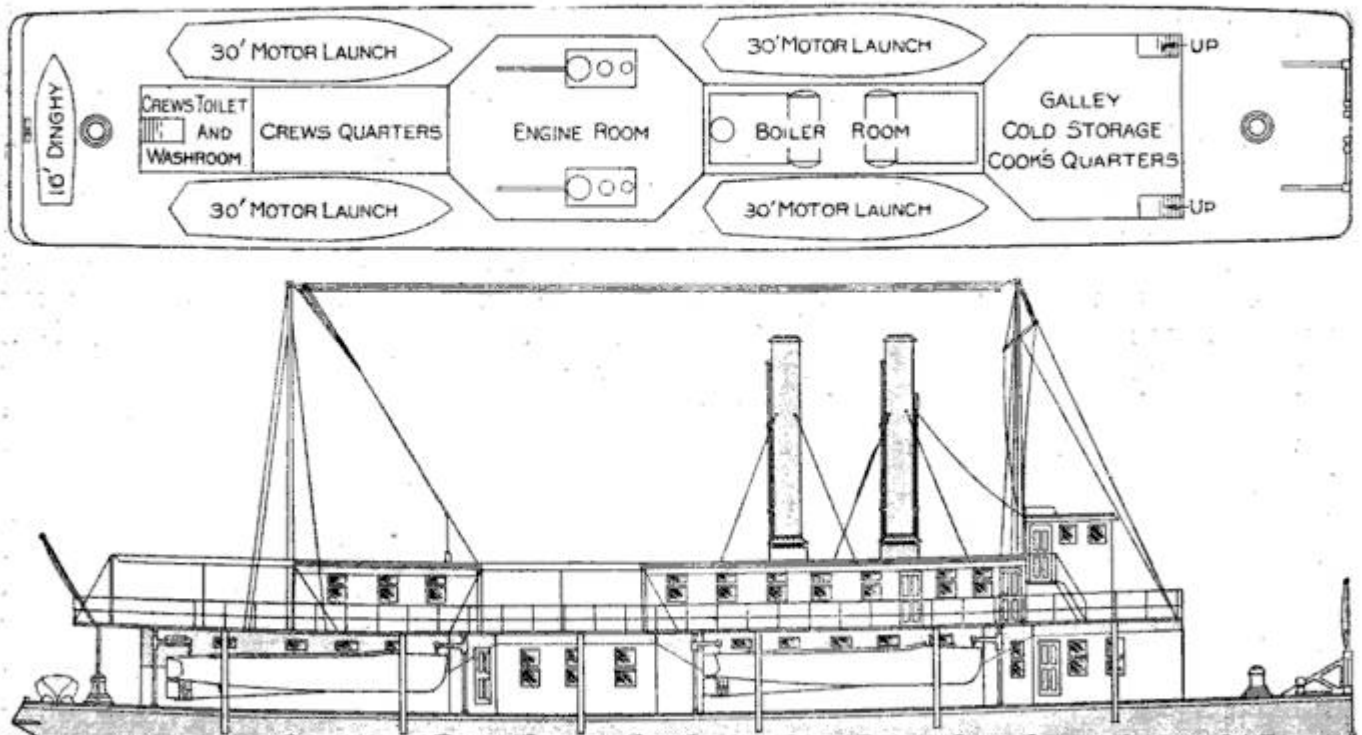
## REVENUE CUTTERS FOR OHIO AND MISSISSIPPI RIVERS

Widespread suffering and loss of life, such as occurred in the spring of 1913 when large sections of Ohio and Indiana were submerged by one of the most disastrous floods ever known in the country, will in future be prevented, if the bill now before Congress providing for extending the Revenue Cutter Service to the Ohio and Mississippi Rivers becomes a law. During that flood it was necessary to send from the Great Lakes and Atlantic ports skilled men and life-saving apparatus to aid in saving life in the inundated regions, and in the worst stricken district, the Miami Valley in Ohio, effective relief could not be begun until motorboats had been transported across country in automobiles.

Three powerful, shallow-draft steamers, to be equipped as revenue cutters and estimated to cost about \$80,000 each, have already been designed. Each cutter will have twin screws working in tunnels and will therefore be able to traverse flooded sections without danger to the propellers from wreckage. Each will be equipped with four 30-ft. motorboats carried on davits, and with one or more rowboats,

while cold-storage quarters in the forward part of the hull will enable the cutter to carry large quantities of food for distribution among flood sufferers. Such a vessel as this could probably have gone into the main streets of Dayton while the flood was at its height, could have sent its motorboats to rescue persons marooned in tree tops and crumbling buildings, and could have distributed food to others less perilously situated. During the flood season of each year these cutters will follow the crest of the flood.

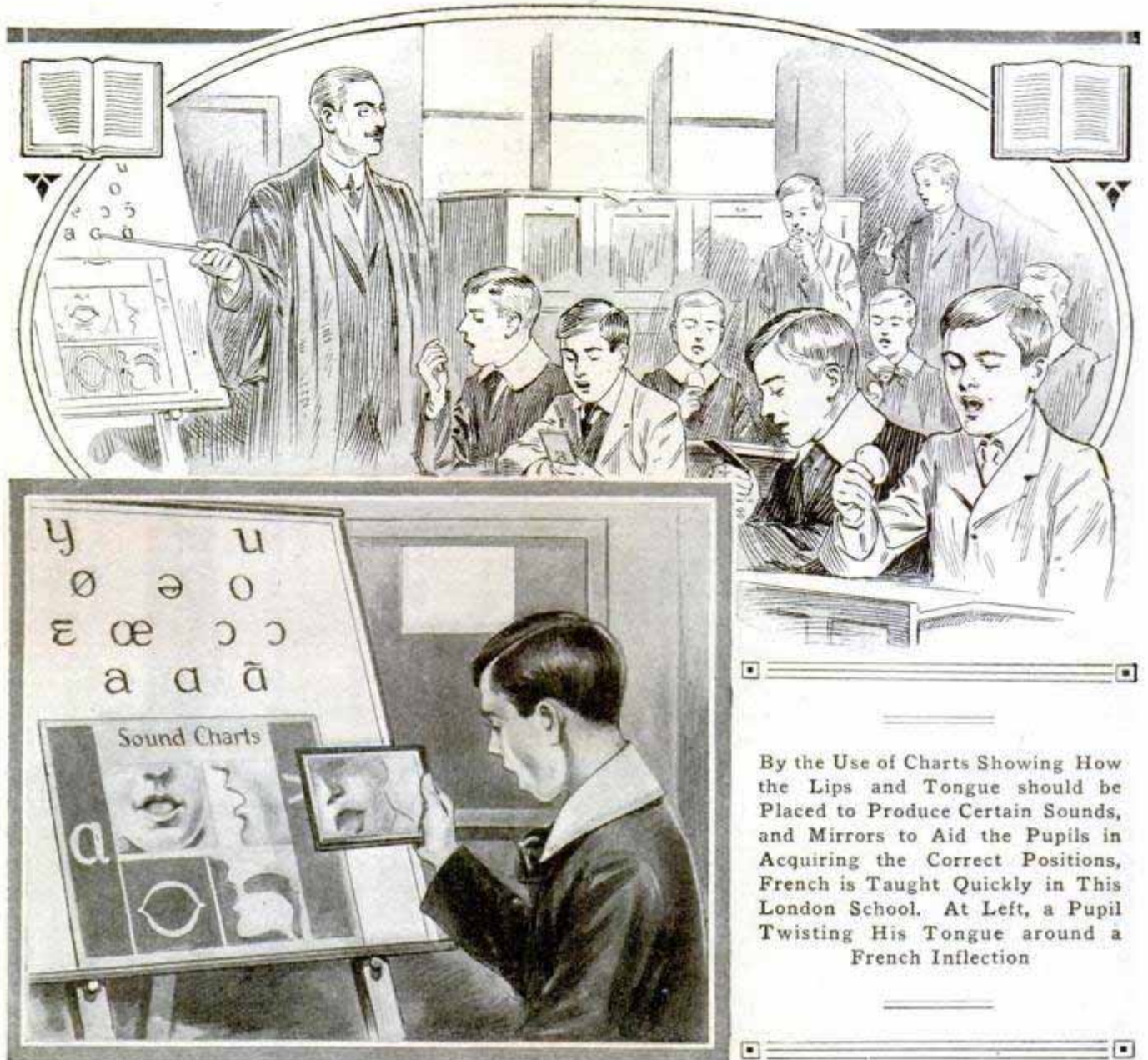
Headquarters will be assigned to each of the cutters—one to be located at Louisville or Cincinnati, one at St. Louis and one at Helena, Ark., or Vicksburg, Miss. Under ordinary conditions they will patrol the river just as the revenue cutters now patrol the ocean, enforcing the navigation and motorboat laws, helping vessels in distress, and performing such other duties as may be assigned to them. They will be equipped with wireless apparatus and will therefore be able to respond quickly to any call for help. Each cutter will be 145 ft. long, with a beam of 27 ft. and a draft of 3½ feet.



Side View of Proposed Revenue Cutters for Mississippi and Ohio River Service, with Plan of Main Deck



## SYSTEM FOR TEACHING FOREIGN LANGUAGES



By the Use of Charts Showing How the Lips and Tongue should be Placed to Produce Certain Sounds, and Mirrors to Aid the Pupils in Acquiring the Correct Positions, French is Taught Quickly in This London School. At Left, a Pupil Twisting His Tongue around a French Inflection

In a London school foreign languages are taught by a novel system, using sound charts and mirrors. The charts show, graphically, how the lips and tongue are placed to produce, for example, the vowel "a." The pupil stands before the chart, mirror in hand, and tries to form his mouth and tongue in the manner indicated in the chart.

Lessons in which the whole class simultaneously go through the same exercises are given. In six months, two-thirds of the class could speak French correctly, while in other schools, not using this method, only a few of the scholars, after a similar length of time, could pronounce French in an intelligible manner.

#### MISSION PAPER PUBLISHED ON LONELY ISLAND

Midway between New Zealand and New Caledonia in the southern Pacific Ocean, and nearly 800 miles from the Australian shores, lies the

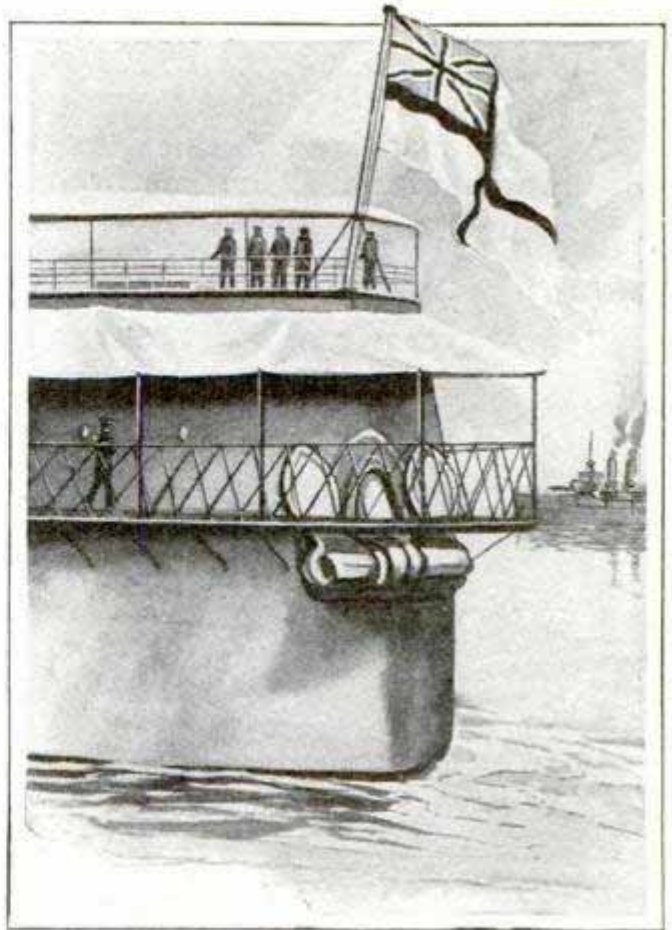
lonely island of Norfolk, having an extent of but 13.3 square miles. Once a penal colony, it now contains one of the most remarkable printing shops in the world. Here is published a half-yearly mission paper, the "Melanesian Mission Press," and other works in 21



different languages. It is owned by a German-American, formerly employed on a New York newspaper. He is publisher, editor, compositor, proof-reader, printer and binder. He has lived on the island for 32 years.

### STERN ANCHOR ON BRITISH BATTLESHIP

The use of a stern anchor is an innovation introduced on the new British battle cruiser "Queen Mary" which is nearing completion on the Tyne. The accompanying photograph shows how the stern anchor is carried in a hawser hole immediately below the admiral's walk on the stern of the vessel. The staging and ladder below the walk are of course temporary.



The Stern Anchor Adopted on a New British Warship

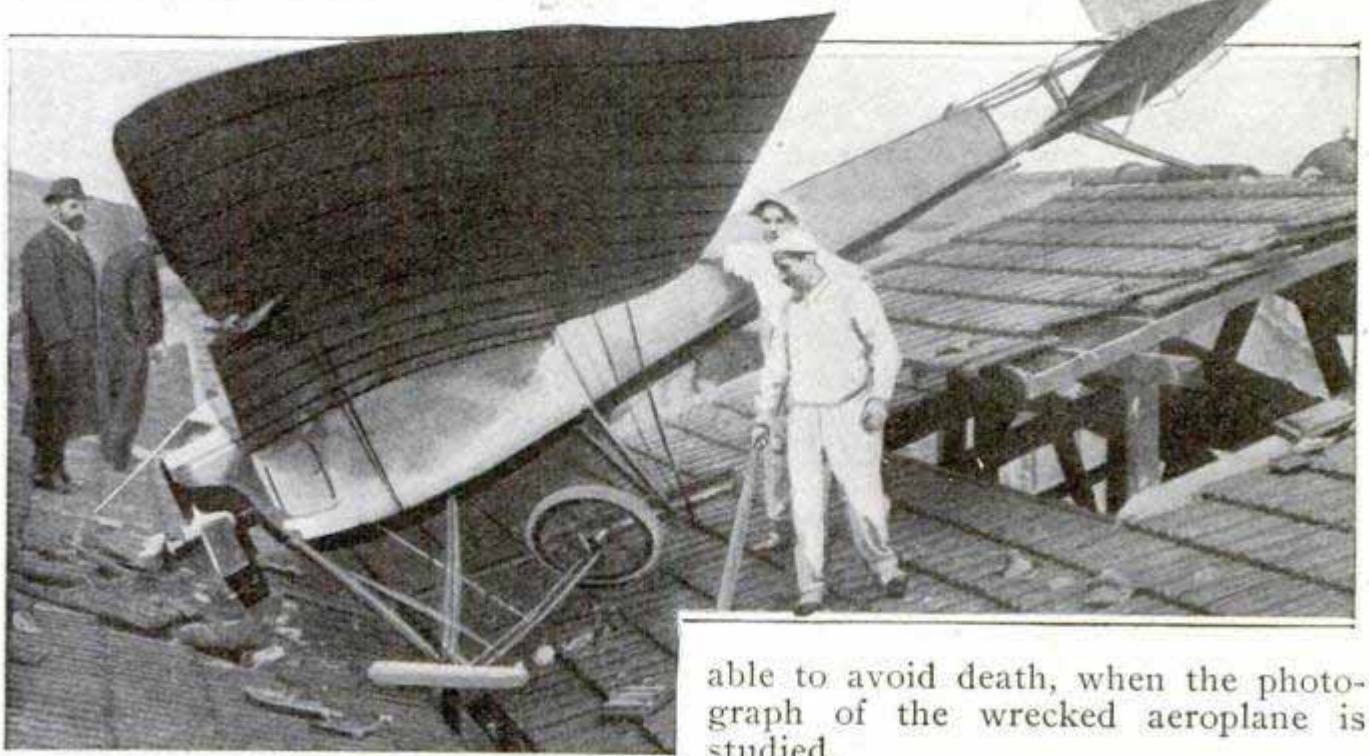
CA reproduction of the Yellowstone National Park will be one of the concession features at the Panama-Pacific Exposition.

### ODD ACCIDENT TO FRENCH AIRMAN

When a French airman attempted to make a landing recently, near Paris, his monoplane struck the tiled roof of a building, wrecking the machine and

smashing the tiling. Fortunately, the pilot escaped injury, though it is hard to understand by what miracle he was

An Accident of the Kind All Airmen Dread



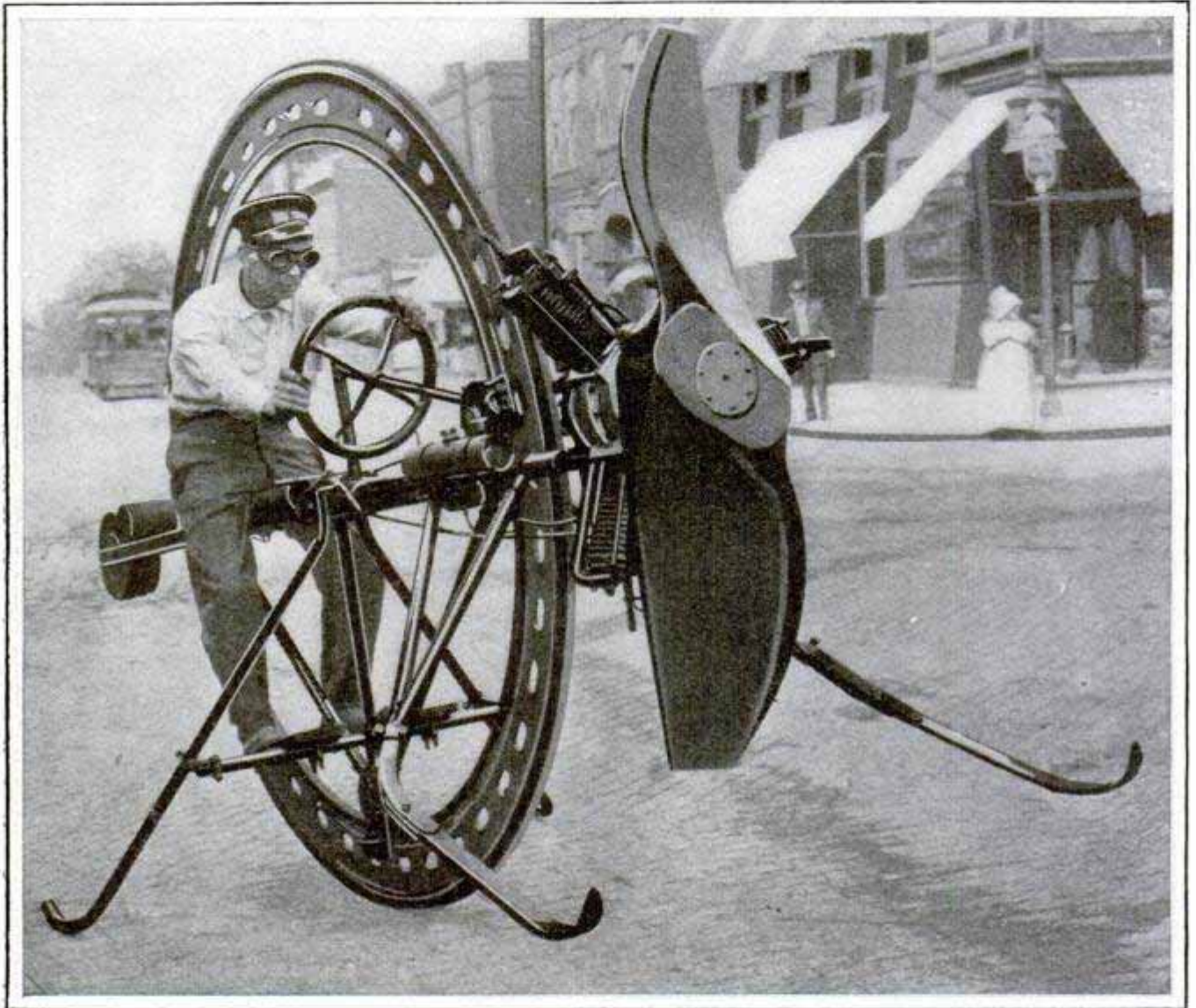
able to avoid death, when the photograph of the wrecked aeroplane is studied.



## AIR-PROPELLED UNICYCLE IS NOVEL VEHICLE

A new machine which upon the boulevards of St. Louis has attained

and oil supplies. The saddle is affixed to the same support, the rider's hands grasping a wheel upon which are mounted the controls, while his feet rest upon a little platform bolted to the



Remarkable Conveyance Which Uses an Aerial Tractor

a speed of 67 miles an hour is built after a novel design. It is a huge wheel or ring of aluminum, 81 in. in diameter, with a 2-in. solid-rubber tire. Within this outer rim is a curious framework of steel tubing so arranged that it remains stationary while the outer wheel or rim revolves. In front of the wheel and projecting from this framework is an air propeller nearly 5 ft. long, its two blades having a 4-ft. pitch and a tractive force of some 150 lb. Just behind the propeller is the three-cylindered engine. Along the principal rib of the framework, and within the wheel, are grouped the batteries, the magneto and the gasoline

lower part of the frame. On either side, and projecting some little distance from the main line of the wheel, are steel prongs or skids, which, when the unicycle is at rest, support it and keep it from falling, while the rearward projection of the frame ends in a small wheel or roller, of aid in starting the machine by giving it stability until enough momentum has been gained to enable the rider, by inclining his body forward, to bring the main rib into a horizontal position, which lifts the roller clear of the ground. The connection between the outer wheel and the frame is found in three jaws supplied with 5-in. fiber roll-



ers, 1 in. thick, which contact the inside rim of the wheel, and are kept from side-slipping by smaller side rollers of the same material. All rollers have ball bearings and lubrication is carefully planned. There is no steering device, the inclination of the body of the rider being sufficient, as in bicycle riding.

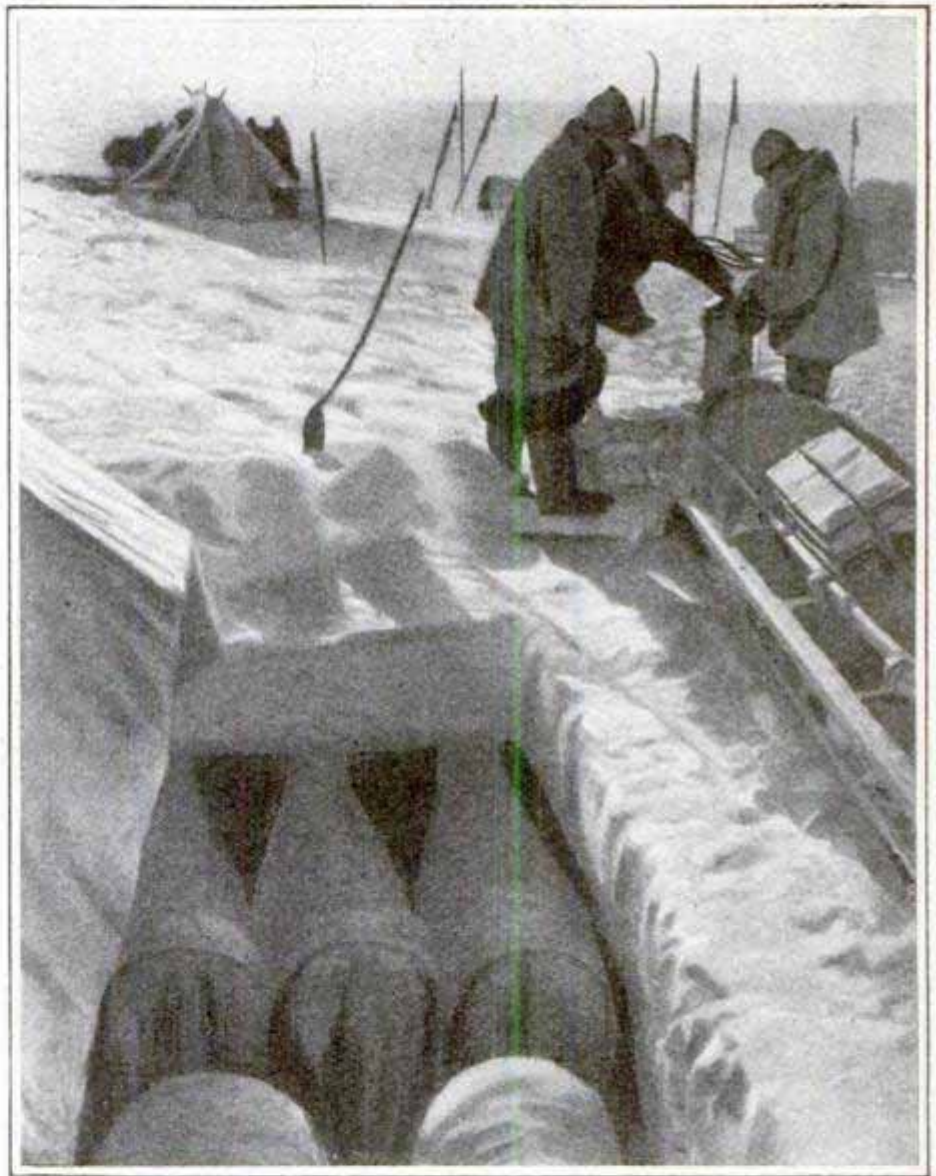
### FINDING MISSING PEOPLE BY THE "MOVIES"

A novel use for the motion-picture film has been found by those who are seeking lost friends or relatives. A portrait flashed upon the screen, with a request that anyone knowing the whereabouts of the missing person should communicate with the police, has been the means of locating sons, brothers, fathers and children who have run away or become lost in a large city. That the same means may be used advantageously by army and navy authorities for locating deserters, or by the police for finding men wanted for crimes and misdemeanors, has been suggested and is being favorably considered, as the motion-picture theater serves as the recreation place for hundreds of thousands whose eyes and memories may be enlisted in such search. It would be difficult to hide very long from such publicity.

CA Minnesota cow is credited with having broken the world's record for production of butter fat, her yield for one year being equivalent to 726 lb. of commercial butter.

### HORSES STABLED IN ICE IN GREENLAND

A Danish explorer who has just returned from a journey across the inland ice of Greenland made use of Icelandic ponies, which he found to be well adapted to arctic travel. When stops were made the horses were sheltered in holes cut in the ice. These icy stalls were quite comfortable, and in severe weather were covered with tarpaulins to keep out snow and wind. The small horses gave a good account of themselves, and will doubtless be



Courtesy Illustrated London News

Five Horses Given Shelter in Hole Dug in the Ice

used extensively in future arctic expeditions.

CA submarine telephone cable, 105 miles long, to cost \$3,000,000, is to connect England and Holland.



## GARAGE ON RAILROAD CAR

A western railroad president who makes many trips of inspection over his lines, is especially interested in

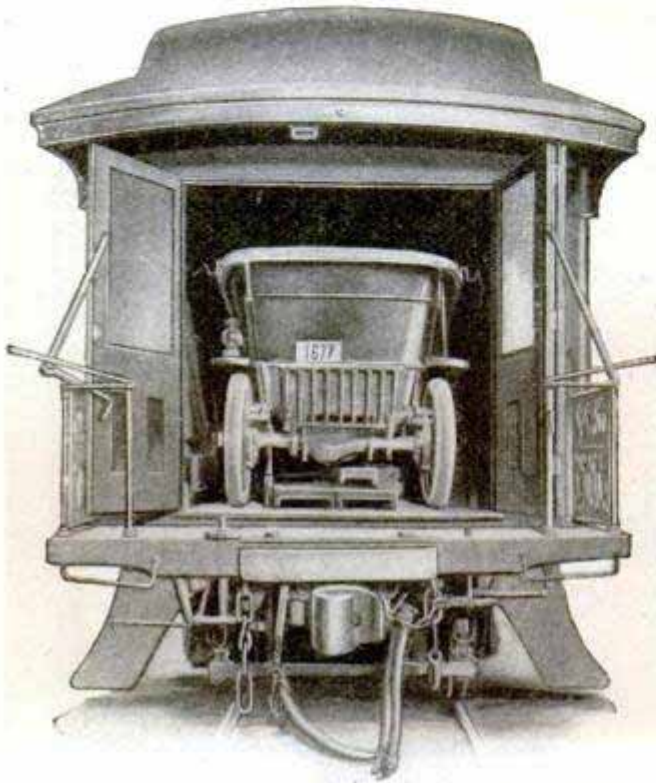


Photo by Underwood & Underwood  
How a Railroad President Carries His Automobile

crop conditions. In order to see at first hand how the farmers in the territory served by his lines are doing, he carries with him his automobile in a garage car attached to his special train. At any stopping point the automobile may be unloaded, and a ride throughout the farming section quickly gives him the information he most desires.

## SUBMARINE FAILS TO RISE AFTER MANEUVERS

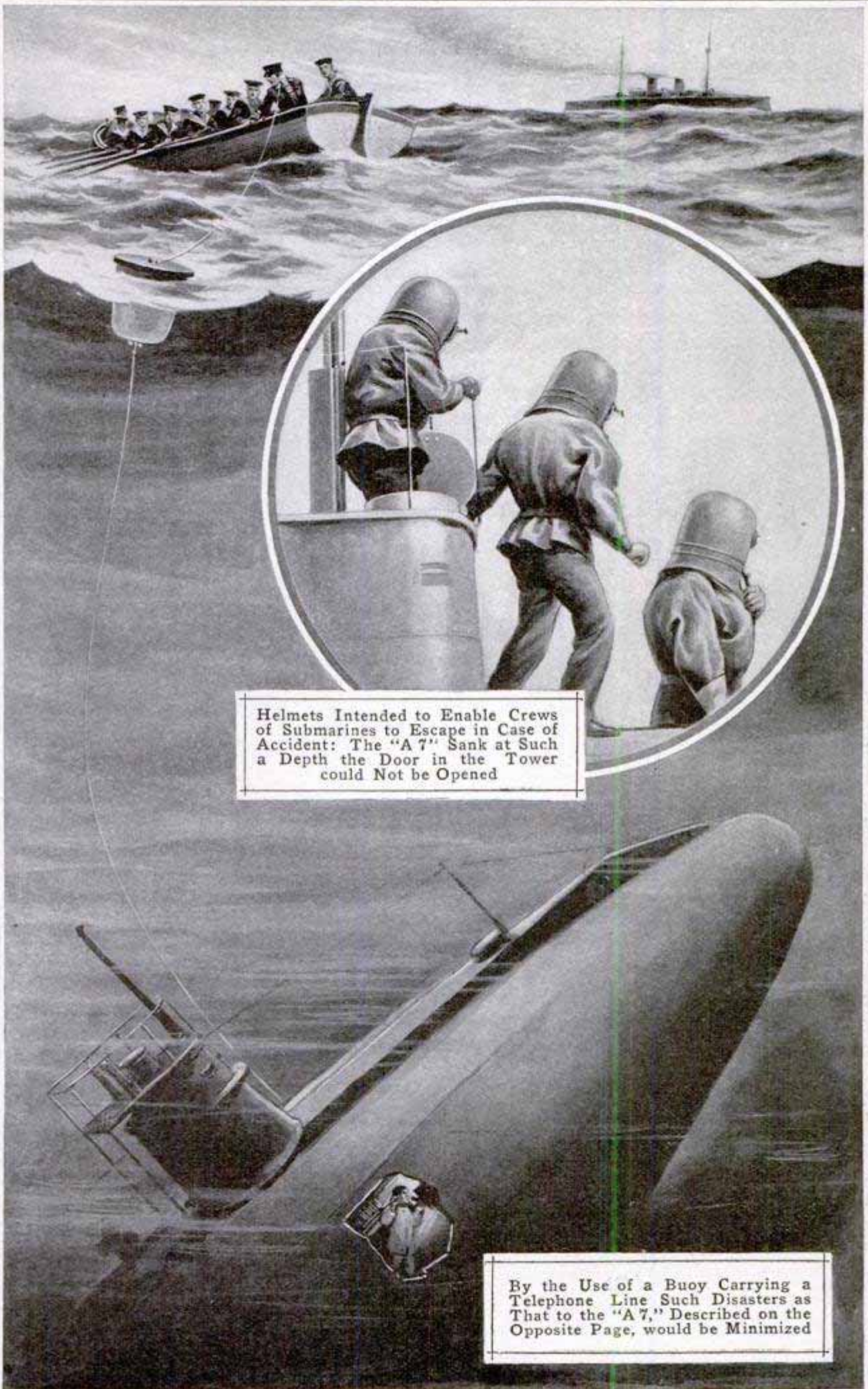
Eleven men lost their lives on January 16, last, when the British submarine "A 7," which went out with a flotilla from Portsmouth for instructional evolutions, failed to make its appearance at noon, when the first maneuvers were completed. Six submarines with a tender, comprised the little fleet, which was engaged in carrying out exercises and firing torpedoes in the Channel. The first indication

of an accident came when the officers of the tender observed oily bubbles on the surface of the water.

When the "A 7" failed to appear a buoy was put down, and all available salvage boats summoned, but owing to the increasing rough weather, the buoy was washed away and when the salvage boats arrived, the submarine could not be located. There was sufficient oxygen on board the submerged boat to keep the crew of eleven men alive for only five or six hours beyond the time set for the completion of the evolutions. Several days passed, however, before the missing craft could be found, although an aeroplane was employed as well as a careful combing of the vicinity by submarines and salvage vessels. When at length divers located the "A 7," it was found stuck in the mud, 138 ft. below the surface, with its bow projecting upward at an angle of 30° to 40°, making the task of raising it an extremely difficult one. One theory of the accident is that the craft got so close to the bottom that, when its nose was pointed upward to start for the surface, the stern was thereby depressed so far that the propeller caught in the mud.

The "A 7" was built in 1904, and was one of the oldest submarines in the British navy. It was used only as a training boat, and would have been retired in regular course this year according to the Admiralty rules. It was 150 ft. long, with a displacement of 204 tons, and equipped with gasoline engines of 450 hp., giving a speed of about 14 miles an hour on the surface. When submerged it was operated by electric motors and could make about 8 miles an hour beneath the surface. It was built with air locks and safety helmets, but the pressure of the water at a depth of 140 ft. must have made it impossible to open the conning tower. At the depth the "A 7" is lying, divers can work only with extreme difficulty owing to the pressure of the water, more than 60 lb. to the square inch. Very few divers have ever reached the 140-ft. depth.





Helmets Intended to Enable Crews of Submarines to Escape in Case of Accident: The "A 7" Sank at Such a Depth the Door in the Tower could Not be Opened

By the Use of a Buoy Carrying a Telephone Line Such Disasters as That to the "A 7," Described on the Opposite Page, would be Minimized



# HARNESSING SCIENCE TO THE FACTORY

By FRANK PARKER STOCKBRIDGE

[ EDITOR'S NOTE—The sudden death of Dr. Robert Kennedy Duncan, which occurred on Feb. 18, 1914, is a distinct and serious loss to the cause of science which he so faithfully served. It is even a greater loss to American industry, to which he was in a very true sense a torchbearer, shedding the light of the new knowledge on its old problems and leading the way toward that industrial efficiency which alone can place American manufacturers on an equal footing with their foreign competitors in the world markets. Doctor Duncan was born in Canada, Nov. 1, 1868, and was educated at the University of Toronto, and at Clark and Columbia Universities in this country. He was the discoverer of several valuable industrial chemical processes and the author of a number of books on scientific subjects. His greatest achievement, however, was his successful attempt to bring manufacturing industries and pure science into closer accord, an achievement which was just reaching its full fruition when he died. It is gratifying to know that the work he so ably began will be continued under the direction of one in whom he had complete confidence and who had long been in touch with his methods and his plans, Dr. Raymond Foss Bacon. "A great deal of the credit for what we have accomplished belongs to Doctor Bacon," said Doctor Duncan in the course of the interview, less than a month before his death, which formed the basis of this article. "I want you to be sure to mention him." The request was characteristic of Doctor Duncan's broad mind and generous nature. And upon the foundation which he laid with so much skill and pains, the new conception of the place of science in industry will stand as his enduring monument.]

**I**N a little wooden building on the grounds of the University of Pittsburgh, 36 young chemists are working at scientific problems, the solution of which will earn millions of dollars for many industries, and eventually add to the happiness and prosperity of everybody in the world.

The little wooden building is the temporary headquarters of the Mellon Institute of Industrial Research of the University of Pittsburgh. A hundred feet away, the walls are going up for a big fireproof building that will house 70 distinct research laboratories, in which a hundred men can work at once on as many different industrial problems. But the walls of the little old wooden building, if they could speak, could tell of discoveries already made, as startling, as valuable and as far-reaching in importance as any that are likely to be made in the institute's new quarters.

Think what it would mean to reduce the nation's bread bill 1 per cent. "Homemade" bread is extinct in this country except in remote rural districts, while the old-fashioned "salt-rising" bread of our grandmothers, which everyone who ever was fortunate enough to taste it will agree was

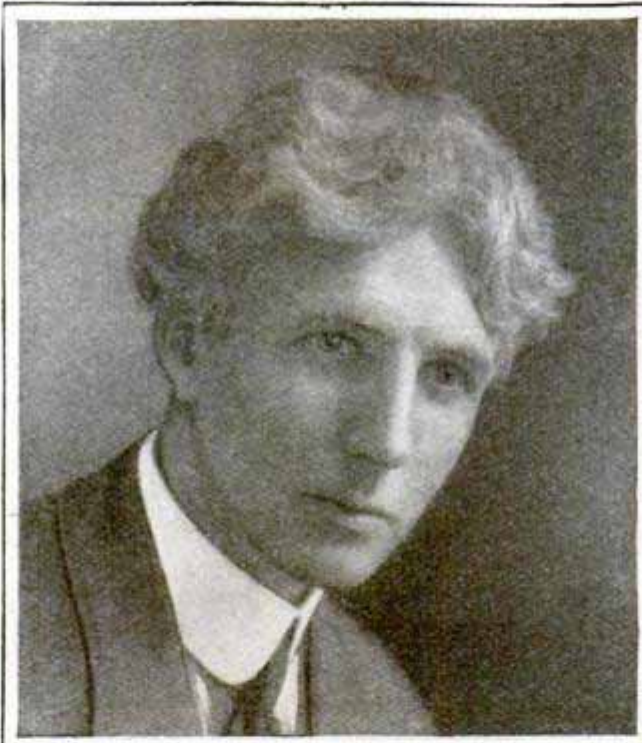
the best bread ever baked, is practically unknown to the present generation of Americans. We buy our bread from the bakeries—almost \$400,000,000 worth of it every year.

"How can we make better bread?" asked a big baking company of the late Prof. Robert Kennedy Duncan, Director of the Mellon Institute. The first step in finding the answer was to

put a trained chemist at work in one of the institute's laboratories. The baking company paid him a salary of \$750 a year for two years and offered him a prize of \$2,000 if he found a satisfactory answer. Before he had finished his experiments, another baking company asked the same question. They offered \$4,750 a year for two years and a prize of \$10,000 for any practical results.

And the chemists got results—found

not only one answer but a dozen answers—found how to make better bread, while at the same time cutting down the cost of manufacture; found how to make "salt-rising" bread of better quality than the kind grandma used to make; found out, in short, so many interesting and valuable facts about the chemistry of bread making, that the companies which are now



The Late ROBERT KENNEDY DUNCAN, Sc. D.  
Dr. Duncan, the Originator of the Modern Idea  
of Industrial Research in the University,  
Died on Feb. 18, 1914, after This Article  
had been Written and Set in Type



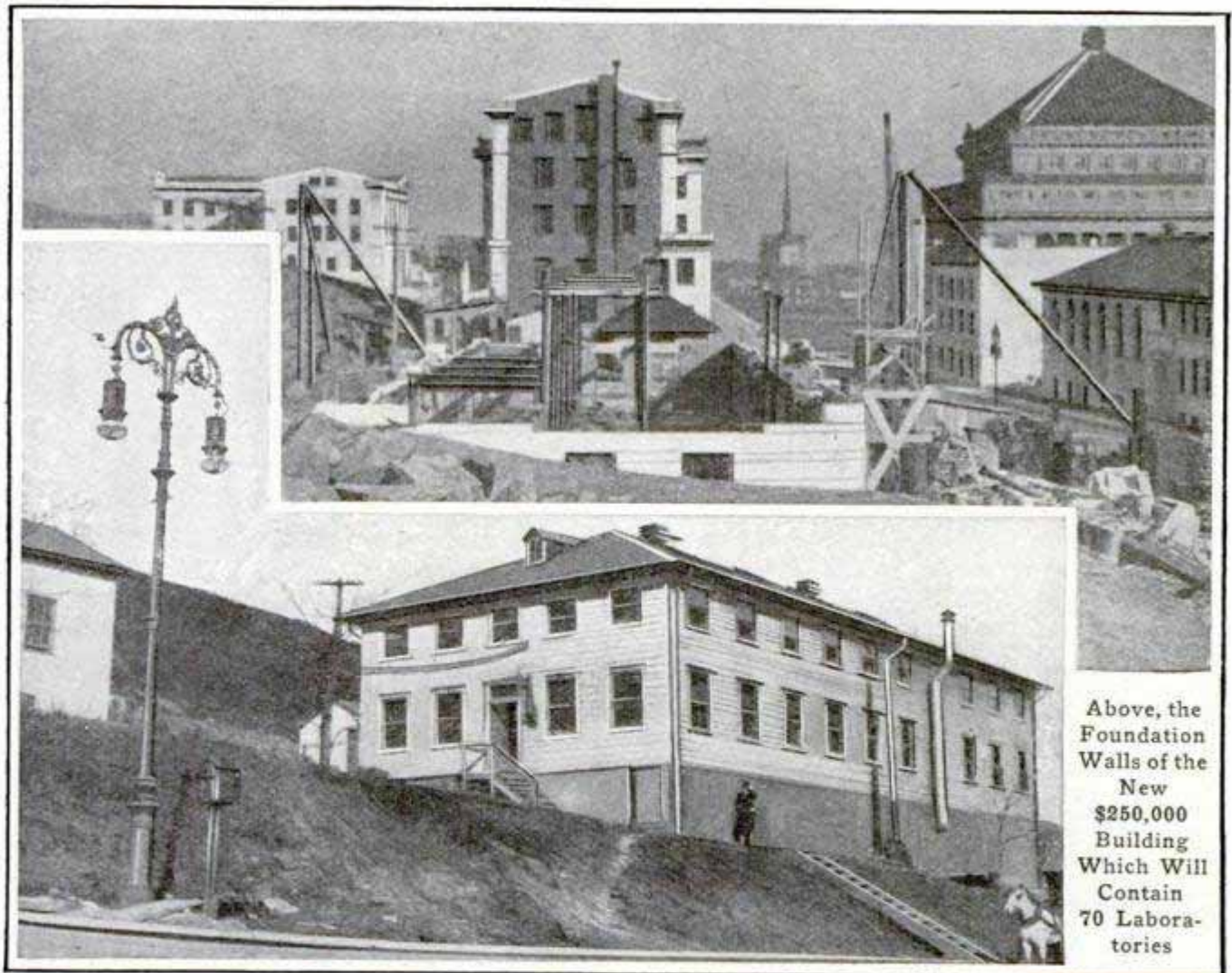
utilizing these facts are already saving probably more than \$250,000 a year in the cost of their product and giving their customers better bread than they have ever had. And that was only a beginning of the research into the chemistry of bread at the Mellon Institute. When I visited it in January I saw three chemists working with masses of dough in one of the little laboratories, trying to work out still more complicated problems in bread making. They are working under a gift of \$6,000 a year for their living expenses, with another \$10,000 prize in view, if they get the answer.

It is almost safe to predict that the poorest bread sold ten years from now will be better than the best on the market today, and cheaper. It is certain that the world's knowledge of chemistry of bread making has been

enormously increased within five years as a result of these men's work.

I have written first of the Mellon Institute's work in bread, because there is no other product of industrial chemistry that enters into the lives of so many people. Baking, after all, is merely a chemical process. But so are thousands of other industrial processes—almost all manufacturing, every branch of farming. Chemistry enters in some degree into every branch of business, into the day's work of everyone engaged in productive labor.

Over in Germany, manufacturers and business men have recognized this direct connection between science and industry for many years, and have been making good use of it. The greatest triumphs of German industry, triumphs that have given them almost a monopoly of the world's markets in



Above, the Foundation Walls of the New \$250,000 Building Which Will Contain 70 Laboratories

The Temporary Wooden Building That Houses the Mellon Institute of Industrial Research, Where Science is Brought to the Assistance of Industry. At the Left is One of the Small "Unit Plants" for Testing Laboratory Results on a Commercial Scale



many lines, have been won through the coöperation of business and science and the application on a commercial scale of the chemists' laboratory discoveries. But while the Germans have been going ahead rapidly, American industries have lagged behind, either refusing to avail themselves of chemical knowledge that would be of immense value to them or at least offering no encouragement to original chemical research, even in lines directly related to their own products. Occasionally an American manufacturer has hired a chemist on about the same basis as he would hire a machine hand, and with about the same expectation of a daily output in return for his wages. But the instances have been as few in America as they have been frequent in Germany where manufacturers have provided adequate laboratory equipment, freedom from restrictions and interference, and reasonable salaries for trained chemists to work out scientifically the vital unsolved problems of a particular industry.

Dr. Robert Kennedy Duncan, at that time professor of industrial chemistry in the University of Kansas, suggested in 1907, in a book on chemical problems, that a practical means of giving American industry the benefit of the best scientific research might be found in the establishment of what he termed "Industrial Fellowships," in some university. He proposed that the manufacturer should lay his particular problem before the university authorities, paying an annual sum sufficient to provide a fair salary for a skilled research worker for a limited time, and offering a prize, either in the form of a cash bonus or an interest in the profits derived from the discovery, if the problem were solved. Several manufacturers took up the idea, and a number of industrial fellowships were established at the University of Kansas. The idea spread, the University of Pittsburgh invited Doctor Duncan to take charge of similar work at that institution, and the Mellon Institute is the result. Doctor Duncan was its first

director, with Raymond Foss Bacon, Ph. D., as associate director.

An interesting and inspiring place, this rough building in which science is teaching industry how to transmute base materials into coined gold. Literally from cellar to garret it is crowded with men and women and apparatus, while the odors of ozone, oxides of nitrogen, yeast, petroleum, sulphuric acid and a hundred other gases and chemicals mingle familiarly in the hallways and provide an "atmosphere" that at once suggests chemistry, even though it does not necessarily imply research. Thirty-two industrial fellowships have so far been established at the Mellon Institute. The work under many of them has been completed, but that still going on represents an annual expenditure by the industrial interests that have endowed the fellowships of \$102,400.

"We can get money for research easier than we can get men qualified to do the highest class of research work," said Doctor Duncan, when I talked with him less than a month before his death. "Two Pittsburgh men, A. W. and R. B. Mellon, have given \$250,000 for the new building, \$60,000 for apparatus, \$20,000 for the purchase of a chemical library, and an endowment of \$40,000 a year for general maintenance. This makes it possible to devote every cent that is paid by a manufacturer for research work to the solution of his particular problem. Our only difficulty now is in getting the best men for research work, but we are getting them from every part of the world."

Secrecy is the rule at the Mellon Institute—the protection of the trade secrets of the manufacturers in whose interests the research work is being done, in order that they may reap the benefits of their investments in the fellowships. Yet every contract between an industrial company and the institute contains a provision insuring the eventual publication, after a reasonable lapse of time, of the results obtained, for the benefit of the whole industrial world. When a process or





Two Interesting Features of the Work of the Mellon Institute: Each Research Worker Tacks His Pennant to This Wall as a Pledge of the Honor of His University for His Loyalty and Fidelity. The Stenographic Corps is Almost as Important as the Chemists, Furnishing the Connecting Link between the Institute and the Scientific Knowledge of the Whole World

product discovered in the laboratory is patentable, it is patented by the research worker discovering it, if the donor of the fellowship so desires, and the patent transferred to the donor. Often, however, the new processes found are kept secret rather than giving to the public, through the medium of a patent, a clue from which others might work out similar results without infringement, as so often happens in commercial enterprises. But since the primary function of the university is to serve the whole people rather than any individual or single interest, even these secrets must in time be disclosed, though not at such time or under such conditions as to affect seriously the business of their original possessors.

With forty or fifty young chemists working in the same building, each on a different problem and each bound to secrecy as to the exact results he obtains and the methods by which he gets them, it is, of course, essential

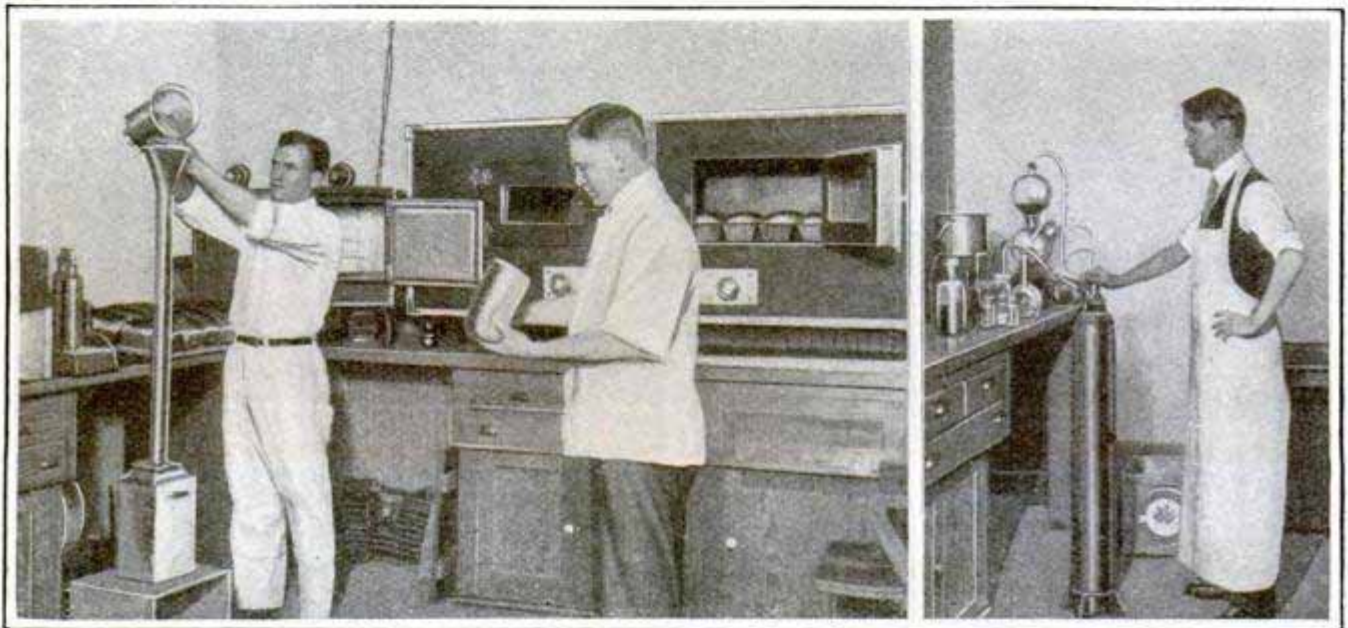
that a high standard of honor shall prevail throughout the establishment. One of the finest and most inspiring sights at the Mellon Institute is the partition wall in the main office, covered with university pennants. Upon this wall, when he enters the institute to take up research work, each fellow tacks the emblem of his alma mater. It has already become a tradition that in so doing he pledges the honor of his university, not only as to the quality of his work, his enthusiasm and his devotion to it, but by way of an oath to keep his own counsel and never reveal the secrets with which he is intrusted or that he may learn while there. Not once has there been the slightest lapse from this high standard of honor. It is understood that none of the researchers is to question another as to the results he is getting or how he got them. He may—and this is being done continually—ask another who has specialized in a particular



field of chemistry how best to get a certain reaction, for instance, or the meaning of results which are not clear to the inquirer, but as to the bearing of these detailed questions on the main object of research there is no communication and no "prying." In short, the ordinary courteous interchange of information that prevails among scientists is utilized fully, to the advantage of all concerned, without at any time jeopardizing the interests of anyone.

An interesting illustration of the

problems they are to undertake by spending several weeks, or even months, in the factories where the results of their work are to be applied, thus gaining first-hand knowledge of the manufacturing conditions which must be met. Nor does their research work stop with the achievement of mere laboratory results. These once gained, a "unit plant" is constructed, sometimes on the university grounds, sometimes farther away, in order to be beyond the reach of curious outsiders,



Better and Cheaper Bread for All the World is One of the Most Important Aims of the Research Work of the Mellon Institute: These Views Show Some of the Chemists Engaged in This Work, Which has Already Resulted in Reducing the Cost of Baking

way in which the best available knowledge of specially trained scientists is utilized is found in the organization of the office and the library of the institute. Here, in addition to the books, is a large staff of stenographers. Instead of wasting days or weeks hunting for a special piece of information which may or may not be contained in one of the volumes, if the facts sought are not readily accessible, letters are written to those scientists in every part of the world who stand foremost on the particular questions involved, and thus the fullest available information is brought to bear on the problems.

Before beginning the work in the laboratory, most of the research fellows familiarize themselves with the

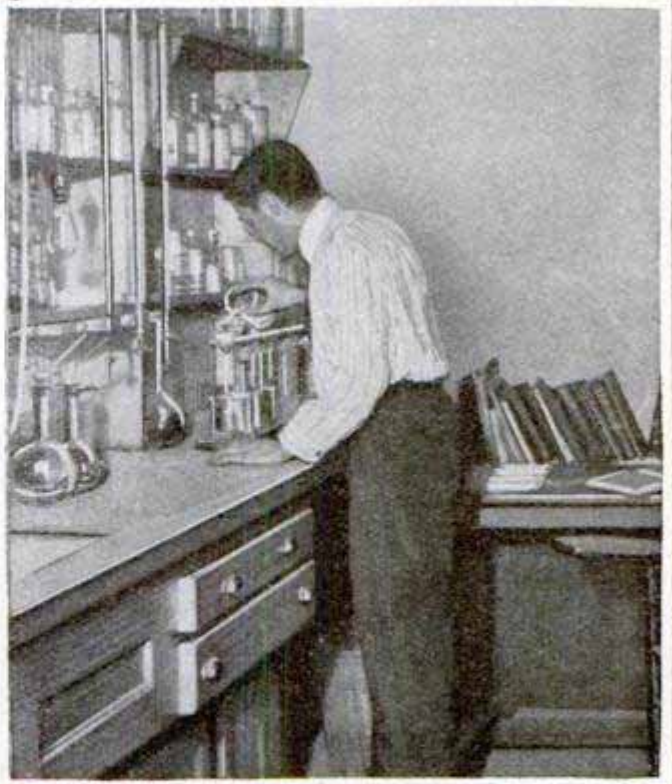
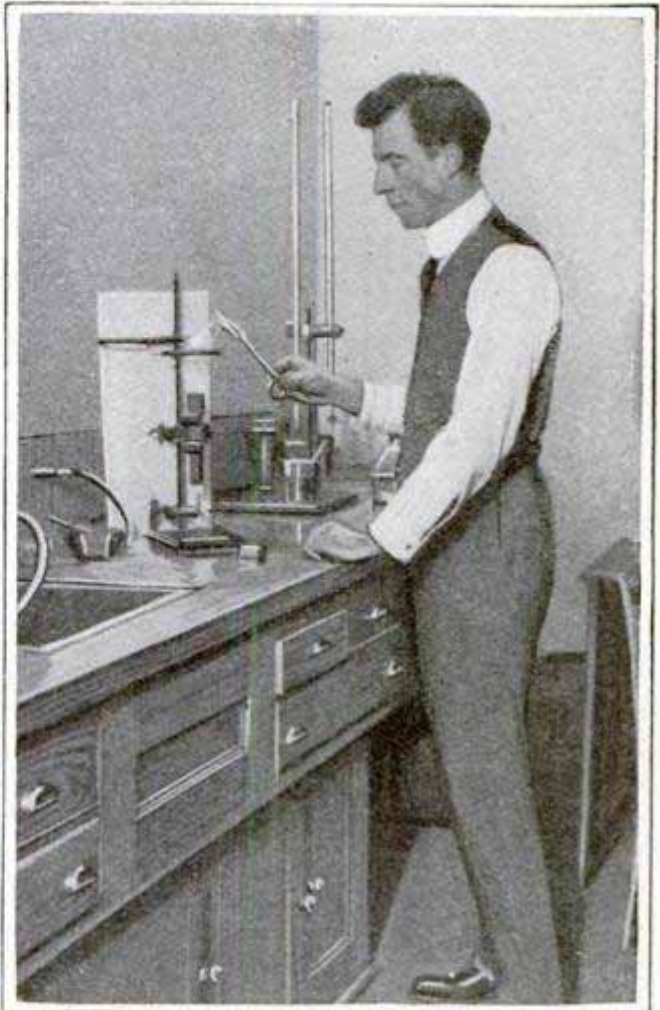
and the new process tested or the new product manufactured on a scale large enough to demonstrate its commercial applicability. This "unit plant" demonstration, too, is often followed by a "full-sized" experiment with all the resources of a great manufacturing plant at the investigator's disposal, before the results of his work are finally accepted as satisfactory. Mere theories win no prizes at the Mellon Institute.

While nothing that could affect the interests of the supporters of the industrial fellowships may be made public, yet enough was disclosed to me by Professor Duncan to prove the tremendous value to industry, and so to the public generally, of the work which the Mellon Institute is doing for American manufacturers.



"Here is the result of one of our researches," he said, taking from his desk several objects made of what appeared to be vulcanite or hard rubber. "And here is another specimen of the same substance." This was a rod of material that looked exactly like a fine specimen of clear amber. "Both of those substances are the same," he said. "It is a new product, called amberoid, which was discovered by our industrial fellows. A manufacturer wanted a new finish for wood—an enamel that would be better than anything yet produced. He provided a fund of \$1,500 for the first year and \$4,200 a year for two years more, with a bonus of 25 per cent of the stock of his company for the three scientists engaged in the research. The product which they have evolved is revolutionary. The only enamel now in use which approaches it in quality has to be made and applied under very high pressures and at high temperature. This is produced and readily worked at 60° centigrade, or about 140° F., and without heavy pressures. It is clear and translucent, can be dyed or colored as desired, and is a perfect substitute

for vulcanite in every possible use, both because of its elasticity and its hardness and high insulating power. It is



Scenes in the Laboratories at the Mellon Institute, Where Skilled Chemists are Bringing Scientific Knowledge to Bear on the Unsolved Problems of American Industry. There will be Seventy of These Individual Laboratories in the New Building



odorless, insoluble in acids or alkalis, and nonexplosive. It can be used as a binding material, as with sawdust for artificial flooring, or with carborundum for grinding and polishing. I regard it as one of the most important industrial discoveries of recent years.

"Another very important research is one which is now in its third year, in petroleum. There was a variety of problems presented to the nine fellows engaged in this work. The endowment is \$10,000 a year for three years and the bonus a 10-per-cent interest in the discoveries made. One of the most important results so far attained is the discovery of a cheap and practical method of extracting high-grade gasoline from petroleum wastes which have heretofore been thrown away. The importance of this, in view of the tremendous increase in the demand for gasoline, is apparent. These fellows have also discovered a new method of distilling lubricating oils, which gives better results than any process heretofore used.

"Another group of fellows, working under a different endowment, has found new methods of producing hydrogen and new markets for this gas.

"The problem of the preservation of orange juice has puzzled the Florida and California fruit growers for 30 years. No matter what preservatives were used, the preserved juice would eventually turn brown. A practical and cheap method of preserving it would make it possible to utilize a large part of the orange crop which is now wasted. One of our fellows has discovered such a process, whereby orange juice can not only be preserved, but crystallized, so that it can be packed and handled in a dry form; again becoming true orange juice when mixed with water, the only change being that it is slightly less sweet than when first pressed. No artificial preservatives of any kind are used.

"One of our most important lines of research, so far as Pittsburgh is concerned, is the effort to find an effective, yet commercially practical way of abolishing the smoke nuisance. The

sum of \$41,000 was given during a period of three years, and we have now found the answer. The passage of a high-potential current of electricity, of low amperage, through very small wires suspended vertically in a flue, has been found to cause the precipitation of the carbon particles in the smoke. Arrangements are being made to give Pittsburgh the first opportunity to avail itself of this discovery, which was financed from motives of public spirit more than the desire for commercial gain.

"We are now testing, in a unit plant, a new method of extracting copper at a profit from 'tailings' and low-grade ores which were formerly of little or no value. Some of our fellows have made important discoveries relating to the hardening of fats by catalysis.\* An interesting research now under way deals with the purification of sewer grease for use in soap making. The utilization of leather scrap; a method of making glass of a new and distinctive color; the whole subject of the chemistry of glue, of which little is known; methods of coating steel with copper; questions dealing with the utilization of natural gas; the production of cement, and the corrosion of steam radiators—these are among the practical, present-day industrial problems which are being attacked under these industrial fellowships. Most of them will be solved. There have been but two failures so far to get the results sought, and these were such as to reflect no discredit on the institute.

"A particularly interesting problem of far-reaching importance is involved in an industrial fellowship, negotiations for the endowment for which are now under way. The positive results that have been achieved in the use of radium for the treatment of cancer have made the question of the world's radium supply a vital one. Scientists have long known that the Roentgen rays—the ordinary 'X-rays'—are identical with the curative rays of radium

\*A description of this method of converting fluid oils or fats into stable solids was published in Popular Mechanics Magazine for November, 1913, page 622



—the so-called 'gamma' rays—except that the X-rays have much less penetrating power. It has been suggested that if some means could be found to produce by the electric current X-rays having the penetrating power of the gamma rays, the curative powers of radium would be at the command of every physician at a trifling expense. It will require a fund of at least \$7,000 a year for an industrial fellowship having this discovery as its object. It will take some time to find the best-equipped man to undertake this re-

search, for, as I have told you, it is easier to get money than men. But he will be found, and the work will be undertaken. If he succeeds, some arrangement will be made to provide an adequate prize for his discovery and to give the result of his work freely to all the world, for the use of the whole medical profession in the relief of suffering humanity.

"If this discovery shall be made and everything else we have accomplished should be wiped out, our work will have justified the faith of its founders."

### MOTION PICTURES SHOW ARMY IN ACTION

Under orders from the War Department at Washington, an officer of the field artillery is delivering a series of lectures illustrated by about 8,000 ft. of motion pictures showing large bodies of infantry, cavalry and artillery in action. Maneuvers are worked out with perfect technical accuracy. An orderly delivers a message from the commanding officer to assemble one company at once. Call to arms is sounded by the bugler. In a few minutes the company is "on the hike" in the direction of the enemy. The advance guard comes in contact with the enemy. Flankers join the movement. Connecting files inform the main command the preliminary skirmish is on. The entire company goes into action, with rapid fire and bayonet charge. Cavalry supports the rush and field batteries come into action, portraying the most magnificent picture of warfare ever seen. The lectures are well attended and occasion much comment.

### NEW FILLER FOR LIFE PRESERVERS

The Navy Department is considering the adoption of llano silk, or kapok, instead of cork in life-saving appliances. Kapok is the long silky fiber of the bark of a tree which grows freely in tropical America, although

now the product is produced almost exclusively in Java. Kapok, or "silk cotton," as it is also known, is lighter and more easily handled than cork, occupies less space and is better suited in every respect than cork to use in the life-saving apparatus. The fiber is soft, silky and elastic, and maintains its elasticity in use.

DRESS MADE OF  
NEWSPAPER

PRINTED  
ON SILK

Eight Yards of Satin was Run through the Press of a Washington Newspaper Plant Recently. This Garment was Then Made from the Cloth and Formed One of the Most Curious Costumes at a Fancy-Dress Ball. Extreme Care on the Part of the Newspaper Pressmen was Necessary, That the Delicate Material Should Not be Smudged by the Ink, and Caution on the Part of the Modiste and Her Helpers, of Course, in Transforming the Material into a "Creation"



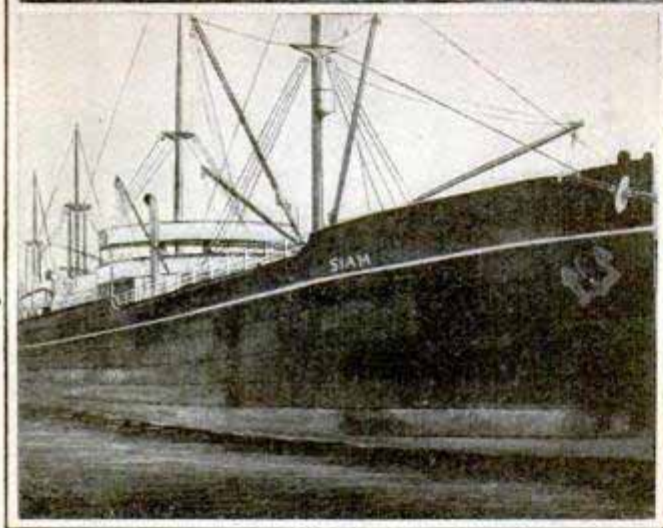
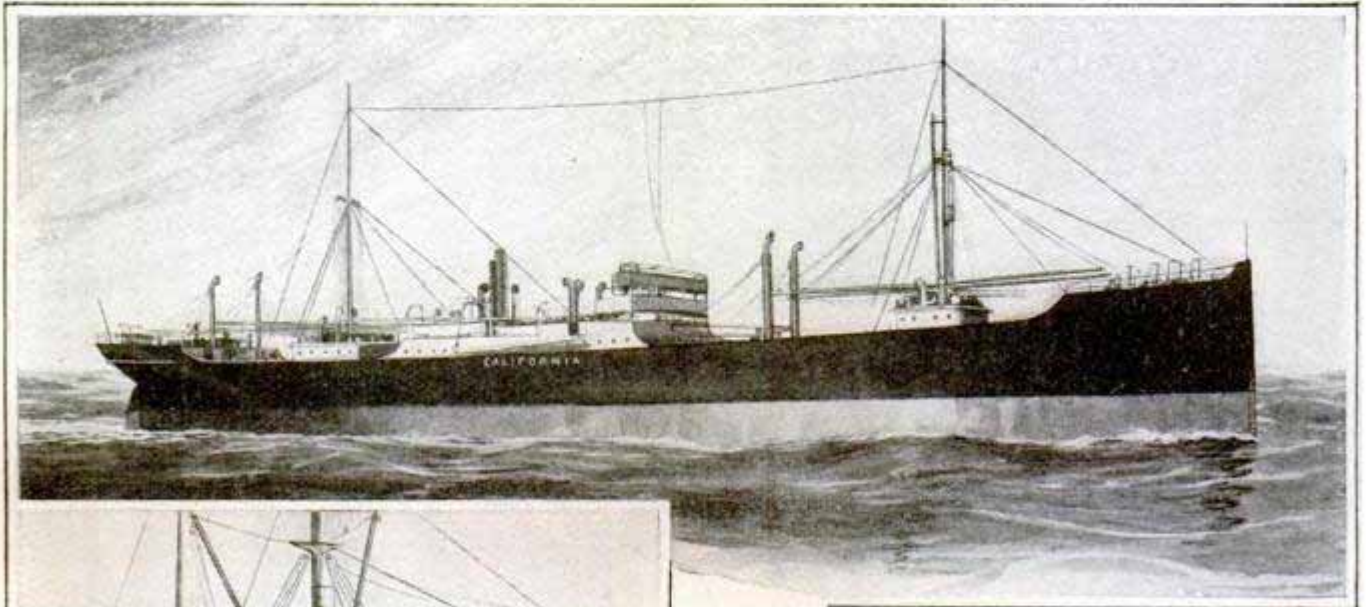
Photo by G. V. Buck



## LARGE SHIPS PROPELLED BY DIESEL MOTORS

After years of experimenting with smaller craft, the Diesel motor is now being applied to merchant vessels of

sels are the "Siam" and the "California." The "Siam" is the largest merchant motor ship afloat and the first to be placed in service on the Pacific. The motors of this ship develop 3,200 hp., while the ship itself is 425 ft.



The Stackless Ocean Liner "Siam," All the Machinery of which is Driven by Diesel Motors

The Motor Ship "California" Has Propellers Driven by Diesel Motors and Cargo Winches Driven by Steam

such size as to compare with modern ocean liners. The latest of these ves-

long and has a beam of 55 ft. According to announcements it is the advance guard of a fleet of similar craft to be used for trade by way of the Panama Canal. This ship has a dead-weight capacity of 10,000 tons. The "California" is slightly smaller than the "Siam," having a length of 405 ft., a beam of 54 ft., and a dead-weight capacity of 7,200 tons. The motors are capable of developing 2,700 hp. The cargo winches being steam-driven, it is equipped with a slender funnel.

## AMERICAN TYPEWRITERS IN INDIA

A recent invention permits the adaptation of an American typewriter, in common use in India, so that it may be used for printing the 360 letters and signs of the Bengali alphabet. The standard typewriter keyboard has 42 keys, which, with the one-shift arrangement, permits printing 84 letters and characters. By the addition of four printing keys, each carrying two characters, the whole of the Bengali

alphabet may be written. This is possible from the fact that by the aid of "dead" or non-carriage-operating keys, and the back-spacer key, combined with placing of characters or parts of characters upon the type blocks in certain defined positions, the 360 characters and signs of the alphabet are practically reduced to 92. For example, the triangular character, which is one of two engraved upon a single type block, may be impressed upon the paper by itself, and with the aid of a back-spacer key may be struck a sec-



ond time to form two triangles connected by a dash at the top, forming another and entirely different character. Since the dead keys, when struck, do not cause a movement of the carriage, another character or sign can be impressed upon the paper by an ordinary key at or near the same printing point as that already printed by the dead key. The device is expected to increase the use of typewriters throughout India, where the Bengali language is largely used in commercial affairs.

More than 800,000 hp. has been developed from streams on national forests under government regulation.

### PORTABLE KITCHEN USED BY FRENCH SOLDIERS

In order that his men might have their meals piping hot and without delay, a captain of the French colonial army has invented a portable field kitchen. This unusual contrivance consists of two shafts attached to either side of a portable stove and boiler,

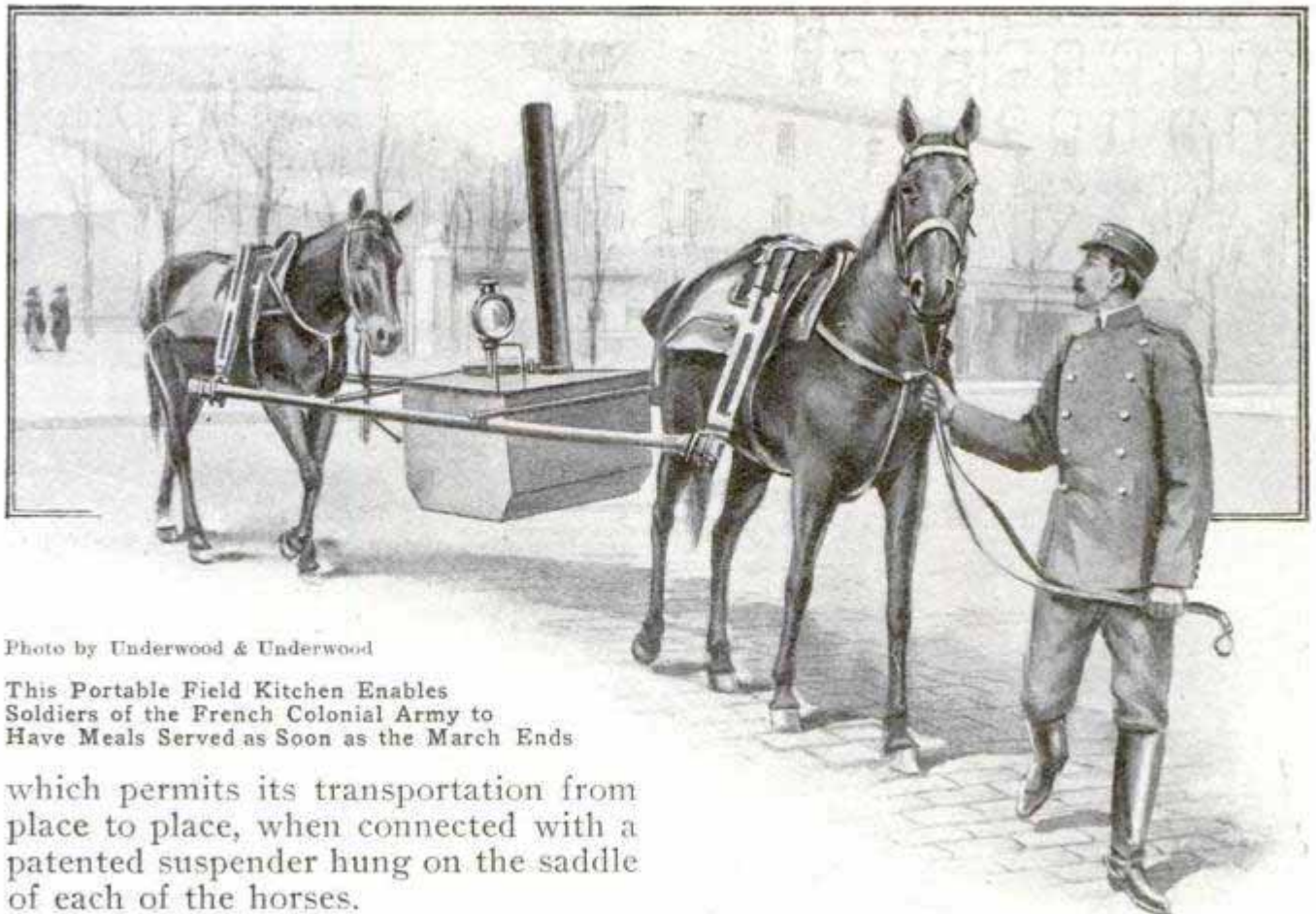


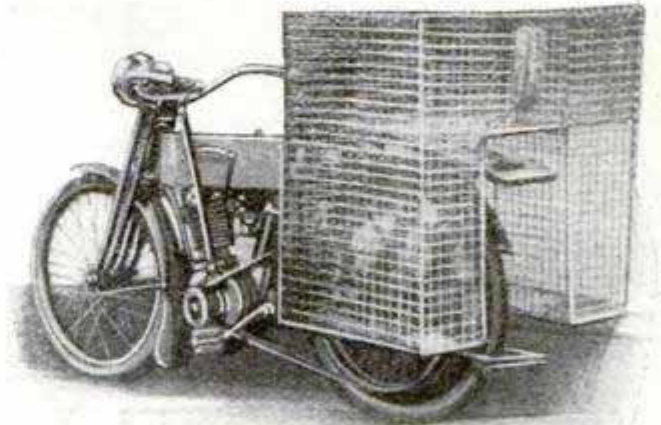
Photo by Underwood & Underwood

This Portable Field Kitchen Enables Soldiers of the French Colonial Army to Have Meals Served as Soon as the March Ends

which permits its transportation from place to place, when connected with a patented suspender hung on the saddle of each of the horses.

### PACKAGE CARRIER FOR MOTORCYCLES

Wire receptacles built over the rear of a motorcycle transform that vehicle



Package Delivery without a Sidecar

into a delivery van for a steam laundry. Heavy woven wire is reinforced at the corners and bottom with stout iron rods, the carrier thus formed being securely fastened to the rear of the saddle and to the frame of the motorcycle. The dimensions on the one pictured are about 30 in. each way, giving it a capacity almost equal to a medium-sized sidecar van.



## AN INTERESTING EXAMPLE OF SNOW SCULPTURE

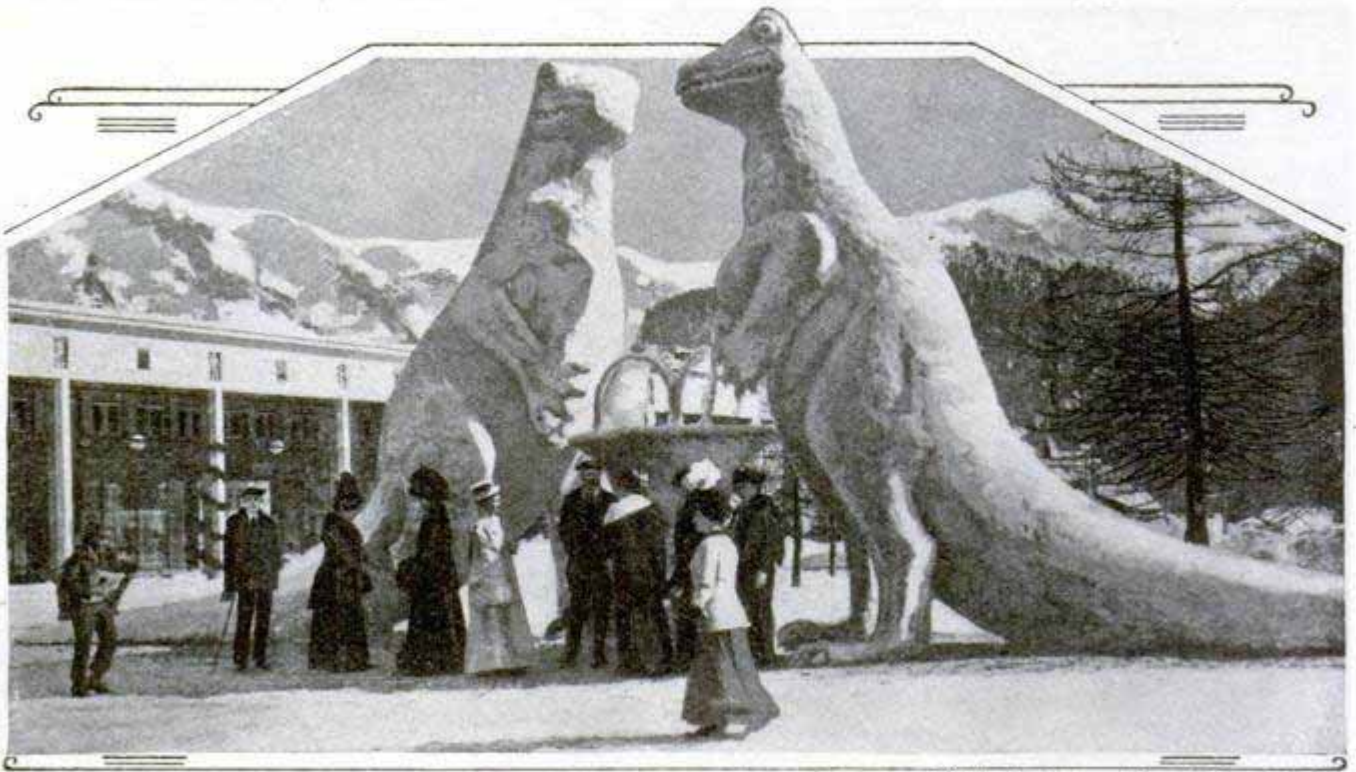
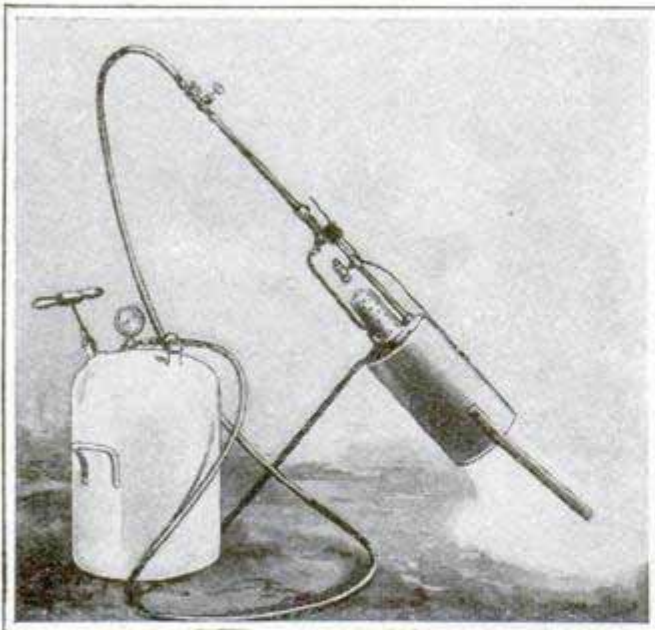


Photo by International News Service

Curious Snow Figures Reproducing Prehistoric-Animal Forms Seen at a Swiss Winter Resort

### KEROSENE HEATER FOR POLE DIGGING

When the ground is frozen the task of digging post holes becomes a heavy one. A new portable heater has been



Banishes Frost When Poles are to be Set

designed, consisting of a kerosene-burner outfit, with tank, hand air pump, pressure gauge and hood of special construction. By means of the

hood the intense flame from the heater is directed to the ground on the spot where the hole is to be dug, and the frost is taken out in a very short time. The earth is thoroughly thawed, so that when tamped back in the hole after the pole has been planted, it sets solidly and no retamping is required.

### WILD HORSES MAKE RAIDS ON CANADIAN FARMS

In the first mad rush for the Yukon gold fields, every available form of transportation was engaged to hurry seekers after the precious yellow dust to their destination. Once the gold camps were reached, many horses, mules and dogs were abandoned, and left to shift for themselves, seeking forage where they might find it. The result is seen today in northern Canada, where herds of wild horses menace the farms of settlers in Alberta and British Columbia, raiding the ranches, stampeding the domestic horses, and leading away into the wilderness numbers of high-bred horses brought to Canada for breeding



purposes. So serious has this condition become that the minister of agriculture for the province of Alberta has applied to the Dominion government for aid in stopping the depredations.

### CEMENT POSTS SUPPORT DECAYED TREE

A large and very old live-oak tree which adorned the lawn of a Pasadena residence had become decayed and broken down. Its picturesque appearance induced the owner to make an effort to save it. Cement posts securely imbedded in the ground, and finished and stained in such a manner as to make them resemble closely the natural bark of the tree, were provided and set in such positions as to support the limbs. One of these posts is as large in diameter as the tree itself, others are 10 or 12 ft. tall, and have stubs which appear to be ends of branches. Few persons looking at the tree and its supports would suppose that the latter were anything but live-oak wood.

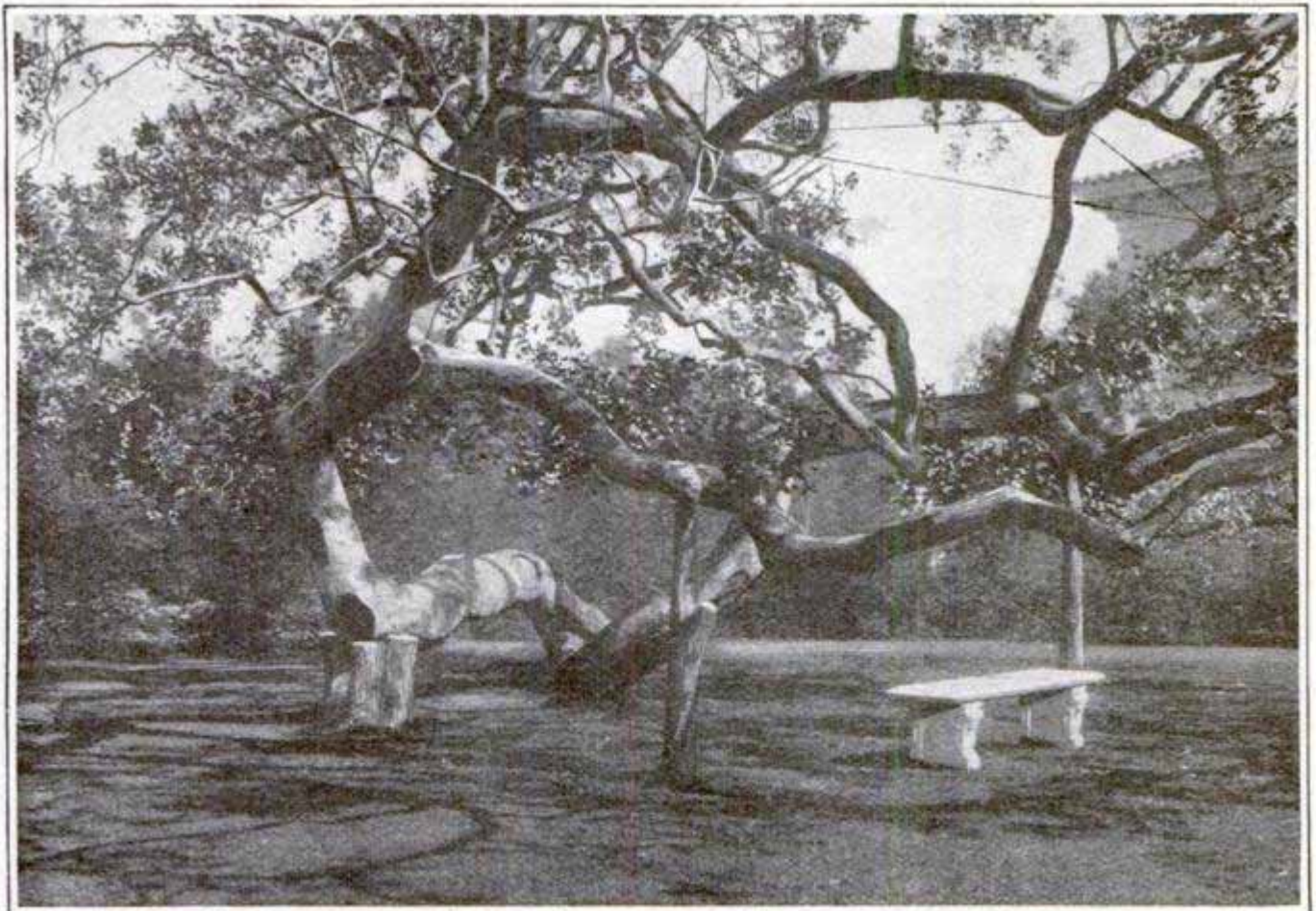
### MEXICAN MINERS WEIGHED WITH LOADS OF ORE

To save rehandling, the ore from a Mexican silver mine is weighed as it comes from the mine on the backs of



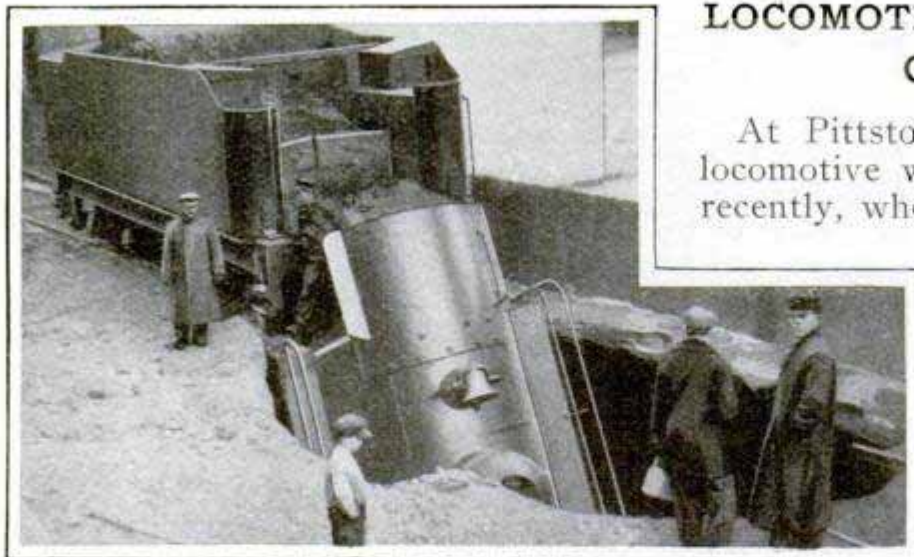
Weighing Ore and Man  
Together at Mexican  
Silver Mine

the peons. The checker has the weight of each man and his equipment noted in his book, so that the correct number of pounds of the mineral is represented by the difference. This method not only saves considerable time, but also spares the laborers much unnecessary work.



Cement Tree Supports Which Imitate Bark





## LOCOMOTIVE PLUNGES INTO COAL MINE

At Pittston, Pa., a Lehigh Valley locomotive was engulfed in a cave-in recently, when the tracks on which it was standing gave way, precipitating the engine into a portion of a coal mine. Fortunately no one was injured, and the engine was pulled out of the hole by the wrecking crew without difficulty.

## IN ARID EGYPT EVERY DROP OF WATER COUNTS

In the land where it rarely rains, all water must be brought from the river Nile, whose sources of supply lie a thousand miles distant. The goatskin bottle and the earthen jar here take the place of water mains and hydrants. The camel and the ox slowly turn the crude wooden gears which lift water from the sluggish river in buckets lashed to a rude water wheel.

Trenches distribute the precious fluid to fields where cotton, sugar cane and rice are grown in the black alluvial soil. True, steam pumps are seen in increasing numbers and irrigation projects of vast impor-

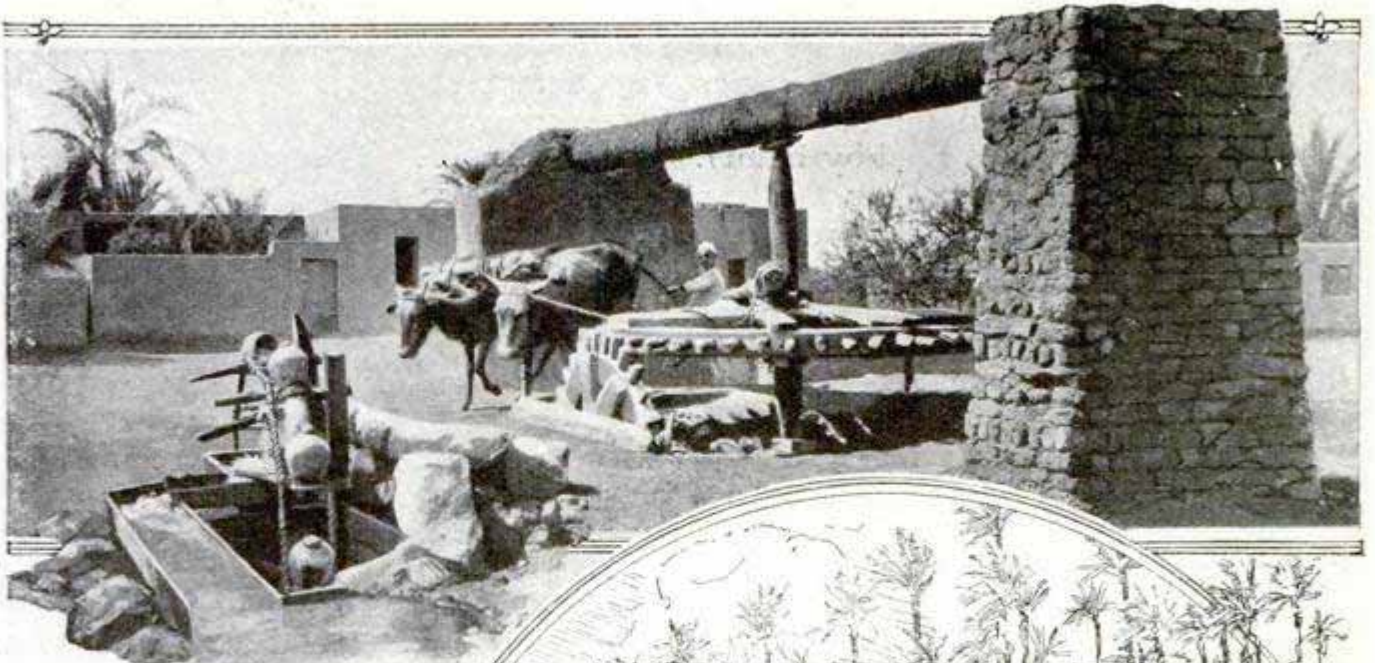


The Boy with the Goatskin Bottle  
Sells Water from Door to Door



A Sakiya, or Geared Water Wheel of Primitive Type,  
Such as is Used in Egypt for Irrigating





Water Buffaloes Plod Their Daily Round While Earthen Jars Pour Ceaselessly



In Some Sections the Bank of the Irrigating Ditch is the Only Road



A Cairo Water Vender Selling Drinking Water from Earthen Jar



This Form of Screw Pump Dates Back to the Time of Archimedes



tance have been built, but Egypt is essentially the land of the sakias (water wheels worked by oxen) and shadufs (water lifts worked by hand).

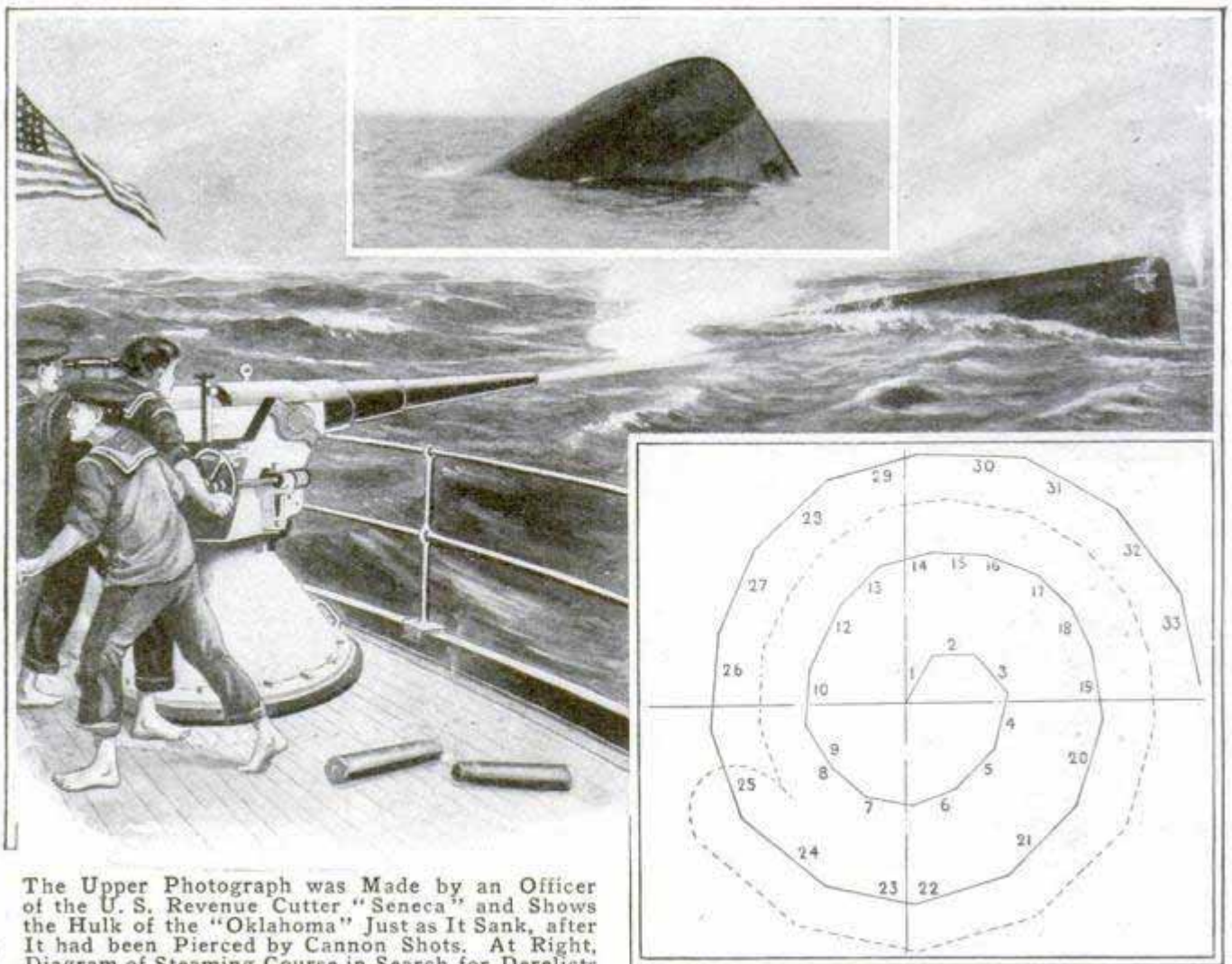
### FINDING AND DESTROYING DERELICTS AT SEA

When the "Oklahoma," an oil-tank steamer, suddenly broke in two during a terrific gale which swept the North Atlantic last January, the stern part sank quickly, while the forepart, upheld by the air retained by its bulkheads, floated and, lying in the steamer lanes, formed a serious menace to commerce. The wireless brought six vessels to the rescue, of which the United States revenue cutter "Seneca," known as the "derelict destroyer," was among the first, and after the rescue of the half dozen officers from the wreck, the "Seneca" guns fired solid shot through the derelict's hull until it sank.

Derelicts and disabled vessels always

drift more or less under the influence of wind and wave. The ocean currents are known and their direction and speed charted so that allowance may be made in seeking a lost or helpless ship. But to find quickly a water-logged hulk, in a tract of ocean as large as Texas, Oklahoma, Colorado, and New Mexico combined, is a task which seems to the landsman all but impossible. Yet the Revenue Cutter Service has worked out methods for covering such large areas quickly and thoroughly.

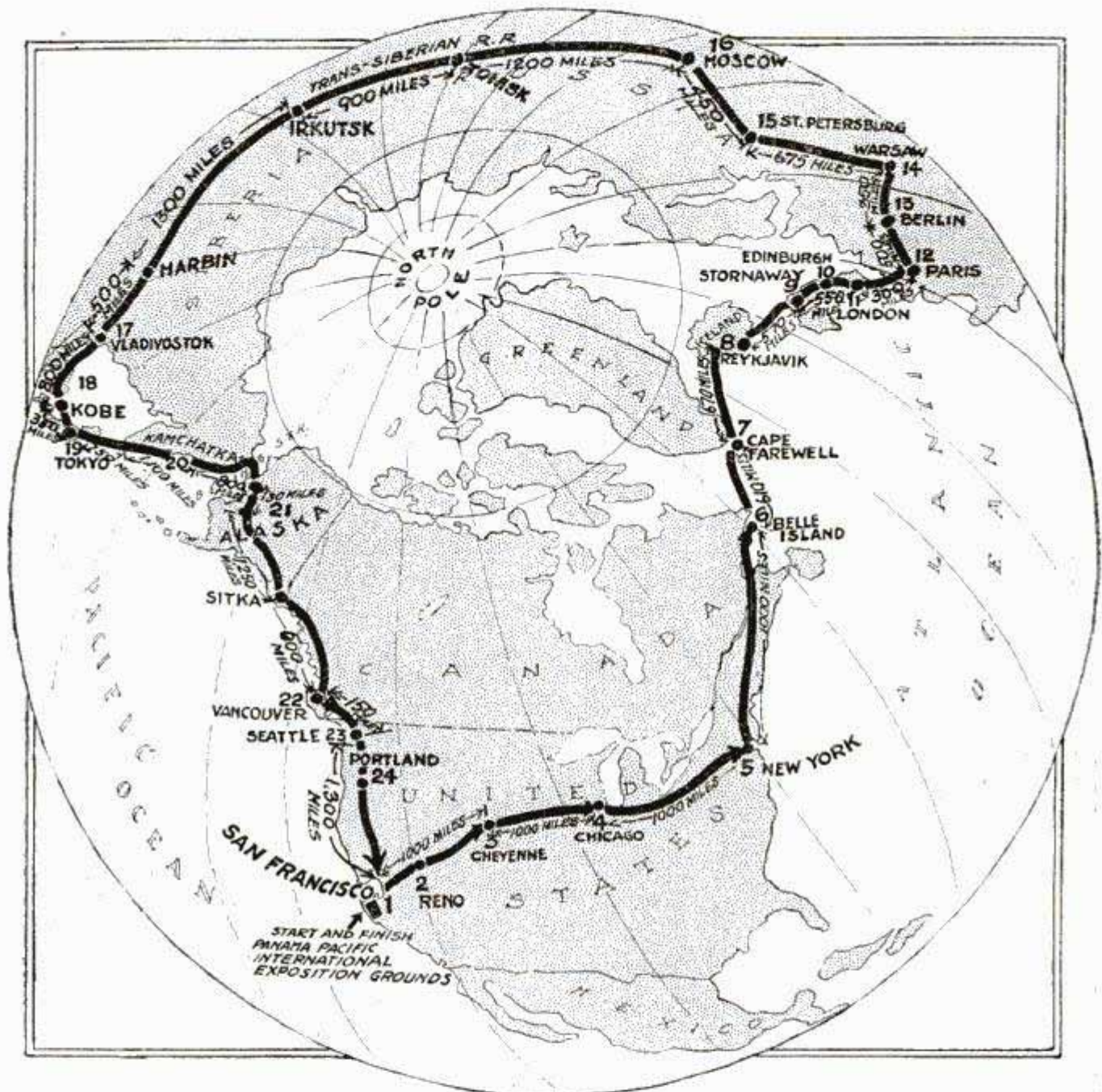
When a derelict is reported to the Revenue Cutter Service, one of its vessels at once speeds to the spot where the abandoned vessel was last seen. Taking the limit of visibility of a derelict from the crow's-nest of the cutter as five miles, a spiral course is laid about the spot where the derelict was last reported. In the course of a day's steaming, amounting to 145 miles, the cutter can survey thoroughly 1,522 square miles.



The Upper Photograph was Made by an Officer of the U. S. Revenue Cutter "Seneca" and Shows the Hulk of the "Oklahoma" Just as It Sank, after It had been Pierced by Cannon Shots. At Right, Diagram of Steaming Course in Search for Derelicts



## AIRMEN TO CIRCUMNAVIGATE THE GLOBE



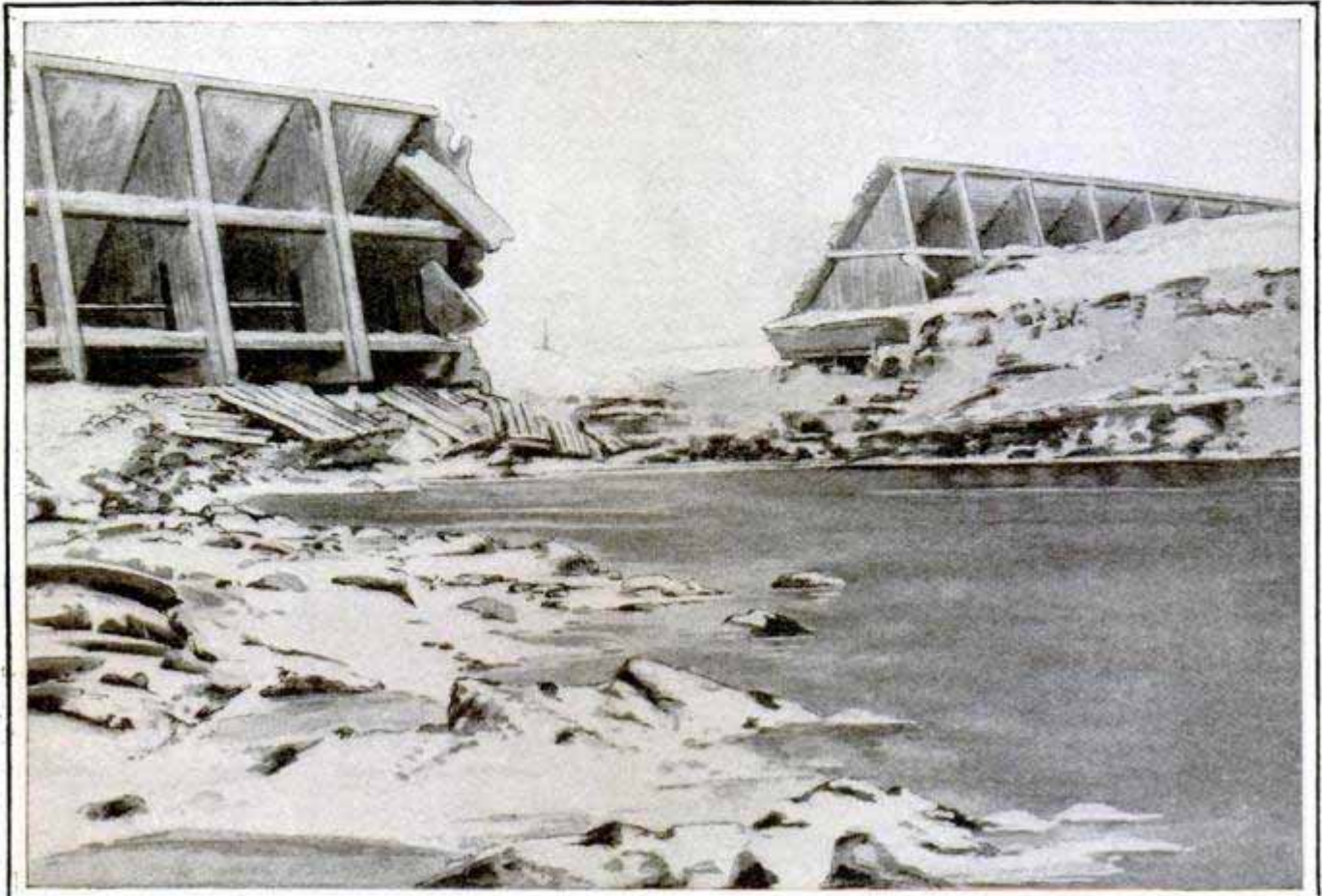
Preparations are under way for a flying race around the world, to start from the exposition grounds at San Francisco in May, 1915, and to end at the same place within 90 days from the time of starting. The flight is to be an international contest, with a prize of about \$300,000 awaiting the airman who completes the journey in the shortest time. The route shown on the map was adopted with the idea of keeping the fliers over land as much as possible. It has a total length of 22,760 miles and is to be followed in an easterly direction. The most dangerous section of the route is considered to be the steppes of Siberia, and the Russian

government will be asked to station troops along this section to give aid to the airmen. All parts of the route that lie over the sea will be patrolled by cruisers.

The longest over-sea flight will be from Cape Farewell, Greenland, to Reykjavik, Iceland, a distance of 670 miles. Twenty-six control stations equipped with supplies and facilities for making repairs will be established at intervals around the world. At each of these controls each airman must check in and have his machine marked with an official stamp. The Fédération Aéronautique Internationale will supervise the contest.



## CONCRETE DAM UNDERMINED AND WRECKED



Five bays of a reinforced-concrete dam across the Stony River at Dobbin, W. Va., after being undermined by seepage under the foundations during the high water of last January, collapsed and were carried out under the pressure of the water in the reservoir. The dam is of a cellular type, the sloping surface presented to the water being a comparatively thin reinforced-concrete deck, supported at 15-ft. intervals by slablike buttresses, and was built about six months before the col-

Courtesy Engineering Record

**Breach in the Stony River Dam at Dobbin, W. Va., Seen from Downstream. Left, View Showing Fragments of the Shattered Floor and Deck Slabs Hanging by Their Steel-Reinforcing Rods**

lapse. This superstructure is supported on a concrete foundation. The concrete portion of the dam was 990 ft. long, and had earthwork ends which made the total length about 1,065 ft. The maximum height of the dam was 51 ft., while the storage capacity of the reservoir was 3,000,000,000 gal. The collapse is attributed directly to seams in the footing under the foundations, through which the water was forced under the pressure of the full reservoir. This resulted in a deep cavity and the collapse of the five panels involved. When the dam broke, a wall of water, 8 ft. or more in height, went down the valley, wrecking a number of bridges and other structures. No lives were lost, as the dam is located in a wild and unsettled region.

¶Thirty different wood preservatives are in commercial use in the United States.



## SIDECARS FOR CARRYING LUNGMOTOR EQUIPMENT

Eleven motorcycles with sidecars have been installed in Chicago for enabling police surgeons with lungmotor equipment to reach, in the shortest possible time, victims of asphyxiation, electric shock, drowning, and other classes of accident, in which it is possible to restore life by means of artificial respiration. Motorcycles have been adopted for this service because they are capable of high speed and can be handled in close quarters at a higher speed than would be safe with an automobile. The machines are distributed at police stations in such a way as to cover the city effectively, and each is kept loaded with a lungmotor and other first-aid appliances so that it will be ready to answer a call instantly. These machines are capable of carrying three persons with all equipment at the rate of a mile a minute.

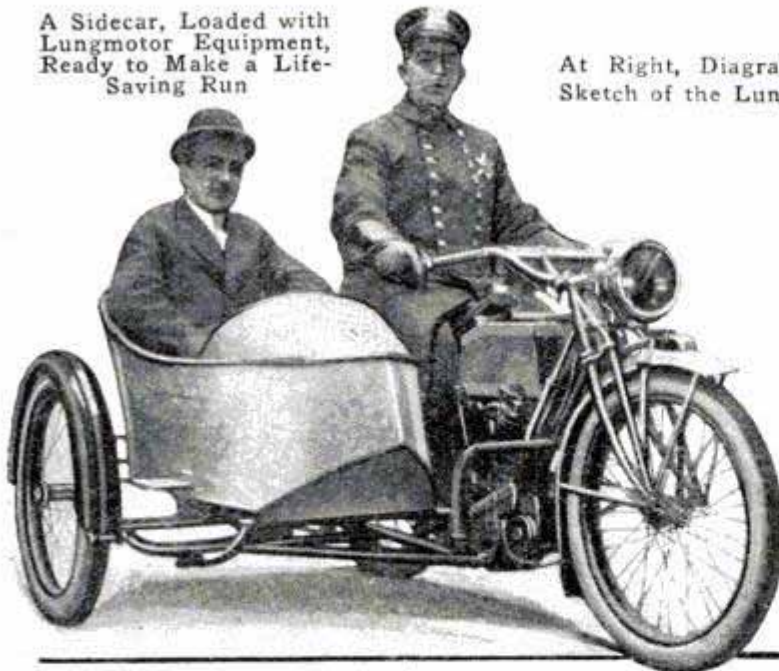
The lungmotor is a comparatively new apparatus, although the pulmotor, which is somewhat similar to it, has been in use for a number of years. The lungmotor bears a pronounced

resemblance to a hand-operated tire pump. It has two cylinders, connected by tubes to a mask that is placed over the mouth of the patient. The pistons of the two cylinders are rigidly connected by the handle at the top and operate in unison. When the handle is drawn up, one cylinder takes in fresh air and oxygen from the reservoir, while the other draws the air from the lungs. When the handle is pressed down the mixture of air and oxygen is forced into the lungs while the used air in the other cylinder is exhausted into the open air. This process of artificial respiration is kept up until natural respiration is restored or the attempt to revive the victim is proved to be hopeless.

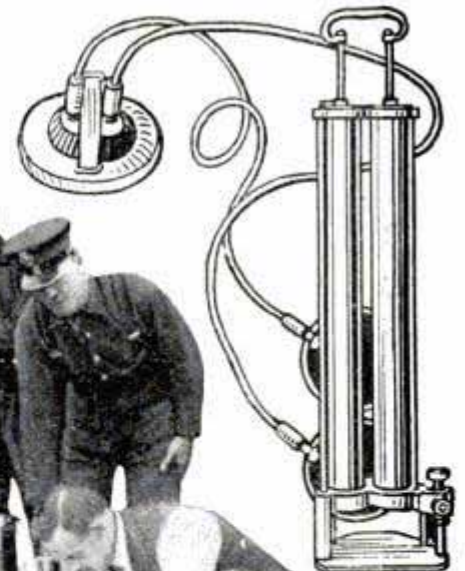
☐ An aviation school is to be established in Peru, the government having received contributions amounting to \$30,000 to be used for this purpose.

☐ A course of instruction in apple packing is given each year at North Yakima, Wash., where there is always a demand for expert packers during the fruit harvest.

A Sidecar, Loaded with Lungmotor Equipment, Ready to Make a Life-Saving Run



At Right, Diagrammatic Sketch of the Lungmotor



How the Lungmotor is Applied in Reviving the Victim





## COLLISION IN DENSE FOG SINKS STEAMER

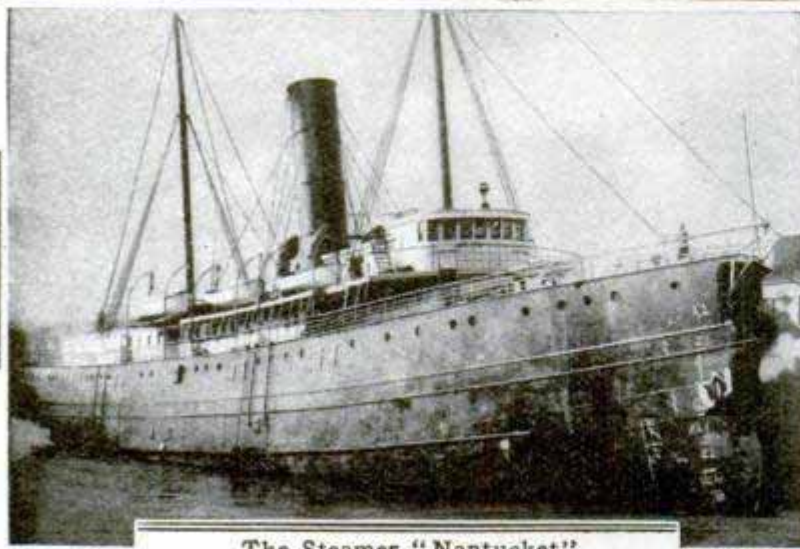
In a dense fog off Norfolk, Va., on January 30, last, the steamer "Nantucket," rammed the passenger steamer "Monroe," sending her to the bottom in a few minutes with the loss of 41 lives. A wireless call, sent out by the "Monroe" immediately after the crash, was heard by several vessels, but owing to the heavy fog, the ships in that route could not come to the aid of the stricken boat with any speed. The survivors were taken on board the "Nantucket," which put in to Norfolk,

badly damaged. The terrific shock of the two steamers bent and broke the steel plates, cutting through the sides of the "Monroe," a staunch steel steamer of the Old Dominion line, and smashing the prow of the "Nantucket," even breaking the huge anchor hanging at her bow.

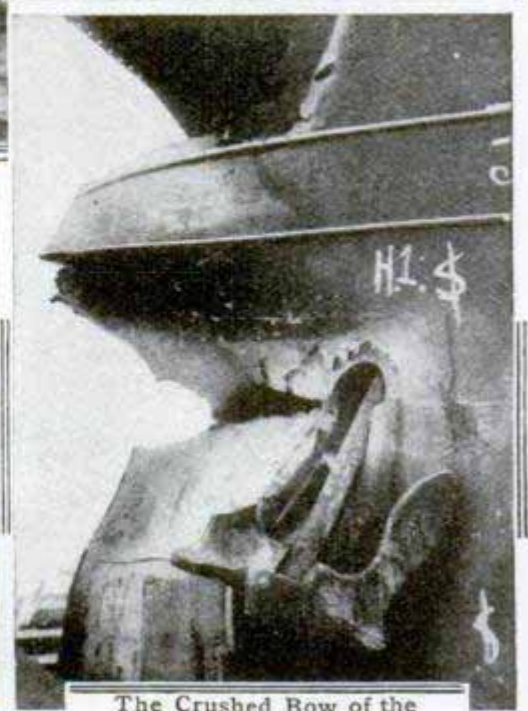
☞ About 175 different kinds of wood are contained in the forests of Florida.

☞ With a population of only a little over 350,000, Stockholm, Sweden, has 80,000 telephones.

Photo by International News Service



The Steamer "Nantucket" after the Collision



The Crushed Bow of the "Nantucket"

Photos by Underwood & Underwood



## DEMONSTRATION AGAINST A CRUEL PRACTICE

The campaign against the use of the aigrette by milliners has evoked dem-

onstrations in diverse forms, none of which excited more comment than the parade of sandwich men through the streets of London, bearing banners descriptive of the life and death of the mother heron. The aigrette, which was long popular by reason of its filmy daintiness, consists of a bunch of feathers produced by the mother heron, or egret, during nesting time. This bit of plumage could be easiest obtained by killing the parent bird. The young birds thus left without protection perished miserably.



Photo by Underwood & Underwood

Curious Street Demonstration in London Works Change in Millinery Styles

onstrations in diverse forms, none of which excited more comment than the parade of sandwich men through the streets of London, bearing banners descriptive of the life and death of the mother heron. The aigrette, which was long popular by reason of its filmy daintiness, consists of a bunch of feathers produced by the mother heron, or egret, during nesting time. This bit of plumage could be easiest obtained by killing the parent bird. The young birds thus left without protection perished miserably.

## NEW CAMERA PHOTOGRAPHS FLYING SHELL

By means of a novel electrical control for a camera shutter, Engineer James A. Wilson of the Department of Enlisted Specialists, U. S. Coast Artillery Corps, assisted by Capt. Francis J. Behr, of the same branch of the army, has been able to obtain a series of remarkable pictures of the firing of the great coast-defense mortars at Fort Monroe, in which the shell is

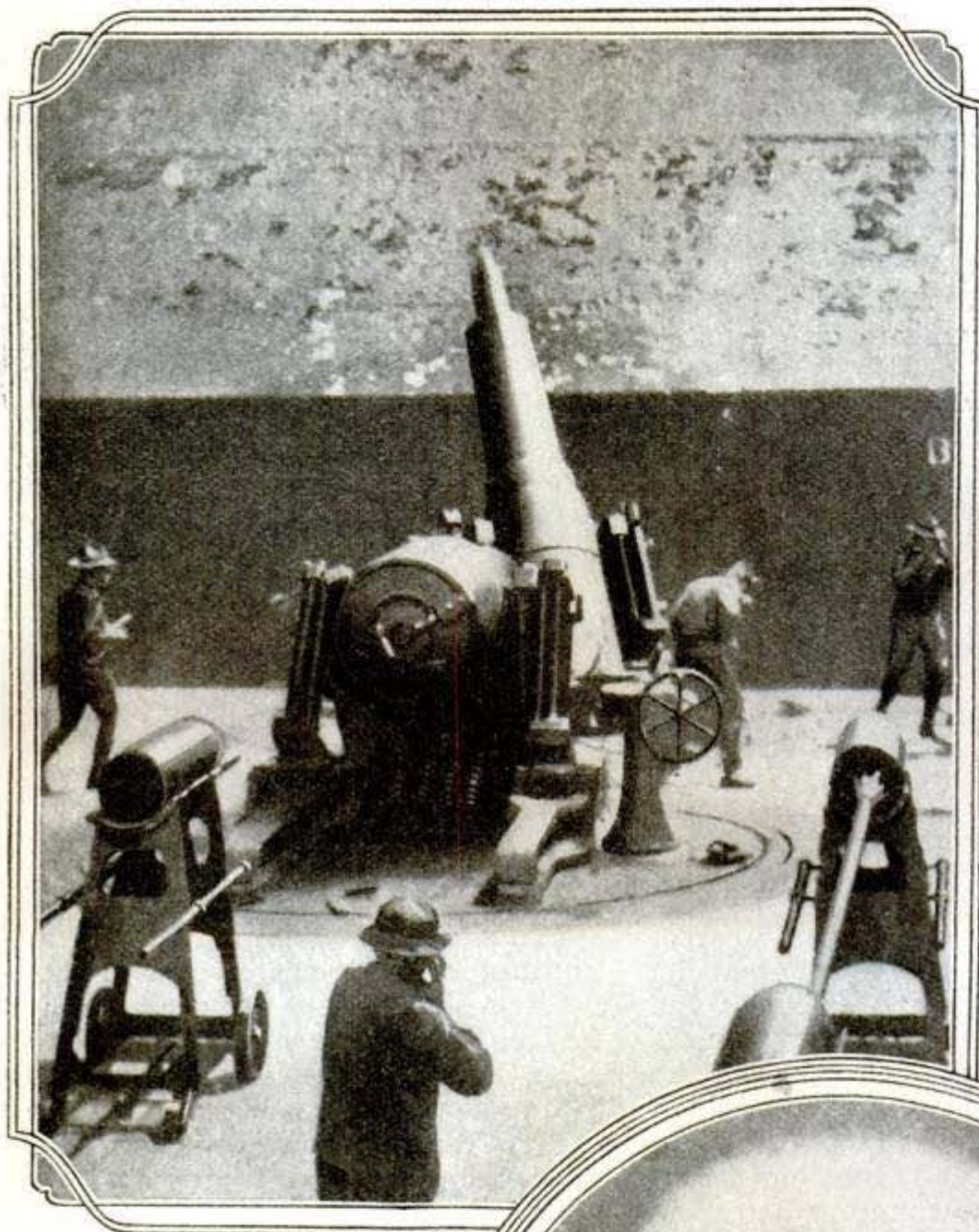
seen actually issuing from the mouth of the mortar, and the action of the gases, the formation of the smoke ring and the flight of the shell are all depicted.

The shutter is operated by an electric motor which makes several thousand revolutions per minute. By this device the photographer may determine the exact length of the exposure to be given, even as little as one-five-thousandth of a second, during which almost infinitesimal fraction of time the shell seen in the picture moves a trifle over two inches. At the mouth of the mortar, delicate electrically charged wires form a screen which, broken by the discharge, opens an electric circuit that actuates the shutter, exposing the highly sensitized plate for an instant, thus recording the flight of the projectile, which leaves the muzzle of the gun at the velocity of 900 ft. a second, or more than 617 miles an hour.

The photographs made with this device, shown on the following pages, are pictures of separate shots, each one taken at a slightly different time after the ignition of the powder, so that a progressive picture was obtained which represents the events in the firing of a single shot. Not less interesting than the photograph of the



REMARKABLE PICTURES OF A SHELL IN FLIGHT



The Beginning of the Shot:  
Shell Emerging from the  
Muzzle of the Mortar



The Luminous Ring  
of Gas Exceeds the  
Shell in Speed, as  
This Photograph  
Clearly Shows

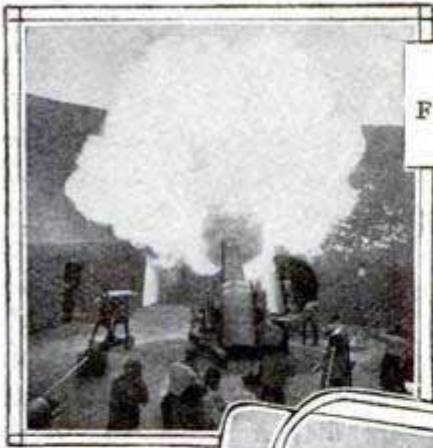


Gas Forced Back,  
Seeking Lines of  
Least Resistance

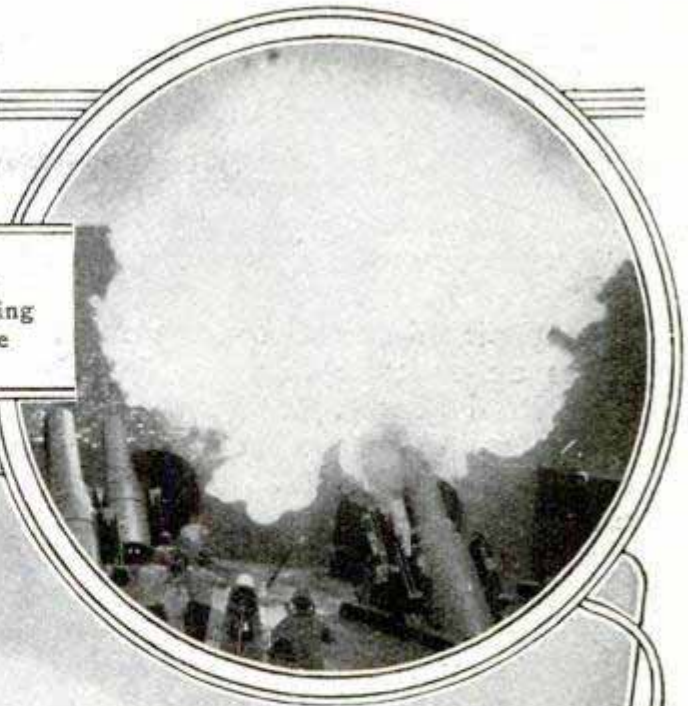


The Ring of Smoke and  
Gases is of Much Greater  
Density Than the Air It  
Displaces

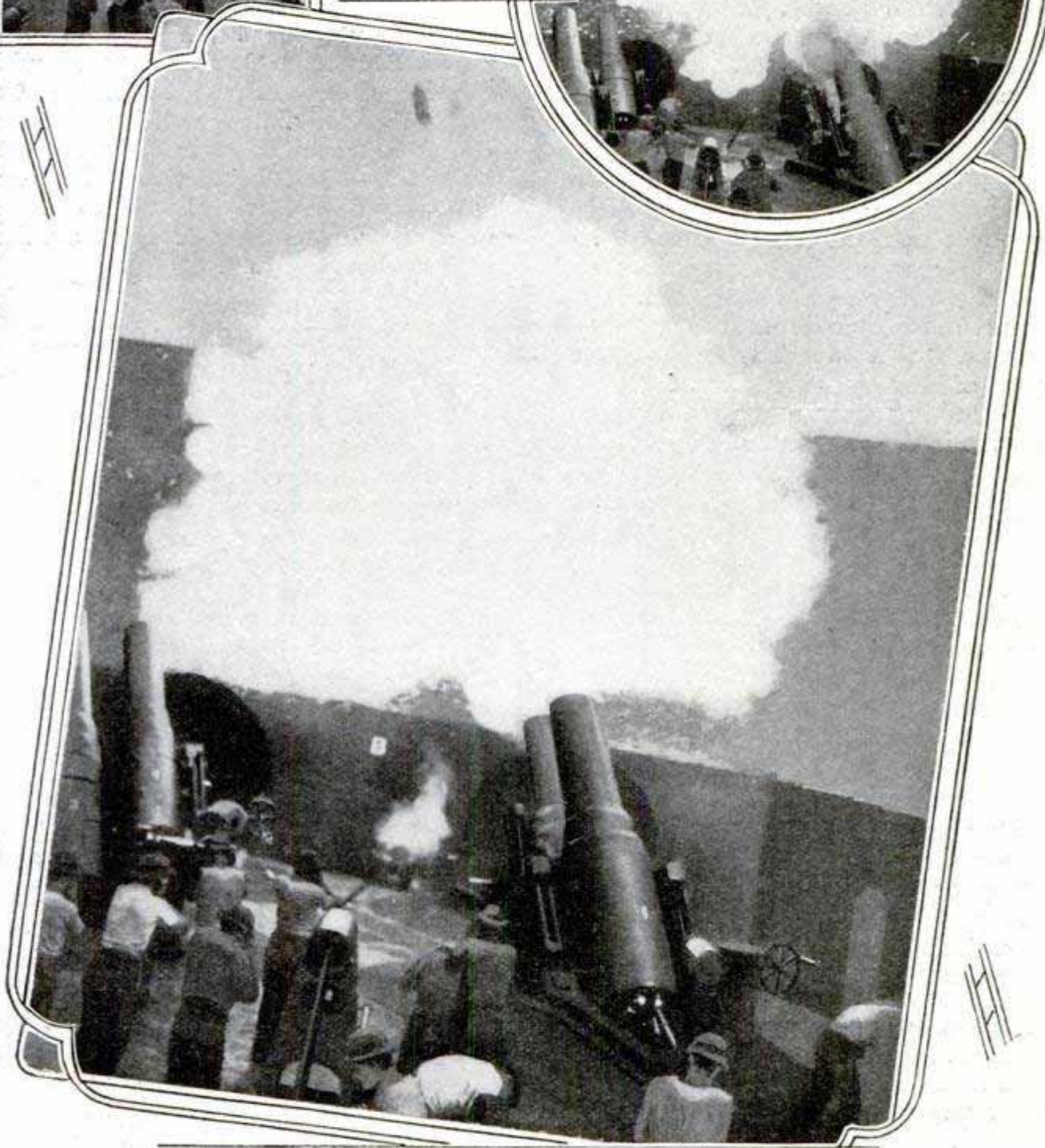




Fifth Stage in the Firing of the Mortar



The Discharge:  
The Shell Appearing  
above the Smoke



These Remarkable Photographs of the Firing of a Coast-Defense Mortar Show the Seven Stages of the Emergence and Flight of the Shell. They are Fully Described on Page 493



projectile are the pictures showing the formation of the deadly smoke ring immediately following the shell, and which gunners declare to be "as hard as steel," the inconceivably rapid whirling motion of the gases giving it a density comparable to a rigid ring of metal.

The projectile fired by the mortar reaches an altitude of from 5,000 to 20,000 ft. depending upon the range it is desired to reach. It is fired at a moving target towed at a rate of at least six miles an hour. The tug is separated from the target it is towing by only 500 ft. which, considering the distance—often four miles or more—at which target practice takes place, is a small margin. In practice 10 shots are fired, and often companies make 10 hits with the 10 shots fired. To be a hit, the projectile need not strike the target, but if the shell falls within 50 yd. of the moving target a hit is counted. This circle with the 50-yd. radius is the approximate size of a battleship's deck, and a mortar projectile is fired high so as to fall upon the deck of such a target.

A mortar projectile can be seen with the naked eye ascending into the zenith, and a person stationed near where such a projectile falls can see it for some time before it strikes. From the study of these and other photographs of the action of smoke and the flight of shells, officers of the coast artillery hope to discover and remedy faults in mortar construction, in powder making, and in the design of projectiles.

### SUEZ CANAL HAS BEEN DEEPENED

Announcement has just been made that the deepening of the Suez Canal has been completed, and the waterway now has a depth of 29 ft. for its entire length. Originally it was planned to give the canal a depth of  $26\frac{1}{4}$  ft., and for years after it was completed this depth was maintained. Increase in the size of vessels routed through this short cut to the Orient made it necessary to

deepen the cut, and dredging operations, conducted in the early eighties, added 1 ft. to the depth. Six years ago, the now finished undertaking was begun, and throughout the 100 miles of navigation from Port Said to Suez dredges have removed silt and sand, deepening the waterway to 29 ft. Already proposals are being considered for a further dredging, which will make the minimum depth 30 ft. The Panama Canal, while but 50 miles long, cost nearly \$300,000,000, as compared with the Suez expenditure of \$86,500,000 for twice the distance. The Panama Canal, however, is 40 ft. deep and 300 ft. wide, while its eastern rival is considerably narrower, only 200 to 265 ft. in width, and is a sea-level excavation mainly through sand.

### A DIMINUTIVE WIRELESS APPARATUS

A wireless receiving apparatus small enough to be carried in the vest pocket is a recent French invention. While intended mainly for receiving time signals from the Eiffel Tower in Paris, it is suited to a variety of other uses as well. This apparatus consists of a sensitive telephone receiver to which is attached a small but delicately made detector which carries two wires. If no antennae are available, one of the wires is attached with clips to a metal balcony, chimney, or other metal object through which the wireless waves are received, while the other wire is "grounded" by attachment to a gas or water pipe or to a metal rod driven into the ground. Small spools are provided on which the wires are wound up compactly.





## GLASS CASE PROTECTS CAR CHECKER'S RECORD

A handy device recently invented and designed to make the work of



the railroad-car checker easier in bad weather, consists of a glass case in which the book used in making the record is carried. The sides, top and one end are closed with glass, while one end is left open for inserting the book and hand. The book is laid in the case and is used in that position. The case is intended particularly for protecting the

record book in rainy weather, but is handy for use at other times, since it prevents the leaves from blowing in the wind and protects the hand from cold in winter.

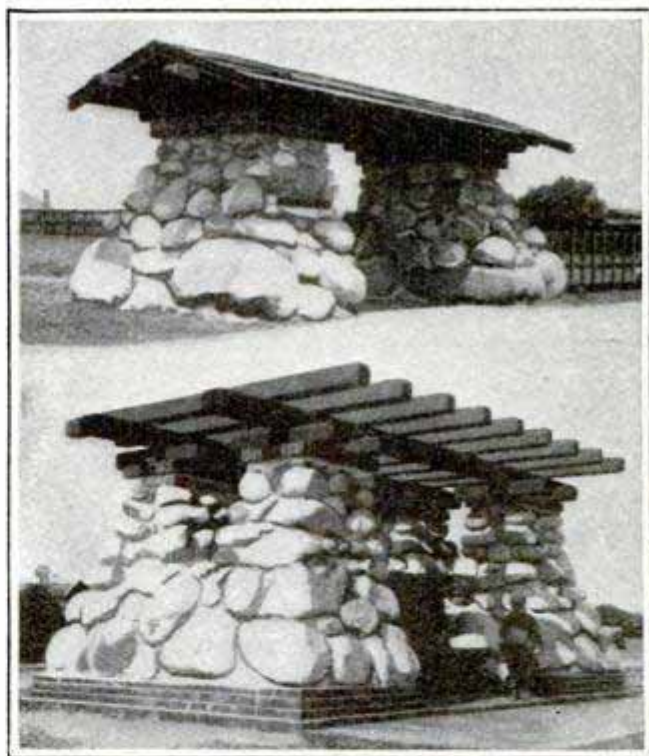
## LONG GLIDE MADE BY ENGLISH AIRMAN

With the engine of his biplane shut off, and starting from an elevation of nearly three miles, an English airman recently made a glide of 21 miles across country with a total drop of less than two miles in that distance. This apparently smashes all records for gliding feats. The airman had risen to a height of 15,000 ft., as shown by the recording barograph, when his nose began to bleed. Shutting off his engine, he started gliding with the wind toward a town 21 miles away. When he reached this town he found that he was still more than 5,000 ft. above the ground. Descending into

the town he picked up a passenger and flew back to his original starting point. The flat angle at which this glide was made, the drop being less than 500 ft. to the mile, is an indication of the increased security the fliers are beginning to enjoy through more efficient shaping of the wings and greater skill in handling.

## PICTURESQUE CAR STATIONS BUILT OF FIELD STONES

The residents of a Los Angeles suburb may await the coming street car in comfortable and artistic stations, formed of field stones, cement and rough beams. These attractive little structures were erected at a cost of about \$400 each and are permanent additions to the tract. Vines and flowers will add to the beauty of these remarkable architectural creations, which form a distinctive feature of the scenery.



Car Patrons Given Esthetic Stations

A reinforced-concrete building, 200 ft. high, containing a spiral driveway for automobiles to an observation platform on the roof, is planned for Denver.

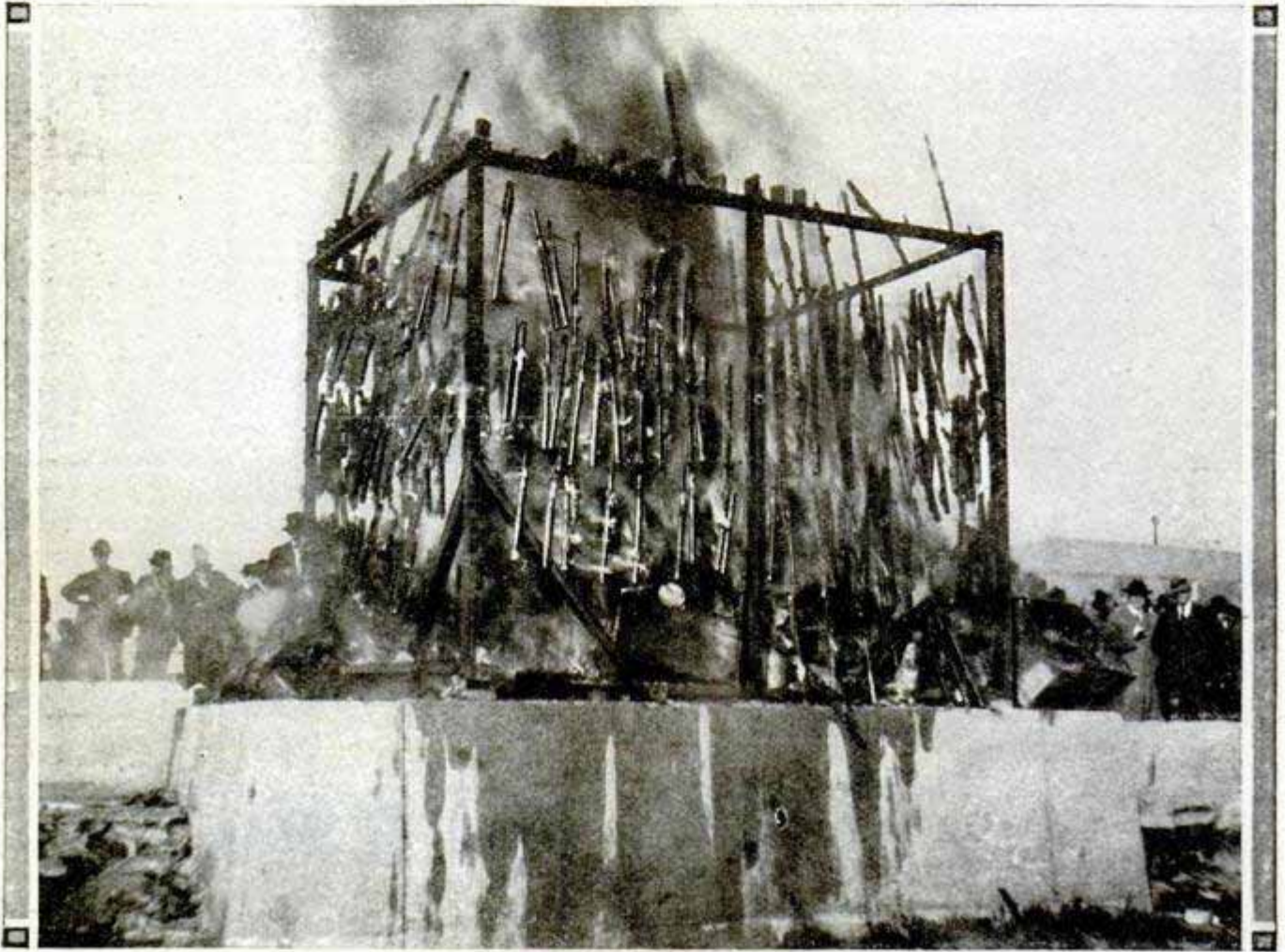


### DESTROYING OPIUM IN SAN FRANCISCO

An immense amount of opium, together with pipes and other parapher-

### MOTOR SUPPLIES CARRIED IN MOTOR CAR

A complete supply of automobile accessories is carried in the motor car

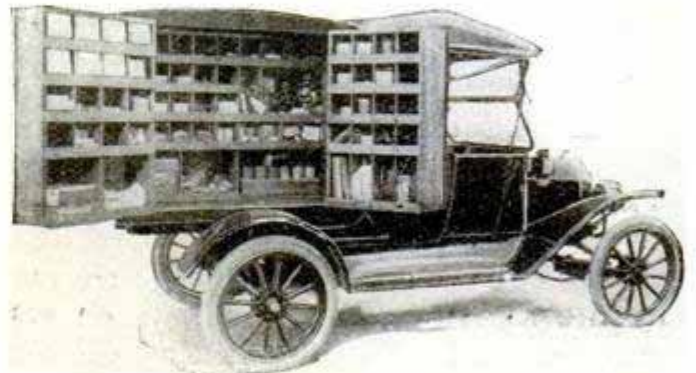


Burning of Opium Layouts by San Francisco Authorities

naliam which had been confiscated by the police of San Francisco, was burned in public recently, on the site of the old city hall. A scaffolding was erected and hundreds of opium pipes, many of them beautifully carved, hypodermic syringes, tins of opium, utensils for the preparation of the drug, bottles, cases and boxes containing opium and other illicit drugs were hung on wires stretched on the scaffold. Kerosene was then poured over the pile and set on fire. Dense smoke, reeking with nauseous fumes, rose from the pile, which contained, it is estimated, over \$20,000 worth of material.

High-pressure direct current is now being used on American electric railways operating 1,946 miles of trackage.

of a Philadelphia salesman, who is thus able to fill small orders without delay. He finds it valuable in introducing novelties, for instead of showing the catalog or photographs of the articles,



Supply Store on Wheels

the actual samples can be shown, and this might be a difficult matter to handle from an ordinary sample case.



## NEW FIELD GUN OF THE UNITED STATES ARMY

What is thought to be the biggest single improvement made in the artillery service in a decade is comprised in the new field gun recently adopted by the United States government. The carriage of this gun has a double, or split, trail, the word "trail" being used to designate the long beam, or prop, that supports the gun on the ground at the rear. The old-style single trail prevented any great lowering of the gun breech and therefore limited the angle to which the muzzle could be elevated. With the split trail the breech drops down between the halves, and any elevation of the muzzle that is necessary may be secured. By means of a handwheel the gun may be swung quickly and easily in a wide horizontal arc without shifting the trail, which is another great improvement over the old-style carriage. The gunners are thoroughly shielded by steel plates only two-tenths of an inch in thickness, but of such strength and toughness that they cannot be penetrated by a steel-jacketed, needle-nosed bullet fired from a service rifle at a distance of 100 yd. Even the gunner who sights the piece is not exposed. By a system of mirrors and prisms the telescope sight zigzags upward and passes out through a port in the shield a foot or more above the gunner's head. The projectile fired by this gun is 3 in. in diameter and about 1 ft. long, but contains enough explosive and balls to wipe out a whole company.

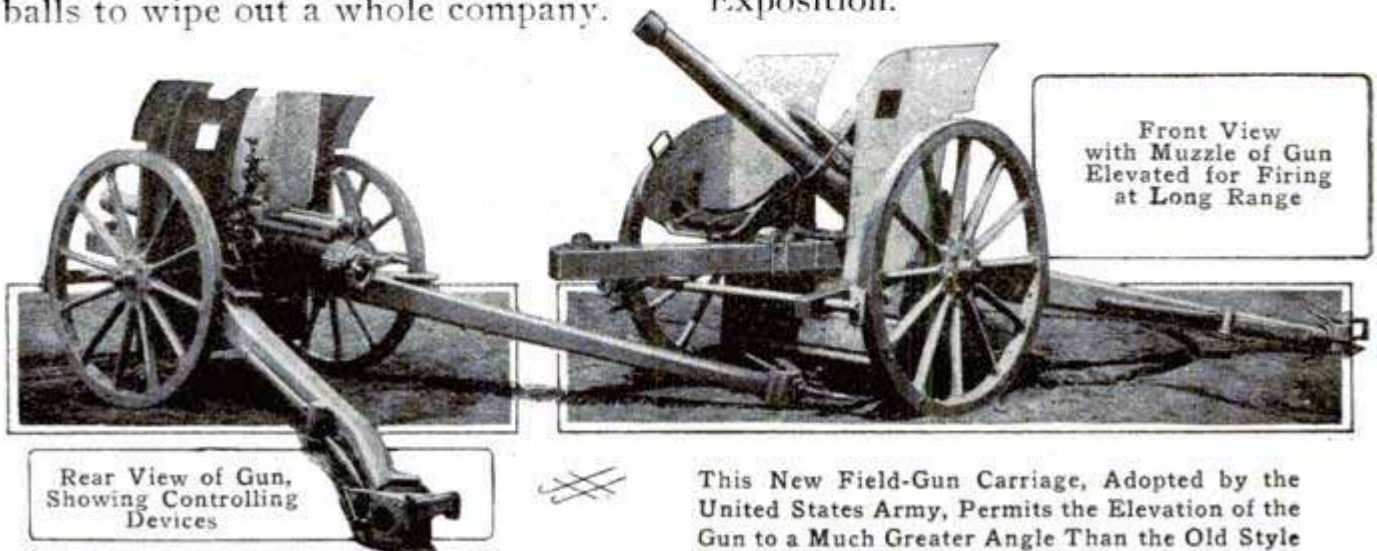
## ADVENTUROUS BURRO POSES ON GLACIER POINT

Overlooking the deep chasm of the Yosemite Valley is a projecting rock familiar in a thousand photographs as Glacier Point. It is so poised that it will bear a heavy weight upon its outer edge, and tourists for a generation have perched on the point and posed for photographers. A rather unusual model presented itself one day when a burro walked up to the very edge and stood in admiring contemplation of the scene below.



☞ Fuel oil is displacing 20,000,000 to 25,000,000 tons of coal each year, largely in locomotives.

☞ More than a thousand tons of glass will be used in the construction of the buildings of the Panama-Pacific Exposition.



Rear View of Gun, Showing Controlling Devices

Front View with Muzzle of Gun Elevated for Firing at Long Range

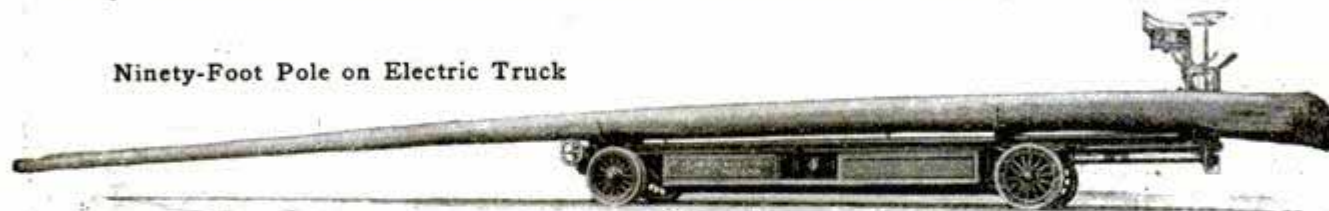
This New Field-Gun Carriage, Adopted by the United States Army, Permits the Elevation of the Gun to a Much Greater Angle Than the Old Style



## LONG TELEPHONE POLES ON ELECTRIC TRUCK

An electric truck of unusual size is used by an eastern telephone company

Ninety-Foot Pole on Electric Truck



in hauling poles for line installation. It is 31½ ft. long with a 20-ft. wheel base, and has a four-wheel motor drive with four-wheel steering. It has demon-

strated its capacity by hauling 90-ft. poles, a feat seldom considered possible without a trailer. A winch in the center of the car, also operated by electricity, enables two men to load

## DESTRUCTIVE ERUPTION OF JAPANESE VOLCANO

Although the eruption of the Japanese volcano Sakura-Jima, did not result in such great loss of life as was first reported, the destruction that followed in its wake was serious enough to make this rank as one of the most disastrous eruptions of recent times. From official Japanese sources it is learned that 31 persons were killed, that over a hundred were seriously injured, and that from 10,000 to 15,000 were rendered homeless and destitute as a direct result of the eruption itself, while no estimate can be made at the present time of the damage and distress caused by the series of earthquake shocks that accompanied and followed the eruption.

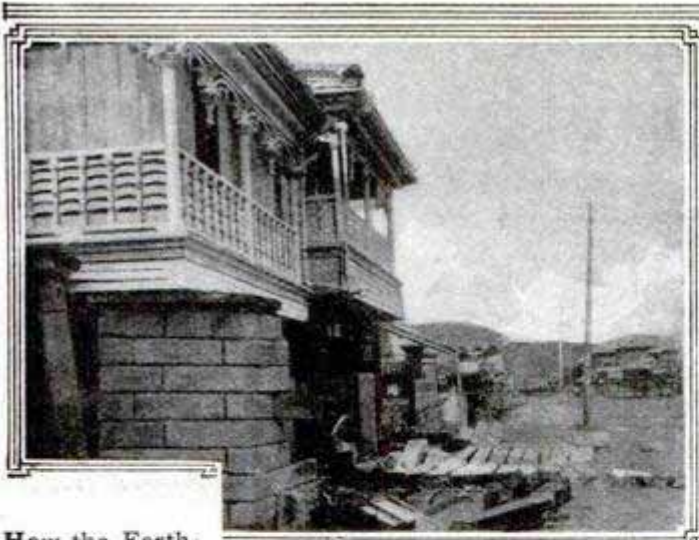
This volcano, which had lain dormant for a period of 135 years, burst into sudden and violent activity on the morning of Jan. 12, 1914. The eruption was preceded, on the day before, by a succession of earthquake shocks, but these were too light to serve as a warning of the approaching calamity. The volcano is located on the small circular island of Sakura-Jima, from which it takes its name. This island lies in the landlocked harbor in front of the important city of Kagoshima, which was also damaged greatly by the eruption and resulting earthquake shocks. The name Sakura-Jima, literally translated, means

these poles easily. The truck carries storage batteries of 42 cells below the body of the car and has a speed of 7 miles an hour with full load.

"Cherry Island," an appropriate name for this, one of the most beautiful and fertile of all the islands of Japan. As a result of the eruption, over two-thirds of its area is now covered with lava and volcanic ashes, and made permanently unfit for habitation. Owing to the suddenness of the eruption and the fact that the boats that went to the rescue could not approach some parts of the shore because of danger from falling stones, thousands of the islanders were unable to escape to the mainland promptly, and it was here that most of the deaths and injuries occurred. The island had a population of 20,000, and the homes of over half of these were obliterated by the eruption.

Kagoshima, which has a population of over 60,000, is situated on the island of Kiusiu, the most southerly of the main islands forming the Japanese empire, and on this island is a range of volcanic mountains known as the Kiusiu Range. Coincident with the eruption of Sakura-Jima, this entire range became active and hundreds of earthquake shocks were felt throughout the island, while ashes from Sakura-Jima fell as far north as Nagasaki, a hundred miles distant. The most severe shocks were felt in Kagoshima, and it seemed for a while that this city would be destroyed. In a few hours the city

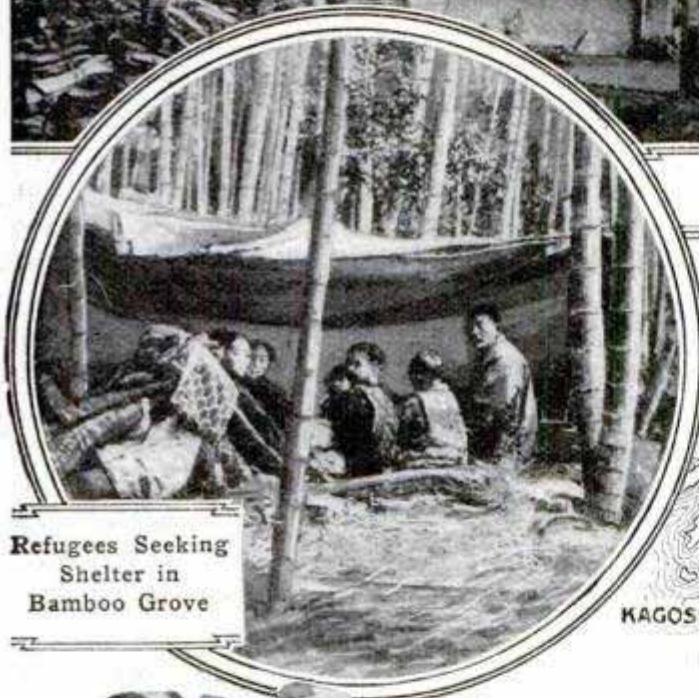
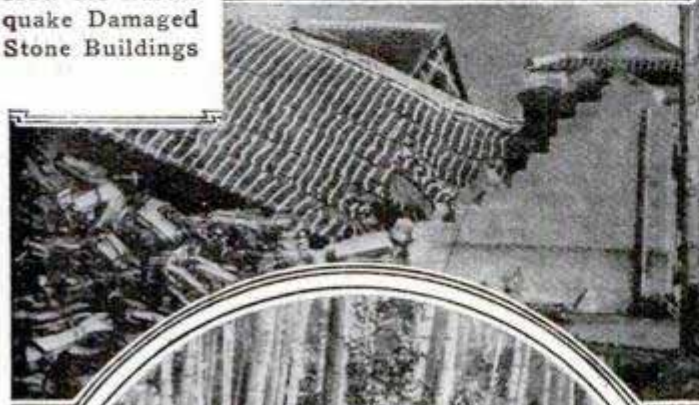




How the Earthquake Damaged Stone Buildings



The Eruption of the Sakura-Jima Volcano, Japan, As Seen from Kagoshima



Refugees Seeking Shelter in Bamboo Grove



Effect of Earthquake on a Japanese Dwelling



Refugees Arriving at Kagoshima from Island of Sakura-Jima

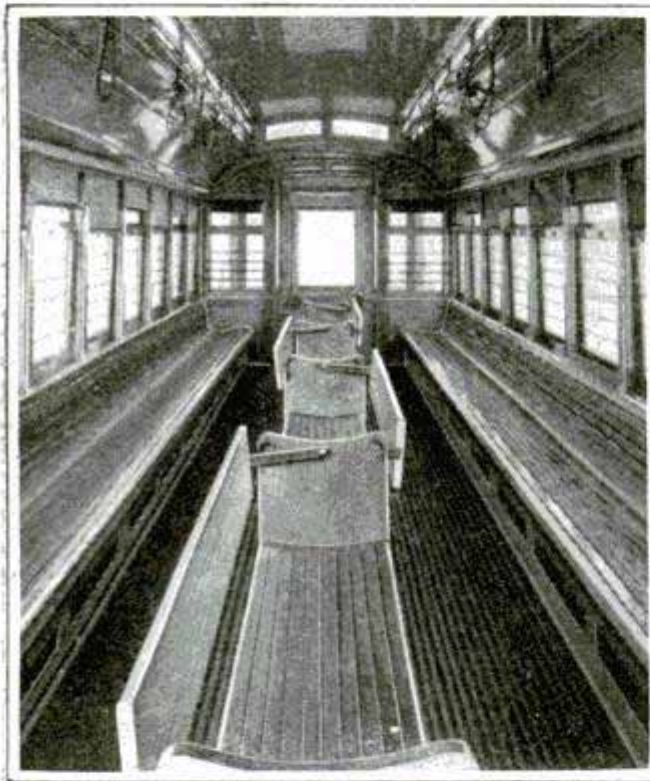


was almost entirely emptied of its inhabitants, the panic-stricken refugees escaping by many roads into the interior, but mainly over the railroad that runs north and south along the coast. Thousands took refuge in the first bamboo bush they came to, as the Japanese have learned from long experience that this is the safest shelter from earthquakes. The bamboo trees

are too light to cause much damage if they fall, while the thick interlacing of the roots forms the best protection against the opening of crevices in the earth. As seen from Kagoshima, the eruption of Sakura-Jima, with the mountain glowing from foot to summit with lava, is described as resembling an enormous and terrifying display of fireworks.

### NOVEL ARRANGEMENT OF STREET-CAR SEATS

A novel seating arrangement for street cars that makes it practically unnecessary for passengers to stand



Seating Arrangement Adopted in Spanish-American City for Transportation of Second-Class Passengers

except during periods of unusual congestion has been adopted in a Spanish-American city for the transportation of second-class passengers. The seats along the side of the car are bench seats and through the center of the wide aisle thus provided an additional line of bench seats is placed. These are arranged in sections to face in opposite directions with passageways between the ends of the sections, a plan that enables a passenger, by using first one side and then the other, to

pass along the aisles without the necessity of treading on the toes of seated passengers.

### CURTISS MAKING PLANS FOR TRANSATLANTIC FLIGHT

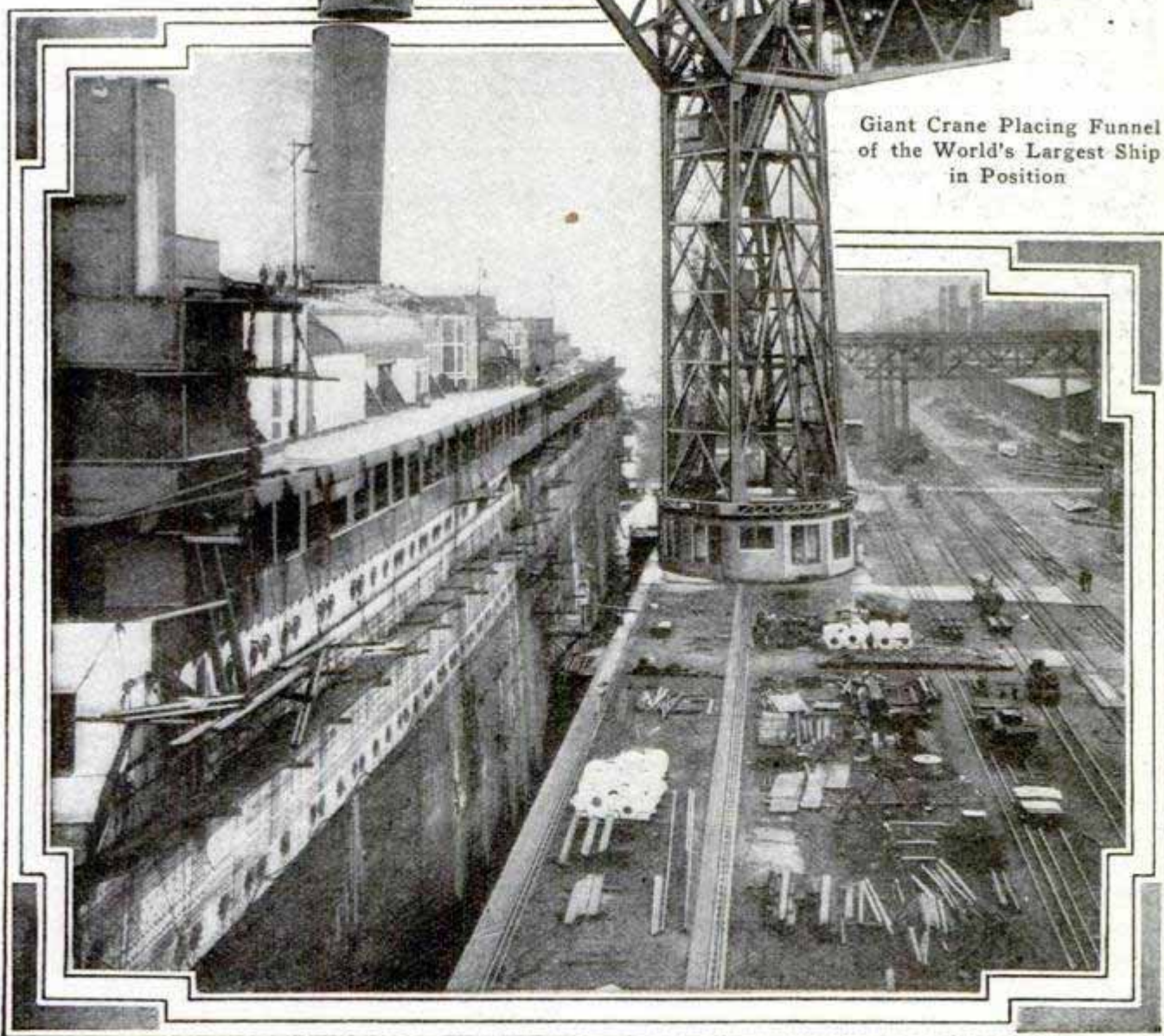
Interest in transatlantic flight in a heavier-than-air machine has been revived by the announcement that Glenn H. Curtiss, backed by a wealthy Philadelphian, is engaged in the construction of a biplane which it is intended to enter for the Lord Northcliffe prize in the summer of 1914. Other airmen are seriously considering the question, notably Graham-White, the English flier, whose plans, however, have not yet been made public. Lord Northcliffe, the publisher of influential British papers, offered \$50,000 for the first person making the flight across the Atlantic "from one point in the British dominions to another" in a heavier-than-air machine. This means, of course, from Newfoundland to Ireland, or vice versa, a distance of approximately 1,640 miles. A speed of but a trifle over 68 miles an hour would enable an airman to negotiate this distance in 24 hours. It is announced that flight will only be attempted with a strong following wind, when from the weather reports the duration and direction of the wind can be depended upon. Already airmen have made distance flights of over 14 hours without alighting, and it is believed that with a new model biplane which has much larger fuel capacity, the entire distance can be covered successfully. An officer of the U. S. Navy and one of the British navy are expected to be the pilots of the American machine.



## PUTTING THE SMOKESTACKS ON THE LARGEST SHIP

The completion of the steamship "Vaterland," the largest vessel yet built, marks an advance in ship construction, not alone because of its great size, but because of the exceeding care with which the safety of the passengers has been guarded. Some idea of the enormous size of this ship

may be gained from the three funnels which tower 62 ft. above the upper deck. They are oval in shape, measuring 20 by 30 ft., and consist of an outer and inner tube, air space being provided between them. It was found necessary to provide a larger crane for handling these and other great pieces of steel, as the 150-ton traveling crane in use was not considered adequate. So a new revolving crane was built, with a capacity of 250 tons, at a distance of 113 ft. from the center, and 110 tons at the extreme



Giant Crane Placing Funnel  
of the World's Largest Ship  
in Position



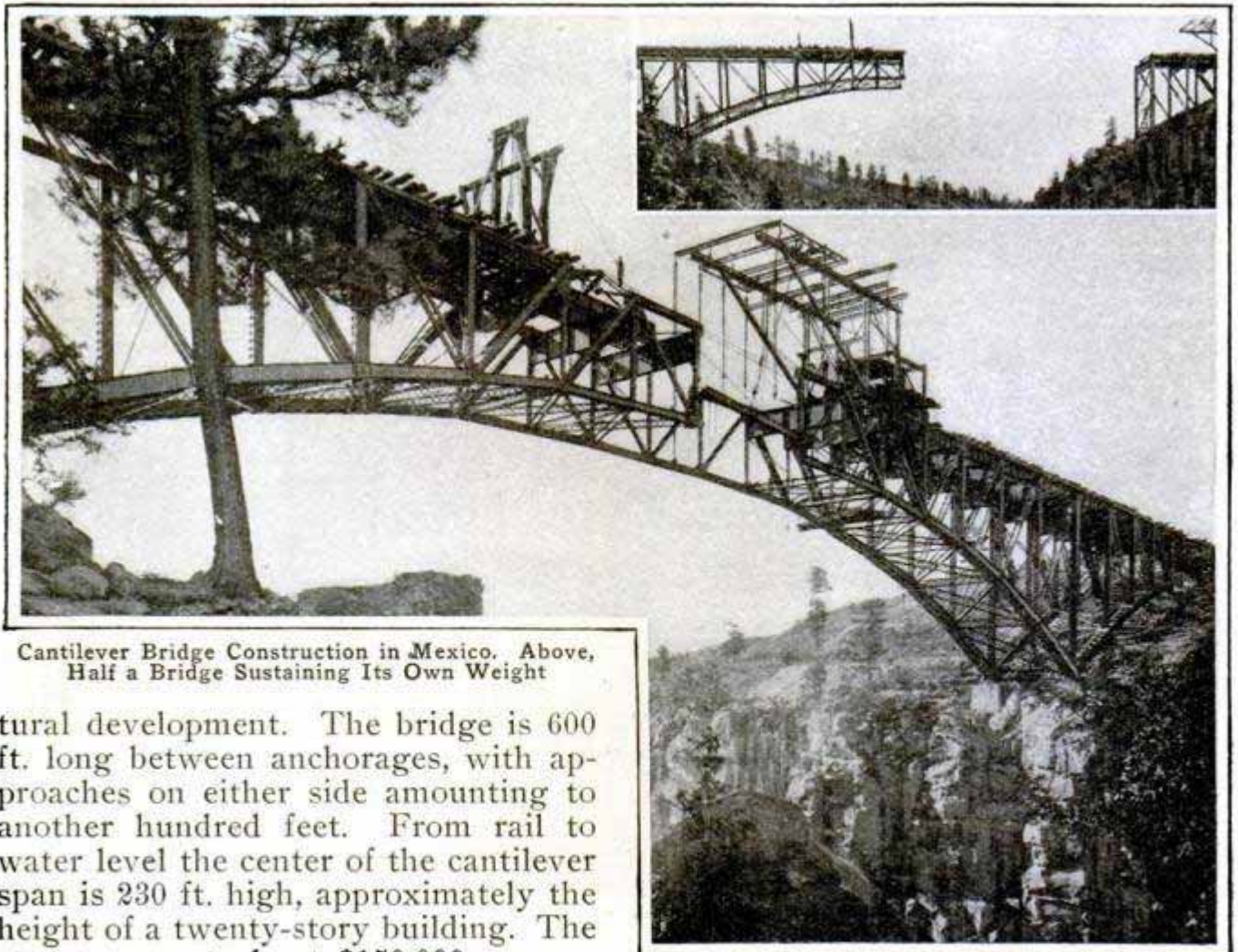
end, 174 ft. from its support. In addition to the main trolley which runs inside the jib girders, a revolving traveling jib crane of 20 tons capacity at a 33-ft. radius is added. The motors on this giant crane represent 550 hp., but only one man is needed to operate the entire apparatus. His cabin is directly under the hinge of the jib. The picture shows one of the outer funnels being slipped over the inner tube, the big crane dwarfing its burden.

### MEXICAN CANTILEVER BRIDGE

Across the Rio Chico in Mexico, the National Railways have thrown a bridge which is a fine specimen of cantilever construction. It is on a new line between Durango and Llano Grande, and forms part of a projected line to the city of Mazatlan on the west coast, to open up extensive pine-timber resources. It will also serve a mining and cattle country with some agricul-

### COLUMBIA RIVER CANAL COMPLETED

A blast of five tons of giant powder on the afternoon on February 5, last, swept away the remaining obstructions to the free flow of water through the Celilo Canal, and the project which makes the Columbia River navigable for a distance of 400 miles was accomplished. The canal is 8½ miles long, and has been in course of construction for five years. Located midway on the northern border of Oregon, Celilo was the site of obstructions to navigation which hampered the use of that great river which forms so large a portion of the boundary between Oregon and Washington. At a cost of more than \$5,000,000 a canal was dug around the rapids, and a system of locks provided, which, it is anticipated, will afford ready access to the fruit orchards of Idaho, Washington and Oregon, giving the consumer the benefits of low freight rates.



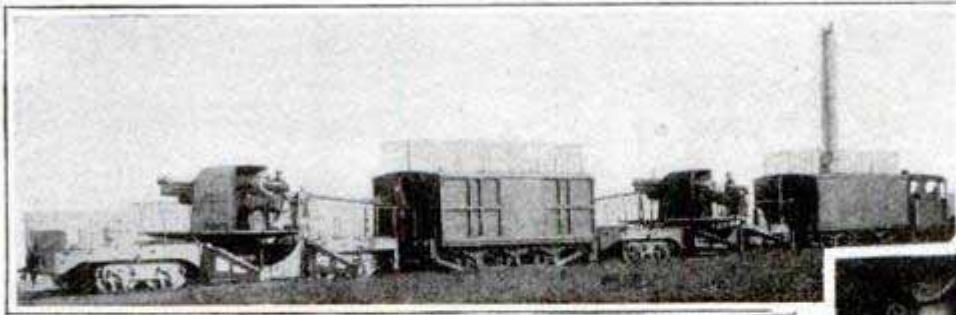
Cantilever Bridge Construction in Mexico. Above, Half a Bridge Sustaining Its Own Weight

tural development. The bridge is 600 ft. long between anchorages, with approaches on either side amounting to another hundred feet. From rail to water level the center of the cantilever span is 230 ft. high, approximately the height of a twenty-story building. The structure cost about \$150,000.

Courtesy Railway Age Gazette



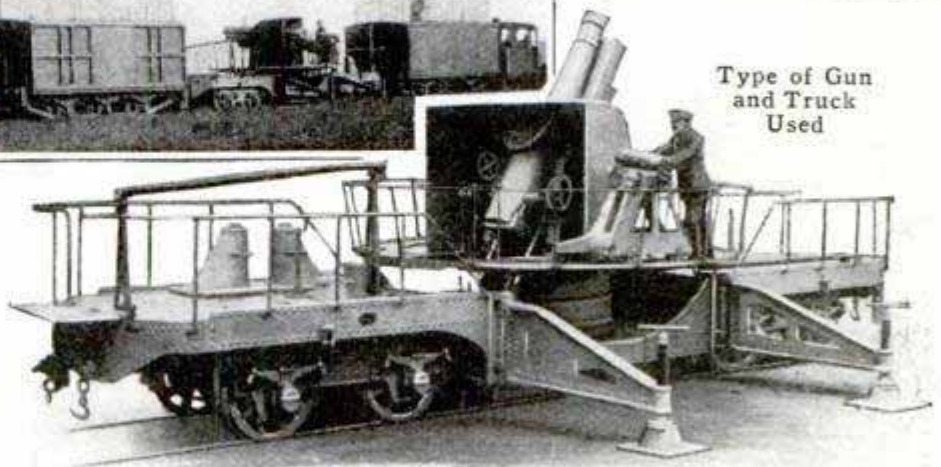
## COAST DEFENSE BY RAIL TO SOLVE PROBLEM



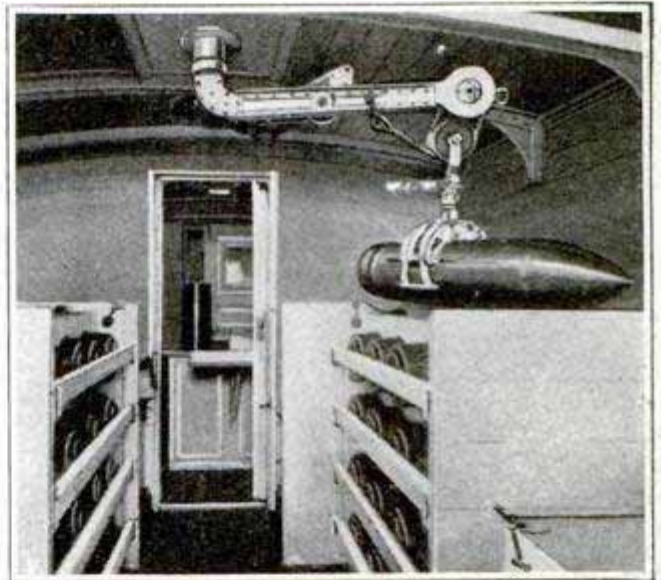
Coast-Defense Train,  
Showing Observation Tower

An entire coast-defense battery mounted on railway trucks is the answer of French military authorities to the question of how to secure positive defense over long coast lines with economy. The advantages claimed for these mobile batteries are the economy in the preparation for the defense of any place, as the batteries on wheels cost less than permanent fixed batteries and can be sent to threatened points from places where they are not needed, the only expense being for laying the rails. Then, too, no coast-defense plans can be sold to the enemy, no photographs or drawings stolen, for no permanent works indicate where the salient points of this defense are located. No special roads need be laid, for military railways may be used in time of peace for commercial purposes, and in war time, peaceful roads utilized for war purposes. The guns so far manufactured for this work are of howitzer pattern, and in 7.87-in., 6-in.,

and 4.7-in. sizes. They are protected by turrets, and the ammunition cars are



Type of Gun  
and Truck  
Used



Interior of Ammunition Car

armored. An interesting feature of one car used in the French maneuvers is an observation tower extending some 40 ft. above the rail tops.

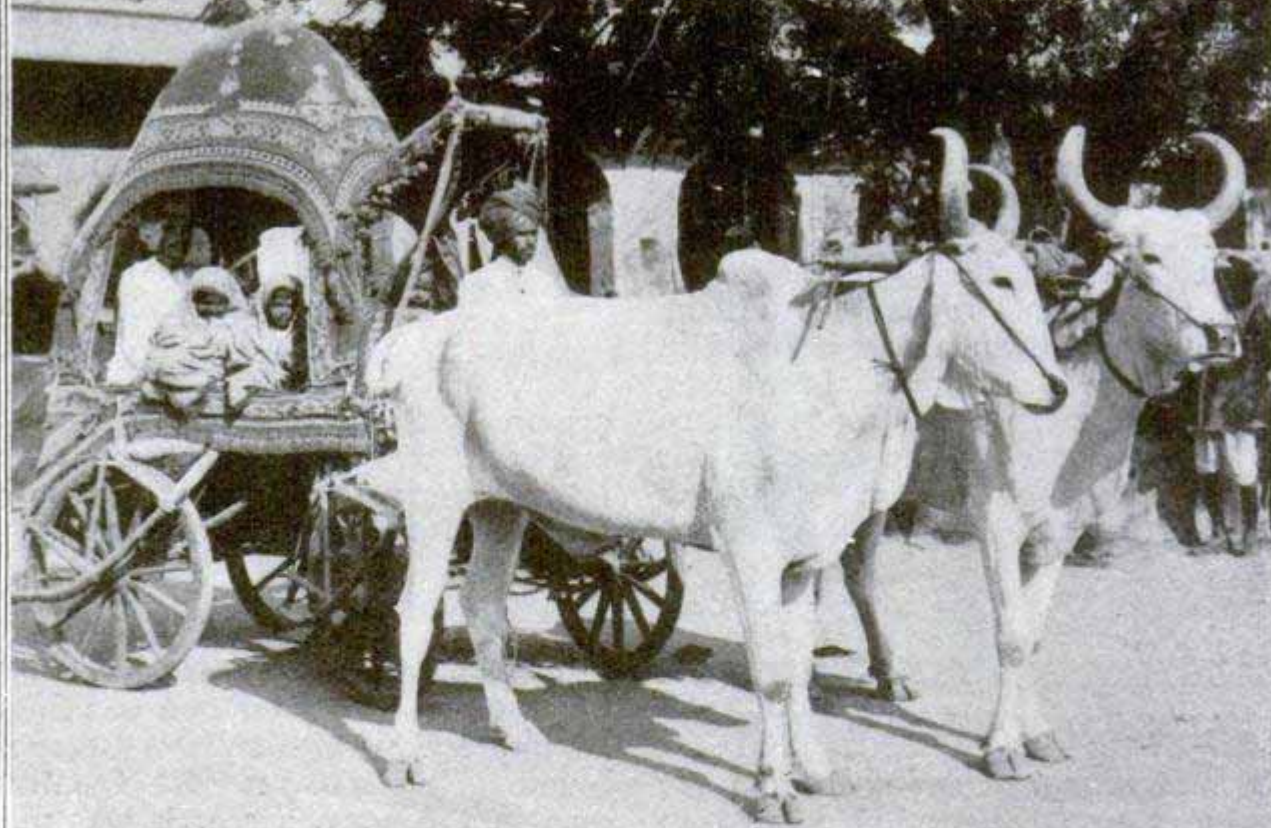
### MUTILATING FINGER TIPS FAILS TO SAVE DESERTER

A man who had deserted from the Marine Corps recently attempted to enlist under another name in the navy, and used powerful acids to destroy the ridges on his finger tips, that he might not be identified. The condition of his hands aroused suspicion, as the

skin was scarified except for a little patch the size of a tack on one finger. As impressions of his fingers were not found among the records of enlisted men in the navy, a search was made of the files of the Marine Corps, where he was found under another name. The minute portion of unmutilated skin remaining on one finger was amply sufficient to identify him.



India, the Land of Poverty Far More Appalling Than can be Found Anywhere Else in the World, is Also the Land of Riches in Amounts That Would Stir Many American Millionaires to Envy. Even the Primitive Bullock Carts, Used as Carriages by the Wealthy Classes, Crude as Their Mechanical Construction is, are Often Decorated with Canopies Embroidered in Solid Gold and Hung with Rich Fabrics. These Decorations do Not, However, Completely Compensate for the Absence of Springs and Rubber Tires. The Photograph Shows the Conveyance of a Lady of Rank at Ulwar





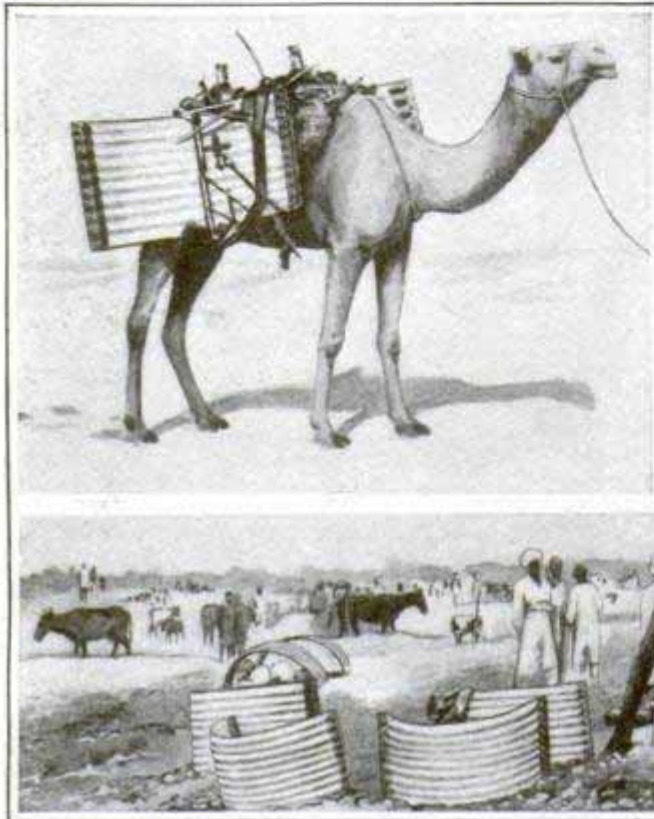
The Custom of Harnessing Three Horses Abreast, Which in America is Confined to Fire Engines and Heavy Trucking, Prevails Quite Generally in Russia for Pleasure Vehicles. This Style of Rig, Known as the "Troika" is Characterized by the High Arch over the Middle Horse. In Winter, Bells are Hung from This Arch. The Beard, Round Cap and Heavy Padded Overcoat are Characteristic of the Typical Russian Coachman. These Men are among the Most Skillful Drivers in the World, and Russia has become Noted for its Fast Trotting Horses. The Photograph was Taken at Sokolnika Park, Moscow





## AMERICAN CULVERTS IN AFRICA

Galvanized, corrugated culverts of American manufacture are being ex-



Installing American Corrugated Culvert as Well Casing in Interior of Africa. Above, Bringing in the Culverts on Camel Back

possible from its proper environment when being transported through an African desert on the back of a camel, as shown in the illustration. Nestable culverts of this type, however, are suited to transportation of this kind, because of the possibility of arranging them in small units for shipment. The construction consists of upper and lower half sections of corrugated metal with facing flanges, which are joined together to form a complete culvert by

tensively used in remote parts of Africa and in other sections of the world where the problem of transportation is a difficult one, although it seems, at first sight, that a typically American product such as this is about as far as

means of bolts passing through the flanges of opposite sections. The sections are made in comparatively short lengths and can be packed together compactly for shipment, forming a package easily loaded and handled.

## PARIS SHOWS NEW STYLES IN VEILS

A hint of Constantinople is seen in the newest veils worn on the boulevards of Paris. A heavy border is utilized to mask the lower part of the face, while the eyes are seen clearly through the thinner upper portion of the veiling, giving a peculiarly



Oriental and rather striking effect.

## "MOVIE" TICKETS REWARD GOOD CONDUCT

Officials of the Maryland House of Correction, at Bridewell, four miles from Laurel, have adopted the motion picture as an incentive to good conduct, with results which proved satisfactory. Tickets are given two or three times a week to those inmates who have not violated institutional rules, and these are accompanied by little checks entitling them to admission to the moving-picture shows on designated evenings within the chapel. This, so the officials state, has resulted in raising the department record nearly 50 per cent. Formerly, when certain



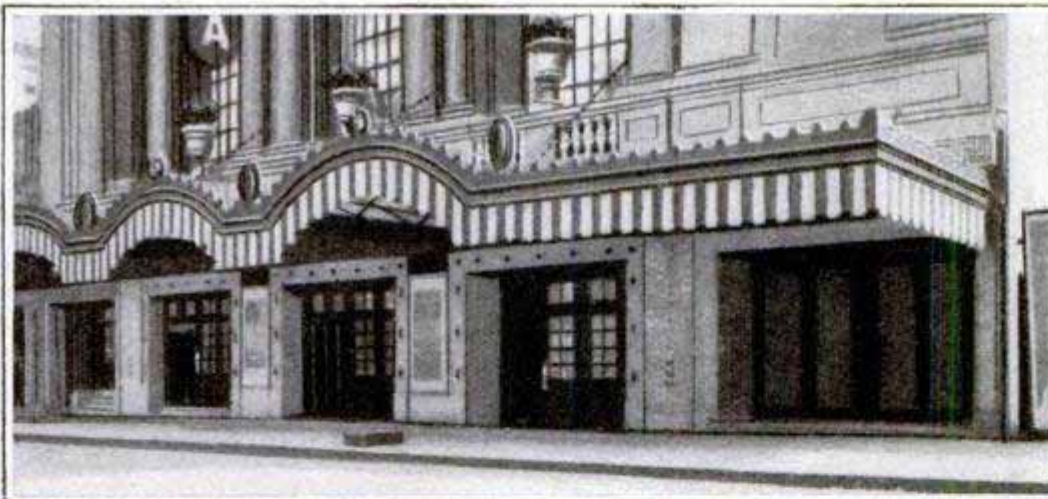
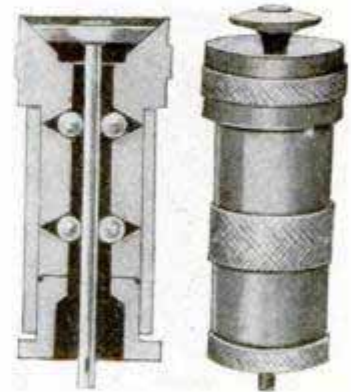
department standards were reached, they were rewarded by having their prison clothes taken from them and civilian clothes given. Then, as a further reward for model conduct, white sheets were placed on their beds, but the introduction of the "movies" has had the best effect of any method yet tried, as all the prisoners are anxious not to miss a single entertainment.

### THEATER CHANGES FRONT TO ADVERTISE SHOW

When a mission play was to run at a San Francisco theater, the entire lower front and entrance was changed, as an advertising scheme. A false frame of timber was run up to the marquis in a design to resemble an old Spanish mission. This was covered with canvas and painted in the semblance of stone, giving a realistic impression of heavy arches and hanging bells. Conforming to the style and era of the play, the mission front attracted much attention.

### A NEW VALVE-TRUING DEVICE

It is of great importance that valve and stem shall be concentric, and as the severe conditions under which exhaust valves in gasoline engines have to work tends to warp the stem where it is subjected to the greatest heat, a novel device has been invented which permits grinding of the valve head and at the same time maintaining it true. It contains a cutter to trim the head and a ball adjustment held within cones, supporting two sets of balls. A valve and stem being inserted for grinding, the support holds them concentrically whatever the diameter of the stem, and the valve face will be held evenly.



This Playhouse  
with Its  
Artistic Entrance  
is a  
Well-Known  
San Francisco  
Landmark

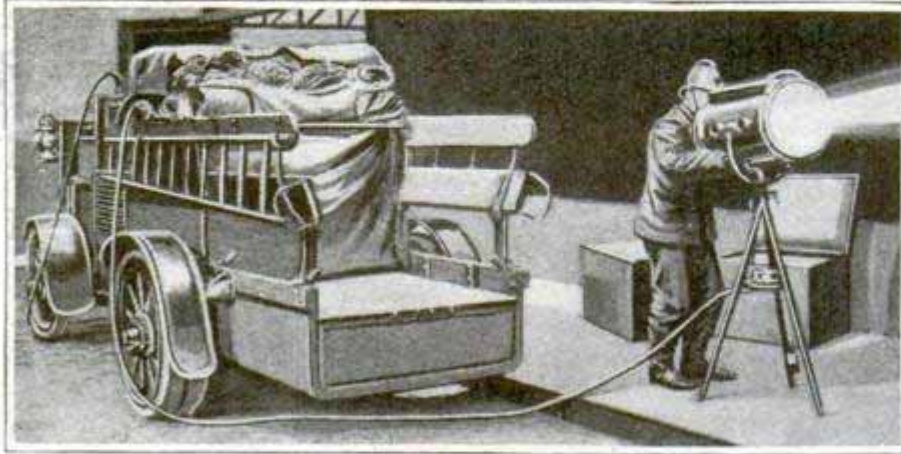
When a Play  
Representing a  
Spanish Mission  
was Staged,  
the Entire Front  
of  
the Theater was  
Remodeled





### FIRE-INSURANCE PATROL USES SEARCHLIGHT

In Paris the fire-insurance patrols are an important factor in the salvage of goods, both from fire and smoke and



Fire Patrol Carries Searchlight into Burning Building

from damage by water. Their wagons are equipped as are the American apparatus, with tarpaulins, fire axes, and such protective implements, but, in addition, they carry a portable electric searchlight with a long insulated cable, receiving current from a motor-driven dynamo on the wagon. In penetrating remote interior rooms, when gas or electric lighting is cut off by the fire, this portable light is of great value in spreading the tarpaulins, removing goods, rescuing injured firemen or similar work.

### IDEAL GLASS SOUGHT FOR SPECTACLES

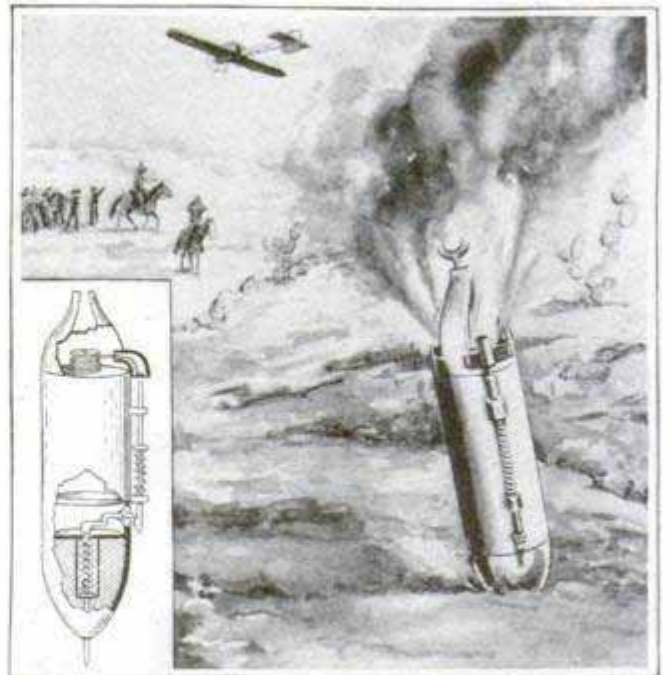
Sir William Crookes, the famous English physicist, who has been making researches in the effort to discover a glass which, when used in spectacles, would avoid certain faults, states that he has succeeded in obtaining a glass which cuts off 90 per cent of heat radiation, also glass which is opaque to the invisible ultraviolet rays, and glass which is sufficiently free from color to be used in spectacles. He has not yet, however, been able to combine these three qualities in one piece of glass. The ideal glass should be transparent to all the colors of the spectrum, yet cut off the invisible rays at each end.

### SELLING ROCK AND SAND AS POULTRY

Buyers of poultry in New York City pay for from 150,000 to 300,000 lb. of sand, rock, and other weighty material every week, according to a statement made by a poultry dealers' association, and steps are being taken to have the matter investigated by the United States Department of Agriculture. It is said that this weight-producing material, which adds about half a pound to each fowl, is fed to the chickens on the eve of marketing in a paste that is so palatable that it is devoured eagerly by the birds.

### CARRIER FOR AEROPLANE MESSAGES

Communication between observers scouting in an aeroplane and their military base is difficult, in that messages thrown from aloft are easily lost in grass or on the roadway. A new de-



Device Which Enables an Army to Locate Messages Dropped by Air Scouts

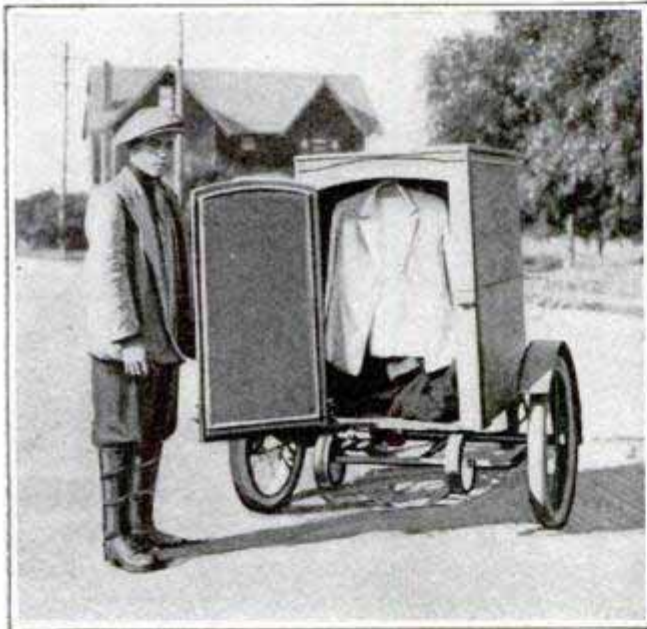
vice, by means of a loud report or a blazing torch, announces the location



of the communication. A metallic tube used to inclose the message from the aeroplane is weighted at the lower end, which is fitted with a spike so that it will imbed itself in the ground. At the top a cartridge is fitted with a detonating device which will give a sharp report. If the carrier is used at night, a slow-burning powder is substituted for the detonator. The message, of course, is thoroughly protected from any injury from either detonator or flame.

### WARDROBE ON WHEELS GIVES QUICK DELIVERY

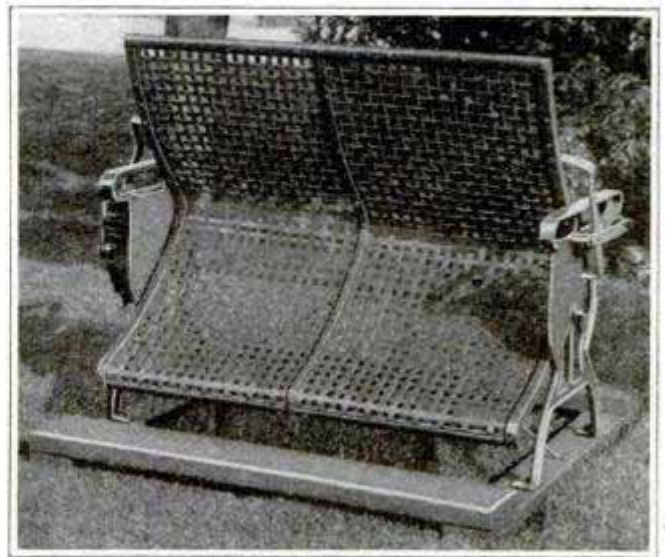
A pressed-metal wardrobe, mounted on a motorcycle sidecar, gives quick



**Traveling Wardrobe a New Wrinkle in Delivery Carts** and safe delivery to the patrons of a cleaning establishment in the West. The interior is equipped with a system of hooks and garment racks, so that newly pressed suits can be taken to customers without folding or creasing. A rod runs through the center of the roof to carry the hanger hooks, and a large number of garments can be carried without crumpling. There is plenty of space below for suits sent to be cleaned, which can be rolled together without damage. The delivery boy can cover a wide radius easily, and when working in town, often makes 50 calls on customers in a single day.

### COIN-CONTROLLED RESERVED SEATS FOR PARKS

In San Diego an inventor has developed a novel seat for use in parks and



California Park Has Novel Seats

pleasure resorts, which is normally so tipped that it cannot be used. Upon placing a coin in the slot, however, the seat may be tipped back into the usual position, making a comfortable and restful bench. When the occupants rise from the seat it automatically swings forward and locks in a nonusable position, from which it can only be moved by the insertion of another coin.

### AN ELECTRIC-LIGHTED SHAVING GLASS

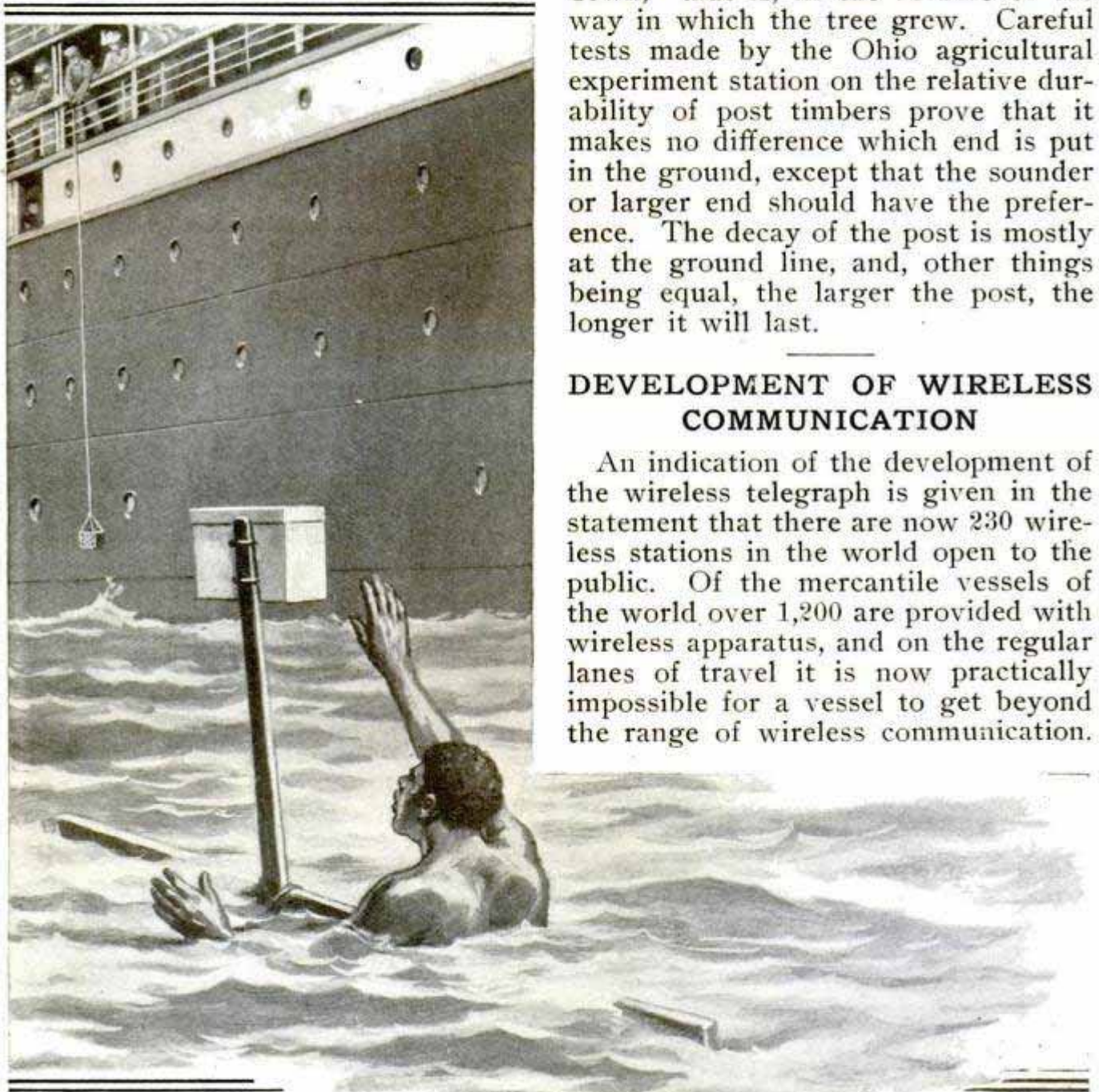
A novelty which adds to the comfort of an early morning shave, consists of a shaving mirror mounted on a ball joint at the base, with an adjustable reflector and electric lamp attached to the upper rim of the mirror frame. Any desired angle may readily be obtained, and the light directed to fall on the face without the least glare in the eyes.





## A SWIMMING MAIL CARRIER OF THE PACIFIC

The surf is generally so rough at Niuafu, an island in the Tongan group, that there is difficulty in launching the native boats. Once a month the mail steamer passes by, and slows down about a mile from shore. Although sharks abound, a native swimmer plunges through the surf with a long plank, to which is lashed a pole, at the top of which is fastened the letters or other mail to be sent away.



Meeting the  
Mail Steamer Once a Month  
is an Event in the Friendly Islands

This mail is hooked up by a sailor on board the mail steamer, and at the same time the ingoing mail is thrown overboard in a hermetically sealed tin can, and carried by the swarthy swimmer to the shore.

## SETTING FENCE POSTS TO GIVE LONGEST LIFE

In the belief that it is natural for water to flow upward through the cells of wood, farmers for generations have planted their fence posts "upside down," that is, in the reverse of the way in which the tree grew. Careful tests made by the Ohio agricultural experiment station on the relative durability of post timbers prove that it makes no difference which end is put in the ground, except that the sounder or larger end should have the preference. The decay of the post is mostly at the ground line, and, other things being equal, the larger the post, the longer it will last.

## DEVELOPMENT OF WIRELESS COMMUNICATION

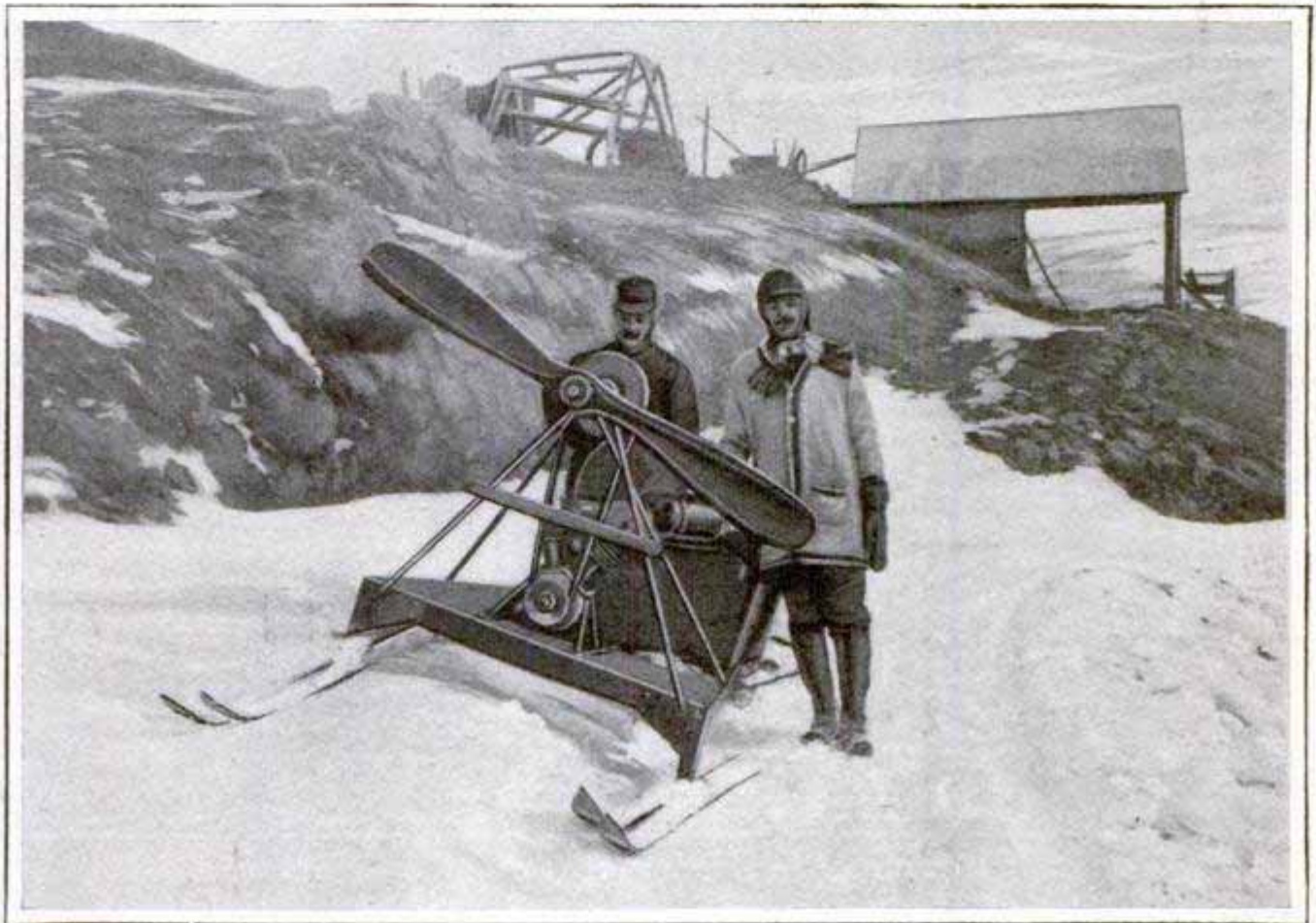
An indication of the development of the wireless telegraph is given in the statement that there are now 230 wireless stations in the world open to the public. Of the mercantile vessels of the world over 1,200 are provided with wireless apparatus, and on the regular lanes of travel it is now practically impossible for a vessel to get beyond the range of wireless communication.



## ALPINE TRAVELER USES AERO SLEIGH

Crossing the French Alps in a sleigh, the motive power being furnished by

21 hours. The centrifugal pump is 10 ft. in diameter, and the suction and discharge pipes, 30 in. The "Columbia" is working on the lower Columbia River.



Air-Propellered Auto Sleigh, in Which a Frenchman Crossed the Alps

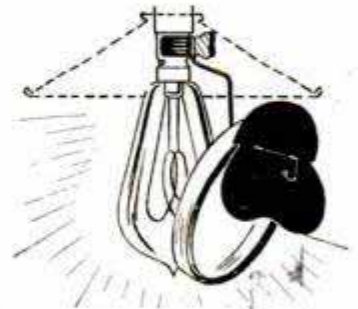
an air propeller, an inventive and adventurous Frenchman set a new record for scaling snow-clad heights by the aid of gasoline. The motor is set upon a platform which itself is supported by runners formed of skis or ski-shaped boards. The propeller is set in front of the sleigh and consists of two wooden blades.

## LARGE HYDRAULIC DREDGE

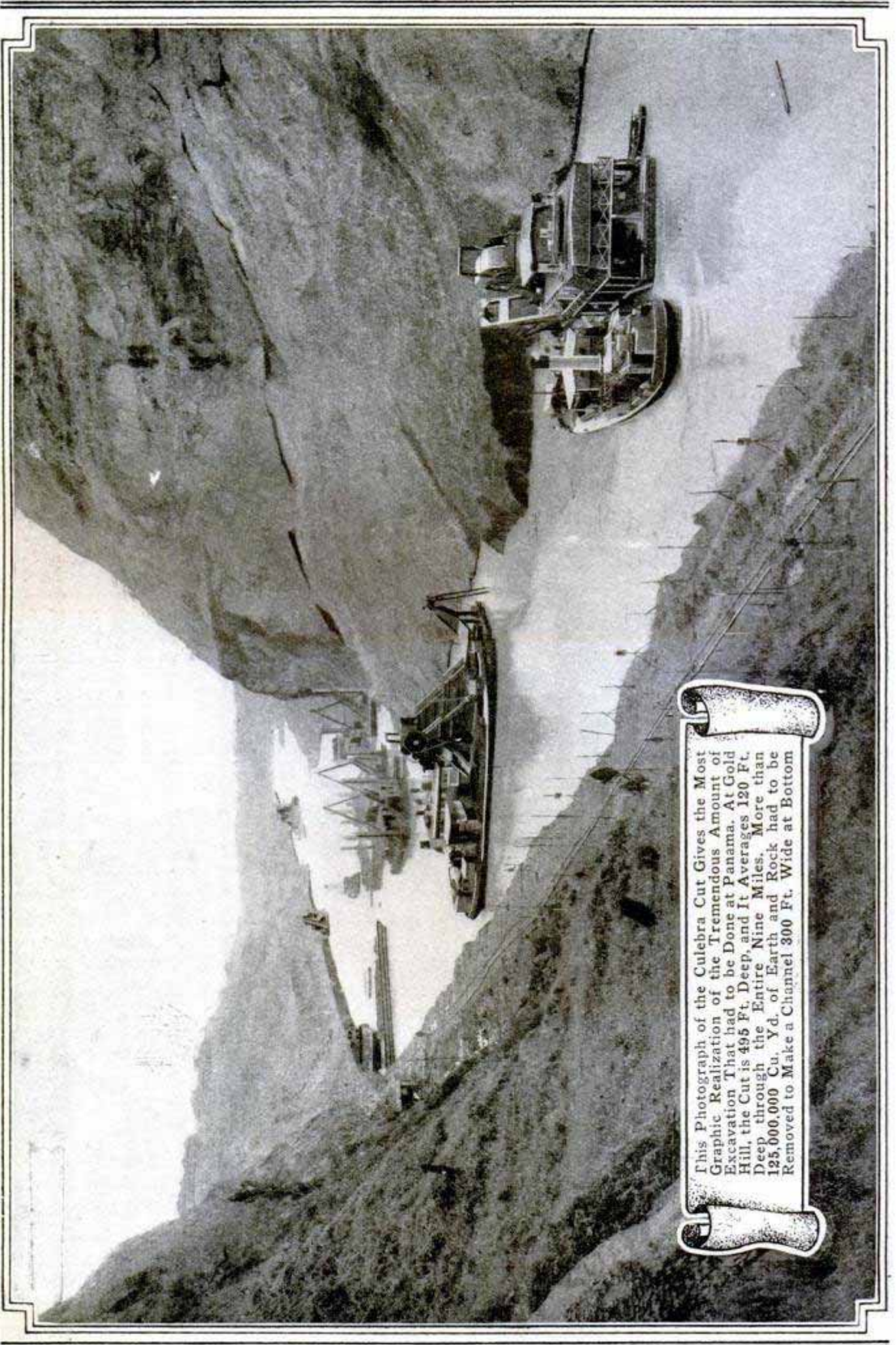
The dredge "Columbia," owned by the Port of Portland, Oregon, is 250 ft. long and 65 ft. beam. The main engine is of the marine type and develops 1,500 hp., with four boilers operating on 150 lb. of steam. This dredge, it is stated, will dig 70 ft. below the level of the water, and make a channel 350 ft. wide. Her record is given as 29,000 cu. yd. of solid material in

## SHIELDS THAT FILTER LAMP LIGHT

Lamp shades which filter artificial light and remove the most troublesome rays are among the latest French inventions. As it is the ultraviolet rays that tire the eyes, the circular, transparent screen is made of a fibrous film impregnated with uranium salts, which have the property of intercepting these rays. An opaque shade above the screen can be lowered if the light is still too strong. The wire holders attached to the light filter are arranged to fit gas, electric, and other kinds of lamps.

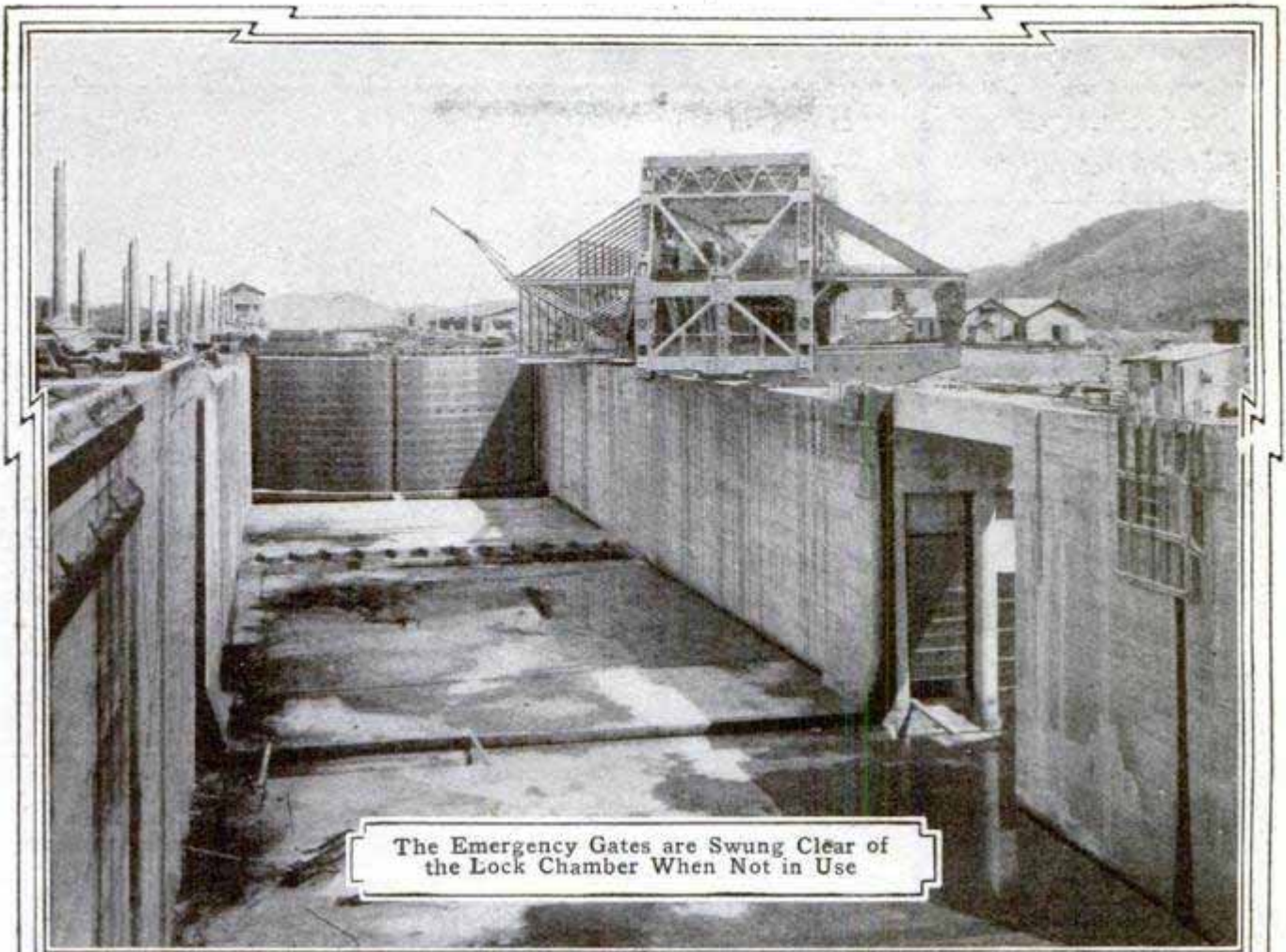




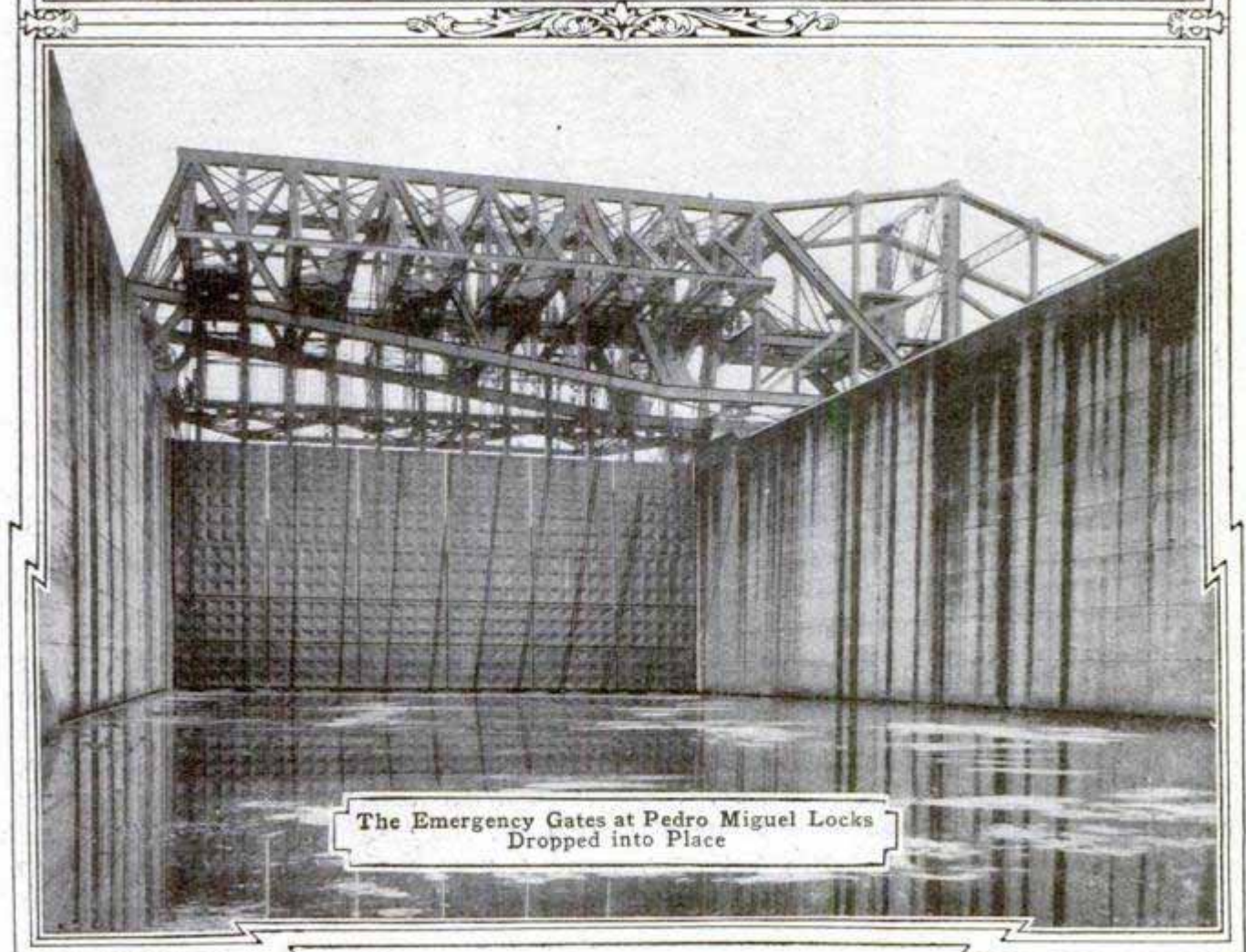


This Photograph of the Culebra Cut Gives the Most Graphic Realization of the Tremendous Amount of Excavation That had to be Done at Panama. At Gold Hill, the Cut is 495 Ft. Deep, and It Averages 120 Ft. Deep through the Entire Nine Miles. More than 125,000,000 Cu. Yd. of Earth and Rock had to be Removed to Make a Channel 300 Ft. Wide at Bottom





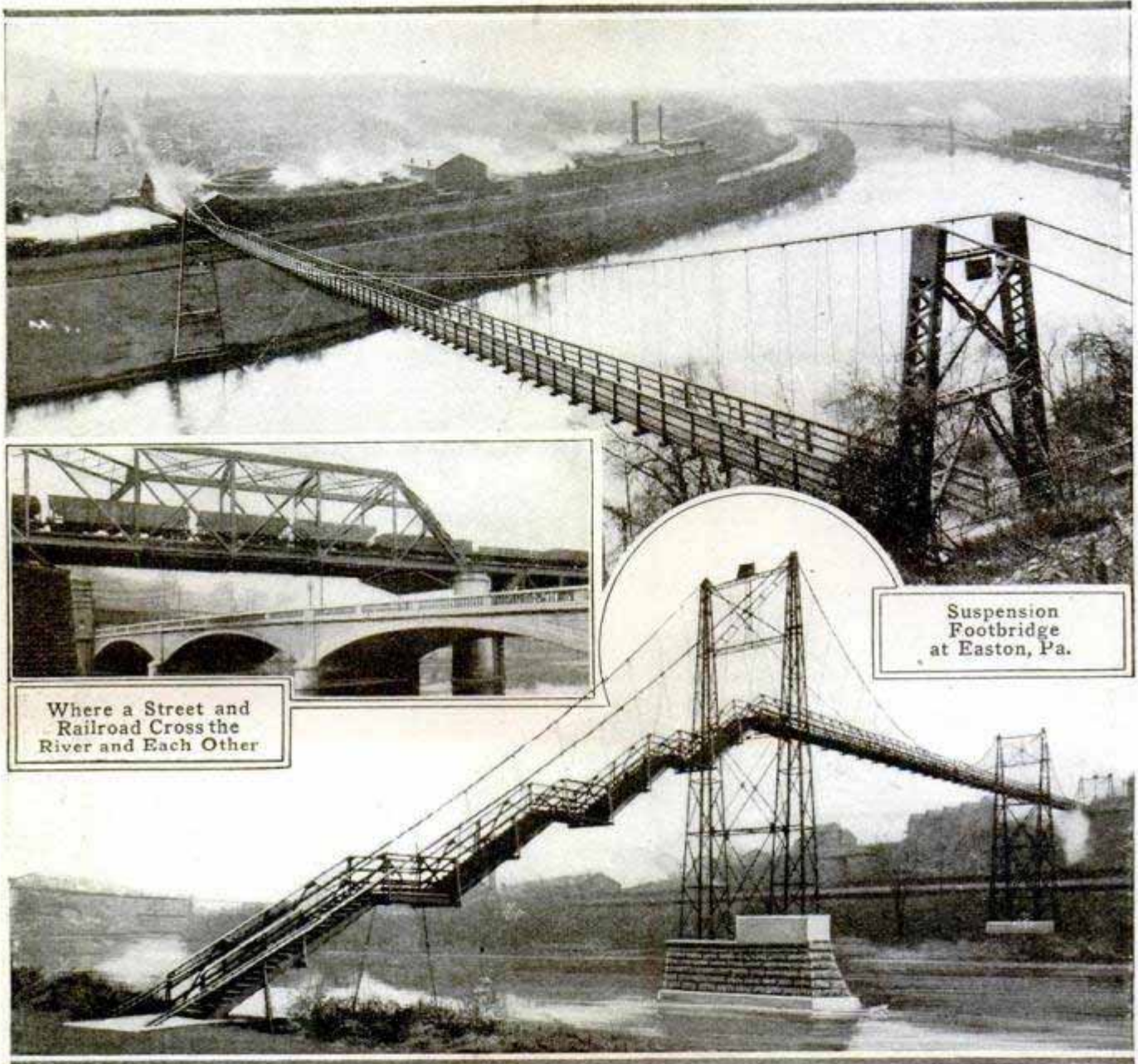
The Emergency Gates are Swung Clear of the Lock Chamber When Not in Use



The Emergency Gates at Pedro Miguel Locks Dropped into Place



## NOVEL BRIDGE CONSTRUCTION IN PENNSYLVANIA CITY



Suspension Approach of Bridge between West Easton and South Easton

Two rivers, the Delaware and the Lehigh, come to a junction at Easton, Pa., the latter cutting the city into two separate sections, and some novel types of bridge arrangement and construction have therefore been necessary in providing convenient communication between the different parts of the city. One of the suspension footbridges, connecting Easton and South Easton, is, perhaps, the highest footbridge in the United States, the floor being 128 ft. above the water. This bridge spans the Lehigh River, the Lehigh Canal, and two railroads, and is 1,020 ft. long. The suspension

footbridge connecting West Easton and South Easton is considered unique among the bridges of this country on account of the construction of the West Easton approach. The north pier of the bridge, where the main span ends, is set out in the river, and from this the approach slopes down to the shore as a series of stairways and landings. This approach, instead of being supported from below in accordance with the usual practice, is suspended from cables which slope from the tower down to anchorages near the foot of the approach. At another point a street and a railroad cross the



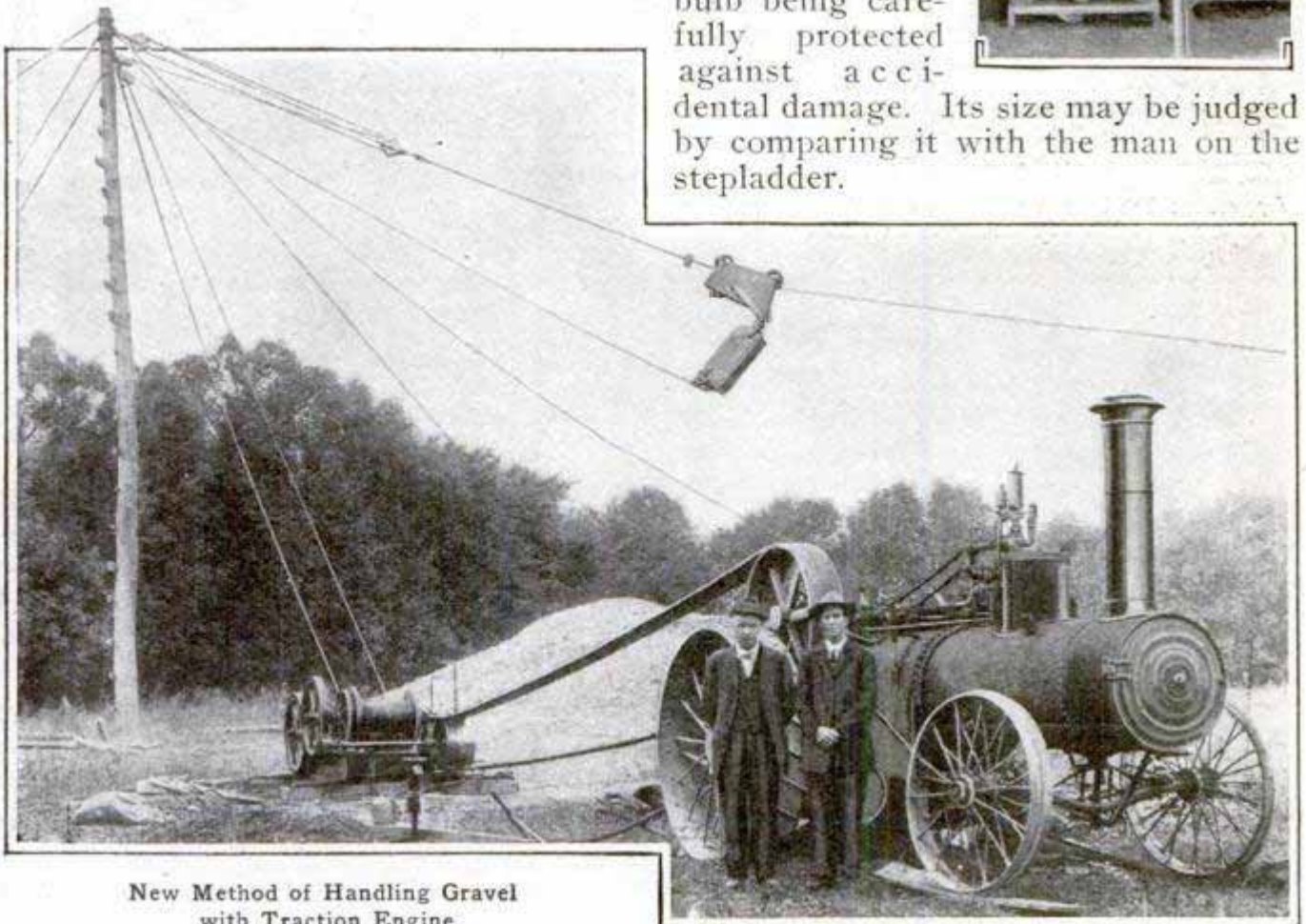
river and each other. This necessitated the placing of the railroad bridge at such an elevation as to give adequate clearance to the traffic on the street bridge.

### CAR FERRY TO HAVANA IS PLANNED

A contract has been let for the construction of a large ferryboat, 350 ft. long and 50 ft. beam, which will be used to ferry trains across the Florida Strait from Key West to Havana, a distance of over 100 miles. The vessel will cost \$500,000, and the specifications call for a speed of about 18 miles an hour.

### GRAVEL EXCAVATOR WORKED BY TRACTION ENGINE

A machine has been devised to be used in connection with a traction engine for excavating in sand and gravel pits. A winch, connected with the engine by a belt, carries a steel cable. A bucket of any suitable type is sus-

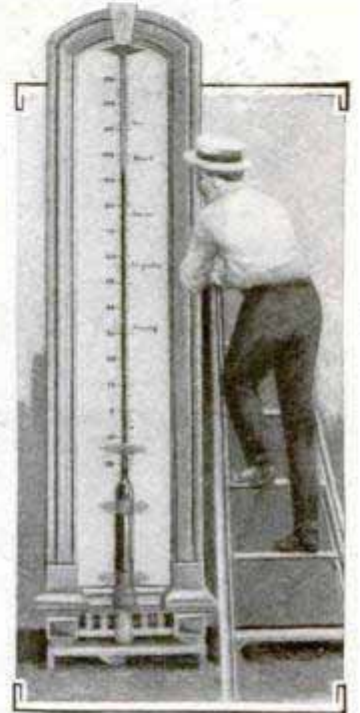


New Method of Handling Gravel with Traction Engine

ended on a guy, moving freely and controlled from the winch by levers. The machine, which is capable of excavating large quantities of material, is designed for use in road making, and to be moved as work progresses.

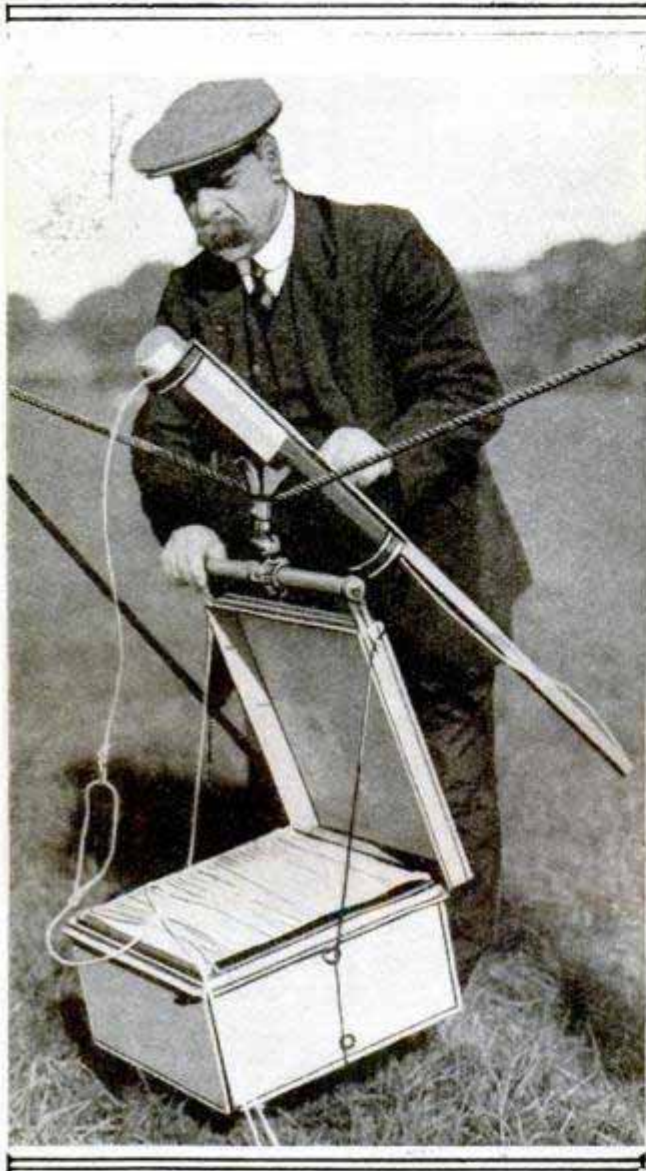
### A PARK THERMOMETER TEN FEET HIGH

In one of the New Orleans parks a big thermometer has been erected close to the superintendent's office, which measures 10 ft. in height and is plainly visible from a distance, enabling visitors to read the temperature without trouble. A gallon of mercury is used in the tube, the bulb being carefully protected against accidental damage. Its size may be judged by comparing it with the man on the stepladder.

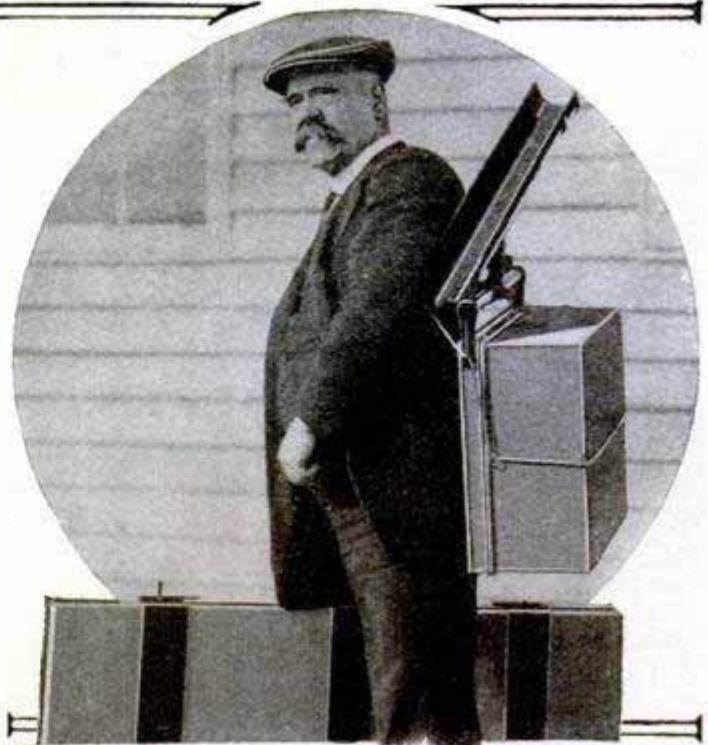




## NEW PORTABLE BREECHES-BUOY APPARATUS



Apparatus Set Up: The Rocket is Connected to the Line and Ready to be Fired



Breeches-Buoy Apparatus Packed and Ready for Transport



Bringing In a Man on the Breeches Buoy: For Test Purposes the Line was Fired over a Point 1,050 Ft. Distant and the Man was Brought In under the Same Conditions as would Prevail at Sea. The Equipment for Firing the Rocket is Shown at the Left

Photos by Paul Thompson

A complete breeches-buoy outfit that can be carried around by one man, and is capable of being operated over a distance of from 450 to 1,200 ft., has been developed by an old English seaman. Each outfit has four lines and four rockets which may be fired in quick

succession, the lines being arranged in the case in such a manner as to run out at high speed without danger of kinking. The apparatus can be readily set up on the ground or the deck of a ship, or may be fired when suspended from ropes or the rigging of a ship, as



it is made to balance automatically. In a recent test with a 6-lb. rocket and 1,050 ft. of line, the line was thrown a distance of 900 ft. against a strong wind.

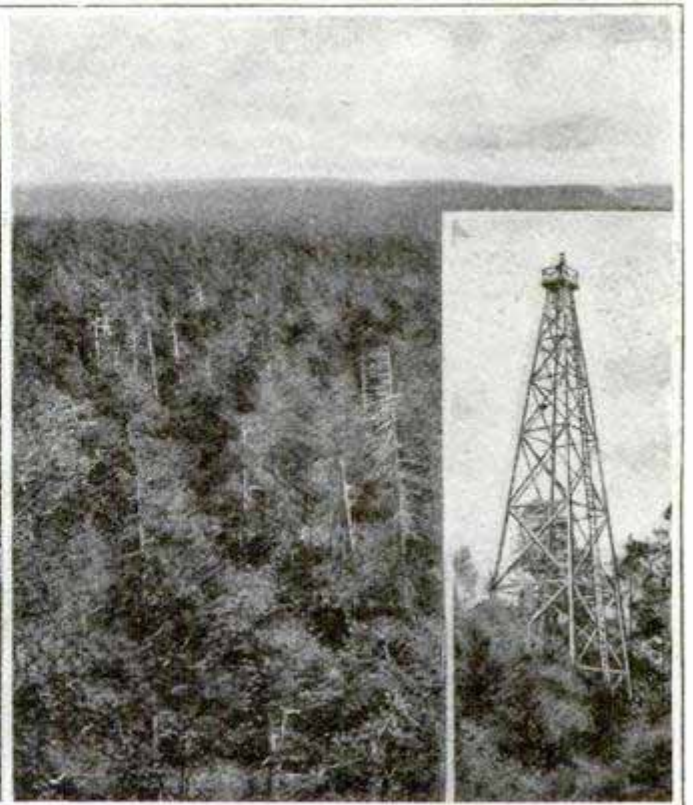
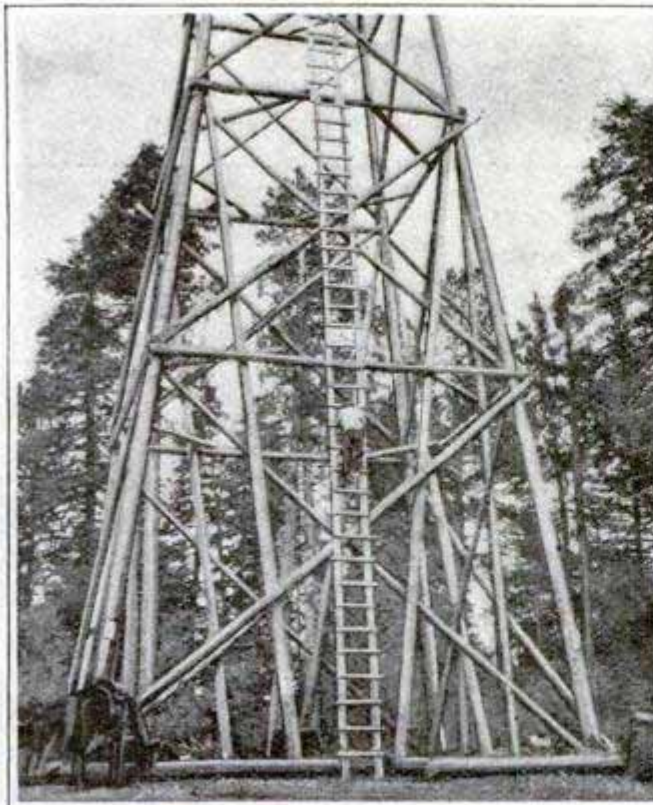
### FOREST LOOKOUT TOWER BUILT OF LOGS

A lookout station was built in the Sitgreaves National Forest, Alaska, by rangers in the Forestry Service, reaching to the height of 115 ft. and constructed entirely of logs. The first task was to cut and peel the logs, and skid them to the spot selected for the tower. Much care was necessary in selecting the main poles, most of which had to be skidded out of dense thickets. The corner poles average 16 in. in diameter at the butts, and 4 in. at the top. They are spliced at a height of 45 ft. and at 100 ft., each splice being bolted and then bound with telephone wire. The timbers are fastened together with  $\frac{1}{2}$ -in. lag screws. The base of the tower is 30 ft. square, and the platform on the top is 6 ft. square. The time spent in cutting and peeling the logs and constructing the tower amounted to less than 24 working days

of 8 hours each for a crew which averaged 5 in number. Four galvanized wire cables,  $\frac{1}{2}$  in. in diameter, will be added as guys, and a copper cable reaching up and over the top of the tower will follow one leg to the ground and serve as a lightning arrester.

### ARTISTIC STANDARD FOR INVERTED LIGHTS

Artistic effects are obtained in hotels and public halls by the use of standards designed with an electric lamp and reflector in the center of a flower receptacle. The light is thrown on the ceiling and reflected without glare or shadows over the room. Hooks upon the side of the pedestal make it serviceable as a coat and hatrack.



Fire-Lookout Station on Promontory Butte, Alaska: Right, the Tower and View from Its Top; Left, Base of Tower, Showing Log Construction



## PLACER MINING BECOMING MORE EFFICIENT

In the early days of placer mining, the gold-bearing sand and gravel was washed in a shallow pan by the simple expedient of rotating it by a swirling motion, the water and sand being

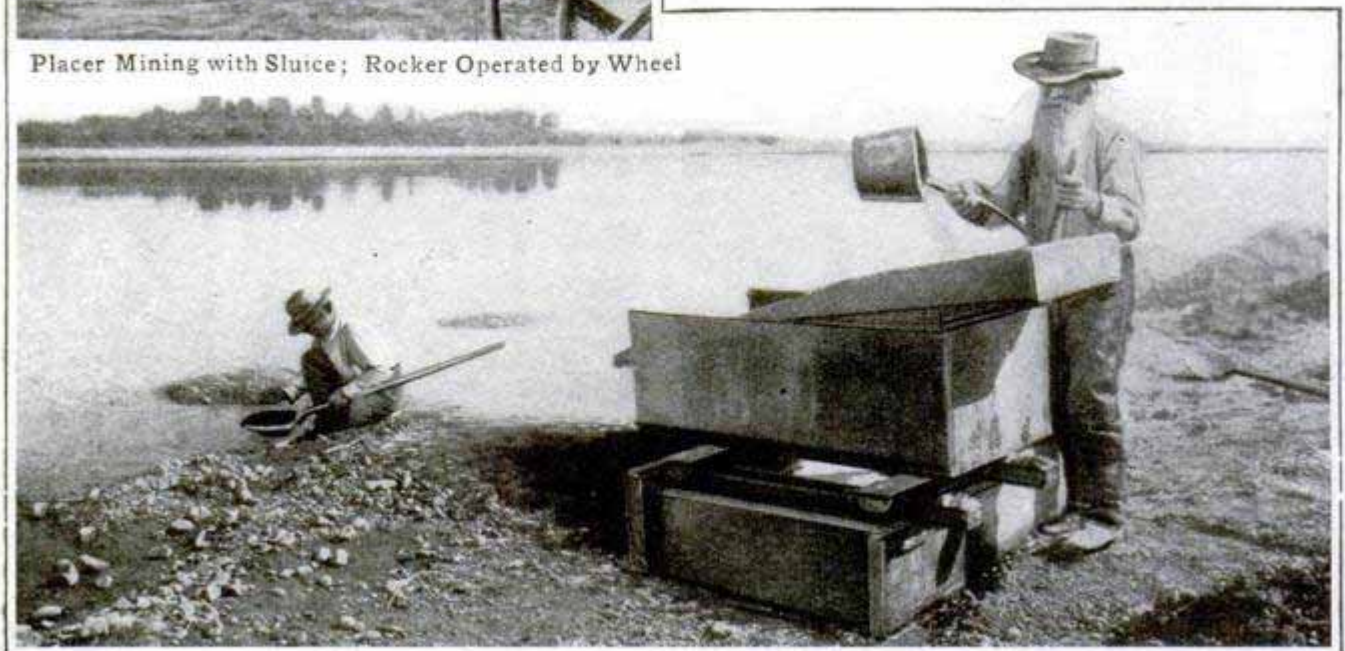
thrown over the top while the heavier gold remained at the bottom. This was a most inefficient method, and as the pay dirt became scarcer, it was necessary to handle larger quantities of gravel to secure sufficient gold to make the operation profitable. The first step was the use of the "cradle," a roughly pivoted box over which a "grizzly," or coarse sieve, was suspended. Quantities of the sand and gravel are shoveled into the sieve, which keeps out the larger gravel, and the fine sand and grains of gold run through the sieve and into the "rocker," on the bottom of which are strips of wood between which the gold is caught, while the sand is washed away. Bigger quantities of pay dirt are handled when the water is sluiced in, and the bottom of the rocker is composed of plates of copper covered with mercury. The gold sticks to the mercury and is scraped off at the end of the day.

¶ A novel use for the parcel post is reported from Washington, where 400 lb. of ore was shipped for test to a laboratory from a mine in a remote section of the country.

¶ Incense cedar grown in California is now extensively used in the manufacture of pencils by German makers.



Placer Mining with Sluice; Rocker Operated by Wheel

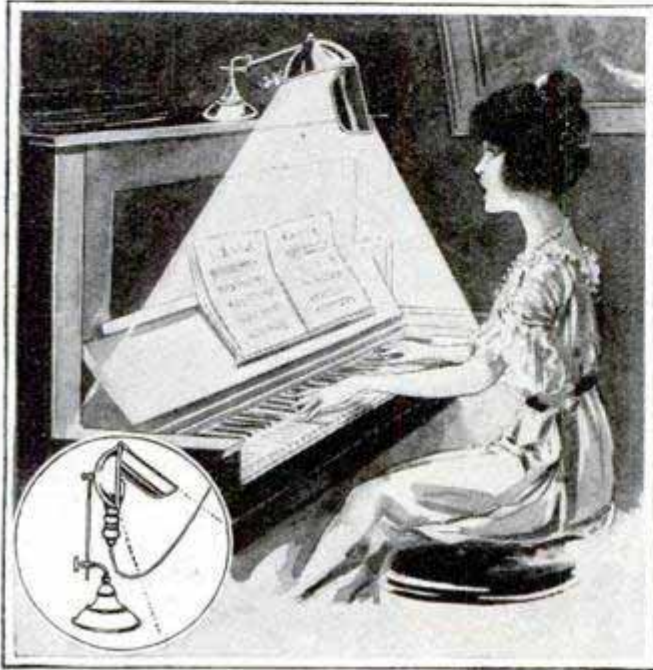


A Primitive Method of Placer Mining: Hand-Washing the Gold-Bearing Sand with a Rocker



## REVOLVING SHADE LESSENS EYESTRAIN

A revolving shade for a portable lamp has recently been invented whereby many diverse positions may be se-



Adjustable Electric Lamp and Shade That Protects the Eyes

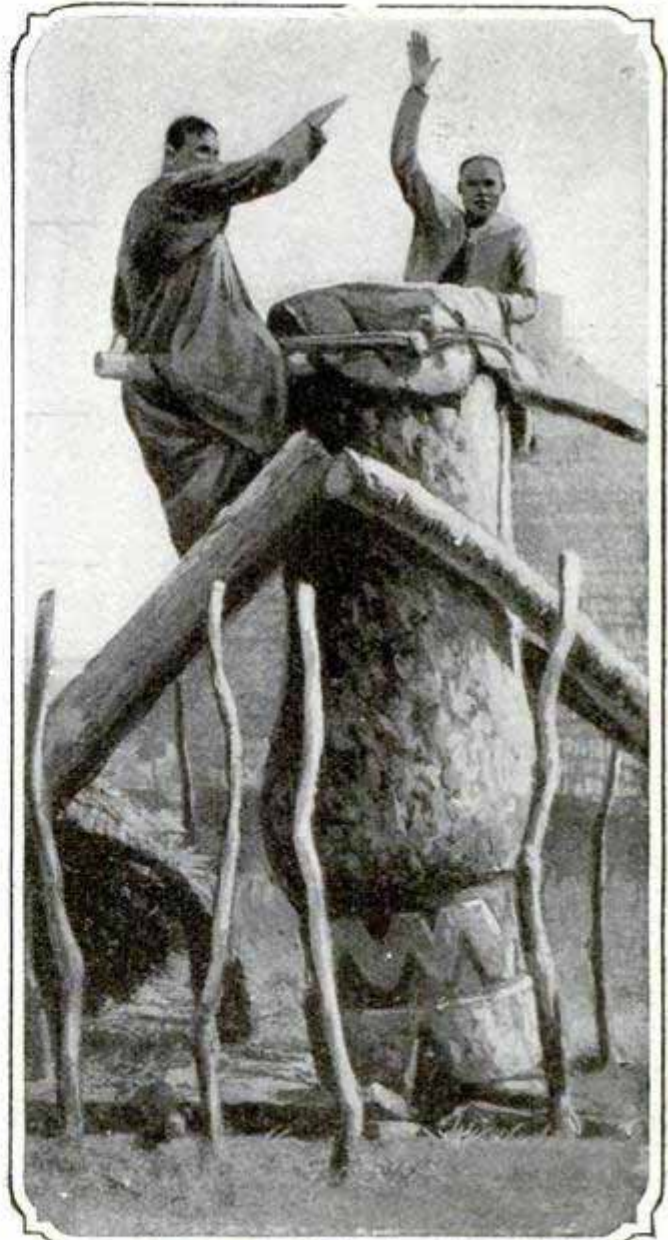
cured, throwing a bright beam of light in any direction desired, without attendant eyestrain. An ordinary parabolic reflector attached to an electric incandescent lamp, with an adjustable revolving shade hinged to the brim in such manner that it remains wherever placed, permits the light to be thrown as desired, but all direct rays are cut off from the eyes, preventing glare from injuriously affecting the vision.

CA bill for a canal across New Jersey, to connect the Delaware River with New York harbor and so give Philadelphia a more direct water route to the sea, has been introduced in Congress.

## AFRICAN WAR DRUM MADE FROM TREE TRUNK

What was once the "Dark Continent" has now been so completely explored throughout its length and breadth, that south of a line drawn from Dakar on the coast of Senegal to

Khartum, the modern maps give a fairly accurate idea of territorial divisions, the sources of the principal rivers, and of mountain ranges. There still remain, however, the savage tribes whose mode of life and death show little of the influences of civilization. A recent party, headed by the Duke of Mecklenburg, secured many interesting photographs of savage life under the equator from the Congo and the Niger to the Nile. The war drum of the Sultan of the Niellims is made of a hollowed tree trunk, which, stood on end, is covered with tightly stretched skins, and beaten by two warriors with their open hands. Its reverberations can be heard a long distance.



Courtesy Illustrated London News  
Calling Out the Troops in an African Village



## FLOATING ON WATER WITH AND WITHOUT AID

In the waters of the Dead Sea, in Palestine, a bather can lie on the surface in perfect ease and comfort with-

Photo by Underwood & Underwood

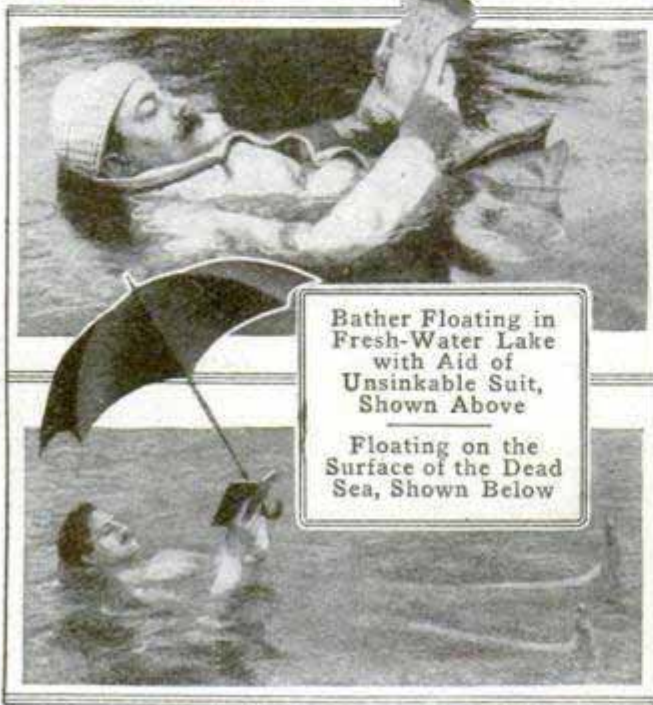


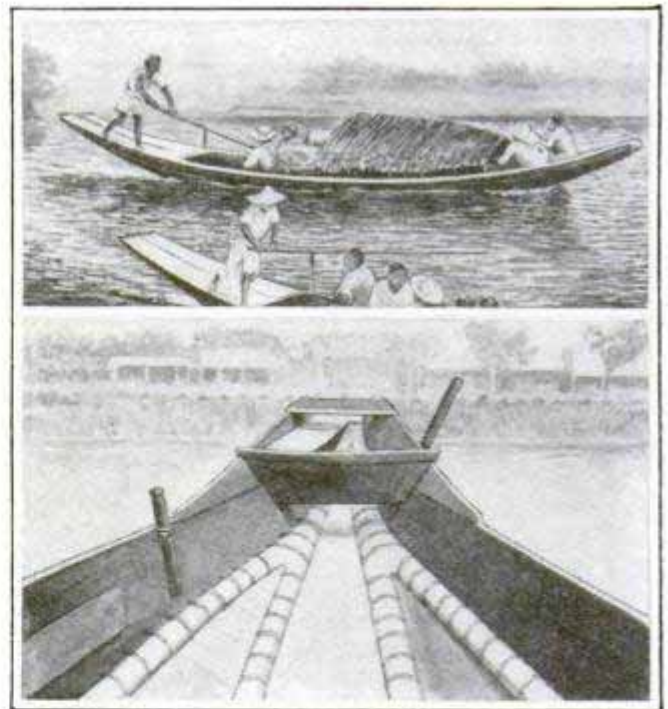
Photo by Wildman Magazine and News Service

out making the slightest effort to keep afloat, since the water contains about six times as much salt as the water of the ocean and is so dense that the body floats only half submerged, as shown in one of the illustrations. A bather may float readily on the surface of the Great Salt Lake in Utah, but on the Dead Sea he can do nothing else but float, and an expert diver can scarcely reach a depth of 6 ft. Quite a different method of floating is shown in the other illustration. Here the bather is floating in fresh water, this feat being made possible through the buoyancy of a special type of suit recently invented in France and made of tissue cloth. The inventor of this suit claims that it is both unsinkable and waterproof, and that it is therefore particularly suitable for use by airmen, steamer passengers, and motorboat enthusiasts.

☐ Direct telephone communication has been established between England and Switzerland.

## NATIVE BOATS OF ANAM MADE WITHOUT METAL

Without nails, screws or bolts, the ingenious natives of Anam, a country lying south of China within the French protectorate, are able to build strong, light boats, some of them of large size, containing no metal of any kind. These sampans, as the native boats are called, are made of five planks, joined together without curving or the use of ribs from one end to the other. The planks used are pierced at intervals of about 8 in. at points directly opposite each other. These perforations form mortises in the shape of double eyelets, through which rattan ropes are passed, tightly binding them together. The joints are calked with vegetable fiber, and over these joints are laid short lengths of board, lapping over one another. These act as stiffeners, strongly reinforcing the boat from end to end and making it water-tight.



Sampans Made of Five Planks without Nails—Rattan Ropes Hold Boat Together at Joints

## AIR CRAFT TO CO-OPERATE WITH NAVY

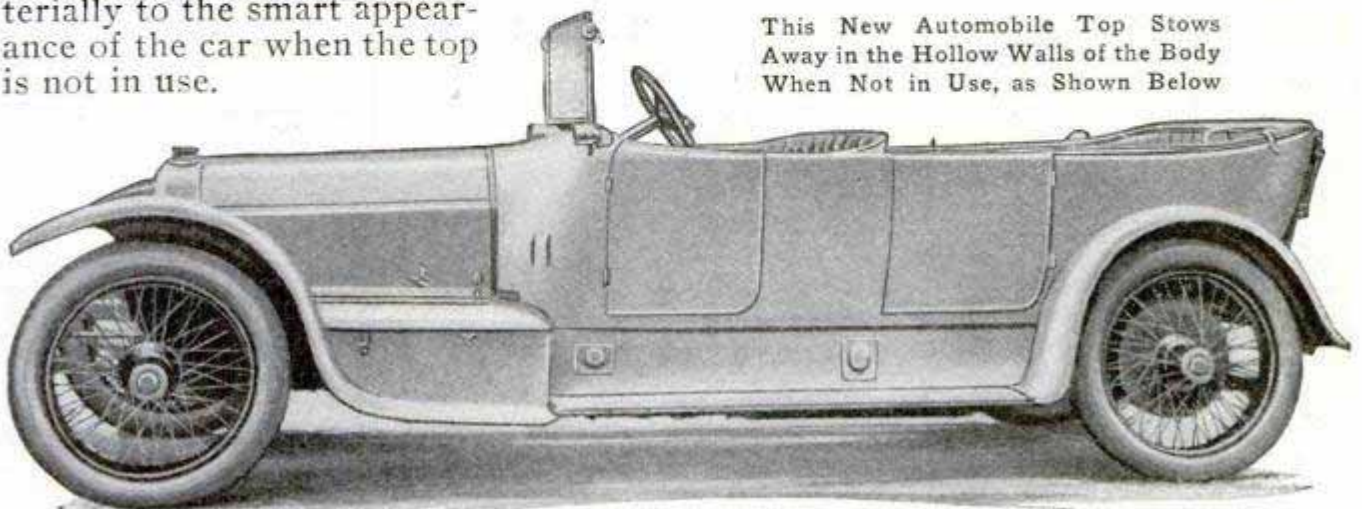
One of the most important recommendations of the board of officers recently appointed to draw up a comprehensive plan for the organization of a naval aeronautic service was that for



placing aeroplanes aboard all battleships. All the powers that consider adequate sea power necessary for national defense are developing a strong aerial force to cooperate with their navies and it now looks as if the United States would follow the lead of the other great powers. The organization will ultimately include not only aeroplanes, but dirigibles, captive balloons and kites. If the recommendations of the naval board are carried out, aeroplanes will be provided for every group of ships on scouting duty or detached service. The bulk of the stores and supplies will be carried on fleet auxiliaries so as not to encumber the fighting units, and the use of special ships for carrying air craft is being considered. The purchase of dirigibles at the earliest possible date, with sheds, hydrogen plants and all necessary appliances, was also recommended.

### MOTOR-CAR TOP FOLDS AND DISAPPEARS

A folding top for an automobile, which can easily be raised or lowered by one pair of hands, and, when not in use, is concealed within a chamber formed by the two walls of the tonneau, is a recent novelty offered by a European manufacturer. The top is of full size, but when packed away it is entirely out of sight, and kept free from dust and dirt. This device adds materially to the smart appearance of the car when the top is not in use.



### HORSE BREATHES THROUGH BRASS TUBE

Among the horses employed in the street-cleaning department of Cincinnati is one upon which a surgical oper-



This Horse Breathes through a Tube in Its Throat

ation was performed to save its life. As a result this horse wears a brass tube of special design, penetrating its windpipe. All the air that the horse breathes now goes through this tube.



## BOARDING HOUSE FOR DOLLS BUILT OF LOGS

Asheville, N. C., has long been famous as a resort, and has numerous excellent hotels, but an innovation re-



A "Dolls' Hotel" at a Southern Mountain Resort, Which Adds to the Joy of Juvenile Guests

cently added, equips that city for a branch of entertainment long neglected. A boarding house for dolls has been opened in a little log cabin, 6 by 5 ft. in size, which, while not impressive architecturally, is undeniably cozy. A rifle reposes over the door, a fireplace and chimney of sticks and clay promise comfort, and the clay chinking between the logs makes all warm and dry. A thermometer hung on the side of the cabin calls attention to the salubrity of the North Carolina climate.

☞ An Oregon mill is using in the manufacture of paper the sawmill waste of Douglas fir, of which enormous quantities are to be found in the western forests.

☞ The gathering of acorns to supply eastern nursery firms with material for forest planting is a new industry in Arkansas.

## AUTOMOBILE ROAD TO THE YUKON

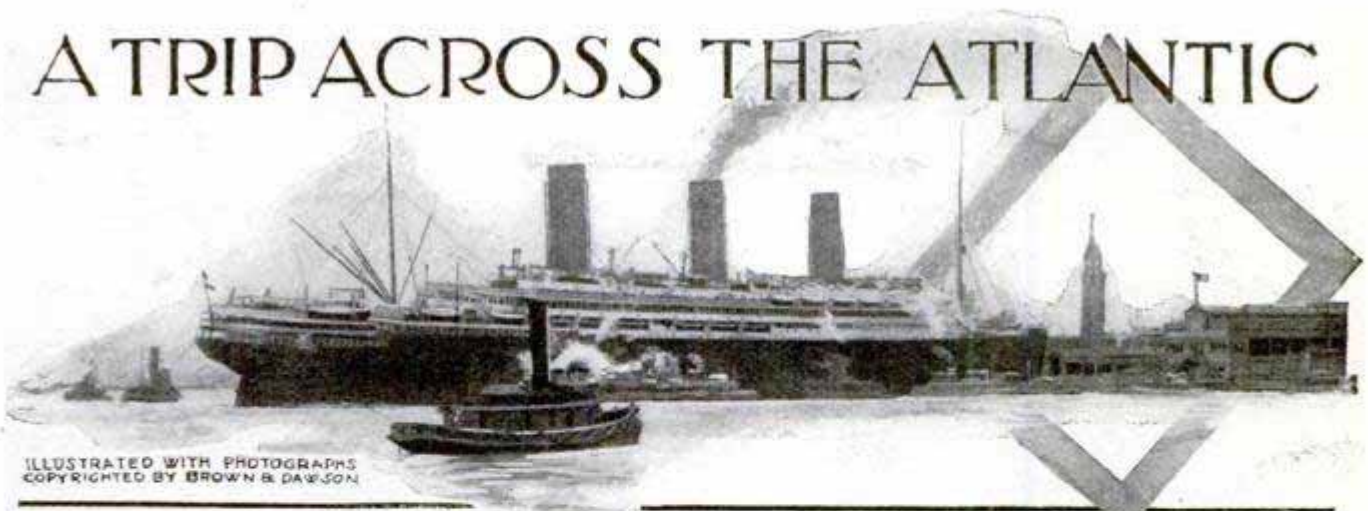
A road suitable for the use of automobiles is being planned to run from Vancouver, British Columbia, to Dawson City in the Yukon Territory, and when this is done it is likely that the road will be extended north and west to points in Alaska. Automobiles have already made the 650-mile trip between Vancouver and Hazelton, British Columbia, and the Yukon Territory government is improving the 300-mile sled road between Whitehorse and Dawson so that automobiles will be able to make the trip between these points. This will leave only 400 miles, the stretch between Hazelton and Whitehorse, to be improved.

## NEWSPAPERS DELIVERED BY AEROPLANE

Traversing the distance of 85 miles between Nice and Hyères, a French airman carried a passenger and several packages containing supplements of a daily newspaper published at Nice, and intended for distribution in neighboring cities. Each parcel was attached to a multicolored parachute, and as the aeroplane hovered over some available spot above each city, the parcels were dropped by the passenger, the parachutes unfolding and sinking slowly to the earth. Antibes, Cannes, St. Raphael and Hyères were thus served, and the full distance traveled in less than an hour. After an exhibition of volplaning and banking at the latter place, where the battleships were at anchor, the aeroplane started on its homeward journey, reaching Nice in good order and in record time.



# A TRIP ACROSS THE ATLANTIC



ILLUSTRATED WITH PHOTOGRAPHS  
COPYRIGHTED BY BROWN & DAWSON

THE 'IMPERATOR' LEAVING HER SLIP AT HOBOKEN

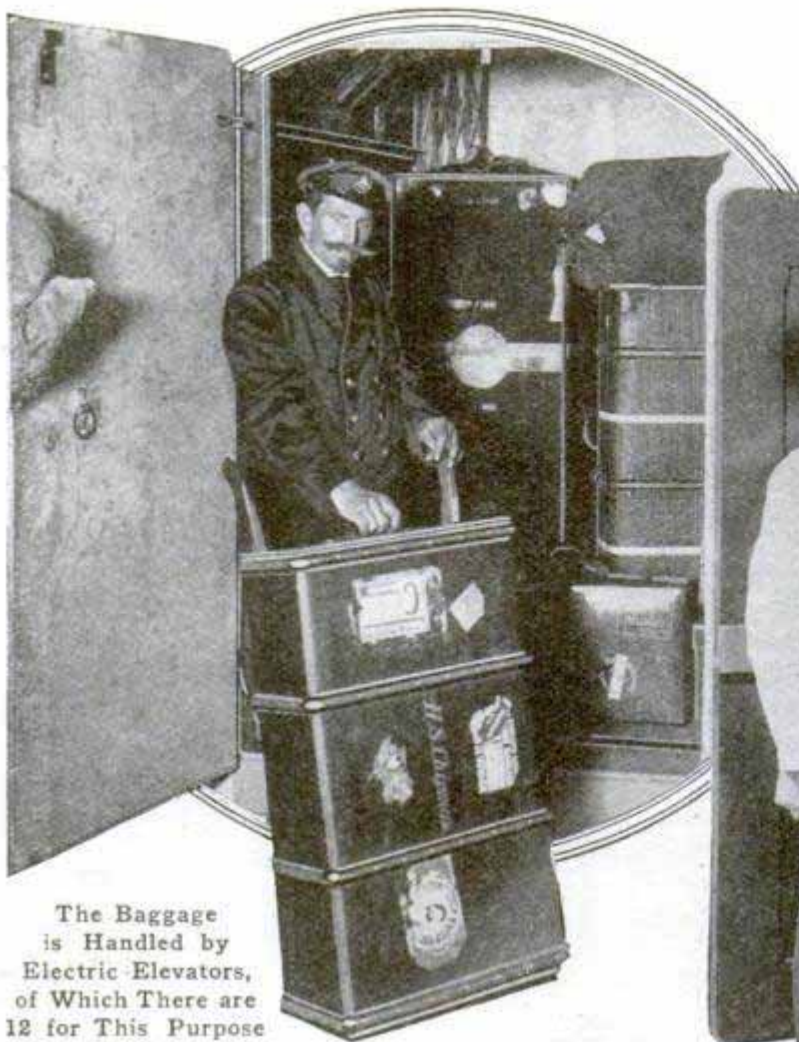
**W**HAT happens on a voyage across the Atlantic? How do the passengers amuse themselves through the week or more of life on shipboard? How are they housed and fed and otherwise cared for? What are the novel and interesting things they see on a great modern passenger ship? These are questions that must occur to everyone who has never made an ocean journey.

The best way to answer them is by pictures that tell the whole story. The remarkable series of photographs printed on the following pages give a clearer idea of the daily life and routine of a sea voyage than could be conveyed by any number of words. These photographs were made on board the "Imperator," the largest vessel that has ever sailed the seas. Only half of the story of a voyage in this great ship is told here. The rest of it will appear in picture form in the May issue of this magazine.



Not the Least Interesting Feature of the Ocean Voyage is the Crowd That Gathers on the Pier to Wave a Farewell As the Great Ship Swings Slowly Out into the Stream

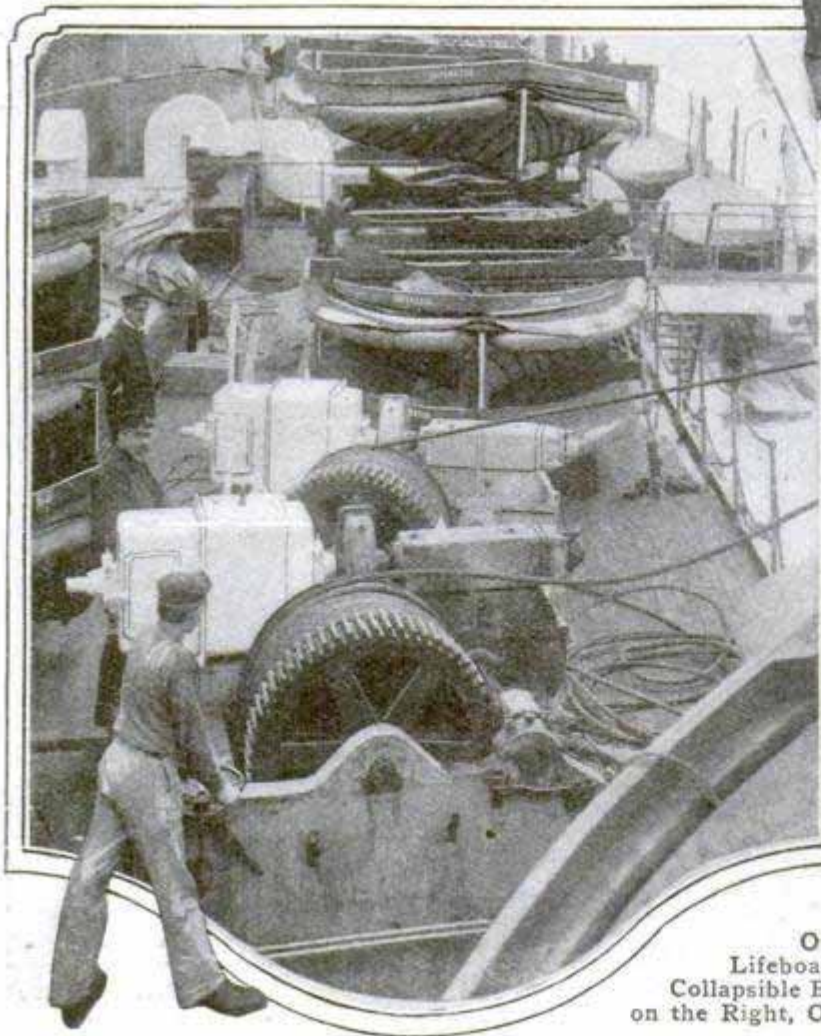




The Baggage  
is Handled by  
Electric Elevators,  
of Which There are  
12 for This Purpose

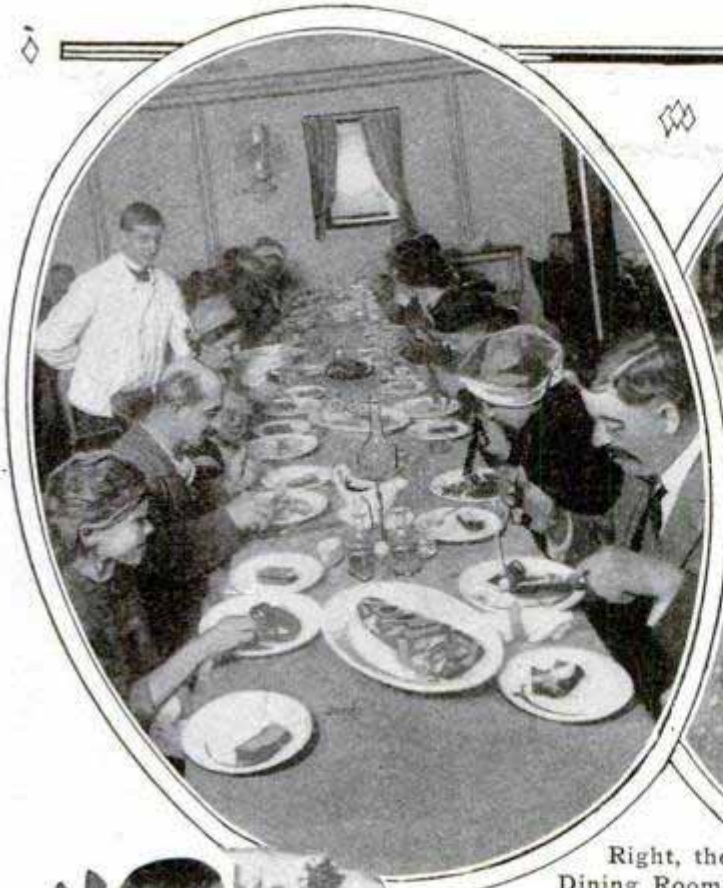


Special Accommodations  
are Provided for Passengers'  
Pet Dogs, in These Cages

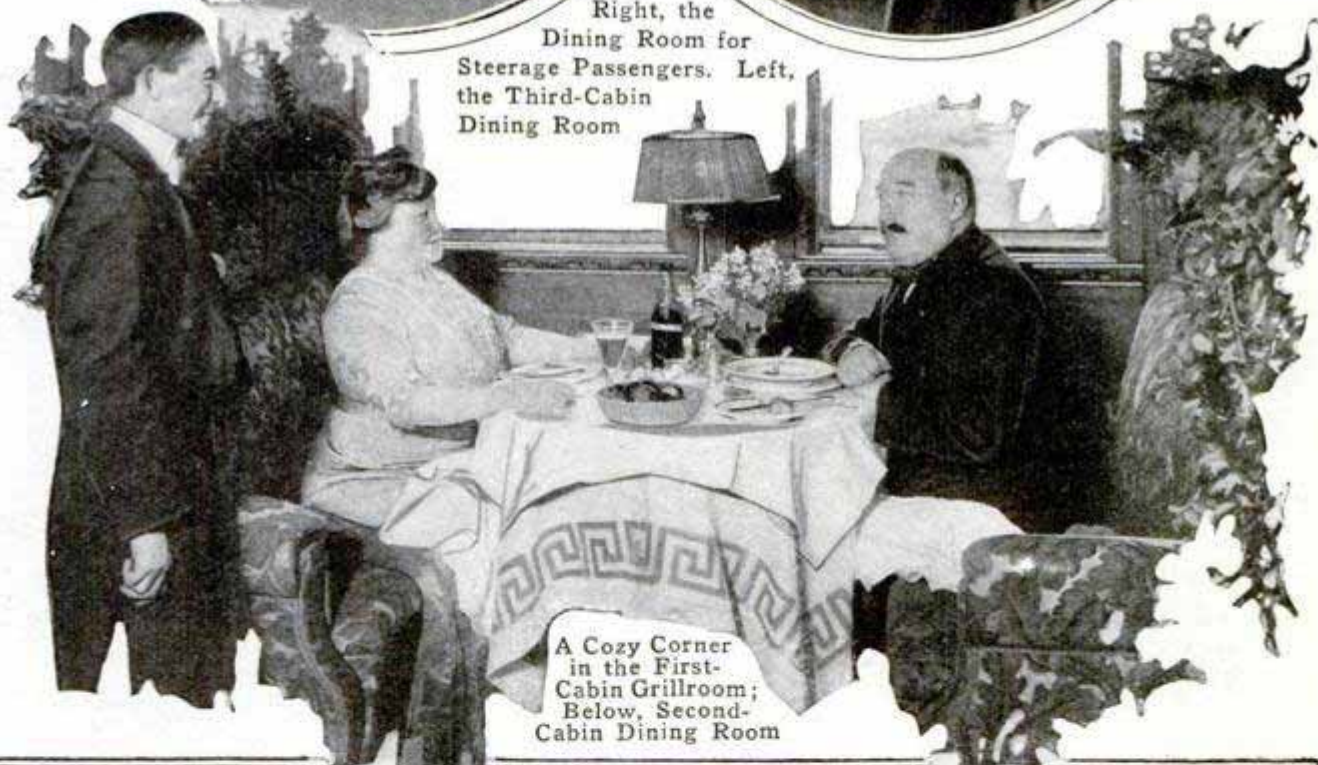


One of the Traveler's First Concerns is the  
Lifeboat Equipment. On the Left are Shown the  
Collapsible Boats and the Winch That Launches Them;  
on the Right, Other Boats, Lowered from Rotating Arms





Right, the Dining Room for Steerage Passengers. Left, the Third-Cabin Dining Room



A Cozy Corner in the First-Cabin Grillroom; Below, Second-Cabin Dining Room







For Those Who Love Flowers,  
a Fresh Supply may be Bought  
on Board Every Day

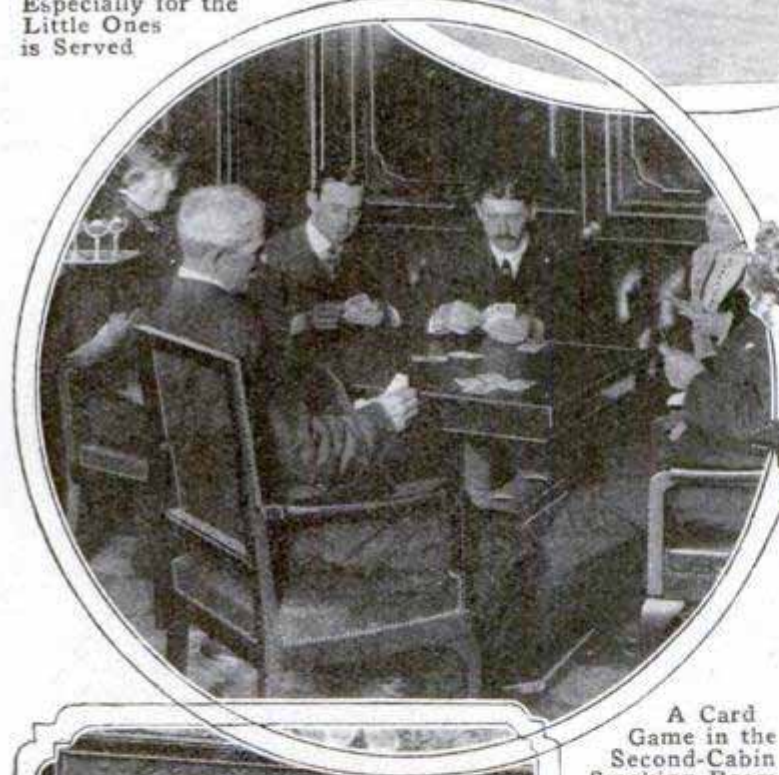


By the Time the First Meal on Board is Over, the Ship has Passed  
Sandy Hook and is Plowing through the Open Sea. Some Join in  
the Deck Sports, Others Take Books from the Ship's Library to Read





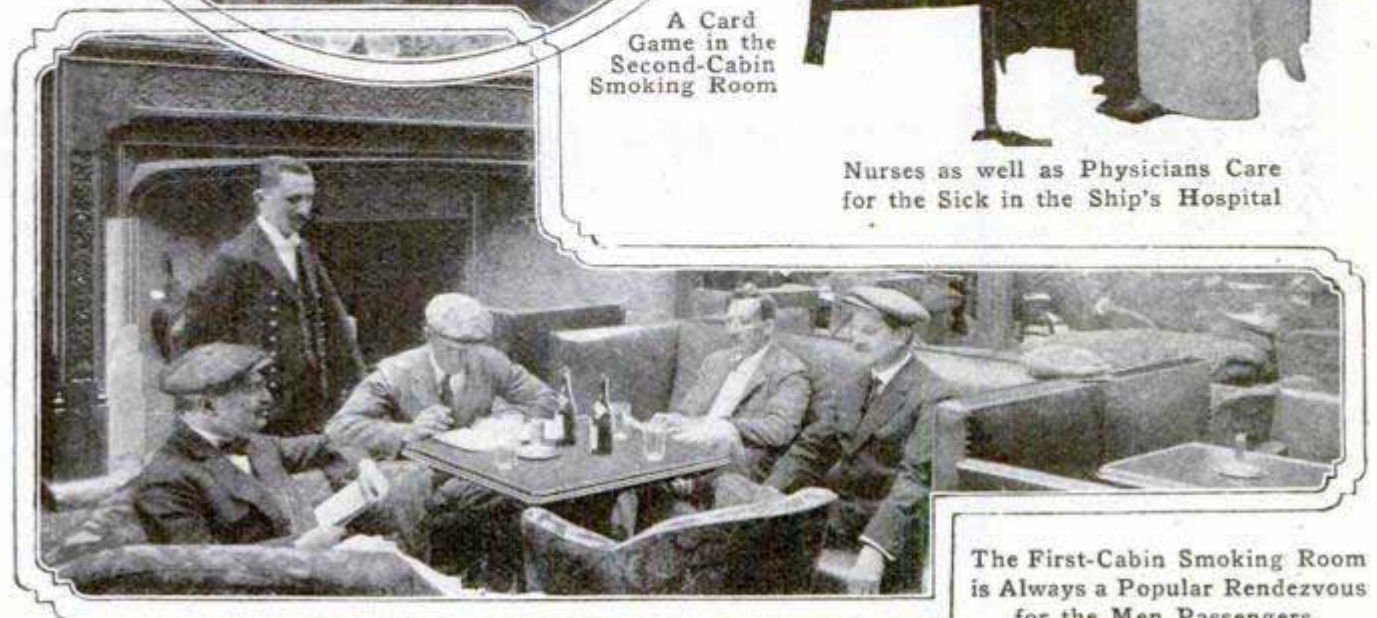
In the Children's Dining Room Food Prepared Especially for the Little Ones is Served



A Card Game in the Second-Cabin Smoking Room



Nurses as well as Physicians Care for the Sick in the Ship's Hospital

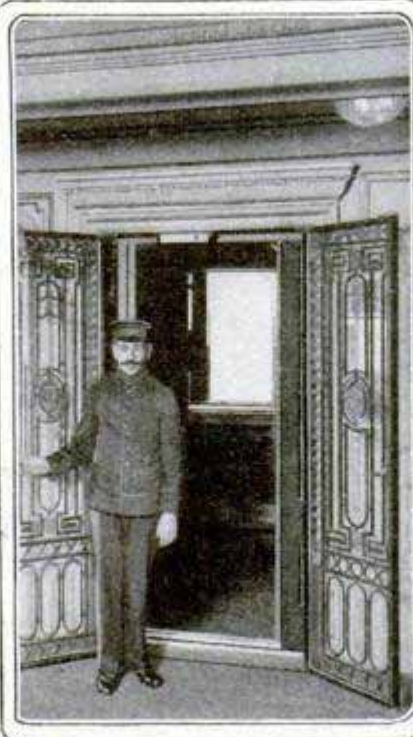


The First-Cabin Smoking Room is Always a Popular Rendezvous for the Men Passengers





Cooking for the Passengers,  
in the Steerage Kitchen



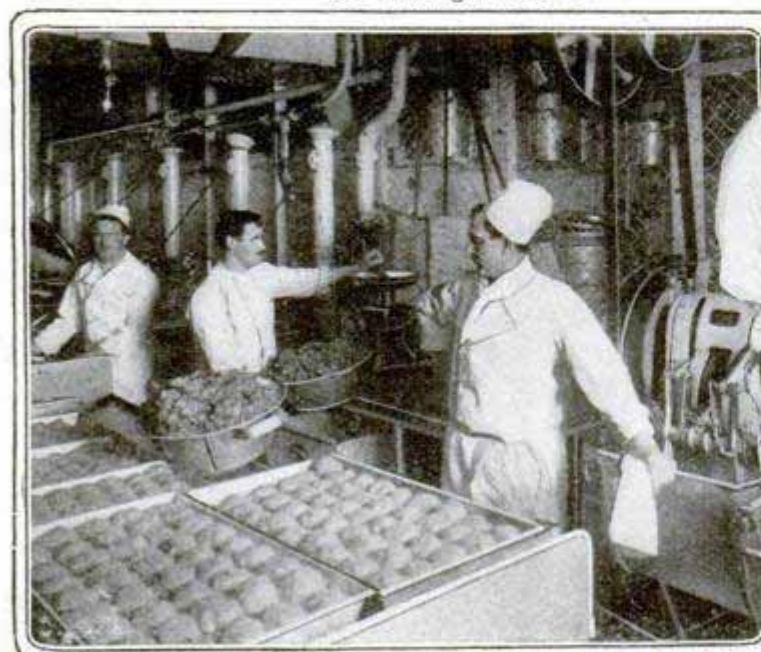
Four Passenger Elevators Save  
Much Time and Many Steps



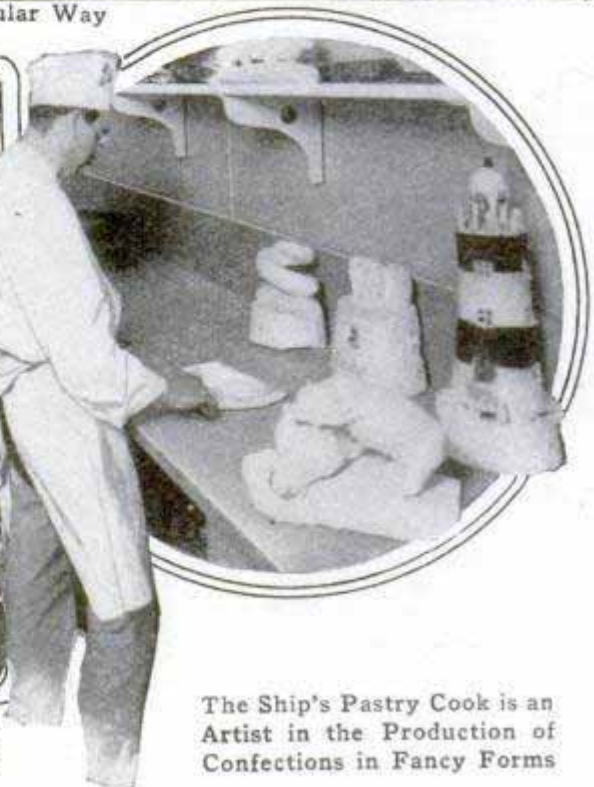
Electric Dumb Waiters Connect  
All Decks with the Kitchens



Lounging on the Sun Deck is, by Far, the Most Popular Way  
of Passing the Time



A Visit to the Kitchens Reveals Wonderful Electric Food  
Choppers, Potato Peelers, and Similar Modern Equipment



The Ship's Pastry Cook is an  
Artist in the Production of  
Confections in Fancy Forms





A Corner of  
a Typical

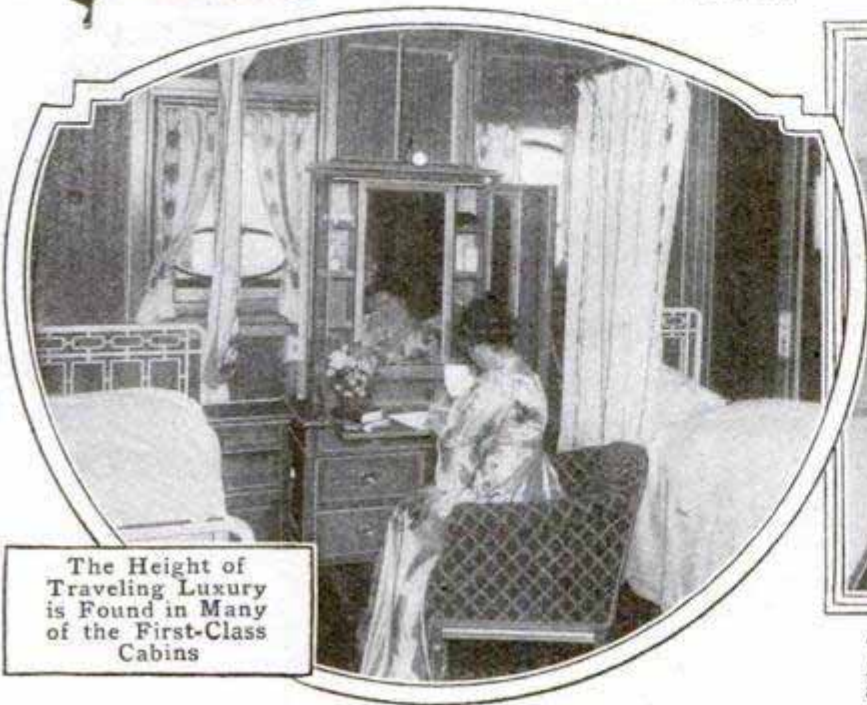
First-Class  
Cabin



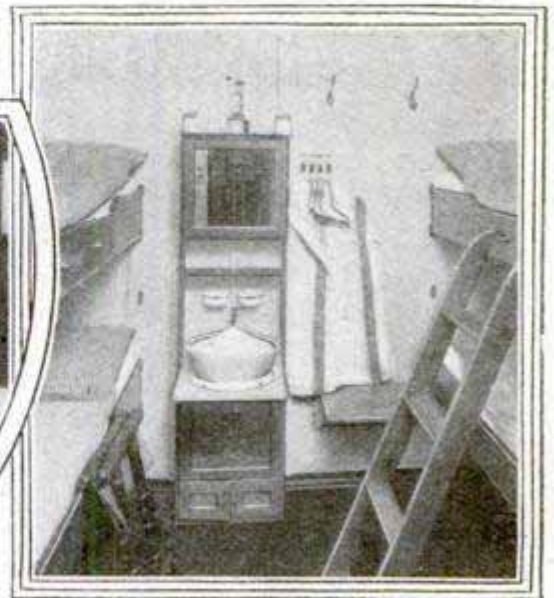
The Second-Class Cabins of Today are Better  
Than the First-Class of a Few Years Ago



Dinner in the  
Main Dining Room



The Height of  
Traveling Luxury  
is Found in Many  
of the First-Class  
Cabins



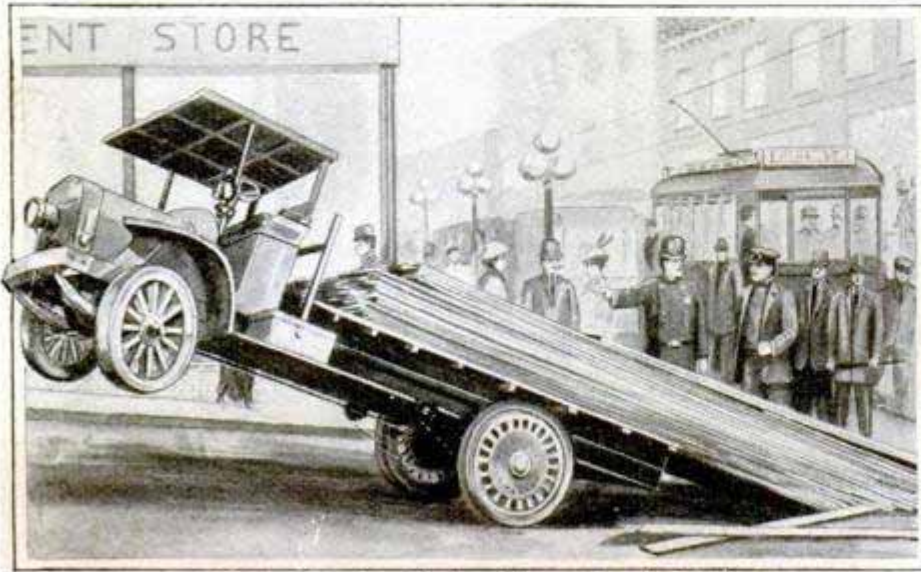
Third-Class Passengers Now Have  
Accommodations That are Clean  
and Comfortable: A Cabin for Four

(To be continued next month)



## BUCKING MOTOR TRUCK DUMPS LOAD

Because the men loading lumber on a motor truck in Tacoma forgot just



Shifting Lumber Makes Motor Truck Buck

where the center of gravity should be, a most unusual accident occurred when the truck was being driven up a considerable grade in that city. The load shifted suddenly and raised the front wheels nearly 30 in. in the air, while the lumber slid back until it rested on the street. The astonished driver climbed down and summoned help. The load was taken off and rearranged on the truck and the trip completed without further trouble.

## GOVERNMENT BRANDS ON CORD WOOD

Cord wood on which is imprinted the brand of the United States is being sold and burned in North Carolina. The wood comes from government forest reserves in McDowell and other counties in the mountains of North Carolina, where 32,000 acres in the western part of the state are under the control of the United States Forest Service. Wood is sold for 25 cents a cord on the stump, only such wood being allowed to be cut as bears the brand "U. S." deep in the trunk. The government rangers inspect the land, condemn the culls, or undesirable trees, and brand them.

## MOUSE BUILDS NEST IN AN AEROPLANE

An English airman was surprised the other day, after a flight of some 500 miles, to discover a nest of mice in his biplane. The machine had been standing in the hangar for some weeks without being disturbed, and when he suddenly took it out for a flight, the mice evidently did not have an opportunity to escape before the machine rose. Upon landing, the mother mouse fled panic-stricken, abandoning her young to the tender mercies of the airman.

## NOVEL TOWEL SUPPLY HAS SANITARY FEATURES

The abolition of the old-fashioned roller towel on the ground of its disease-spreading proclivities has been accomplished in many states, and a novel cabinet has been devised which retains the convenient and economical features of the roller towel, while preventing the abuses which made the old kind objectionable. A closed cabinet contains geared wheels operating two rollers, upon which several yards of toweling are held, and so arranged that as one portion of the clean towel is pulled down, an equal amount of the used towel is rolled up. Only a pre-determined amount of towel is available at one time.



Only a pre-determined amount of towel is available at one time.



## RATS FORM STAPLE ARTICLE OF FOOD IN MEXICO

The high-cost-of-living problem has been solved in some parts of Mexico by breeding rats for food. A large white variety is raised, which, it is asserted by the market woman who offers them for sale daily, are young, tender and delicious. Whatever objections might be raised to this addition to the menu in America, Mexican epicures pronounce them a distinct and most palatable addition to the meat course.



Whatever objections might be raised to this addition to the menu in America, Mexican epicures pronounce them a distinct and most palatable

addition to the meat course.

## FIRES OF FUTURE TO BE FOUGHT WITH CHEMICALS

That chemicals will entirely take the place of water within the next five years as a means of fighting fire was the prophecy made at a recent convention of fire fighters. In the large cities most of the small fires are now put out with chemicals, and it is not a big step from this to the use of guns for shooting powdered chemicals or chemical bombs into buildings for putting out big blazes. As an argument against the use of water, a case was referred to where in a small fire the fire loss was \$5,000, while the loss due to the water poured on the flames amounted to no less than about \$20,000.

## AIRMAN SETS NEW FLYING RECORD

Remaining in the air for 14 hours and 7 minutes, the airman Bruno Lange set a new record for an endurance flight on February 3d, at Johannesburg. The best previous record for sustained flight was made by Fourny, the French airman, who at Etampes, in September, 1912, covered 625 miles, remaining in the air continuously for 13 hours and 18 minutes.

## ACROSS THE ANTARCTIC CONTINENT

The first serious attempt to cross the Antarctic continent is to be made by Sir Ernest Shackleton, whose South Polar expedition was the subject of an article in a recent number of this magazine. A map of the projected route of the expedition is given herewith, which will aid in understanding the magnitude of the undertaking and the vast difficulties which confront the exploring party. Here no supply stations can be effectively placed for the party, as they will not retrace their steps, and must necessarily carry with them food and fuel sufficient for a journey

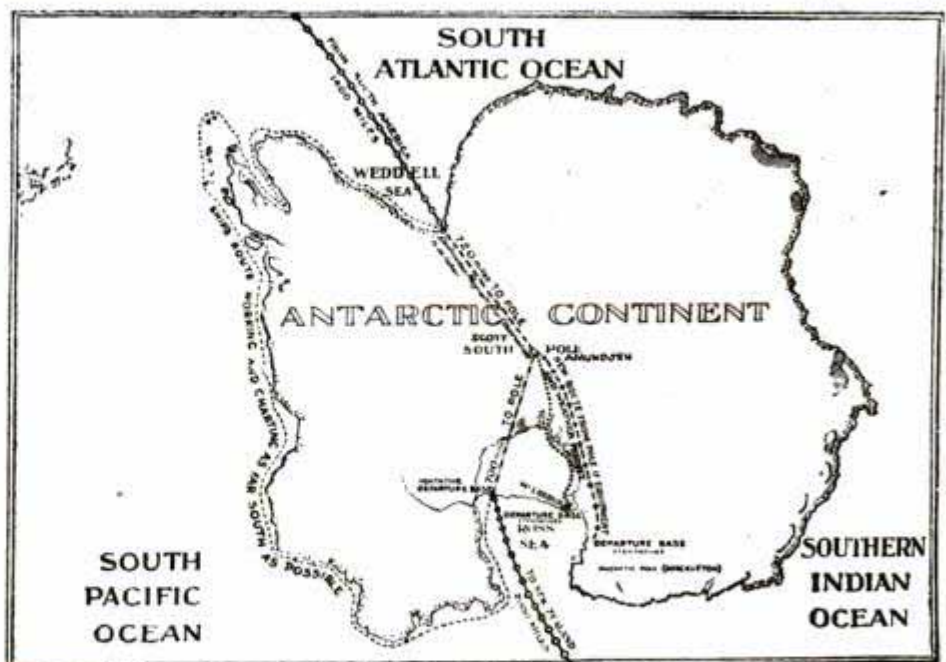


Photo by Paul Thompson

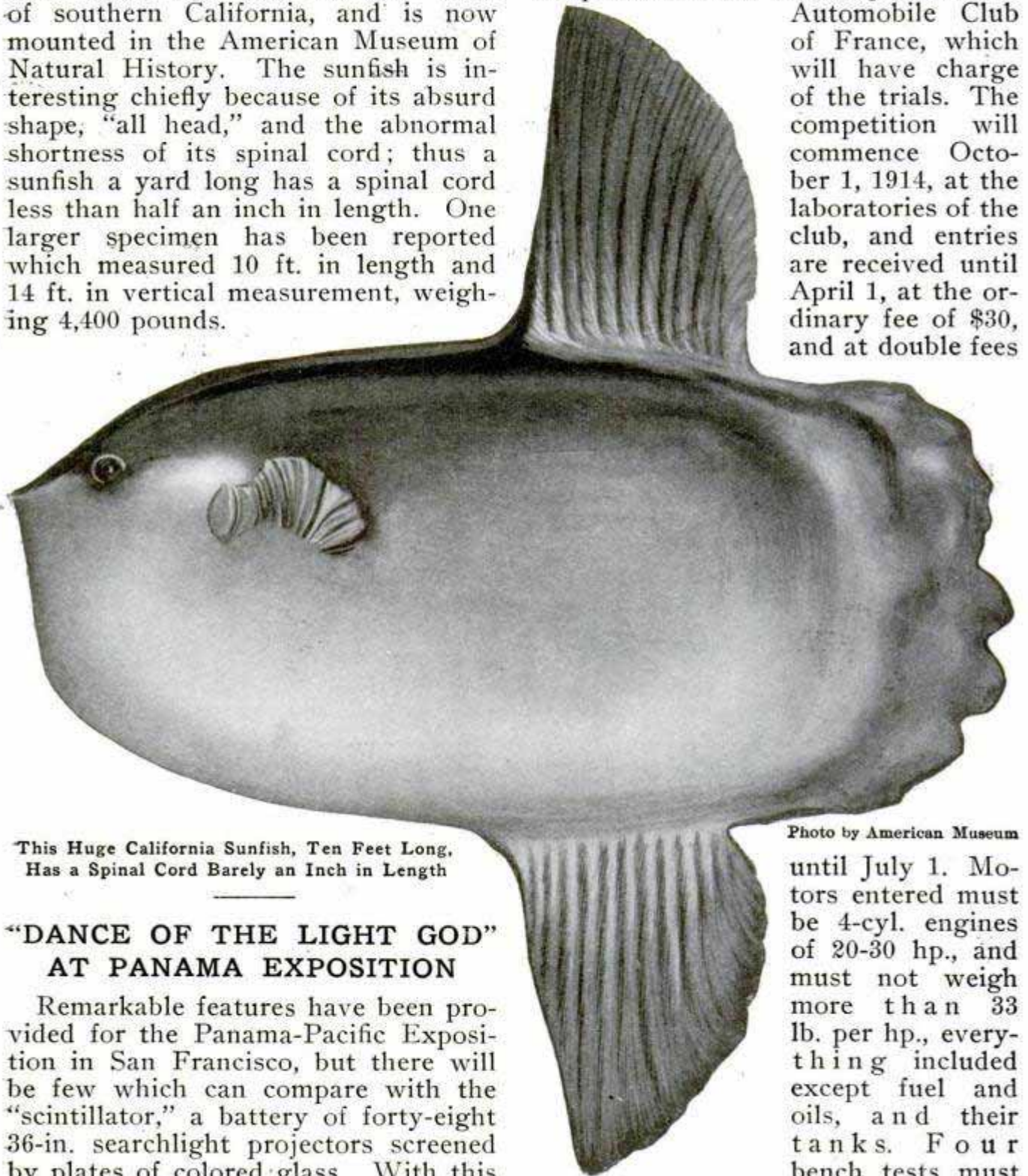
Map Showing Shackleton's Proposed Route across the Antarctic Continent in His Attempt to Reach the South Pole

of over 1,400 miles across trackless wastes of polar snow and ice.



## ENORMOUS SUNFISH CAUGHT OFF CALIFORNIA COAST

A sea sunfish, 10 ft. long and 11 ft. in vertical measurement, was caught with hook and line off the coast of southern California, and is now mounted in the American Museum of Natural History. The sunfish is interesting chiefly because of its absurd shape, "all head," and the abnormal shortness of its spinal cord; thus a sunfish a yard long has a spinal cord less than half an inch in length. One larger specimen has been reported which measured 10 ft. in length and 14 ft. in vertical measurement, weighing 4,400 pounds.



This Huge California Sunfish, Ten Feet Long,  
Has a Spinal Cord Barely an Inch in Length

## "DANCE OF THE LIGHT GOD" AT PANAMA EXPOSITION

Remarkable features have been provided for the Panama-Pacific Exposition in San Francisco, but there will be few which can compare with the "scintillator," a battery of forty-eight 36-in. searchlight projectors screened by plates of colored glass. With this instrument an artist will play a harmonic symphony of light upon the inrolling fog banks, which are incidental to the falling of night in San Francisco. This exhibition has been designated "The Dance of the Light God."

## FRANCE OFFERS PRIZE FOR KEROSENE MOTOR

Prizes for the most efficient kerosene motors are offered in France in a competition under the auspices of the Automobile Club of France, which will have charge of the trials. The competition will commence October 1, 1914, at the laboratories of the club, and entries are received until April 1, at the ordinary fee of \$30, and at double fees

Photo by American Museum

until July 1. Motors entered must be 4-cyl. engines of 20-30 hp., and must not weigh more than 33 lb. per hp., everything included except fuel and oils, and their tanks. Four bench tests must be met, operating under full load, half load, half speed loaded, and half speed light. The amount of fuel burned will be carefully recorded, as well as the amount of gasoline used in starting, and in no case must the time used in



starting exceed 10 minutes. If the motors entered in these preliminary trials show a fuel consumption of less than 350 grams (about  $\frac{3}{4}$  of a pint) per hp.-hour, without repairs, they will be qualified for the road test. Each motor will be mounted on a chassis, the total weight of the vehicle to be not less than 2,645 lb., exclusive of driver, fuel and oil. Four days will be spent on the road, during which time the cars must cover not less than 621 miles at an average speed of 19 miles an hour. The first prize is \$10,000; the second, \$2,000, and the third, \$400.

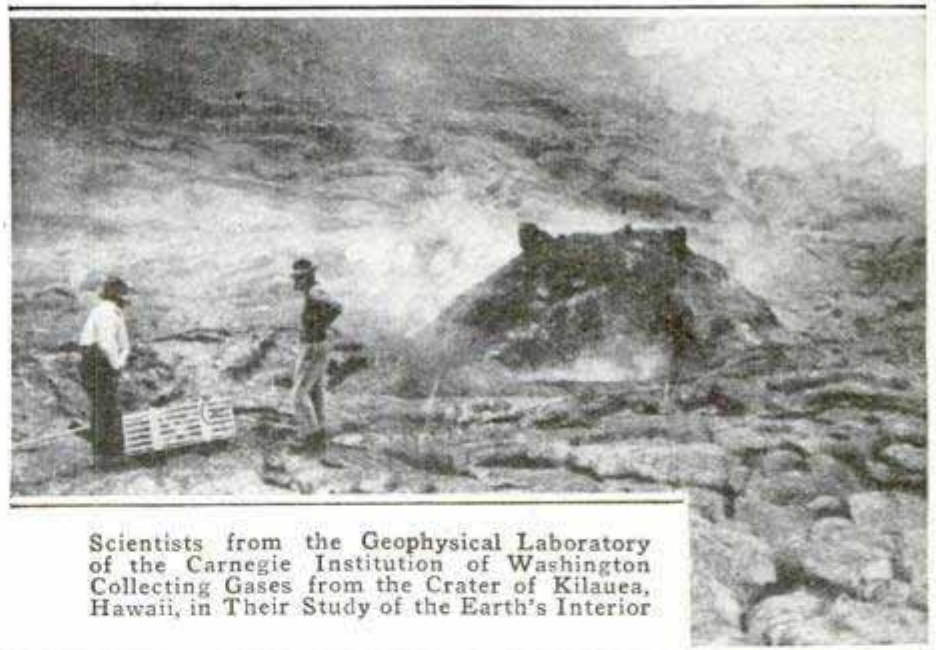
### "MOVIE" FILMS SHOW HOW TO CAST BALLOT

As the result of a suffrage law that has just gone into effect, the total electorate in Italy has been increased from four millions to eight or nine millions, and the number of qualified voters in one province alone, that of Catania, has advanced from 41,000 to 140,000. The task of educating this large number of new voters in the method of casting their votes properly is a big one, owing to the fact that few if any of them have ever before exercised the suffrage. To meet this condition moving-picture theaters throughout the district, as well as some of the political organizations, are running films showing the procedure to be followed. This means of educating the public has been so favorably received that similar methods are likely to be adopted for teaching the elements of domestic and personal hygiene.

☞ For the tropical garden at the Panama-Pacific Exposition, more than 25,000 cu. yd. of soil have been brought on barges from points on the Sacramento River.

### COLLECT VOLCANIC GASES FROM CRATER'S MOUTH

Scientists connected with the Geophysical Laboratory of the Carnegie Institution of Washington have secured gases from the very crater of Kilauea, on the side of Mauna Loa, the sacred mountain of Hawaii, which, in the ancient mythology of the Kanakas, was the abode of the goddess Pele, whose anger was evinced by earthquakes and eruptions. Equipped with specially devised breathing apparatus, these men traversed the crater, a depression 500 ft. in depth and 3 miles in extent. In the center of this they found a large lava lake, approximately three acres in area, in the middle of which there is constant volcanic activity. A crate of glass tubes, from which the air had been exhausted,



Scientists from the Geophysical Laboratory of the Carnegie Institution of Washington Collecting Gases from the Crater of Kilauea, Hawaii, in Their Study of the Earth's Interior

was carried and devices provided whereby the hot gases could be admitted to separate tubes as desired. One end of a long iron tube was thrust into an active fissure from which gas was being ejected, and by the pressure of a lever a certain amount was admitted into the tube, which was then automatically sealed. The tubes with their precious contents are now being studied in the laboratory at Washington, in the effort to obtain new knowledge of the chemical composition of the earth's interior.



### STREET-LAMP STANDARD MADE OF PIPE



A novel form of standard for street lighting is seen in San Francisco's residential park, Engleside Terrace, which is made of inexpensive water pipe and fittings, the main panel of which is covered with wire netting, against which vines are trained. The lights are incandescent globes and a simple form of

reflector completes this artistic and attractive design, which could be readily duplicated anywhere at a minimum of expense where something out of the ordinary is wanted.

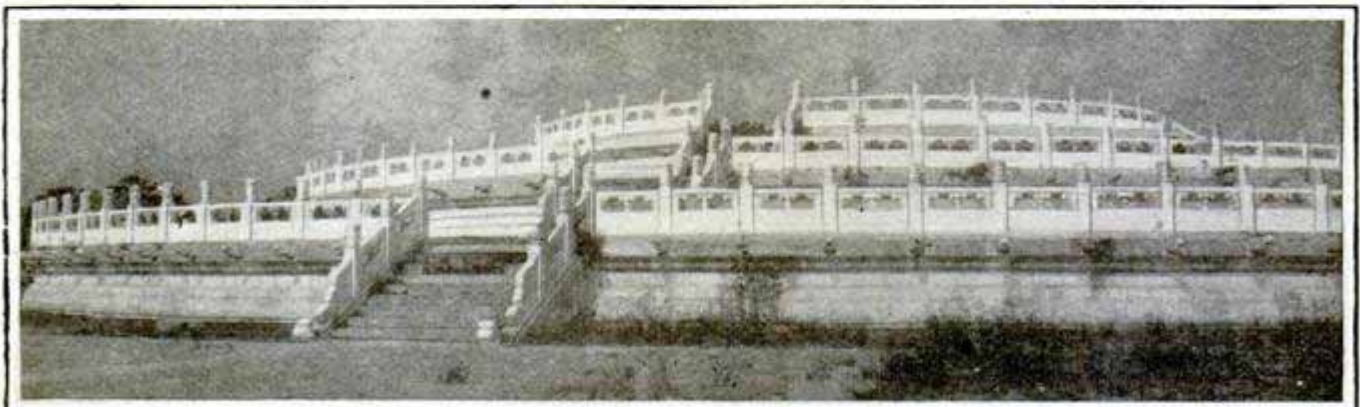
### ALTAR OF HEAVEN CALLED CENTER OF UNIVERSE

When President Yuan Shi Kai of the Chinese republic signed a bill prescribing the worship of Heaven and of Confucius, he made the great Altar of Heaven, located in Peking, once more the religious center of the nation. Built entirely of marble in three terraces, leading to what the Chinese claim to be the center of the universe, it stands near the Temple of Heaven, famed for its blue tiles. To this altar

the emperors of China have repaired for ceremonious worship once a year for centuries. The president of China will worship at the Temple of Heaven annually in the same way as did the Manchu emperors, but without wearing the diadem, which, it is feared, might be taken as an evidence of monarchical tendencies.

### A NAVAL PARTY EXPLORES ALASKAN COAL FIELDS

An expedition into the Bering River coal fields in Alaska was undertaken recently under the direction of a naval officer, to procure sufficient coal for adequate tests as to its efficiency as a fuel for warships. The difficulties met and overcome by the mining party were enormous. There were few trails and, of course, no bridges. When rivers had to be crossed the men would strip and plunge into the icy flood, holding their clothing high above their heads, for they had to have dry clothes to put on after fording the river, otherwise they all would have perished. The parties made sorry spectacles standing in the deep snow on the river banks after crossing the stream, trying to get their clothes over their numbed and bleeding limbs with benumbed fingers, while an arctic wind swept down upon them. In spite of these discomforts the party kept well and thoroughly enjoyed hunting the Alaska brown bears, which are possibly the largest bears in the world and are as cunning as they are wild and fierce. These Kodiak bears are flesh-eaters, extremely powerful, and dangerous customers at all times.



The Chinese "Altar of Heaven," Built of White Marble, is Again the Religious Center of the Nation



## TEAKETTLE CAN BE FILLED WITHOUT SCALDING

To protect a cook's hands from being scalded when she refills her teakettle, a small opening, placed between



the handle and the spout and just large enough to fit over the end of a water faucet, is provided on a 6-qt. aluminum teakettle recently put on the mar-

ket. No matter how much steam there is in the kettle, it cannot reach the hand. An extra large bottom, 10 in. in diameter, gives enough heating surface to heat water very quickly.

## INDIVIDUAL FINGER BOWLS OF PAPER

A very practical advance in sanitation has been adopted by the proprietor of several western hotels and railroad eating houses, by the substitution of individual finger bowls of paraffined paper for the glass bowl used in common with other guests. An ornamental band, sustained by uprights, holds a crimped bowl of paper made impervious by paraffin. This dainty dish



Novel Finger Bowl of Paraffined Paper

may contain the conventional slice of lemon or geranium leaf floating on the water, and when once used, the paper

bowl is thrown away or burned, obviating any possibility of insanitary contact.

## NEW FORM OF BATHING APPARATUS

A bathing apparatus recently invented consists simply of a bag made of rubber or other flexible waterproof material for enveloping the

body of the bather and provided with a collar that can be drawn around the neck in such a way as to be water and airtight. The collar is manipulated by means of cords that hang inside the bag, the whole device being so made that it can be handled by the bather without assistance. Water or steam is admitted through a valve at the front of the bag as shown. This device may be used for medicated

baths of all kinds, but is intended principally for use where ordinary bath conveniences are not available.

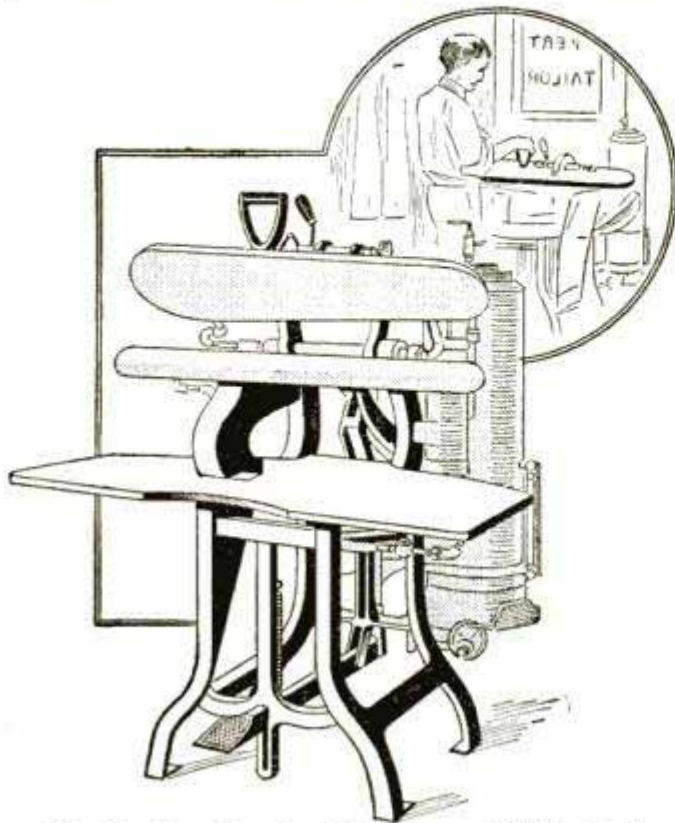


## AN IRONLESS CLOTHES-PRESSING MACHINE

The pressing of men's suits and women's tailored garments is made easy by this ironless machine. The operation is simple. The garment to be pressed is placed in the proper position on the "buck," and then the head, or pressing surface, which is covered with fabric, is pushed down on the gar-



ment, and extra pressure is exerted by means of the foot lever. Inside the pressing head are a number of steam



The Ironless Pressing Machine, and Method of Placing the Garments on the "Buck" or Pressing Block

ducts, which moisten and heat the entire pressing surface. The amount of steam to be used is controlled by means of one of the levers shown at the top of the machine. The steam is furnished by a small gas-heated boiler. Live steam is thus brought in direct contact with the material, the garment is pressed uniformly, set, cured, and sterilized at one operation. Scorching is impossible, and the garment may be worn immediately after pressing. All irregular surfaces such as shoulders, tops of trousers and skirts, fronts of ladies' jackets, and the like, are pressed over the rounded end of the buck.

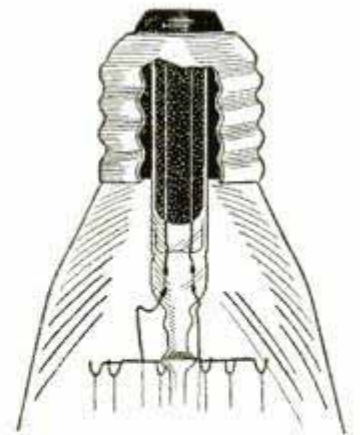
### TRAMP STARTS FIRE WHICH WRECKS TUNNEL LINING

Events happened rapidly when a tramp cooked a meal over a fire near the entrance to Tunnel No. 7, on the coast division of the Southern Pacific Railway. The flames, spreading through the dry grass, reached the entrance of the tunnel and set fire to

the timbers supporting the roof. For 51 days the tunnel was closed to traffic and the cost of extinguishing the fire and rebuilding the tunnel amounted to over \$96,000. A strong wind carried the flames through the tunnel, over 1,000 ft. long. Despite all the efforts of the railroad, which brought fire-fighting apparatus and men from San Francisco, all the timbering of the tunnel was destroyed. The intense heat generated broke down so much rock that it required weeks to remove the debris. Attempts to fight the fire by steam, carbonic-acid gas and water proved unavailing. It was finally decided to let it burn itself out. Restoration work was begun after twelve days, and normal traffic resumed over a month later. Concrete portals and supports for some distance inside the tunnel were constructed, timber being used the remainder of the way.

### A LAMP WHICH TELLS IF IT HAS BEEN USED

A device which is adapted to show if an incandescent lamp has been in use has been invented by a German electrician, and is designed to prevent fraudulent claims being made on manufacturers by dealers and others. At the base of the electric incandescent lamp is a small glass tube through which the wire conductors pass before they are joined to the filaments within the bulb. A substance sensitive to light is placed within this tube. The chemical chosen is not affected by daylight, but is altered by the action of the light from the incandescent filament. When a customer brings back the lamp for exchange or refund, with the statement that the lamp has not been used at all, a glance at the sensitive roll within the tube will proclaim whether





the lamp has been used, and as the color deepens with length of service, an approximation of the amount of use is given the dealer.

### INVISIBLE WARDROBE FITS BENEATH BED

A long box of cedar, or other suitable material, attached by slide rests



Wardrobe Attached to Bed Frame is Off the Floor

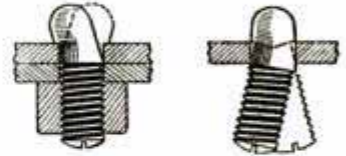
to the under side of a bed frame, is the ingenious solution of closet problems recently placed on the market. With an easy pull it rolls out from the framework of the bed, and may be sent back into place and out of sight by a slight shove. Fitted with a tight cover, the box is dust-proof and is of sufficient length to hold long skirts and trousers without folding. A smaller size is made especially for a child's crib.

### ELECTRIC HOT-WATER PLANT

The problem of equalizing the demand on an electric plant over the day and night is being solved by new uses opened for the electric current. The residence of a business man in Tacoma is heated by a hot-water plant, but instead of burning coal he has had electric-heating coils placed in his fire box, and the control switch is placed upstairs. Equipped with a thermostat, he is able to maintain an even temperature all over the house at small cost, and without the dirt, smoke, ashes and trouble attendant upon a furnace.

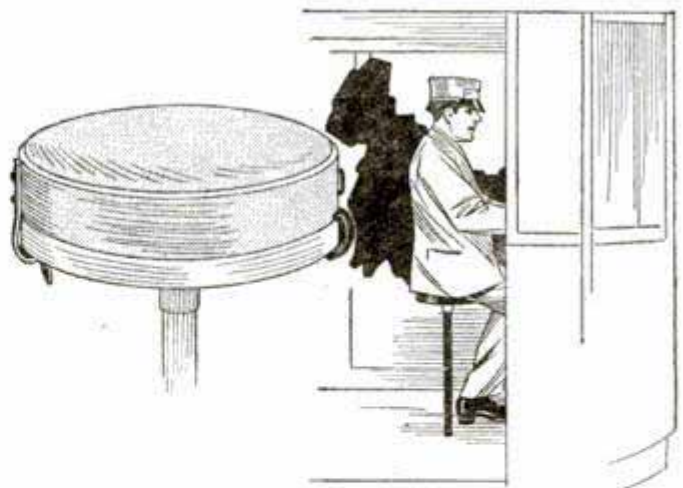
### SPLIT BOLTS HANDY IN CRAMPED PLACES

Bolts for use when only one side of the plates, or other parts to be assembled, are accessible are now split. They are made in various types to suit different conditions, the split usually running lengthwise, cutting the bolt into two parts, each of which is cut obliquely near the head so they may be turned in relation to each other and the head passed through the perforation made for the bolt and then brought together by means of the nut, which is screwed down as usual.



### SPRING SEAT FOR STREET-CAR MOTORMEN

A leather-covered spring seat has been invented which is designed to be secured to the top of the rigid seat usually provided for street-car motormen and relieve the incessant jar to which they are subjected. This seat



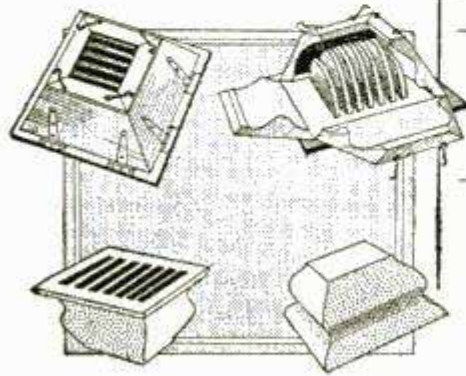
Spring Seat Adds to Comfort of Street-Car Motormen

is secured in place by means of a fixed hook and a spring snap which hook under opposite sides of the ordinary seat. It is easily removed when not in use, and is provided with a sliding hook by which it may be hung on a window rail, or other convenient object.

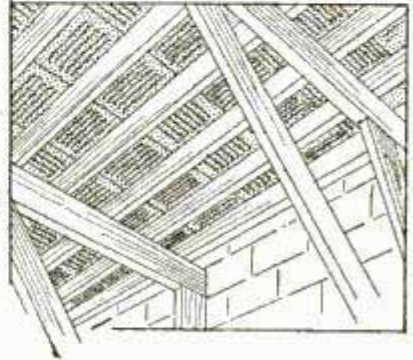


## NEW FIREPROOF FLOORING AND PLASTERED CEILING

A gypsum-plaster block, so shaped that it forms on one side a flat surface, and on the other a dome-shaped hump, is used in reinforced-concrete flooring to form a fireproof floor and at the same time a fully plastered ceiling



Saving Time, Space, and Money  
in Building Fireproof Floors



forms, flat side down, have the steel reinforcing laid along their sides, and concrete is poured in even with top of the block. Flooring can be nailed direct to the top of the plaster blocks, resulting in the saving of much space, while the floor is fireproof, and when the open forms are removed the ceiling is finished

ing which needs only a finishing coat. The blocks, which are laid on open

ished except for the white coat, the process thus being very economical.

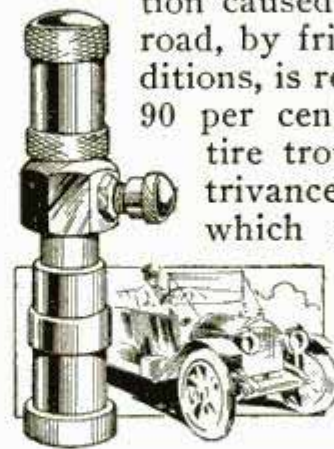
## PHILIPPINE NATIVES MAKE HATS FROM BURRI PALM

Four straws are obtained from the "buri," which is one of the most valuable of the many varieties of the palms in the Philippine Islands. These straws are raffia, buri straw, kalasiao straw, and buntal. The production of the buri straw is the most widespread. The unopened buri leaf is whitened, washed, and cut to size for weaving, and is then known as buri straw. The hats made from buri straw are loosely woven and cheap and do not wear very well, hence are rarely exported, but supply most of the local market. Kalasiao hats are produced from the midribs of the unopened buri leaf, the finest-grade hats requiring from six weeks to two months to complete. Buntal straw is extracted from the leaf stem of the buri leaf, and it takes considerable dexterity to get the fibers out in good shape. The buntal hats are made with an "over and under" weave, and after weaving, are turned over to a finisher for completion. Dealers keep these hats unironed until ready for sale, since ironing is impor-

tant to give the hats the proper finish. Buntal hats are light and silky and are said to be more pliable, and longer-lived than those from Panama.

## SAFETY TIRE VALVE KEEPS PRESSURE UNIFORM

Improper inflation, due to pumping by guess, inaccurate pressure gauges and failure to notice the extra inflation caused by the heat of the road, by friction or other conditions, is responsible for about 90 per cent of all pneumatic tire trouble. A little contrivance has been patented which prevents overinflation, and warns the motorist when his tires need more air. It consists of an air valve with



adjustable pressure gauge to be set at the figure the tires are rated for. Any excess pressure is automatically released, and a plunger, which at normal pressure protrudes from the top of the valve, disappears when the pres-



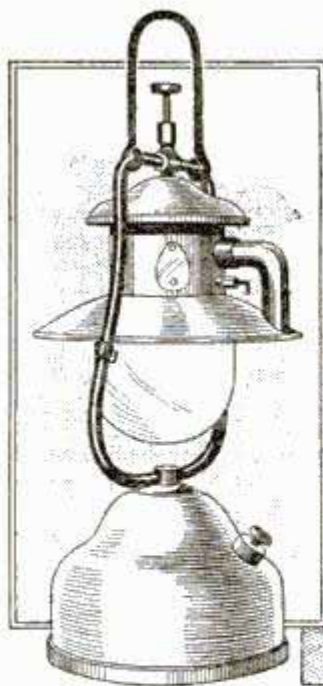
sure sinks 15 lb. below normal, thus giving a positive warning that the tires need refilling. Uniform pressure being assured, the life of the tires is lengthened, and easy riding made certain, as well as freedom from blow-outs.

### WHERE THE NAVY'S SAILORS COME FROM

Enlistments at navy recruiting stations in the past year have demonstrated that the great farming and manufacturing districts of the Middle West furnish nearly one-third of all the naval recruits. The Central and Middle Western states sent 31 per cent of all the men received in the navy, while New England furnished but 8½ per cent; the Middle Eastern states, 28 per cent; the Far Western states, 16 per cent, and the Southern states 12 per cent.

### BLIZZARD LANTERN NOT AFFECTED BY WINDS

A convenient light for outdoor use, which is not affected by winds nor extreme cold, is now on the market, in which a hooded globe contains the burner, to which gasoline is supplied from a lower res-



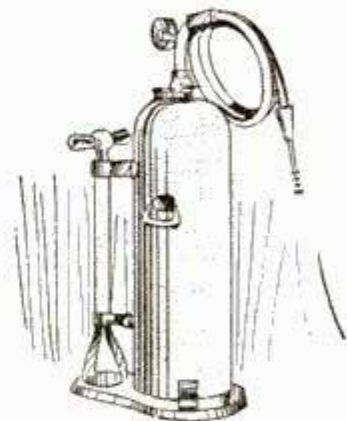
Gasoline Lantern That cannot Blow Out

ervoir by air pressure. Wood alcohol is used to start the light, which after starting burns with a powerful, steady flame.



### THREADING CONDUITS BY AIR PRESSURE

The pneumatic conduit threader is a device for placing wires through a conduit, usually a difficult process by the ordinary methods. The equipment consists of an air tank and hand pump, as shown in the illustration. "Travelers" consisting of a series of washers, loosely fitting the interior diameter of the pipe, are forced through the conduit by the air pressure from the tank. Attached to the travelers is a string, by means of which wires as required may be threaded into the conduit.



### PURE OXYGEN OBTAINED BY ELECTROLYSIS

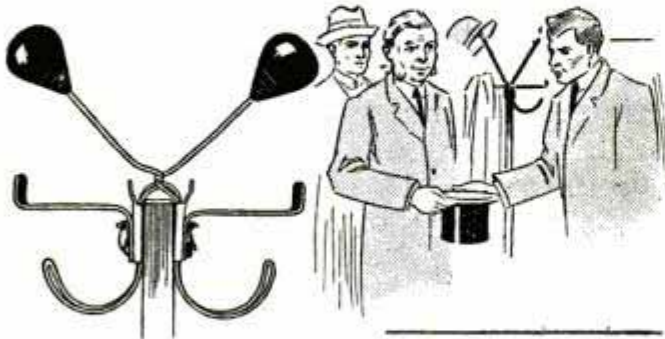
In the distillation of liquid air for the purpose of securing oxygen, present methods do not eliminate all the nitrogen, often more than 1½ per cent of the latter gas remaining, lowering the efficiency of the oxygen in delicate scientific experiments very considerably. So, too, pure oxygen cannot be obtained from well-known chemical reactions without the admixture of more or less impurities. The electrolytic method of disintegrating water into oxygen and hydrogen gases has, therefore, come more and more into use. The crude oxygen obtained from electrolysis contains from 2 to 4 per cent of hydrogen, but the gas is easily rectified by passing it

through a silver tube in which a platinum spiral is heated to redness by electricity. The tube also contains pumice stone treated with palladium.



### A TOP FOR THE TOP OF A HATRACK

Having had some complaints that ordinary wire hatracks broke and cut the hats placed upon them by check-room

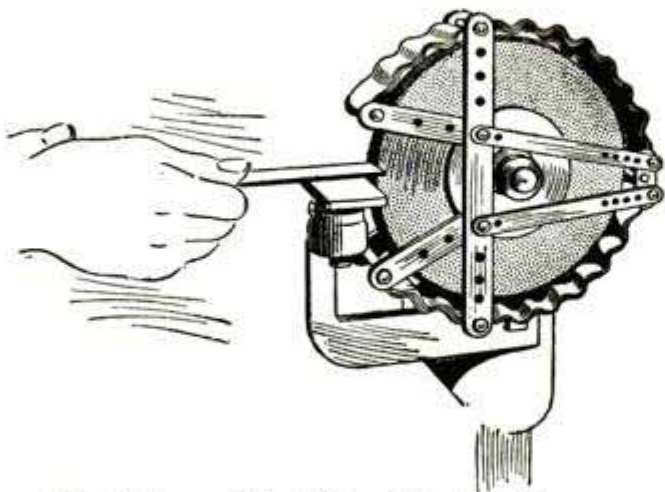


Novel Adaptation of Spinning Tops to the Hatrack

employes, the manager of the cloak-room of the Chicago Post Office obtained a thousand tops such as are sold to schoolboys for a penny apiece, and fastened them on the ends of the wire holders. The tops present a smooth, rounded surface and do not cut, scratch or mar the hats in any way.

### NEW EMERY-WHEEL GUARD CATCHES FRAGMENTS

An elastic steel guard for emery wheels has been brought out in Germany. It is designed, primarily, to resist the shock, and to hold the fragments, of a bursting wheel. The guard



Elastic Emery-Wheel Guard Used in Germany

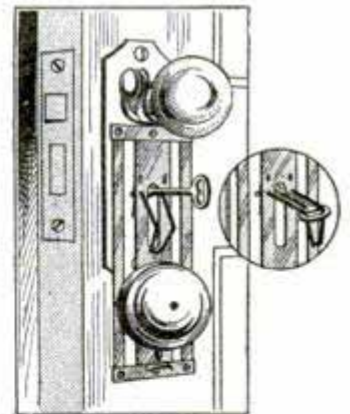
is made up of bands of corrugated sheet steel which are bound together in an elastic framework of crossbars.

### LUMBER MADE OF STRAW USED IN BUILDING

A French inventor has patented a process whereby straw is converted into an artificial wood. Beams, lath, plank and molding can be made of it, and it can be sawed, planed and polished as readily as natural wood. To make this artificial wood, straw is chopped and boiled until it is reduced to a paste, and certain chemicals added. When mixed into a homogeneous mass it is placed in hydraulic presses, and lumber of all sizes is thus made to order. It is also suitable for match sticks, as when burned it gives a bright flame with little smoke.

### DOOR-KNOB BURGLAR ALARM SOMETHING NEW

Based upon the idea that noise is the best weapon against midnight prowlers, a device has been patented which, when attached to any door, rings a bell when the door knob is turned. A key retainer is part of the device, and holds the key in the lock, preventing anyone from turning the key or pushing it out so as to introduce another key in the lock. The device uses a rotary push button for actuating the bell, which gives a continuous ring when the knob is turned. It may be left on the door permanently, and if it is not desired to ring, a thumb-screw may be loosened and the bell is silent.

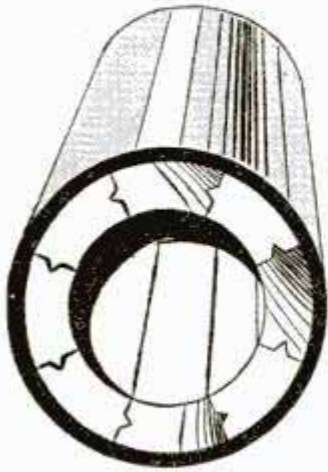


Removing an old steel bridge and replacing it with another within five minutes is the record made by a bridge gang on the Lehigh Valley Railroad, near Victor, N. Y.



## LINING PIPES WITH WOOD TO PREVENT CORROSION

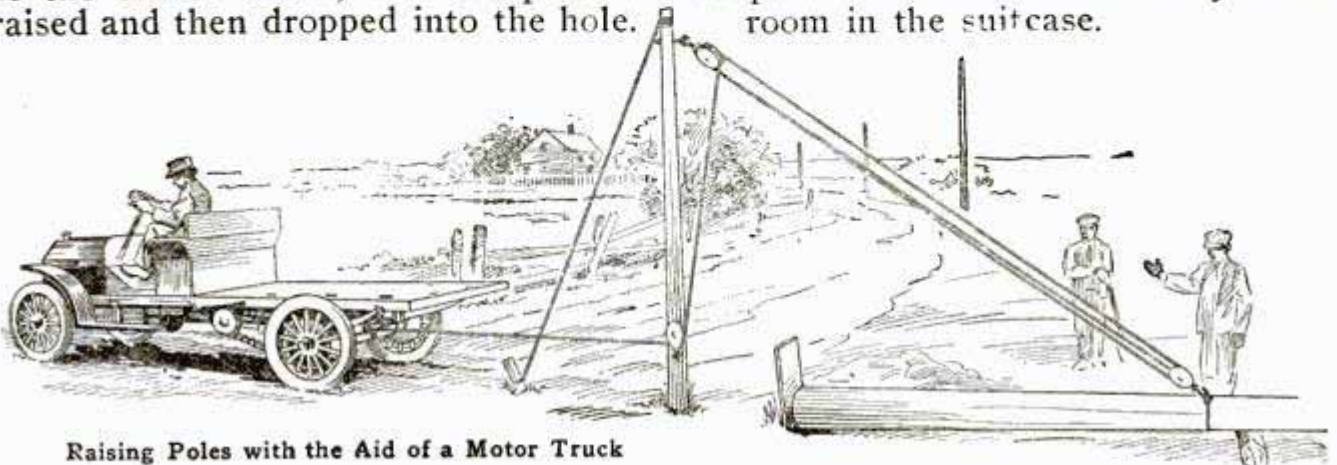
A new form of wooden pipe for the conveyance of fluids which corrode metal, through direct chemical action or through electrolysis, has been brought out in Germany. The tubing is lined with dovetailed staves under pressure and the completed lining shows little trace of joints.



The pipe does not sweat, and interior shocks are taken up by the elastic wood, preventing the bursting of the metal shell. Another advantage is that the wood does not flavor the liquids.

## MOTOR TRUCK REDUCES COST IN RAISING POLES

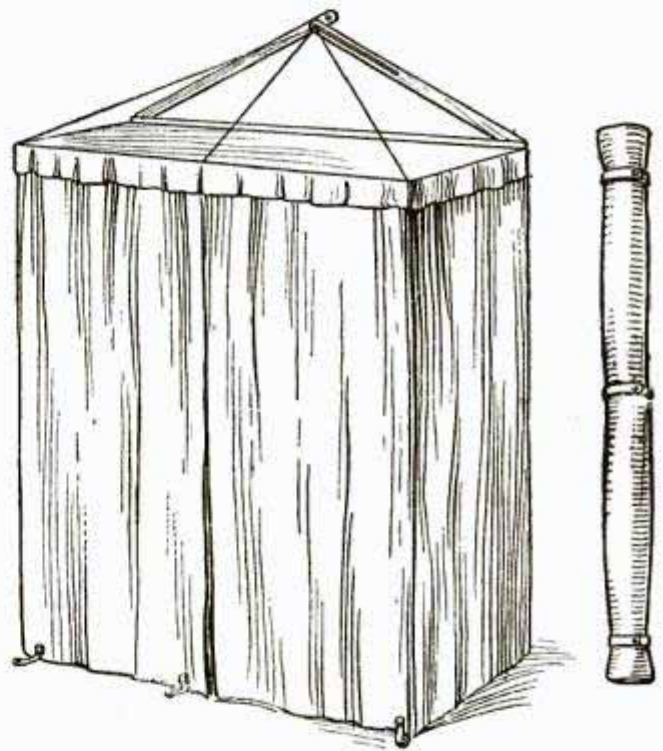
An electric-power company is using a heavy motor truck in raising the heavy poles for overhead wires with a resulting decrease of cost. A gin pole, snatch block and tackle is the only equipment necessary for this purpose. With the gin pole in place and securely anchored by guy ropes, a sling is fixed near the center of gravity of the pole to be raised and connected with the cable run through the blocks. Attachment is made with the rear axle of the motor truck, and the pole is raised and then dropped into the hole.



Raising Poles with the Aid of a Motor Truck

## FOLDING WARDROBE FOR TRAVELERS

A travelers' portable wardrobe, patented recently, can be folded small enough to be carried in a suitcase. It is intended especially for traveling men who may have to stop at hotels where no wardrobes are provided. A light framework of wood that can be hung from a nail or a picture molding forms the top of the portable wardrobe, and a curtain attached to the four sides and opening in front, hangs from the framework to the floor. The cross-



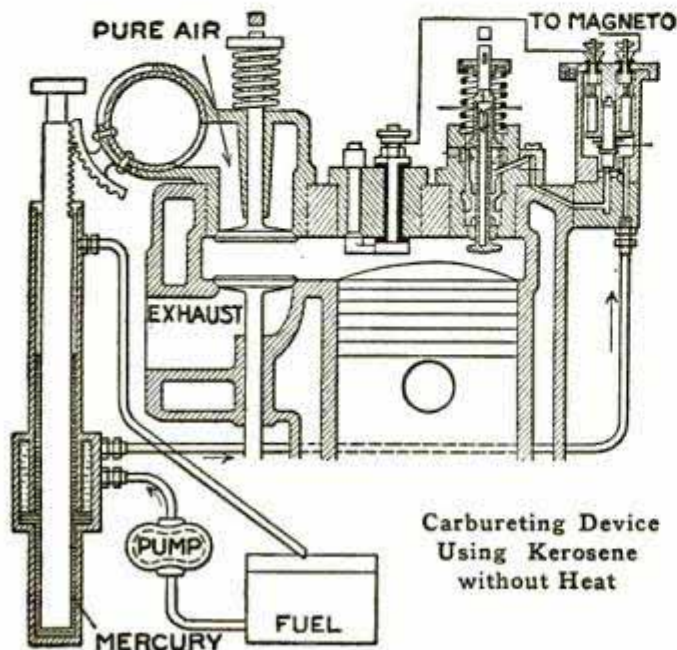
A Wardrobe That can be Folded Up and Carried in a Suitcase

pieces of the framework are hinged so that it can be folded flat and rolled up in the curtain, thus reducing it into a compact bundle that takes very little room in the suitcase.



## NEW KEROSENE CARBURETOR REQUIRES NO HEAT

A novel system for carbureting kerosene has been devised in France which does away with the application of



heat, either to the oil or to the atomized mixture, permitting the starting of an engine so equipped when cold as easily as if gasoline were used. The first point of difference in the new method is that air only is admitted through the inlet valve. The kerosene is sprayed under pressure by an atomizer, located in the cylinder nearly over the head of the piston, directly into the combustion space and mixed with the proper amount of air entering through the inlet valve and immediately compressed. There can be no opportunity for condensation, as the atomization has taken place within the cylinder itself. The admission of the raw kerosene is controlled by a needle valve, of which the needle itself is the plunger of a solenoid and is drawn into the interior of the hollow coil whenever the coil is excited. A spring prevents the passage of oil when the engine is not running. An electric-circuit breaker, geared to the crankshaft of the motor, regulates the excitations of the coil and the fuel supply is thus at all times exactly proportioned to the different requirements of the engine at varying loads.

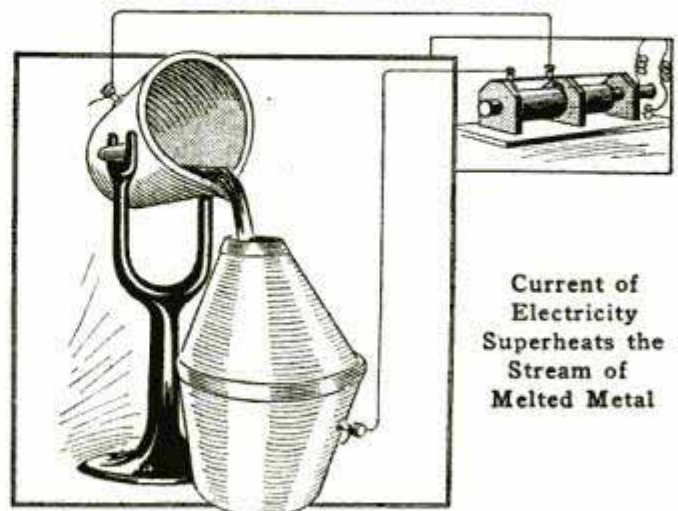
## NOVEL TOP PROTECTS MILK WHEN BOTTLE IS OPENED

A metal top which may be slipped on a milk bottle after it has been opened in the kitchen has been patented. It has a flanged sleeve, clamping the top of the bottle, and a hinged lid with a counterweight which holds it normally closed. When the bottle is tilted, the lid opens automatically, permitting the milk to be poured freely.



## SUPERHEATING MOLTEN METAL BY ELECTRICITY

Taking advantage of the fact that refractory linings of ladles or melting pots, used in foundries, become good conductors of electricity at high temperatures, a Pennsylvania inventor has secured a patent on a method of superheating molten metal by passing a current of electricity through it while being poured. Two pots or ladles are made the terminals of the circuit, the metal in one being fluid. When the contents are poured into the other, an electric circuit is established through the restricted stream, the passage of the current raising the temperature as required. The method is adapted to the

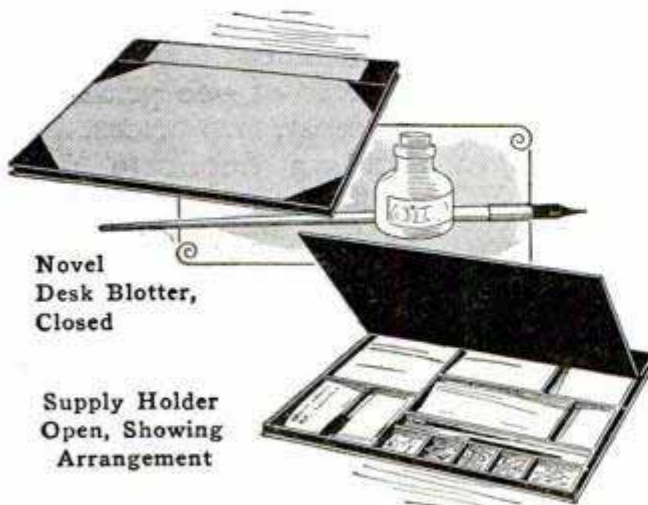


treatment of platinum or other metals where very high temperatures are necessary.



## CONVENIENT DESK BLOTTER AND SUPPLY HOLDER

A readily accessible supply of ink, pens, erasers, stationery, stamps, ruler,



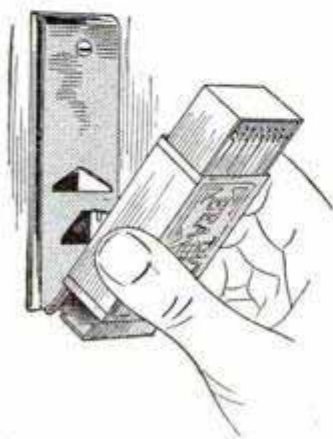
Novel  
Desk Blotter,  
Closed

Supply Holder  
Open, Showing  
Arrangement

scissors, rubber bands, etc., is found in a combination desk blotter and pad just placed on the market. The inkwells rest on the strip of blotting paper, and the cover may be raised without disturbing the ink. Interior compartments are fitted in convenient system to hold all necessary supplies for either the office desk or the home secretary. The pads come in various sizes and are cloth bound with large seal-grain-leather corners.

## HOLDFAST MATCH SAFE FASTENS ON WALL

A simple and convenient device has just been patented which locks the box of safety matches and keeps them in

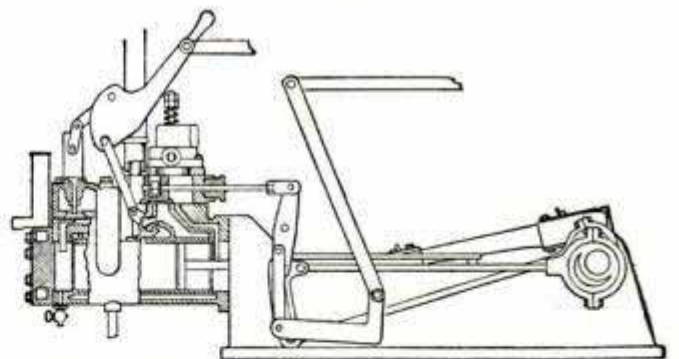


lock it securely in position.

their place. It consists of a metal back, with screw holes, so that it may be fixed permanently against the wall, desk, or elsewhere, and two protruding sharp points which pierce the wooden box and

## A GASOLINE ENGINE THAT CAN BE REVERSED

A reversible gasoline engine has just been patented which gets its reversibility from the fact that in design it is a cross between a steam engine and an internal-combustion engine. In construction it is more like a steam or pressure engine and can be run with steam, compressed air or gas, as well as with gasoline or kerosene. The valves of the engine are in a valve chest and operated by eccentrics and reciprocating links, like those on a steam engine. Back of the chest is a cut-out valve which admits either pressure fluid from a tank or boiler, or gas mixture from a carburetor. With this valve in one position, the engine runs like an ordinary double-acting steam engine; with the valve in the other position, it runs as a two-cycle explosive engine. The burned gas instead of escaping is taken from the exhaust valve into a storage tank to be used in starting. To reverse the engine, when it is running as an explosive



A Reversible Gas Engine Which Has a Valve Chest and Reciprocating Gear Like a Steam Engine, and is Run Like a Double-Acting Steam Engine While It is being Started

engine, it is necessary merely to reverse the link mechanism just as in reversing a steam engine. After the valves have been reversed, the cut-out valve is opened and gas under pressure is admitted from the tank long enough to start the engine.

☐The German imperial war flag, which has heretofore been permitted only to men-of-war, naval forts and naval offices, will in future be flown on the army airships of the German empire.



## NEW LIFE PRESERVER THAT COVERS WHOLE BODY

A new form of life preserver consists of a rubber suit that envelops the whole body and is provided with a rub-



Life Preserver Consisting of Rubber Suit That Covers the Head and Body and Has a Tube through Which the Wearer Breathes

ber cap or helmet that serves to inclose and protect the head. The helmet is made large enough to provide an air space, which not only enables the wearer to breathe for a limited time under the water, but furnishes buoyancy for the upper part of the body. Communication with the outside air is through a tube in the front of the helmet, which the wearer holds in the mouth and which is closed with the tongue when under water, while the wearer is able to see by means of two small windows placed opposite the eyes. The garment is fastened around the ankles with straps, and the opening at the top of the helmet is closed by pulling a strap that hangs inside in convenient reach. This life preserver is so designed that it may be used either for floating or swimming.

CA series of experiments recently conducted in England indicated that the receiving intensity of a wireless station is not influenced by the height of the sun during the day, but is increased in the night during a cold season.

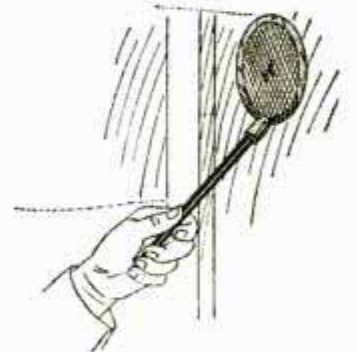
## AUTOMATIC TICKET-SELLING MACHINE

An automatic ticket-selling machine recently brought out is designed particularly for motion-picture theaters and other places of amusement, where tickets of one price, or at most, two prices, are sold, a duplicate machine being used in the latter case. The machine delivers from one to five tickets at a time and registers the sale automatically. The operator simply presses a button corresponding to the number of tickets called for, depresses a foot lever, and the tickets appear at the top of the machine in convenient reach of the customer, an arrangement that relieves the

operator of the necessity of handling the tickets. The machine is inclosed in a small cabinet which rests on a counter, and occupies a space about 10 in. square.

## FLY SWATTER WITH RUBBER EDGE

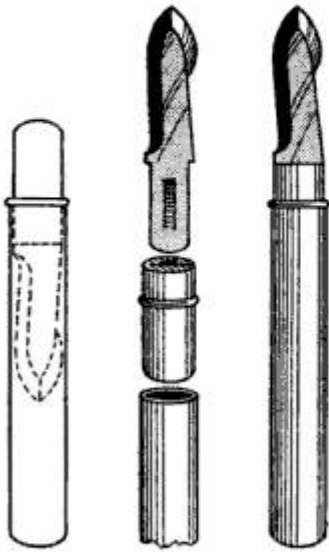
One of the new "fly swatters" has a circular rubber rim around the wire-mesh blade to increase its effectiveness. The patented rubber edge is intended to give the blade enough weight to kill bees and hornets, as well as flies, and the flexible rubber connection between the blade and the handle makes a flat blow possible on any surface. The blade can be removed from the wooden handle for cleansing in boiling water or in an antiseptic solution.





## INTERCHANGEABLE BLADES FOR OFFICE KNIVES

An office knife which serves the purposes of pencil sharpener, eraser and paper cutter is being manufactured with interchangeable blades, the purpose being that the blade may be removed while it is being sharpened and another used in its place. With this device one may use the aluminum holder indefinitely by supplying a new blade when necessary. A slight pressure on the catch spring disengages the blade, which may then be removed and another slipped easily into place.



## WASTE OF NATURAL GAS IS TREMENDOUS

The loss of gas from flowing oil wells in one district in Oklahoma, according to government statistics, equals in value the oil that is secured. Millions of dollars worth of this almost perfect fuel is wasted each year through negligence and indifference. A hundred million cubic feet of gas escapes into the air every day in Oklahoma alone, worth \$20,000 a day, or \$7,300,000 a year. This equals in heating power one and a quarter million tons of the best bituminous coal. The loss of gas in California and Louisiana is no less extensive, and practically all of it unnecessary. Modern methods of drilling make such tremendous drains upon natural resources avoidable, and gas wells may be closed by proper precautions. The gasoline content in the wasted natural gas would go a long way toward keeping the cost of motor fuel down.

## NEW WIRELESS CORPS AID TO SIGNAL EFFICIENCY

It is proposed to organize radio companies to act with the aero sections of the Signal Corps of the United States army, which shall be completely equipped with wireless apparatus, capable of hard service in the field. The field companies consist of telegraph and buzzer outfits with a radio section. The aero section will carry four aeroplanes with necessary equipment, and each company will consist of eight airmen and 40 enlisted men. By combining the activities of the telegraph and aero sections with a complete wireless outfit, the efficiency of the Signal Corps will be vastly increased.

## NEW RAILWAY CLOCK SHOWS MINUTES AT A GLANCE

The minutes on a novel dial, arranged for the use of railroads, are big and plain, because they are so very important to trainmen and others in the transportation and mechanical departments. The idea is not new, but the adaptation is ingenious, and the time is easily read in poor light or at a distance. Lengthening the minute

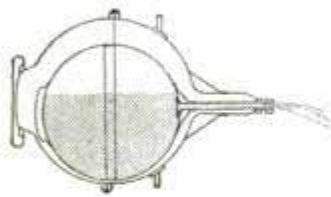


Novel Dial Which Makes It Easy to See the Minutes hand, and showing the hours in different color are the features of this interesting clock.



## EASY-EMPTYING VACUUM FLASK

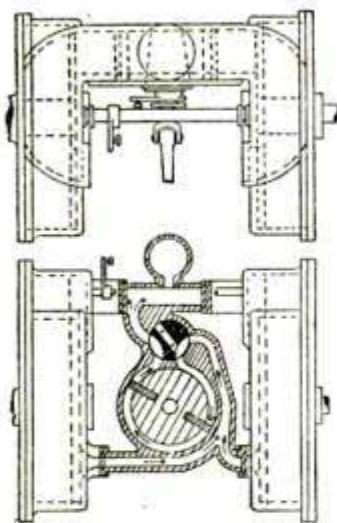
A vacuum container for liquefied gases, designed for easy emptying, was recently patented by a German inventor.



The container is composed of two metal vessels, one inside the other, with a vacuum between —like the ordinary vacuum bottle. Easy emptying is made possible by the fact that the inside flask is suspended from the mouth of the container by a long narrow neck. When the container is placed upon its side, the inside flask rests against the outer vessel, allowing heat to pass to its contents. The resulting vaporizing of part of the liquefied gas quickly forces out the contents. A perforated receptacle filled with magnesium carbonate absorbs any gas that escapes into the vacuum.

## HYDRAULIC TRANSMISSION FOR MOTOR CARS

A new type of hydraulic transmission for motor cars is being introduced which combines a pump running at constant speed with a motor of varying speed,



Courtesy The Horseless Age

being due to the varying surface of the pistons subjected to the action of the fluid. The locations of the rotary pump and controlling valve, as well as the circulation of the liquid, are shown in the illustration. The three positions of the valve enable the driver to move forward or backward, or to stop the car without change in the direction or speed of the pump motion. The liquid

is driven through two motors, one on each side of the car, each controlling one of the rear wheels. The circulation is self-equalizing, and no gear differential is required.

## ROLLERS FOR ASH CANS FACILITATE HANDLING

A loaded ash can or garbage receptacle is an unwieldy object. A recent invention seeks to lighten the labor attendant upon handling such unhandy affairs by placing small adjustable wheels beneath the edge of the can in such a manner that they will carry the loaded can when desired or may be thrown up and out of the way when the can is in place. A small wrought-iron wheel is hinged to a clamp fastening easily on either side of the bottom of the ordinary galvanized ash can, making a two-wheel truck convenient to handle the loaded can.



Patent Rollers Attached to Ash Can Transform It into Truck

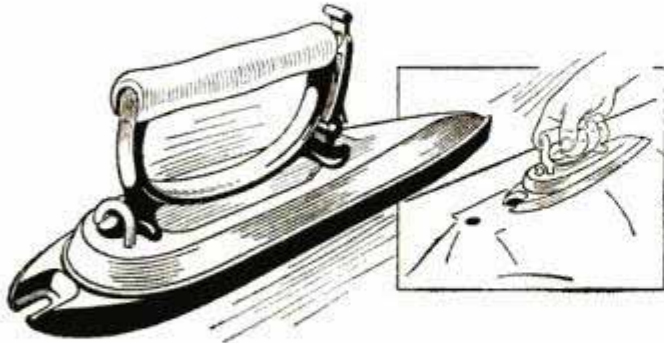
When not in use, the wheels are simply pushed up out of the way and the can is then resting solidly on its base.

⌈The production of natural gas in California, in 1912, amounted to 9,354,428,000 cubic feet.



## NOVEL FLATIRON SAVES BUTTONS

The modern song of the shirt is punctuated by missing buttons, the bane of hurried laundresses. A new



New Device Irons All Around the Button

flatiron has been patented which enables the ironer to give a smooth finish all about the buttons on dress or shirt without tearing them from the garment. A recess within one end of the iron, just big enough to permit the entrance of the button, is the feature of the invention. It readily lends itself to easy handling by even unskilled labor. The handle is removable.

## BUILD ICE ROADS FOR HAULING LOGS

Hauling heavy logs from the forest where they grow to the railroad is facilitated by the building of ice roads. After the roadway has first been prepared by removing timber, stumps and brush, watercarts equipped with two-hose sprinklers are run over the roads when the temperature is at zero or below, and the water dripped in two streams. It freezes as it falls, forming ice-covered ridges and as the cart is kept traveling back and forth, these ridges increase to the depth of several inches. Heavy ruts or grooves are then cut in this ice, to keep the heavily loaded sleighs from running off the ice onto the bare ground. A curious steam engine is used to haul the logs, the front part resting on runners and the rear wheels traveling in a caterpillar belt, with spikes to catch the ice surface.

## DISH-WASHING MACHINE FOR HOME USE

Designed to relieve the housewife of a disagreeable task, the dishwasher shown in the picture is simple in construction and operation. A hollow drum divided into two parts just above the middle line, opens to receive a semi-circular basket of strong wire with suitable racks for holding the dishes. The drum, which revolves, is equipped with several T-shaped elevators, extending the whole length, and these serve to pour the soapy water upon the dishes in the basket, which remains stationary. A gallon of water is sufficient to wash an entire set of dishes, and the basket may be removed to the rinsing pan by lifting it out of the drum.



## NEW SHOCK ABSORBER FOR AEROPLANES



Designed to minimize the terrific jar with which an aeroplane sometimes strikes the ground, a patent recently issued has for its basic principle a hollow cylinder pivoted to the base of the frame and open at its lower end to receive a piston, the rod of which is connected with the axle of the wheelbase. It thus seeks to interpose an air cushion in such manner that when an aeroplane strikes the ground it will first impinge upon the wheelbase, causing the piston rod to operate the piston within the cylinder, absorbing the shock and relieving the machine of unnecessary jar.



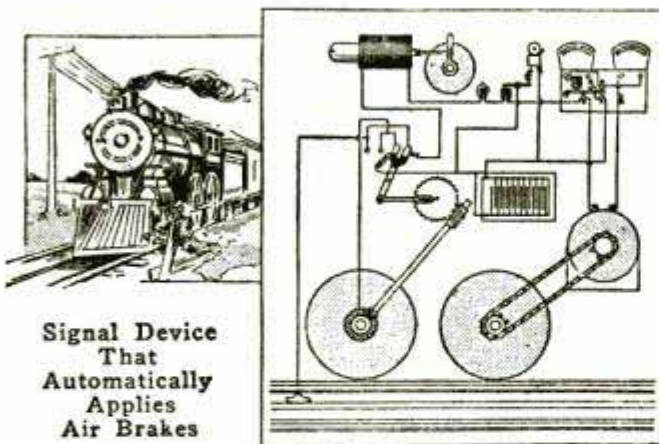
## RUBBER TOOTHBRUSH THAT SLIPS OVER FINGER

A rubber toothbrush which slips over the first joint of the index finger, and which is provided with fine rubber spines for cleansing the teeth, is a novelty on the market. This brush has no bristles to be lost. The claim is made that it is more sanitary than the ordinary type of brush, and that it can be used for massaging the gums without danger of injury.



## AUTOMATIC DANGER SIGNAL AND TRAIN CONTROL

The prevention of accidents on railways is engaging the attention of many minds. A device for which a patent was recently issued is automatic in operation and inexpensive in construction. It consists of an insulated rail laid between the tracks, upon which a shoe with sliding contact actuates electrical mechanisms in the cab. A warning bell is sounded when another train enters the block, a light



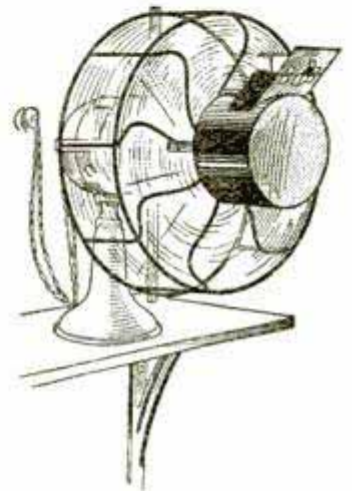
Signal Device That Automatically Applies Air Brakes

in the cab increases in brilliancy as the trains approach, and at a predetermined distance the air brake is applied automatically, bringing the trains to a standstill. A storage battery supplies the current, a gear on any wheel of the engine entrains a mechanism

for reversing the polarity of the shoe, and the resistance between the rails and the shoe controls the warning signals. When the track is clear, the circuit through the apparatus will at no time be closed, while the approach of another train or trains will intermittently change the polarity of the shoe, increasing the resistance until at last it will impel the warning signal.

## ELECTRIC FANS USED FOR DISINFECTANTS

A device which may be attached to any electric fan, for the purpose of automatically disinfecting the room in which the fan is operating, has been patented. The attachment consists of a metal container from which projects a wide-mouthed spout. The lower end of a wick extending from this spout lies in the disinfecting liquid, and capillary attraction brings a fresh supply of disinfectant constantly up to the blast of the fan, which blows the disinfecting medium to all parts of the room.



## NEW YORK STREET CARS USE NOVEL MOTOR

A new street-car line at Great Neck, L. I., will use a novel form of propulsion, for although the cars run on rails and have every appearance of electric cars, they will be independently operating units, without overhead wires, third rails or central power station. A flash boiler on one platform, heated either by gasoline or kerosene, supplies a steam turbine under the body of the car, the normal speed being from 3,000 to 4,000 revolutions per minute. A herringbone gear set connects the turbine to a hydraulic trans-



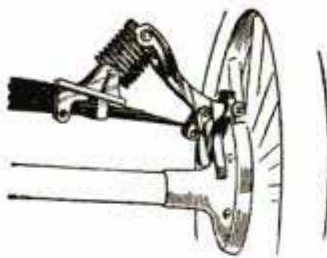
mission, running at 600 revolutions, which delivers power to all four wheels. Twenty-five horsepower is developed by the turbine.

### CURIOUS USE OF COLORED LIGHTS

Color is the result of the reflection of certain rays from the surface of a body, and if the light thrown upon it does not contain such rays, the body will appear dark or black. At the New York Electrical Show a novel application of this principle was shown, where a series of placards on a dark background were illuminated by light reflected from colored lamps placed in front and at the sides of the cards. A switch connected to the lamp circuits alternately lighted lamps of different colors. When each kind of light was in turn thrown upon these colored placards, portions of the picture seemed to disappear, owing to the neutralizing influence of the colored lights employed.

### UNUSUAL SHOCK ABSORBER WITH COIL SPRINGS

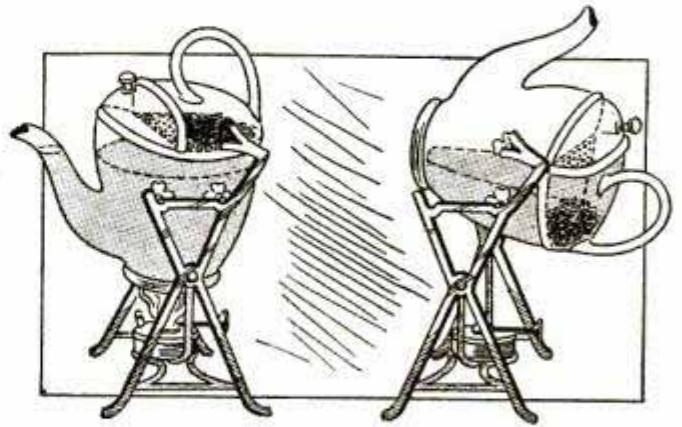
Flat steel springs 9 ft. long, coiled, consisting of four sets, two for each leaf spring of the car, have made their



appearance, which work under compression at all times. Rebound is checked when the leaf spring rises above a certain point, the main lever of the shock absorber is held stationary, and the coil springs are again compressed, so that both upward and downward movements actuate the coil. This novel shock absorber has been found so sensitive that when the car is unoccupied the pressure of the hand will move the car body on the coils. Spring perches are used to attach the absorber, being reversed on the front axles, while on the rear they are bolted to the brake housings.

### PIVOTED TEAPOT SWINGS FOR BREWING

A practical novelty is a pivoted teapot with an upper compartment to hold the tea leaves, and an alcohol

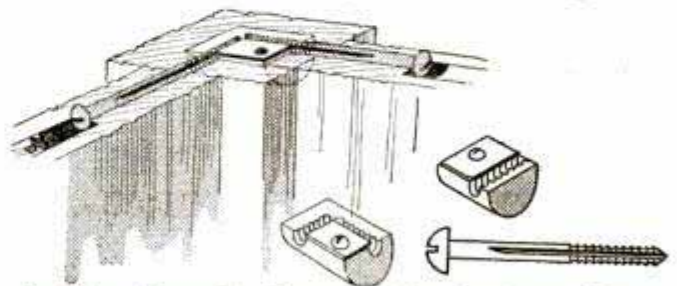


French Teapot Which Does Away with Troublesome Details in Brewing Tea

lamp beneath the pot with which the water is boiled. At the instant of boiling, the flame is extinguished, and the teapot tilted backward until the water covers the tea leaves. The teapot is left in this position as long as may be necessary, and when returned to its normal position the tea is ready for drinking, and is not further affected by contact with the tea leaves.

### LOCK SCREW FOR FURNITURE JOINTS

To take the place of glue and wood-dowel joints in furniture construction and to give greater strength and rigidity is the purpose of a furniture-locking screw that has recently been patented. It is simply a bolt and nut made in such shape as to be imbedded in the wood about the joint entirely out of sight. A small plate, working like

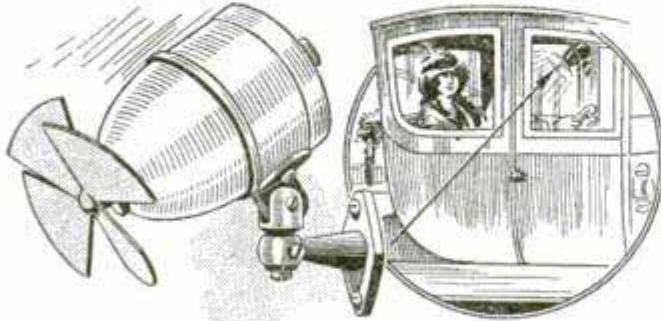


Locking Screw for Strengthening Furniture Joints a ratchet in four channels in the screw, locks the bolt automatically at each quarter turn as it is driven into place.



## ELECTRIC FAN FOR CLOSED AUTOMOBILES

A diminutive electric fan, especially designed to ventilate the interior of a closed automobile, is a French novelty.



Self-Contained Automobile Ventilator

The double-jointed mounting provided with the fan permits one to direct the air current toward any part of the car. The motor is completely inclosed, so there is no leakage of lubricant and the fan is self-contained in an aluminum body. It uses but little energy and takes up very little room.

## ADJUSTABLE CONDUIT BENDER

An ingenious adjustable bender for the conduits used in wiring is here shown. It will bend either  $\frac{1}{2}$ -in. or  $\frac{3}{4}$ -in. conduit without crushing or kinking it. The weight of the bender is a little over 10 pounds.



¶The variations of pressure in water mains are utilized by a French inventor for the operation of a self-winding clock.

## JAPANESE PICTURE BRIDES IN AMERICA

Each steamer from Japan which lands its passengers at an American port brings over a number of young women from the "Land of the Cherry

Blossoms" who are coming to claim husbands they have never seen, but whose photographs they cherish and to whom by Japanese statute they have been lawfully wedded. In the past five years the number of Japanese women in America has doubled, and the increase is due to the "picture brides" as they are called. Japanese bachelors coming to this country as laborers have had their pictures taken and have sent photographs back to parents or friends at home, asking that brides be secured for them. Consent of the girls' parents and registration before the proper official suffices to make the marriage valid according to Japanese law. America, however, requires that another wedding be celebrated and at one time the immigration officer married these couples upon the pier. This was the "pier marriage," but it was so lacking in romance that now the official visits the couple at their hotel and performs the ceremony, and the honeymoon begins with the journey to the new home. In Japan the young couple meet for the first time before the matchmaker and ratify the arrangements. Here, on the pier in a new world, the young bride stands with the photograph of her husband in her hand, seeking to identify him among the hundreds of crowding Japanese. The girl whose dream of America has painted a land of gold, her life one of aristocratic ease, the wife of a wealthy man, may find herself condemned to hard work in the camp or on the farm, if her husband is but a laborer. Many disappointments come to the picture bride, but on the other hand the number of Japanese women in America is steadily increasing, the divorce evil does not touch them, and race suicide is unknown.

¶An eastern railroad is experimenting with "coke breeze" as a locomotive fuel. This fuel, formerly regarded as waste, consists of granular and other particles of coke that are too small to be used in smelting furnaces.



## WASTE TWINE SAVED FOR FOUR YEARS

For years and years the clerks at the post office at Pleasant Ridge, Ohio, threw the short pieces of twine which come wrapped around the bundles of letters into the waste basket. Four years ago the superintendent began saving the pieces and today he has a big ball of twine, 29 in. in diameter, which weighs 75 lb. He calculates



Thirty Miles of String in Ohio Post Office

that there is 30 miles of twine in that ball, and he is still saving the pieces, day by day.

## PHOSPHORESCENT INK NOW USED IN PRINTING

Printers' ink containing a radium preparation has been manufactured in Germany, by means of which newspapers can be printed that can be read in the dark without other illumination than that contained in the ink itself. The so-called radium colors produce light in tints of green, violet, blue, red, and yellow. The inventor claims that these colors will retain their phosphorescent qualities for 10 to 12 years, may be used for signs, wall decorations, illuminating stairways, as well as for painting ships, boats and aeroplanes. All sorts of materials have been treated with the preparation.

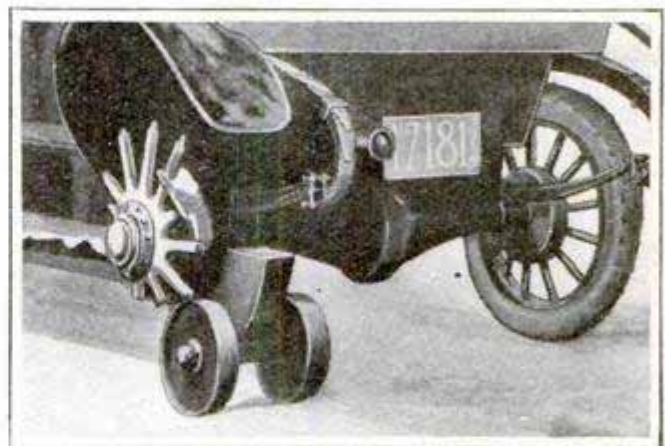
## WATCH THAT SHOWS LAST TIME WOUND

A watch that accurately indicates the exact time elapsed since the last time it was wound has recently been placed on the market. The face of the timekeeper is provided with a small dial near the top of the regular dial, which has a small hand that shows when the mainspring was last wound and also records the progress of its unwinding, thus showing, at a glance, when the watch needs rewinding.



## CASTERS FOR CRIPPLED AUTOMOBILE

A very present help in time of trouble has been invented by an Illinois garage man, consisting of a wrecking truck for towing automobiles which have lost a wheel. The device can be carried in the relief car and readily slipped under the front or rear axle of the damaged car, and as the small wheels operate like casters, there is

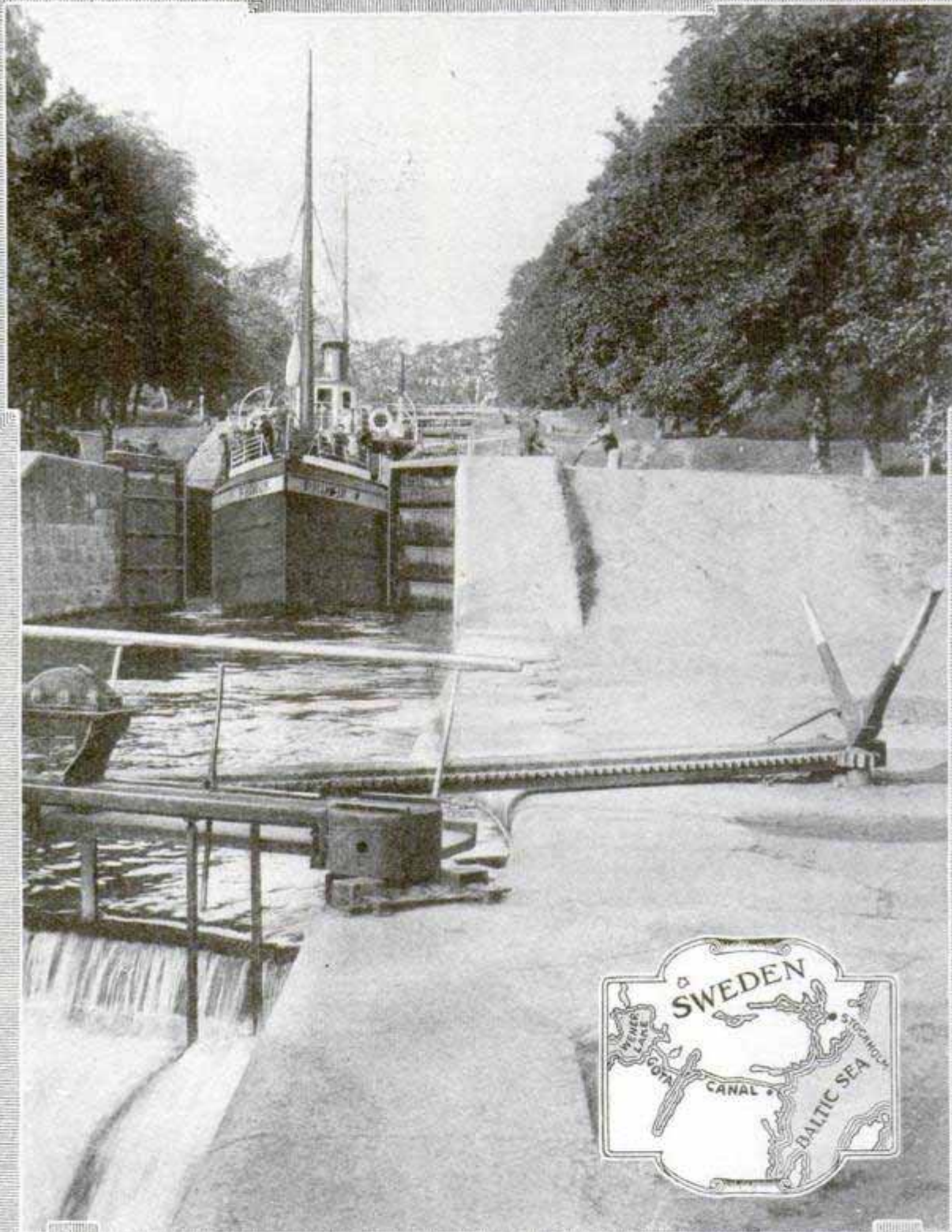


Handy Device for Relief of Injured Automobiles

no trouble in steering. This appliance does away with the former method of setting a heavy beam under the axle and dragging the car to the repair shop.



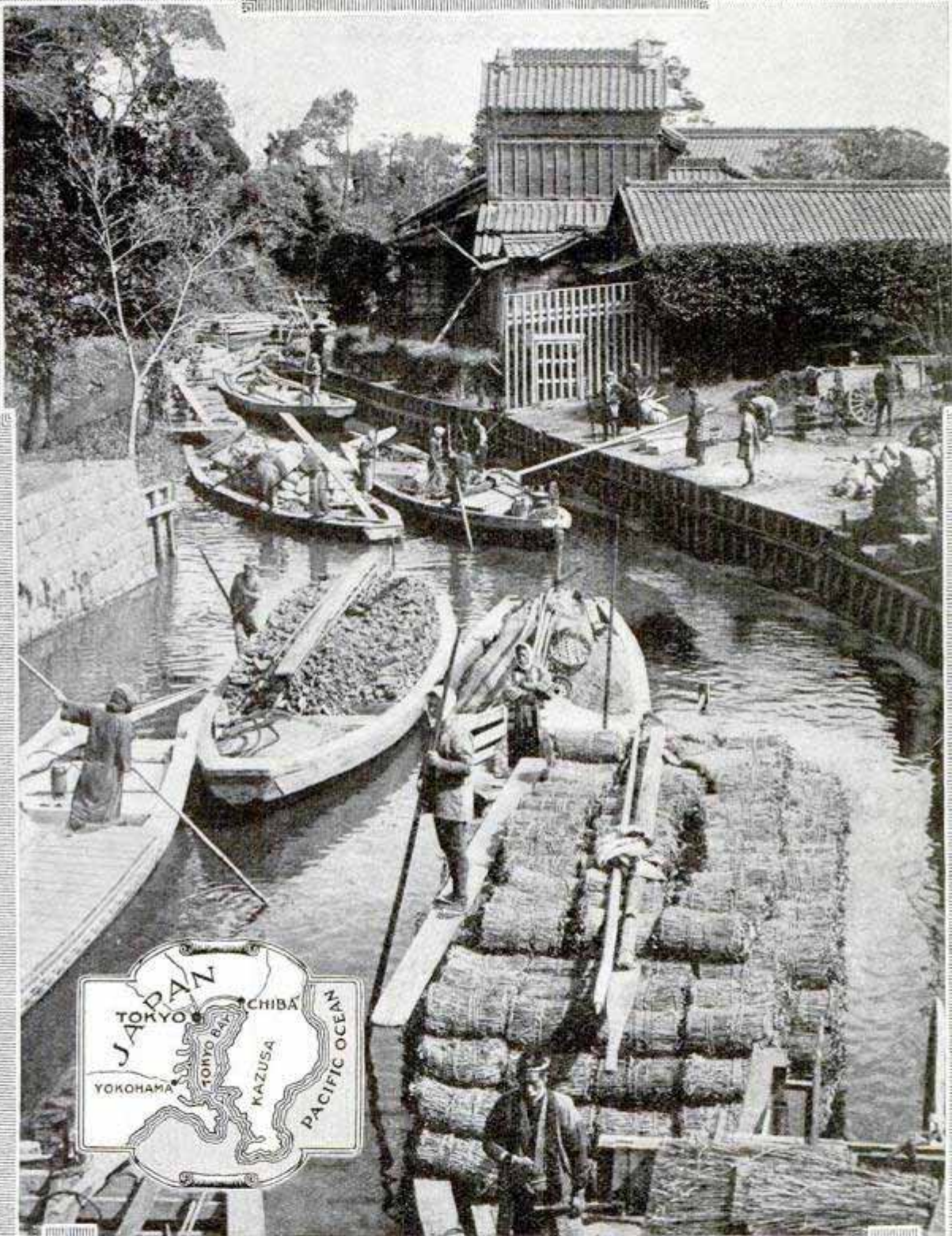
## ARTIFICIAL WATERWAYS IN MANY LANDS



The Göta Canal is the Longest and Most Important Artificial Waterway in Sweden. Connecting Wener Lake with the Baltic Sea, It Enables Vessels of Light Draft to Pass Entirely across the Country, from the North Sea to the Baltic. The Göta River Connects Wener Lake with the North Sea. The Photograph Shows the Locks at Borensult. The Enlargement of This Canal to Permit the Passage of Ocean-Going Vessels is being Agitated in Sweden



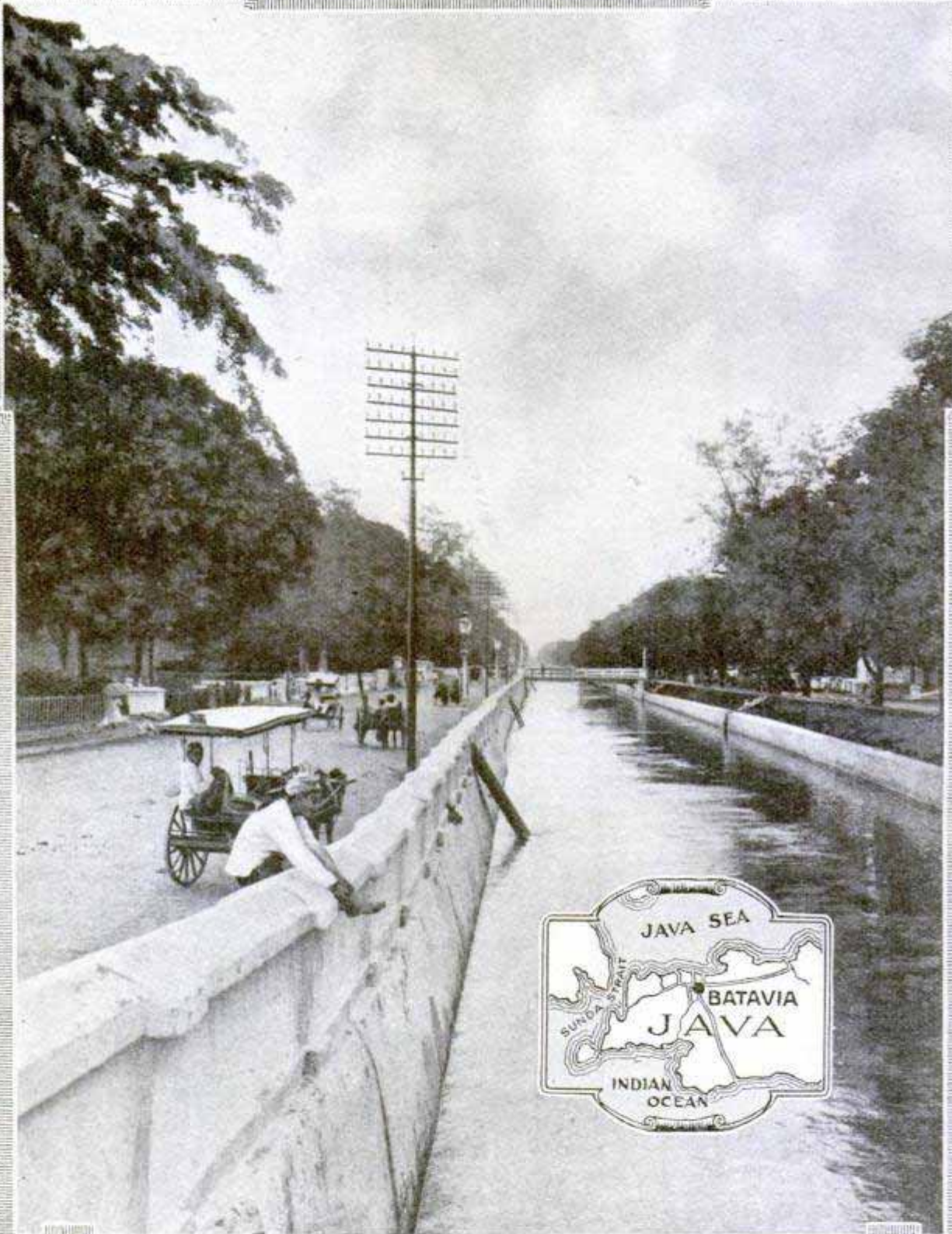
# ARTIFICIAL WATERWAYS IN MANY LANDS



Probably No Other Country is so Completely Covered by a Network of Streams, Lakes and Canals as is Japan. The Rivers being Small and Shallow, Canals Provided the Principal Means of Inland Intercourse before the Railroads were Built. The Lower Part of the City of Tokyo, the Capital of Japan, is Intersected by Many Canals, Connecting Various Parts of the City and Adjacent Districts with the Sumida River and the Bay. The Photograph Shows a Scene on the Chiba Canal, One of the Most Important of These Watercourses



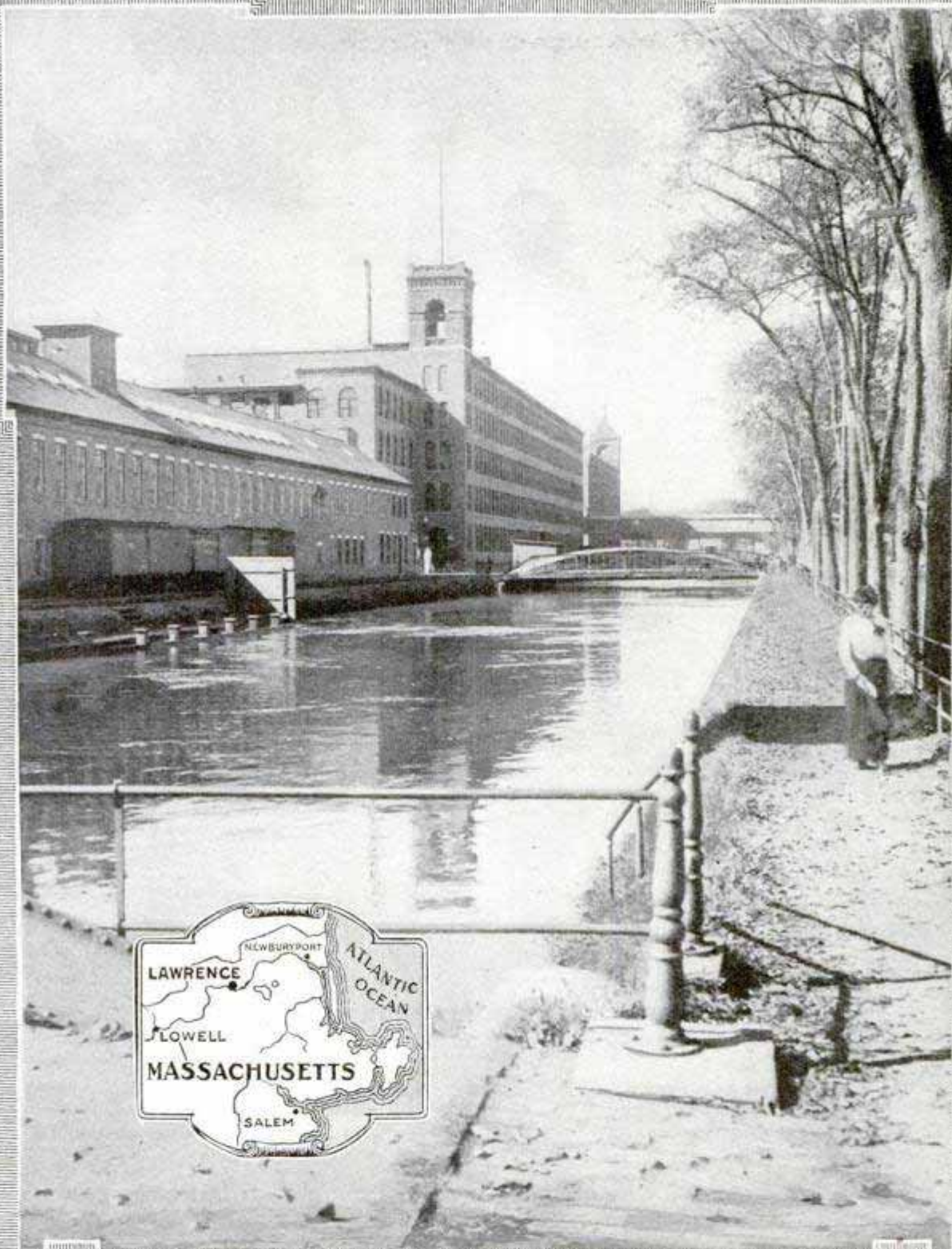
# ARTIFICIAL WATERWAYS IN MANY LANDS



When the Dutch East India Company Settled in Java, in 1610, They Brought with Them Many of the Traditions of Holland. The Swampy Plain at the Mouth of the Jacatra River on Which the Town of Batavia is Located Bears a Certain Resemblance to the Lowlands of the North Sea, and Quite Naturally Canals Similar to Those of Holland were Excavated to Provide both Drainage and Means of Communication. The Photograph Shows One of These, Connecting Two Sections of the City Which are Known as Molenvliet (Mill Stream) and Noordwijk (North Town). This Canal Gives Communication by Water from the City to the Harbor



# ARTIFICIAL WATERWAYS IN MANY LANDS



The "Great Canal" at Lawrence, Mass., Although Not a Navigable Body of Water, is Nevertheless Important among the Canals of the World. It Carries the Water of the Merrimac River a Distance of One Mile, and in Falling Back into the River Bed Below, the Falls Develop 12,000 hp., to Operate the Great Woolen and Cotton Mills. A Stone Dam, 900 Ft. Long, Holds the River Back and Diverts It into This Canal and a Shorter One on the South Side of the River. The Total Fall is 28 Feet



## RUBBERS FOR DANCING THE TANGO

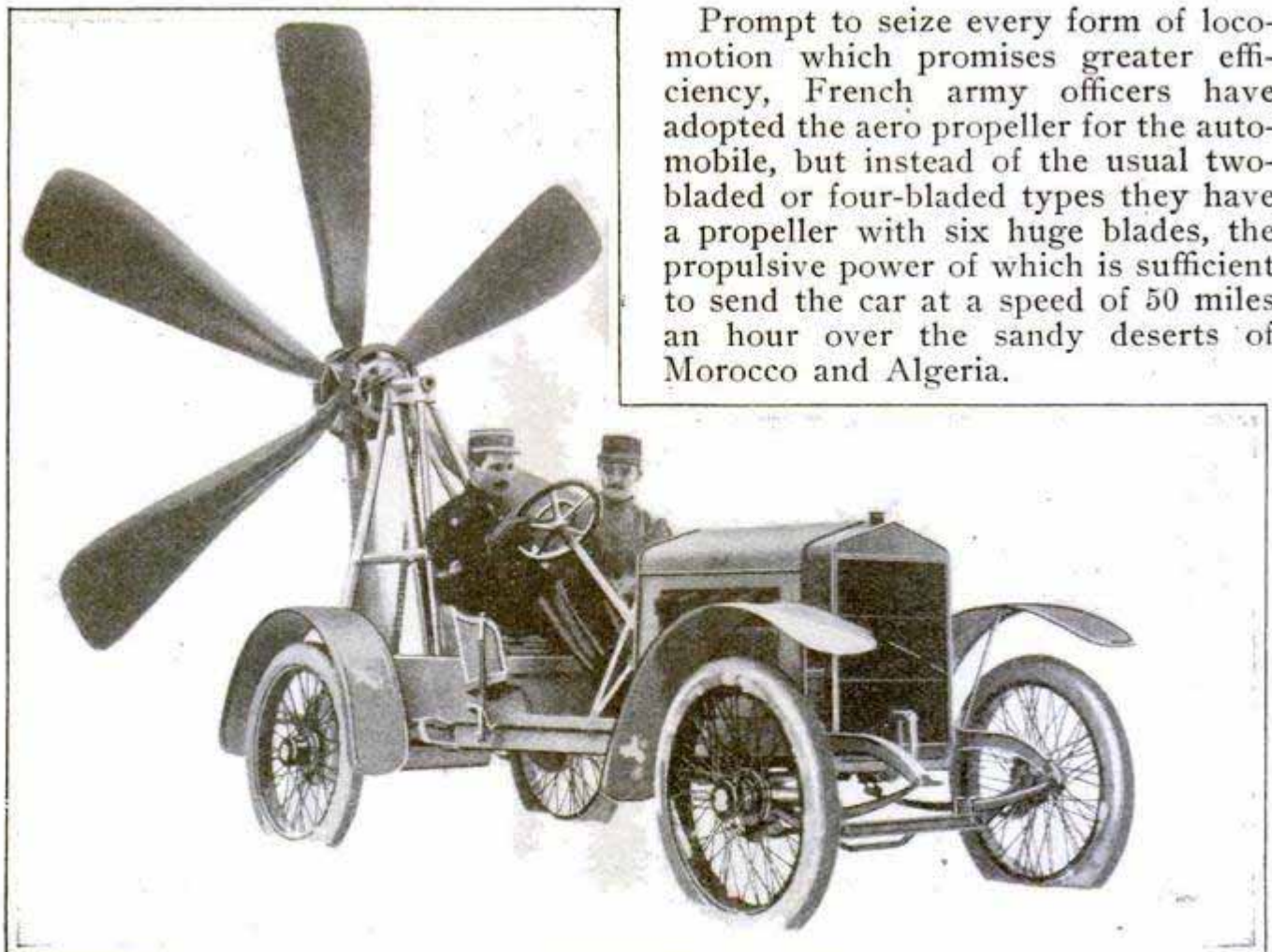
The pace prescribed for dancing the tango is so rapid that the old-style dancing pump cannot be used on a slippery floor with safety. Modifications were introduced, such as a rubber patch in the leather sole near the toe of the pump, or near the ball of the foot. At last a Massachusetts shoe firm has produced a rubber sole which may be slipped on over the sole of the ordinary dancing pump, converting it into a "tango slipper" which gives a firm grip upon the dancing floor and at the same time is scarcely noticeable on the foot.



## STRUCTURE OF HUMAN HAIR TELLS RACIAL ORIGIN

Scientists are able, by the use of the microscope, to tell from a single human hair to what great racial division the original wearer belonged. If a cross section of the hair is elliptical, the man was black; if round, the man was yellow or red; while the white man's hair is oval. The Australian native has hair with the least diameter, the Bushman of Africa, the next, then the American Indian, the Chinese, the white races of Europe, and lastly the Japanese, the coarsest of all. The beard of a white man is 50 per cent thicker than his hair, and is almost identically the size of the hair of the chimpanzee. The strength of human hair is, as a rule, in direct proportion to its thickness.

## SIX-BLADED PROPELLER ON MILITARY AUTO



Prompt to seize every form of locomotion which promises greater efficiency, French army officers have adopted the aero propeller for the automobile, but instead of the usual two-bladed or four-bladed types they have a propeller with six huge blades, the propulsive power of which is sufficient to send the car at a speed of 50 miles an hour over the sandy deserts of Morocco and Algeria.

Speedy Flying Auto Adopted by Military Authorities in French Colonial Possessions  
Photo by Underwood & Underwood

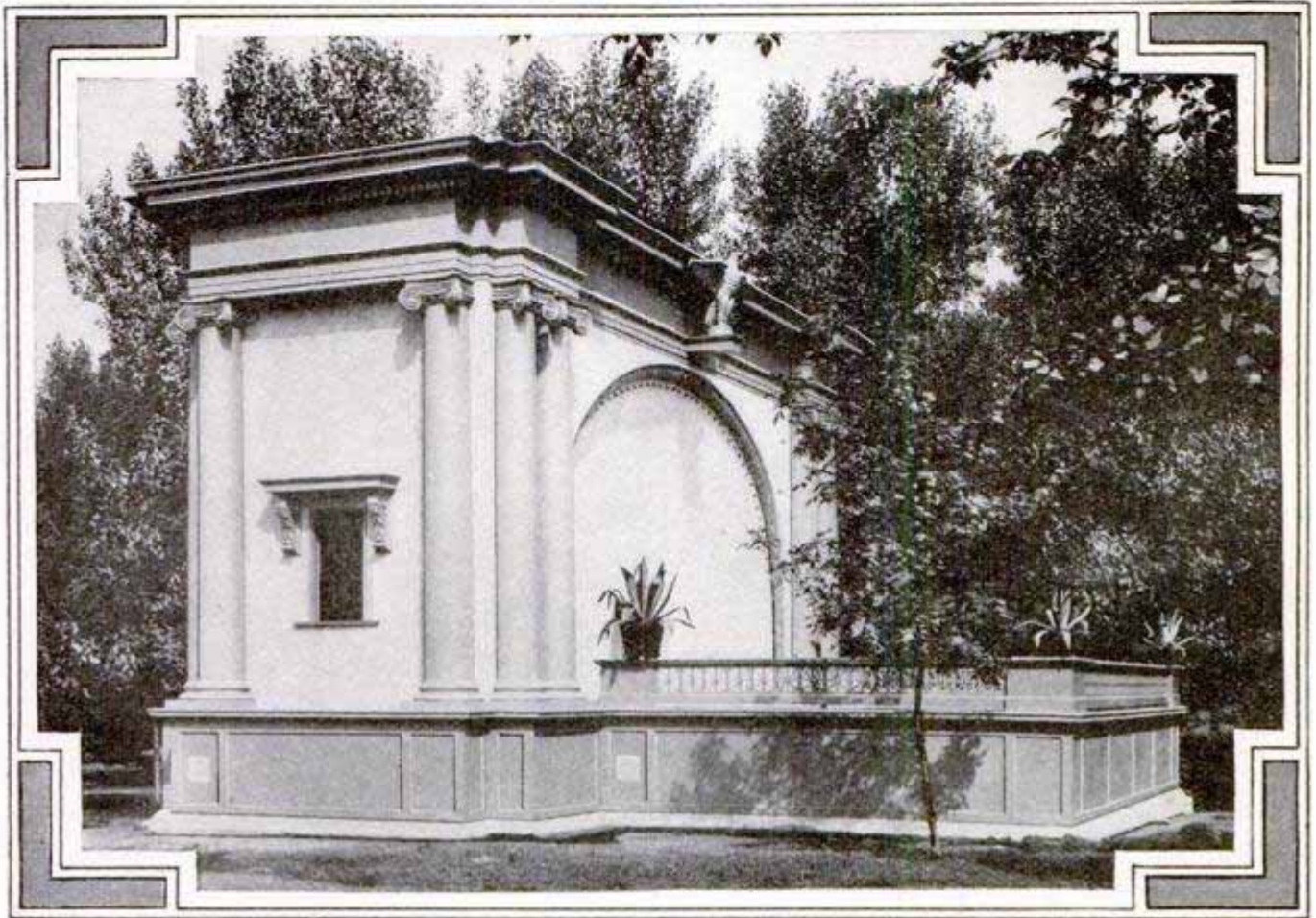


## ORNAMENTAL BAND STAND OF CONCRETE

A band stand of unusual design, in which concrete forms the main mate-

## OPTICAL ILLUSIONS PUZZLE THE EYE

Who has not remarked on the large disk of the rising moon, seemingly so

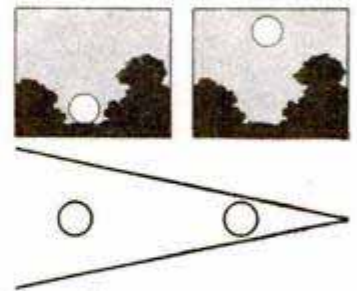


A Concrete Band Stand in Salt Lake City Which Adds Greatly to the Beauty of Liberty Park

rial, has recently been built in Liberty Park, Salt Lake City. The foundations are 12 in. thick and sunk 2 ft. below the surface of the ground. Care was exercised in placing the forms and in tamping the concrete so that the finished structure should be true to line and of proper dimensions. The outside walls and convex sounding board were lathed with expanded metal, tightly stretched, and three coats of cement mortar applied.

Carpet manufacturers in Europe, who formerly had to send samples of their product to southern countries to test their sun-resisting qualities, now use the mercury-vapor quartz lamp for that purpose, its ultraviolet rays having even greater power to fade dye-stuffs than the sun.

much bigger at the horizon than when it floats in midsky? An Italian psychologist explains this optical illusion by means of two diagrams which are reproduced herewith. Two circles of equal area drawn within the angle made by two intersecting lines appear of different size, the one nearest the vertex of the angle seeming the larger. The moon upon rising is seen in the angle formed by the plane of the visible horizon and the slanting vault of the heavens, and thus appears to be of greater diameter than when at a higher altitude.

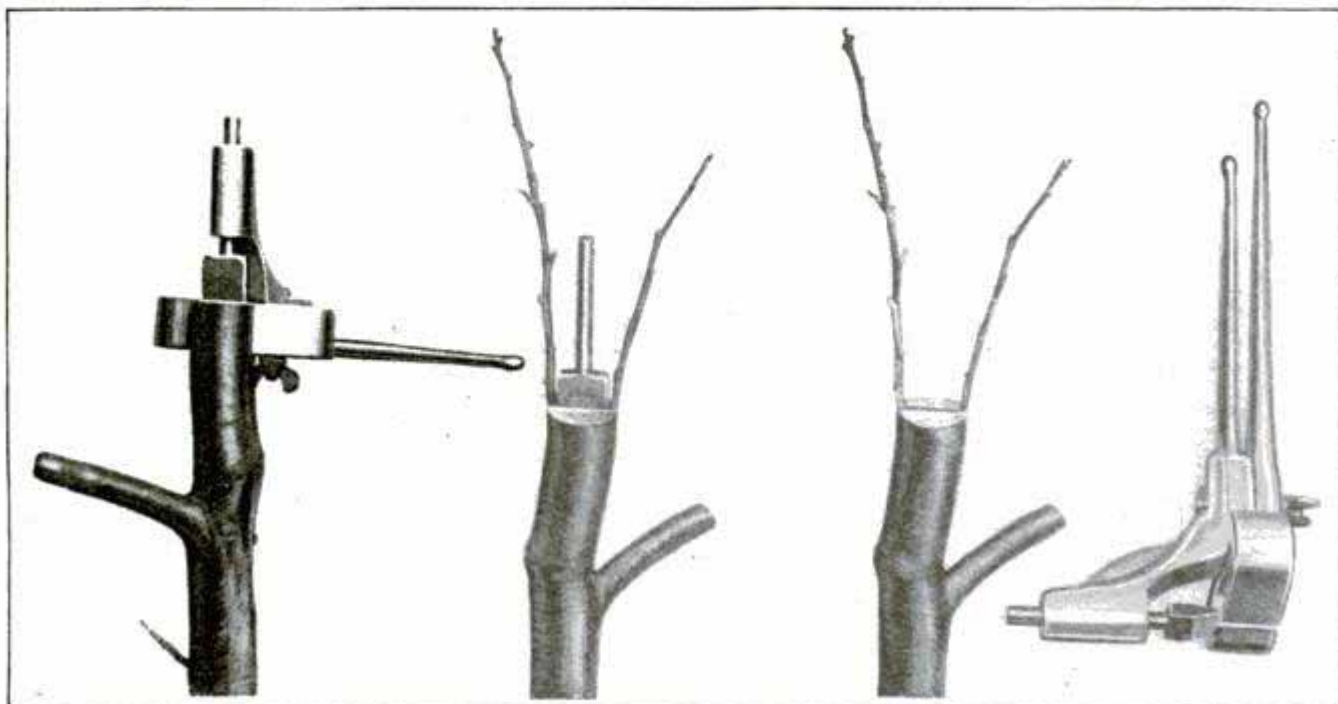




### TREE-GRAFTING DEVICE FOR FARMERS

A farmer has designed a tool for use in tree grafting, by which scientific

of a broken cable, an adjustable friction clutch between the drum and the worm gear is provided, which is designed to transmit just sufficient power to give the braking effect desired,



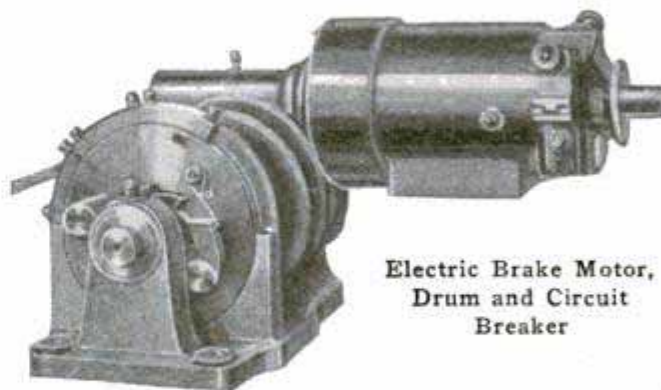
Grafting Tool Which Eliminates Damage to the Bark

grafts can be obtained without expert assistance. Specially devised tongs and a knife are operated by levers so that the bark is cut cleanly, preventing tearing and shredding. The splitting knife is adjusted so that it cuts a straight line between the cuts made by the tongs. The scions are then put in place, the knife removed and the wax applied. A very high percentage of perfect grafts are possible with this improved appliance.

### ELECTRIC BRAKE LATEST AUTOMOBILE AID

A recent innovation in motor-car construction is an electric brake, which takes away from the driver the actual labor of applying the brakes. A very small motor, operating at high speed and supplied from a storage battery, furnishes the power for the braking mechanism. A drum at one end of the transverse shaft carries a steel cable to the brake levers, displacing the usual rod. To prevent the possibility

beyond which the clutch will slip, preserving the cable. Stops govern the position of the lever controlling the operation of the braking motor. When applying the brakes, the lever is moved to the first position, enough current passing to the motor to rotate the drum a certain distance, winding up the cable a predetermined amount, when an



Electric Brake Motor,  
Drum and Circuit  
Breaker

automatic circuit breaker switches off the current. By this means the brake is lightly applied as in ordinary stops. To increase the pressure, it is merely necessary to open and close the circuit again with the finger lever, and the drum makes a further revolution,



and the operation may be repeated as desired. An emergency stop is made by pushing the lever as far as it will go, when the full power of the cable is exercised immediately.

### CHARTING THE APPROACHES TO THE PANAMA CANAL

With the opening of the Panama Canal reliable charts of the Yucatan Channel, the Caribbean Sea, and the coasts bordering on these waters will become a necessity for the heavy shipping approaching and leaving the Atlantic terminus of the canal as well as for vessels engaged in coastwise trade. With this in view the United States government is already engaged in making extensive surveys of these waters, and as a result of the work carried on by the survey ship "Hannibal," the hydrographic office will be able to supply fruit steamers and other trading vessels with correct charts of the sea off the coast of Yucatan and the east coast of Central America. The "Leonidas" is now being fitted up to take part in the work of surveying, which is to be prosecuted more vigorously than ever this year in preparation for the opening of the canal.

### MOTOR PLOW AND TRACTOR FOR FARM

A former number of this magazine contained a description of a motor plow adapted for farm use, and a recent development permits its use as a tractor. A lever is provided for lifting the plow, which is hinged and thus may be folded out of the way. The frame now rests on four wheels, and the tractor may be "hitched" to other farm implements, such as disk harrows, rakes or weeders, or used as a light truck for hauling farm products or

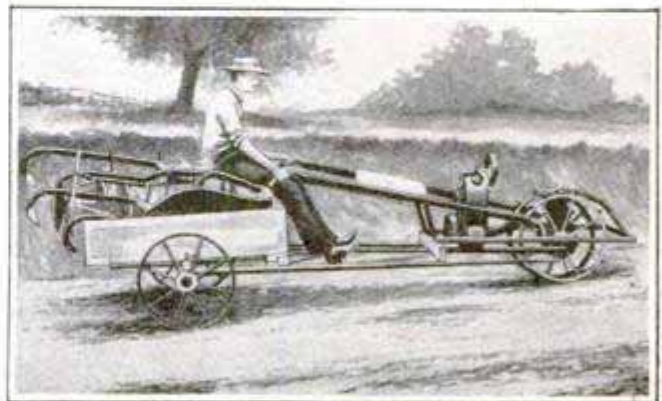
### FACTORIES FOR MAKING MOVING-PICTURE FILMS

The importance of the motion-picture industry has become such that many of the larger film companies have erected buildings specially designed to serve as film factories. A typical illustration of this class of building is shown in the accompanying view of a film factory at Tempelhofen, Germany. Except where there are



A German Film Factory: Plays are Produced and Photographed in the Glass-Covered Upper Story

some special requirements, the exposures for all films are made in the glass-covered upper story of this building, suitable scenery being arranged to produce a realistic effect. A number of plays are often enacted at one time in each building, only enough separation being necessary to avoid interference.

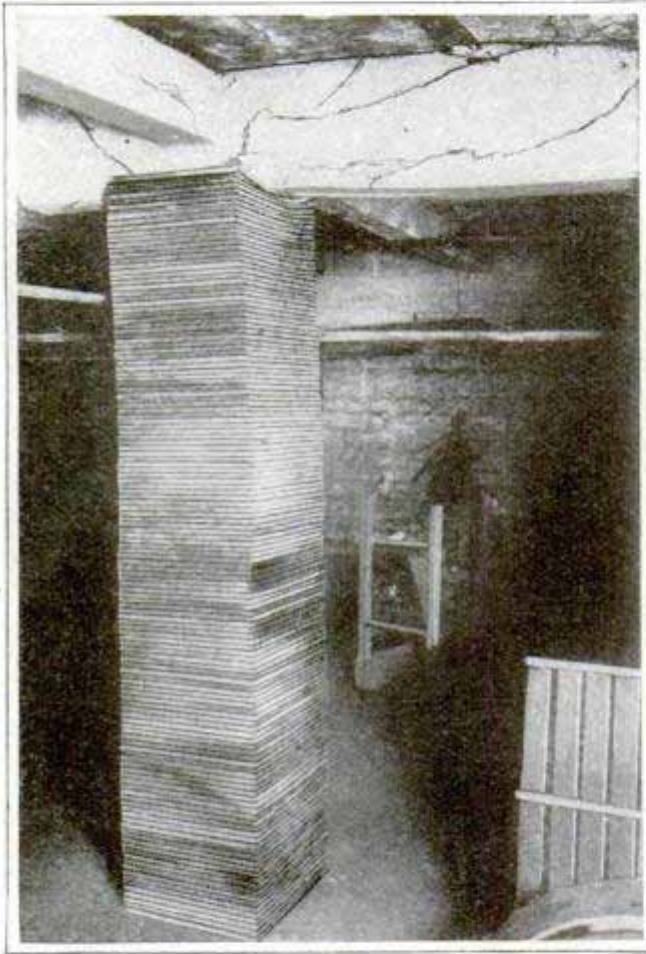


Motor Plow Which can be Used as Truck merchandise, or taking the tools necessary for work out to the fields or back to the farm buildings.



## BUILDING DAMAGED WHEN WET WOOD SWELLS

A pile of dashboards, made of oak veneered with maple, was stacked in the basement of an automobile factory. The top of the pile came within one inch of the bottom of a reinforced-concrete beam, forming the framing of the lower floor of the plant. During a flood the basement was filled with



Water-Soaked Pile of Boards Which Broke  
Concrete Beam

water and the wooden plates became soaked. They swelled to such an extent that they lifted the girder 3 in. above the level, cracking it so seriously that it had to be replaced.

## MAKING WROUGHT IRON AT LOW COST

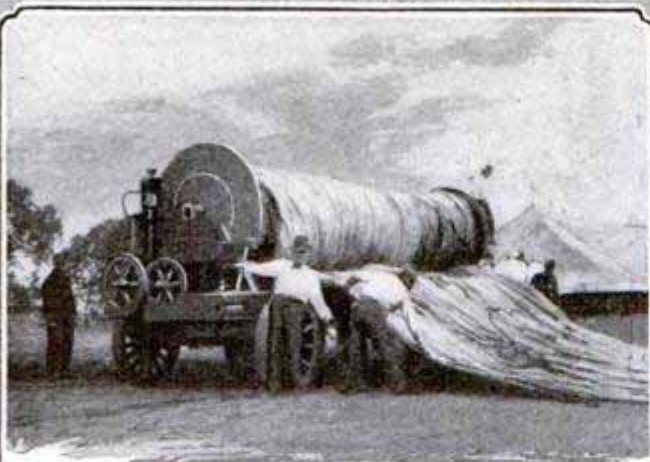
Wrought iron made by hand is costly because of the necessarily small amount which one puddler can handle, about 200 lb. being considered the maximum. A mechanical device has been patented whereby much larger quantities can be handled, the pud-

dling being done in a rotating furnace, and the resulting metal has the low carbon content and other general properties of wrought iron. The process is simple, the pig iron being first blown in a Bessemer converter until most of the carbon is oxidized and just enough iron oxide formed to convert the remaining carbon when puddled or thoroughly worked. Then the iron with a small quantity of slag is transferred to a rotating balling furnace where, under a reverberatory flame, the iron oxide reacts on the remaining carbon and the iron gradually becomes purified. In this process as high as four tons may be worked at once, greatly lessening the cost of production and largely increasing the output of wrought iron. Another slightly modified process patented by the same inventor permits the use of cheap pig iron of high silicon or phosphorous content in the making of wrought iron.

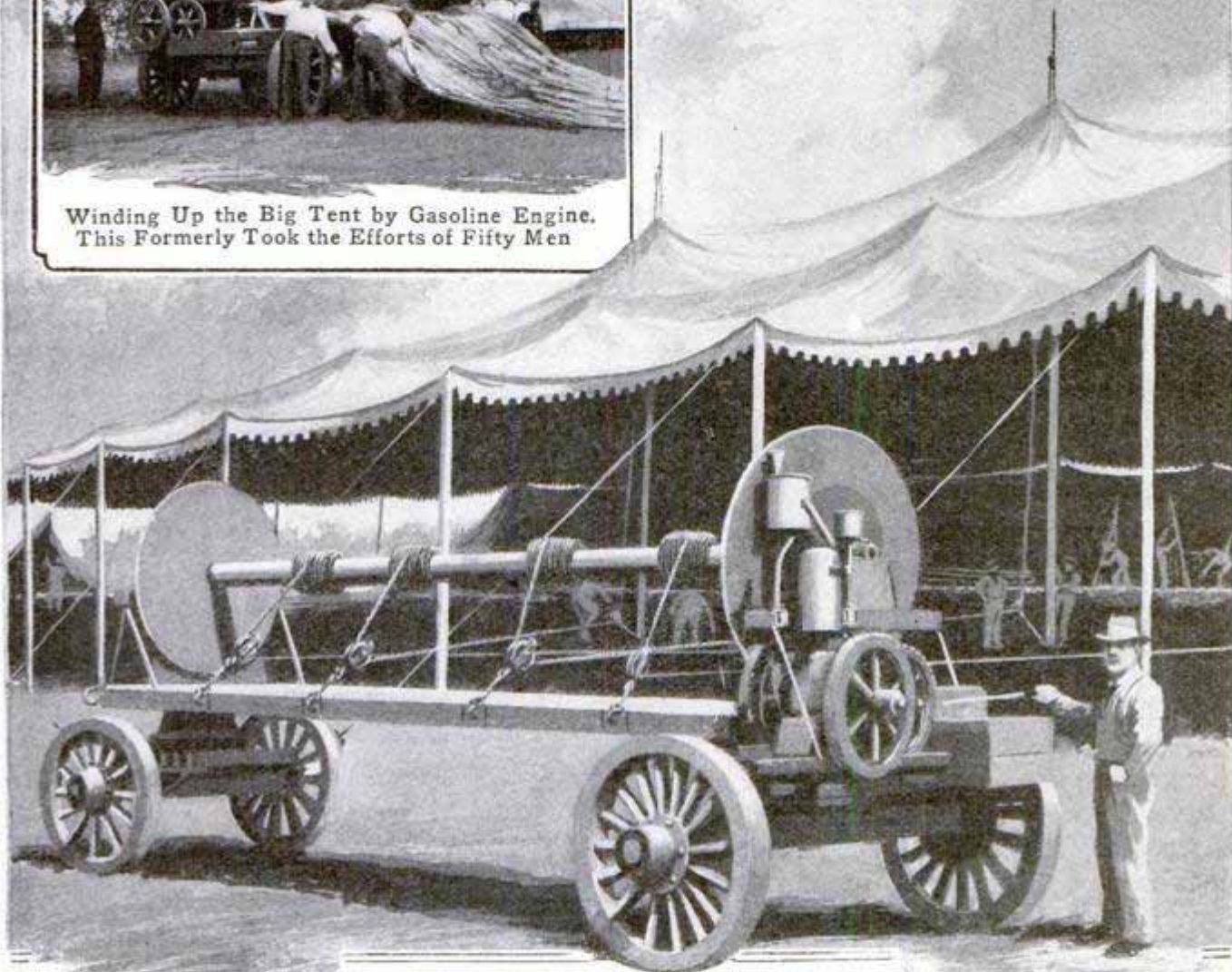
## PITCHING A CIRCUS TENT BY MACHINERY

The great canvas tents so familiar to the circus-going population are enormously heavy, weighing often five tons or more, and handling them quickly is a task that formerly taxed 50 men for two hours, and then was accomplished only indifferently well. By a new device a big wagon is equipped with a long roller, operated by a gasoline engine, which winds up the big canvas as quickly and easily as a clothes wringer handles a sheet. Indeed, the resemblance is something more than fanciful, for this appliance wrings the canvas perfectly dry, even on a rainy night, so that the tent may be transported without fear of rotting or mildew. Reversing the process, and pulling the big canvas off the rollers by horses, the entire tent may be raised quickly, the roller on the wagon being utilized to pull up the ropes which raise the poles, saving an immense amount of hard work and hours of time. The gasoline engine is used only for operating the roller, the wagon being hauled by eight horses.

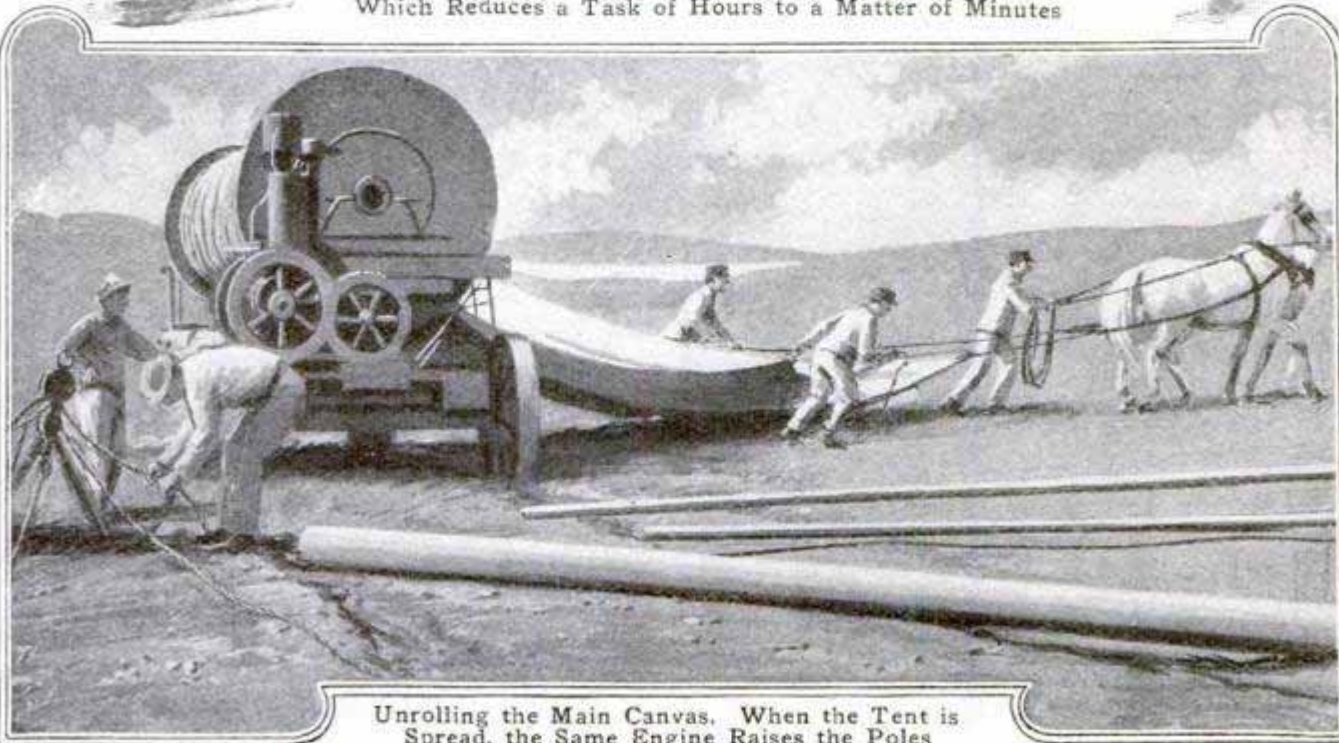




Winding Up the Big Tent by Gasoline Engine.  
This Formerly Took the Efforts of Fifty Men



Great Truck, Showing Reel and Engine  
Which Reduces a Task of Hours to a Matter of Minutes

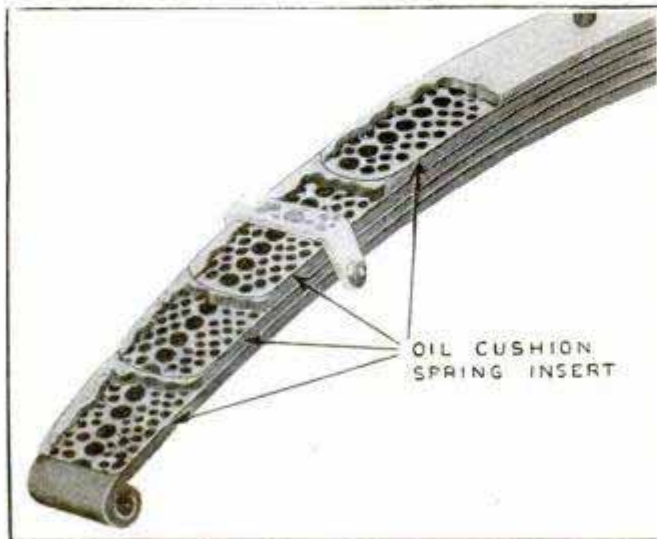


Unrolling the Main Canvas. When the Tent is  
Spread, the Same Engine Raises the Poles



## NEW OIL-CUSHION INSERT LUBRICATES SPRINGS

A perforated strip of special antifriction metal, designed to be placed between the leaves of automobile springs,

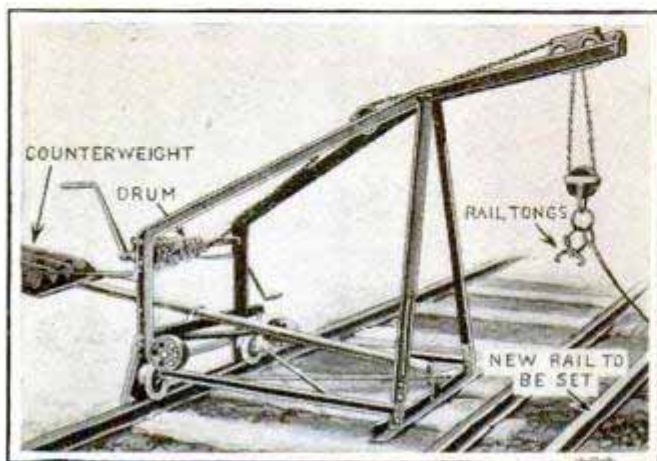


Lubricant is Held between Leaves of Spring

is now being placed on the market, which holds the lubricant in place and prevents squeaking and rusting. The oil-cushion insert is a steel alloy, the perforations being filled with a special heavy grease, having a tendency to stay in the holes. After the perforated strips have been placed between the leaves and the spring drawn together by the bolts and clips, the pockets in the cushions are sealed.

## PORTABLE TRACK CRANE FOR HANDLING RAILS

In replacing worn-out rails by hand, many men are required, and the work



Machine Which Reduces Labor Cost  
in Track Laying

is slow because of the difficulty of getting the men organized to work together systematically. A light rail-handling machine for picking up new rails and laying them in position has been invented, by which three men can do as much work as the ordinary rail-handling crew of from 12 to 20 men. The appliance consists of a hand crane, equipped with two wheels with double flanges to ride on one rail, while an inclined boom, supported by an A-frame, rests on the ties. A winding drum carries a chain by which the rails are lifted.

## TEMPORARY DECORATION FOR LAMP-POSTS

During the Shriners' convention in Atlanta recently, a novel ornament was designed for use on the top of city lamp-posts. Over the top light on a five-light post, was set a metal lantern, inscribed with appropriate words and symbols, so placed that the device was illuminated at night. Over 2,000 of these artistic decorations were used, adding much to the appearance of the city's streets both by day and by night.

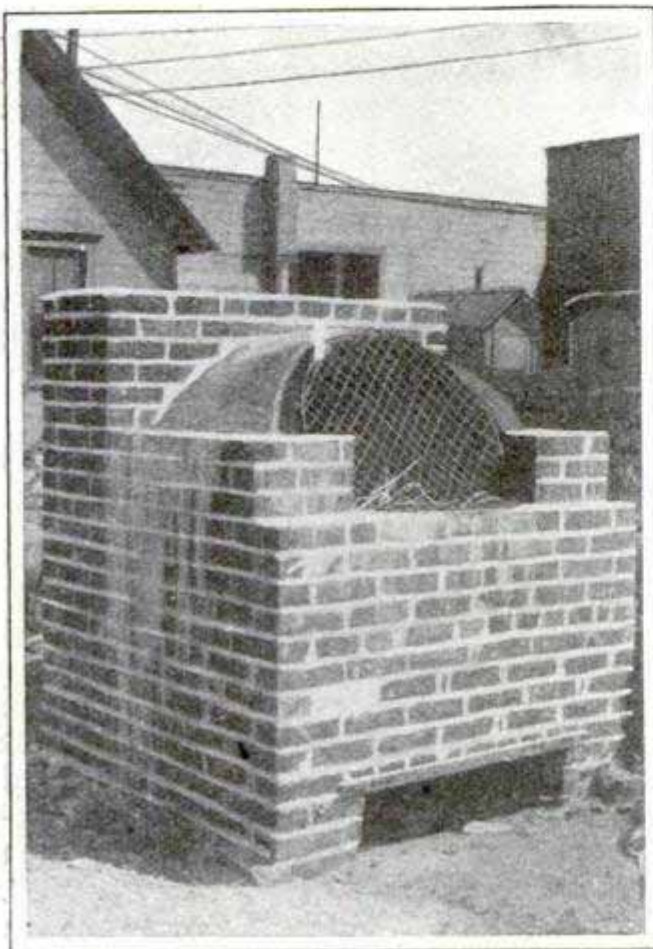


## PUBLIC FURNACES TO BURN RUBBISH

To keep its streets free from waste paper and rubbish, Glendale, a small city near Los Angeles, has built public incinerators or catch-all furnaces in the alleys back of its business blocks. Four of these, paid for by an assessment levied on the merchants, have



not only solved the rubbish problem, but have reduced the danger of fire from promiscuous bonfires. The fur-



A Public Incinerator Built by a California Town to Take Care of Rubbish

naces are built of brick and do not need watching while a fire is burning inside. They are 4 ft. high with a chimney portion extending 1 ft. above the main furnace. Rubbish to be burned is dumped into the furnace through a 27-in. hole, covered with a 2-in. wire screen, in the top. A good draft is secured by a draft hole, 8 in. by 27 in., at the bottom, and the chimney flue, 6 in. by 27 in., is covered with a 1/2-in. wire screen. The chief advantage of the furnaces is that they are always ready for use and are practically fool-proof.

Out of a total of about 20,000,000,000 pieces of mail matter handled in a year by the Post Office Department, a trifle over 13,000,000, equivalent to one piece in about 1,500, are without address or are improperly addressed.

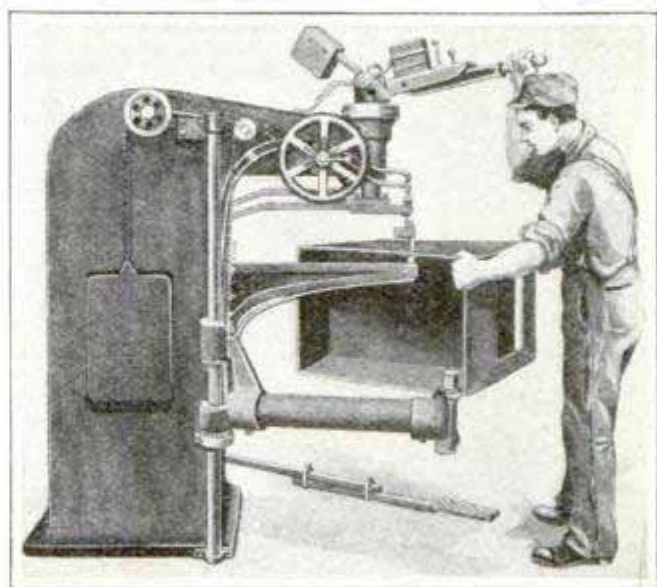
## COFFIN-SHAPED BOTTLES TO HOLD POISON

Coffin-shaped poison tablets in coffin-shaped bottles is a late design aimed to prevent avoidable accidents in handling dangerous substances by the drug clerk, or in the medicine cabinet at home. Sharp points protrude from the bottle, which may also be colored a distinctive shade. In addition to the word "Poison" on one side of each tablet, a skull and crossbones appear on the reverse.



## ELECTRIC SPOT WELDING SUPERSEDES RIVETS

A "spot welding" machine has been invented which promises to supersede riveting. The objection to rivets is that punching holes in the metal plates weakens them. No matter how carefully the rivets are driven in and how tightly they may be hammered down, the seam has inherent weakness. With the electric welder, however, plates are superimposed and welded by the electric current without a trace of weakness. The labor involved is small, the cost of the current but a trifle, and



One Man with Electric Spot Welder Accomplishes More Than Nine Men Riveting by Hand

the operation far quicker than any of the older methods of riveting.



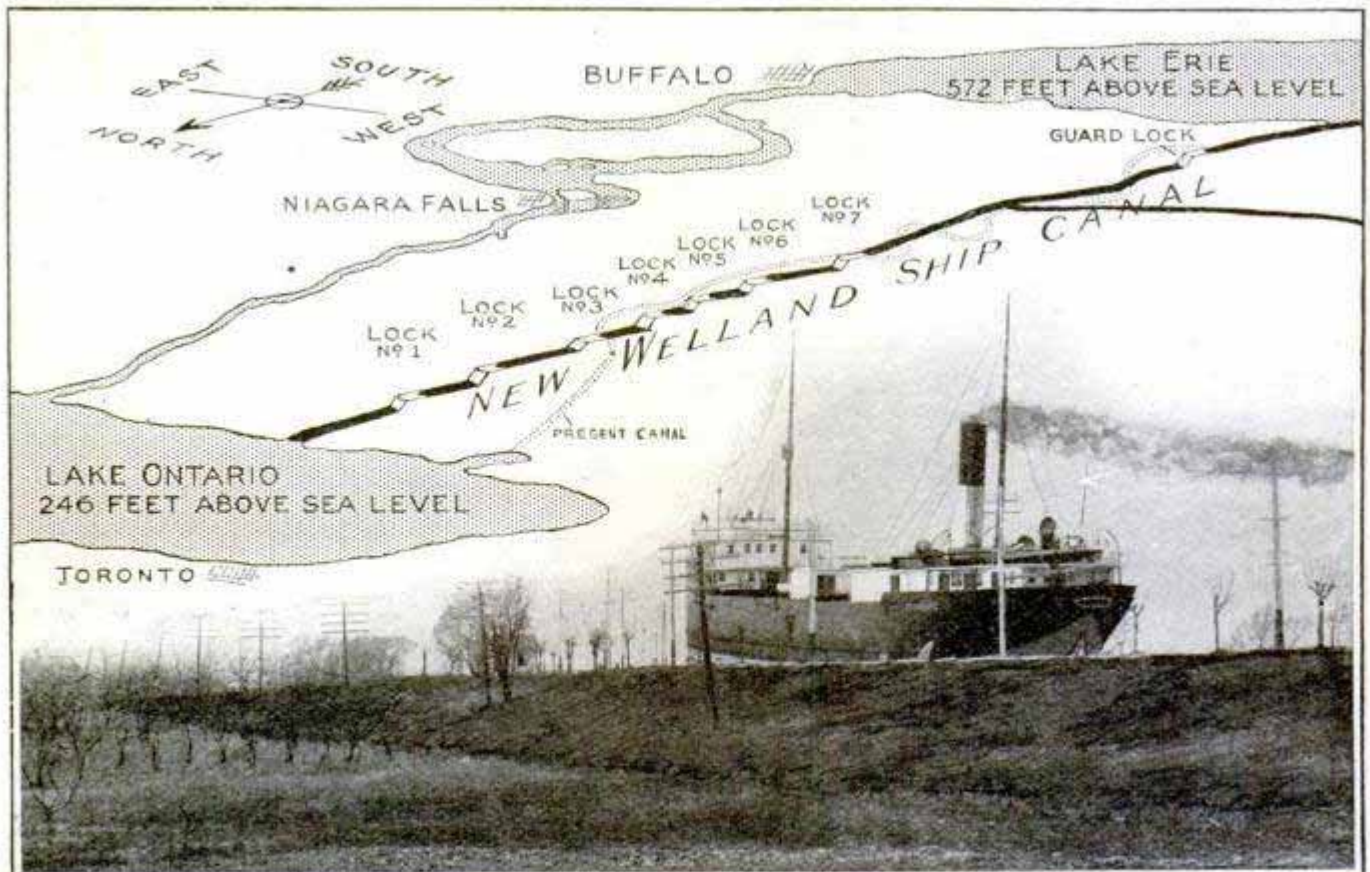
## NEW WELLAND SHIP CANAL HAS ONLY SEVEN LOCKS

That Montreal may have more shipping, the Canadian authorities are about to build a new canal through the Welland route, which materially shortens the passage between Lakes Erie and Ontario, and has 19 fewer locks than the old Welland Canal. A difference in lake levels of 326 ft. gives rise to the magnificent spectacle of Niagara, but offered tremendous engineering difficulties when the first Welland Canal was dug 90 years ago. In 1872, the second canal was dug, practically along the same route as the first, with 27 locks. The canal was deepened and enlarged. Now, by straightening the course,  $2\frac{1}{2}$  miles will be saved, and only seven locks are needed to negotiate the fall of over 300 ft. in 25 miles. A new port on Lake Ontario is being built which will bear the name of Port Weller, after the engineer in charge of construction. The bottom of the canal will be 200 ft. wide and the minimum depth over the sills of each lock will be 30 ft. The locks are longer

and will accommodate larger boats, while decreasing the number of locks shortens the time required to traverse the canal by three hours. The new waterway will cost \$50,000,000 to complete, and years must elapse before it can be put in use. Many freighters from Lake Superior, which now discharge their cargoes at Cleveland and Buffalo, can, when the new Welland Ship Canal is completed, take their cargoes direct to the docks of Montreal, there to be reloaded into ocean-going steamers awaiting them.

## TIME-SAVING DEVICE LOADS MOTOR TRUCKS

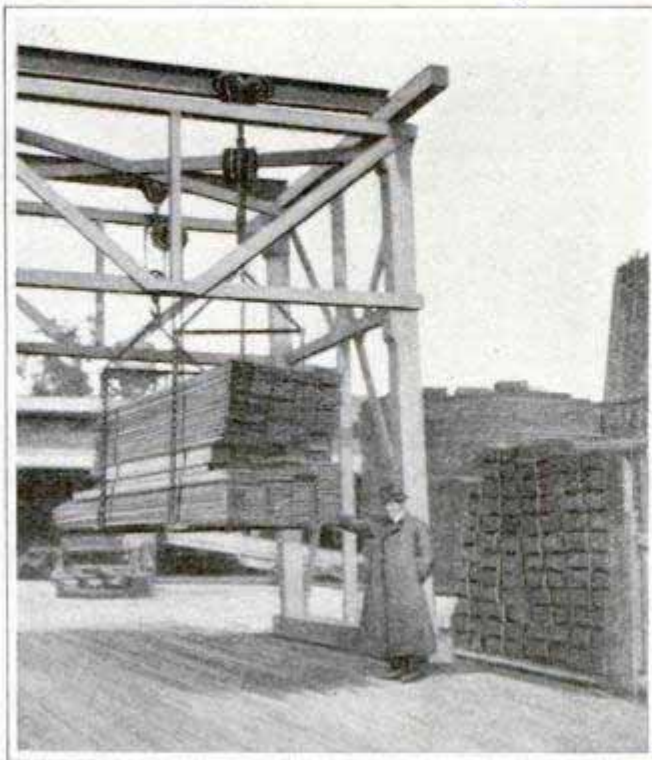
A loading device used in a lumber yard in the West is designed to save the time of the motor truck and driver. A metal framework, fitting both the motor-truck chassis and the running gear of the wagon, is first placed on the wagon, which is loaded with lumber to fill the order from different parts of the yard. It is then driven beneath a small traveling crane, and the load lifted so the wagon can



Photograph of a Ship Steaming Overland in the Welland Canal—Map of Present and New Canadian Ship Canals



be driven out. The load is left suspended at the proper height for the motor truck, which is driven under it



Device That Saves Time in Lumber Yard

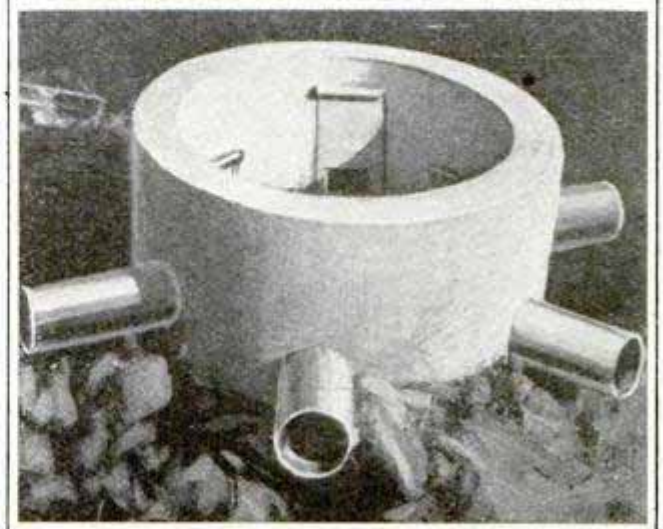
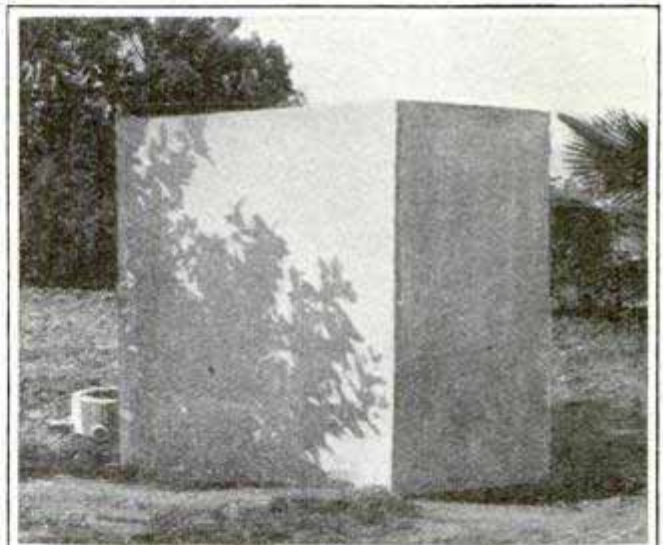
as soon as it arrives in the yard, and the load at once lowered on the chassis. This obviates rehandling the lumber and saves nearly half an hour for each load that is sent out.

### MODERN IRRIGATION SYSTEM USES CEMENT PIPES

The citrus growers of California have adopted a modern irrigating system which, once installed, avoids the yearly ditch digging which, with repeated hoeings to keep down rank weed growths, was the bugbear of the old irrigation ditch. The system consists of a pressure box and a series of cement stations, one of which is located at the head of each row of trees. The pressure box is used to measure the water with which the orchard is irrigated. It is a cement box,  $3\frac{1}{2}$  ft. long and 30 in. wide, rising over 4 ft. from the ground, and reaching down to the water main, some  $3\frac{1}{2}$  ft. below the surface. Inside the box there is a partition which is pierced by a hole 1 ft. square. When the pressure box is full, water is passing through this opening

at a constant rate so that the rancher or orchardist knows exactly how many hour-feet of water he has used during a certain irrigating period.

From the pressure box cement pipes, 8 in. in diameter, conduct the water to the stations, which are 15 in. across, and equipped with a patent shut-off by which the flow of water from the main may be closed at any time. Thus the old basin system gives way to an underground system, which puts the water just where the feeders of the tree can reach it best, and keeps the water away from the surface, where it produced rank growths of weeds. The new system is more efficient than the old ditch or wooden flume, and needs little or no repairs or renewals. Little water is lost by evaporation and the orchards look more sightly than under any of the older methods of irrigation.

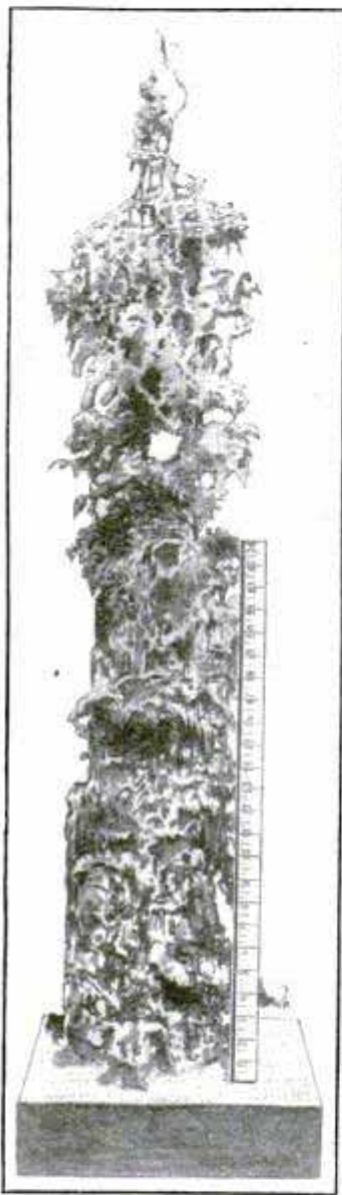


Concrete Apparatus Used in Underground Irrigation System in California Orchards



## CURIOUS DESIGNS FORMED IN CAST IRON

A metallurgist amused himself by pouring the dregs remaining in ladles



of common foundry iron into a rough wooden box, in which he had piled charcoal. The resulting forms puzzled metal workers, for the treelike shapes with their slender tendrils vibrated, if touched, for minutes at a time. It seemed impossible that such delicate objects could have been removed from the mold without breaking. The explanation is that after the molten metal had been poured, the box, which rested on sand, was removed and the charcoal allowed to burn

slowly away. It is noticeable that the treelike forms have shapes resembling birds, perched upon the branches. There are no duplicates and the varying lumps of charcoal and the finer granulations produce an infinite variety of shapes.

## NAVY OPERATES ITS OWN DINING-CAR SERVICE

The navy department has been experimenting with the plan of operating its own dining-car service when transporting drafts of men by rail, and

with such satisfactory results that this plan will be followed hereafter for large bodies of men and over considerable distances. It has been found that the department can feed its own men better than was the case under the old arrangement with the railroads, and at considerably less cost. The food is prepared in a tourist kitchen car, which is simply a regular tourist sleeper with two sections removed and a large coal range installed in their place. The remainder of the kitchen car is used as a sleeper. A table is provided for each sleeping section on the train and the bluejackets are fed in their own sections. Between meals the tables are removed or may be used by the men in reading, writing or card playing. With this arrangement the regular seagoing routine can be followed. When a meal is to be served, the mess call is sounded by the bugler. At 6:30 in the morning the reveille is sounded, while taps is sounded at 8 o'clock at night.

## A JAPANESE GARDEN IN AMERICA

Near Philadelphia, one of the finest Japanese gardens in America has recently been completed. For two years Japanese gardeners have been at work making this a perfect reproduction of the garden so familiar to tourists in the Kingdom of the Cherry Blossoms. A stone with symbolic markings is always placed at the entrance to ward off evil spirits, hence its name "Protective Stone." The sacred crane and other animals all have a part in the mythology or folklore of ancient Japan. The gardens are illuminated at night by real Japanese lanterns. The stones, plants and even the sacred lions from the temple gardens were all brought from Japan and are set in accordance with Nipponese customs and with due regard to the esthetic ideals of the Orient. The result is picturesque in the extreme, and the contrast with adjoining gardens impressive.





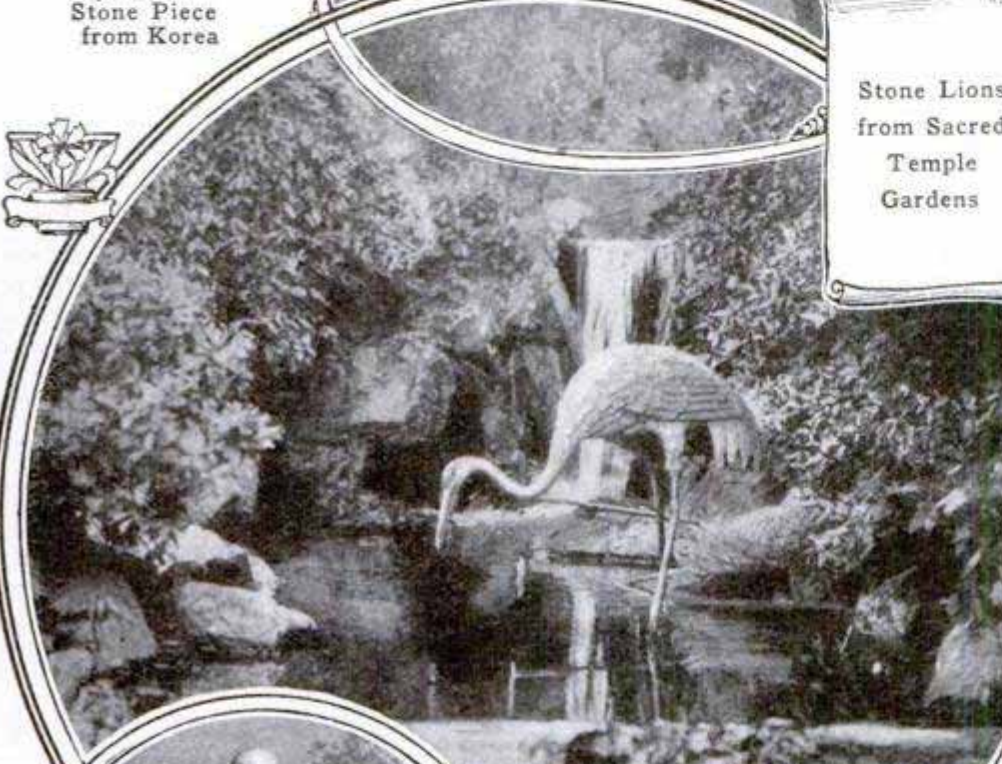
Symbolical  
Stone Piece  
from Korea



Stone Lions  
from Sacred  
Temple  
Gardens



Lantern in Form  
of Pagoda



Sacred Crane  
beside  
Pool



Japanese Lantern  
with Crescent



Protective Stone at the Entrance of a Curious  
Japanese Garden Built near Philadelphia



### NEW SMOKE-PROOF HELMET FOR FIREMEN

A light helmet designed to protect firemen in dense smoke, poisonous gas or ammoniacal fumes has been adopted



French Fire Brigade Equipped with Self-Breathing Helmets

by Paris fire brigades, and might also be used to advantage in mine-rescue work. It is termed a "self-breathing" helmet from the fact that it is hermetically sealed about the head and shoulders of the wearer, whose breath is purified by chemicals, and the oxygen content replenished from compressed-oxygen bottles strapped to his back. Thus the firemen breathe perfectly pure air and are at the same time wholly cut off from the smoke or fumes which may fill the apartment.

### AUSTRALIAN BEEF AT LOW COST FOR OUR NAVY

The Secretary of the Navy recently authorized the purchase of 285,000 lb. of Australian beef at \$11.90 per 100 lb., as compared with \$12.49 per hundred asked by American packers. Canned corned beef was bought for the navy at a price of \$15.37 per hundred for Australian beef, as against \$23.31 per hundred for American corned beef. The purchases followed the passage of the tariff bill permitting the free importation of foreign meats.

### MAGNETIC-SURVEY VESSEL SAILS 80,000 MILES

Accurate reading of the mariner's compass on board modern steel ships is accomplished only after involved calculations, in which allowance is made for error due to aberration of the needle by reason of the immense amount of steel and iron used in the ship's construction. In addition to this, known variations of the needle in the same localities at different seasons of the year make navigation difficult. To determine the absolute magnetic north and to correct the inaccuracies of regular navigation compass points, the Car-

negie Institution built and equipped a nonmagnetic ship, in which brass, bronze and composition metals were used instead of iron or steel, and sent her out four years ago to make a magnetic survey of the world. This remarkable vessel has just returned, after a cruise of more than 80,000 miles, and the mass of data gathered is in the hands of hydrographers. New maps will show definitely the magnetic variations at intervals of 200 miles on all the important shipping lanes of the sea. The "Carnegie" is a wooden ship, 155 ft. long, with a beam of 33 ft. No nails or screws of iron or steel were used, and even the small auxiliary engine carried contains less than 600 lb. of steel. Sails were mainly relied on to give propulsion, and the auxiliary engine was used only in cases of emergency and for maneuvering in port.

It is estimated that the combined cost of replacing wooden cars with steel cars and installing suitable signal service on all railroads of the United States will amount to about \$1,000,000,000.

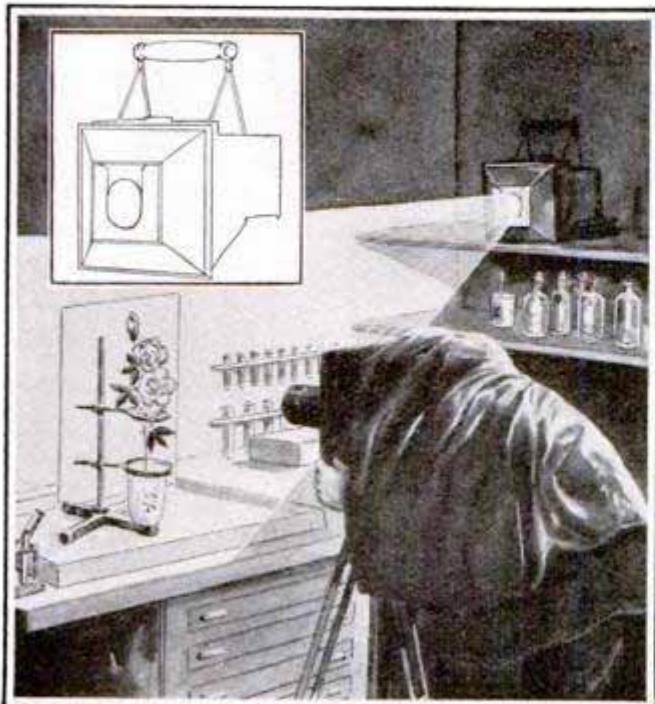


## GLASS COOKING UTENSILS PROMISED SOON

A New York glass manufacturer is experimenting with the making of cooking utensils of glass. Already glass percolators and stewpans have been made which, although they rest on the flames, give no evidence of cracking, and have proved heat-resisting and nonexpansive. These utensils are apparently not affected in any way by the intense heat under them or by the contrasting temperatures of the articles which they contain. Glass is for many reasons superior to either enamel or aluminum, being affected by none of the acids or alkalis formed or used in cooking and not subject to the insanitary cracking which is characteristic of most enameled ware.

## PORTABLE ELECTRIC LIGHT GERMAN INVENTION

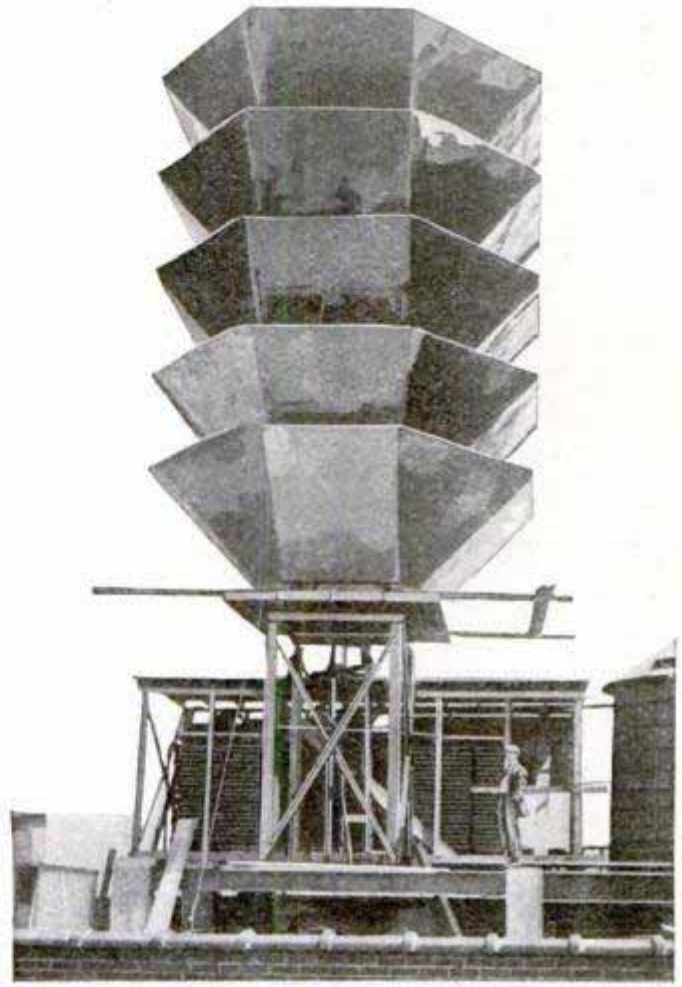
A hand lamp has been invented in Germany which is adapted to a large variety of uses where either alternating or direct electric current is available. An electric arc, giving 6,000 cp., is contained in a lamp only 9 in. wide and 7 in. high. The lamp is particularly useful in confined spaces.



Small Electric Hand Lamp of High Power

## TOWER FOR COOLING WATER IN CONDENSER

An unusual cooling tower which has been built on the roof of a Philadelphia dairy company's building to cool the



This Tower is Used to Cool the Condenser Water of a Refrigeration Plant

water used in the condenser of an ammonia refrigeration plant is shown in the accompanying picture. After the water has passed through the condenser coils in the background it is circulated through the cones of the tower and used over again instead of being run off. The ammonia tanks are at the right of the tower.

CA French airman recently ascended in a monoplane to a height of 20,295 ft., in 1 hour and 35 minutes, breaking the world's altitude record of 19,300 ft.

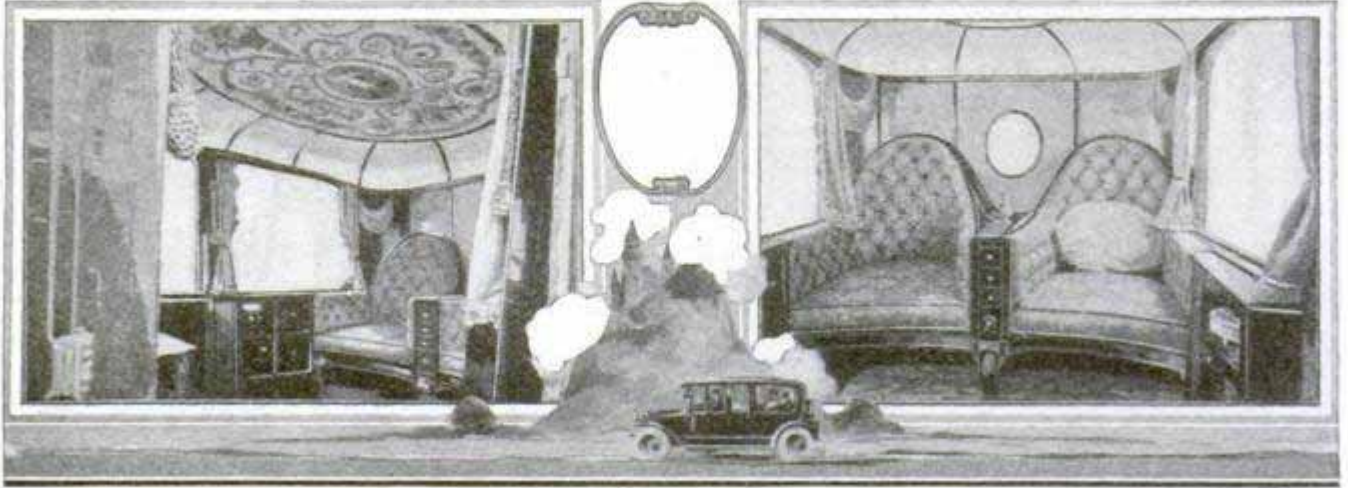
CA An economical process for extracting pure radium salts from carnotite ore has been discovered by a German scientist.



## LIMOUSINE DE LUXE FOR A RUSSIAN NOBLEMAN

A German automobile concern has manufactured a car for a member of the Russian nobility which is a model

proaches and passes through. The door is built of yellow pine, and is 7 ft. high by 8 ft. wide. Attached to the ribs in the passageway, 300 ft. on either side of the door, are switches, operated by the motorman in passing,



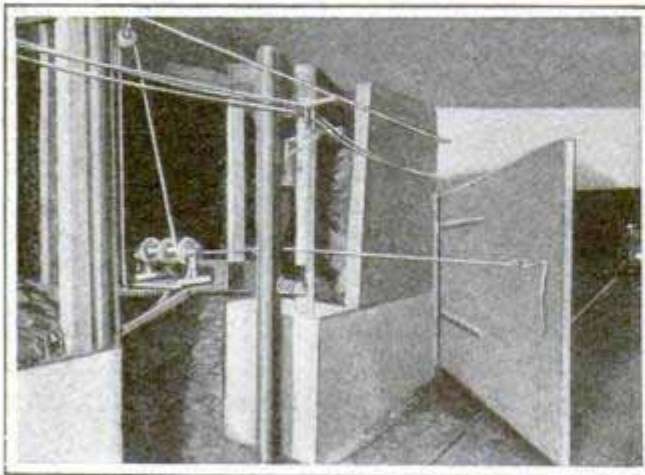
Luxurious Interior of Automobile, with Side Cabinets and Tapestried Ceiling. At Right, Comfortable Cushioned Seats with Nest of Drawers between Chairs

of elegant comfort in transportation. It is the interior rather than the exterior which attracts attention, for both art and ingenuity have been combined in the luxurious arrangement of seats, cabinets and lighting effects, while the upholstery on ceiling and seats is tapestry of special design.

which throw the current on a small motor situated near the door. A spur gear on the end of the armature shaft drives cylindrical drums which wind up the cable attached to the door, swinging it open. When the motor passes, the operation of the opposite switch reverses the motor and the door swings shut.

## AUTOMATIC DOOR FOR MINE OPERATES ELECTRICALLY

A door in a Pennsylvania coal mine is equipped with an electrical mechan-



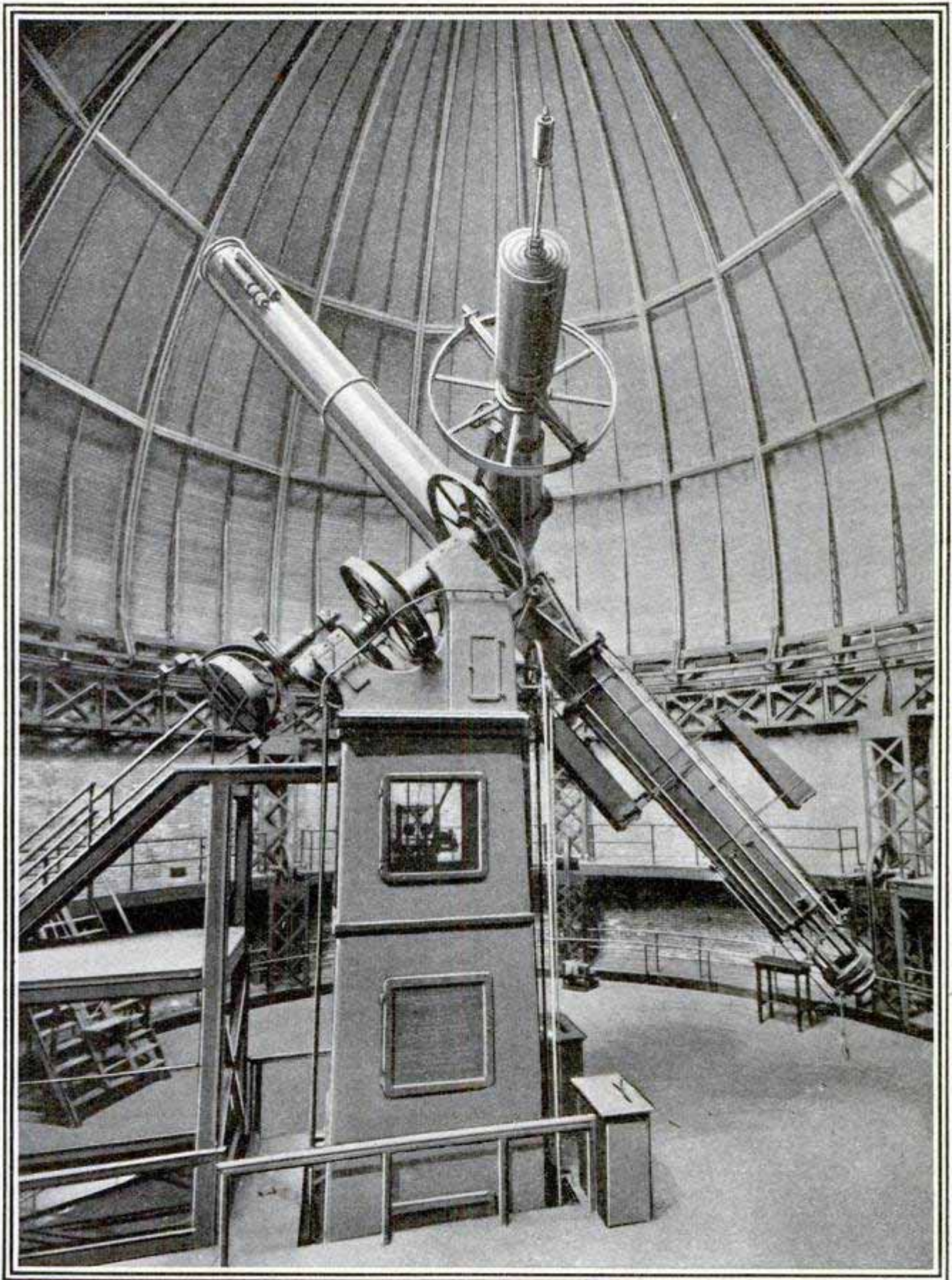
Electrically Operated Door Requires No Tender

ism by which it opens and closes when the small motor trolley car which hauls the coal out of the mine ap-

## PHOTOGRAPHIC TELESCOPE LONG IN MAKING

Seventeen years ago an order was placed in France for the glass from which a lens was to be ground for the largest photographic telescope in the world, which a wealthy Pittsburgh manufacturer gave to the Allegheny observatory. It was not until 10 years later that the piece of glass was shipped, owing to the difficulty of getting a perfectly homogeneous cast. When an American firm attempted to grind the lens, a flaw developed, and all the work was lost. A German firm then prepared another piece of glass, and after six years it is now on its way to America, and it is expected to be ground and in place before the end of 1914. The mechanism of the telescope has long been completed, and comprises a movable dome and floor, oper-





For 17 Years Glass Makers have been Trying to Produce a Perfect Lens  
for This Photographic Telescope

ated by electricity, controlled by clock-work. The pier supporting the telescope is sunk independently of the observatory walls, giving a minimum of

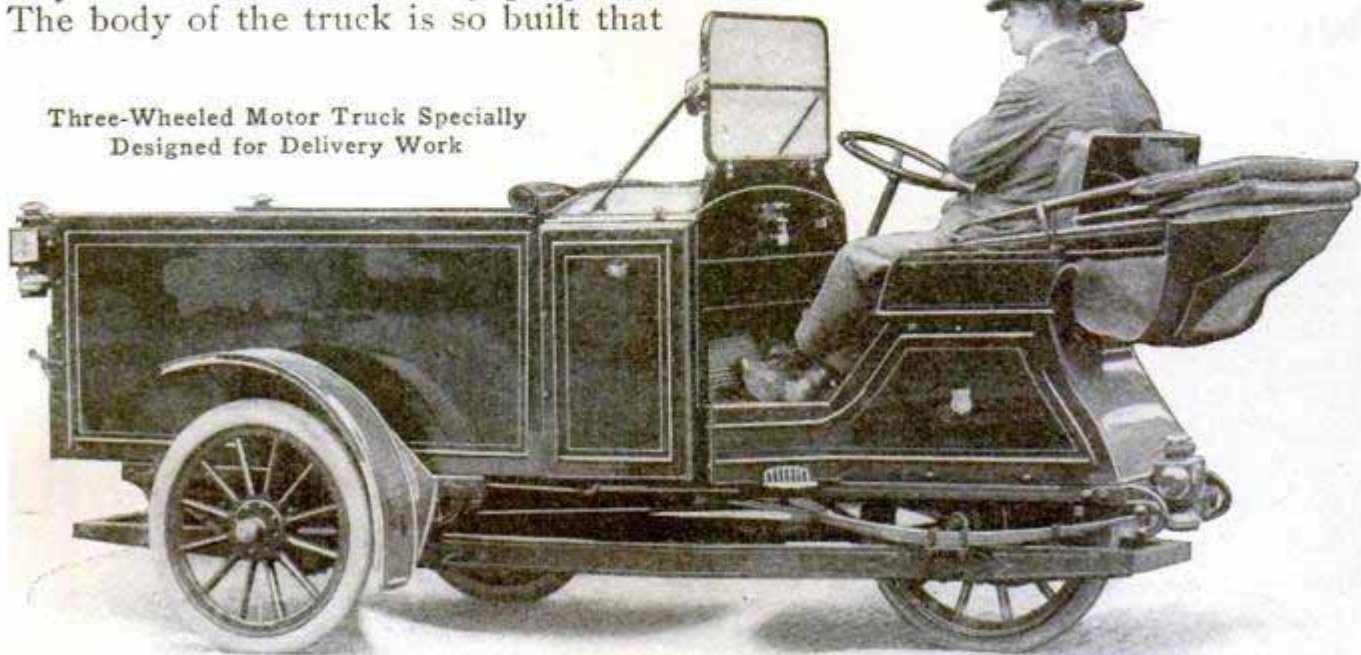
vibration. The diameter of the lens is to be 30 in., and the length of the tube is 50 ft. It will be used exclusively for photographic work.



### THREE-WHEELED MOTOR CAR FOR DELIVERY WORK

Three-wheeled motor trucks with two wheels at the front and one at the rear are the latest thing in the way of vehicles for delivery purposes. The body of the truck is so built that

Three-Wheeled Motor Truck Specially  
Designed for Delivery Work



the greater part of the load is carried on the front wheels, and the vehicle is also steered with these wheels. Power is applied through the rear wheel and one of the advantages claimed for this type of car in addition to its lightness, is that by using one power-driven wheel the necessity for complicated differential gear is done away with. The car shown in the illustration weighs 1,800 lb. and is capable of carrying a load of 800 pounds.

### HIGH SCHOOL HEATED BY ELECTRICITY

The first instance of a large building being heated electrically at a cost below that of other systems is the new high school at Rupert, Idaho, in the center of the Minidoka irrigation project. The power is furnished by the government power house connected with the irrigation system, situated 14 miles above Rupert, at a cost low enough to compete successfully with coal.

Hot-air heating is adopted, and the

usual arrangement of hot-air pipes, flues and ducts is adhered to, but instead of a furnace or boiler, a battery of electric-heating units, similar to those used in electric bake ovens, pro-

vides the heat. Twenty 18-kw. units are installed in pairs, each pair separately controlled from a switchboard in the office of the principal. An emergency switch makes it possible to cut out all current—heat, light and power—from the entire building, so, in case of accident or fire, the lives of the students may be protected.

Electricity, besides heating the building, lights it, ventilates it and runs the machinery of the manual-training department. In the chemistry department, hot plates and small electric furnaces supplant the familiar Bunsen burner; in the domestic-science rooms, each girl of a class of 20 has her individual electric-disk stove and all necessary cooking utensils. An electric water heater supplies shower baths, lavatories and science rooms with an abundance of hot water, and the cafeteria is equipped with an electric range and other equipment for serving meals on a large scale.

It is estimated that the cost of heating the high school by electricity will amount to \$1,760 per year. Enough coal to heat the building would cost



\$1,000, but the use of electricity saves the wages of a fireman at \$75 per month, and the cost of installing the electric system was \$3,000 less than for any other system of heating that was under consideration.

### GOVERNMENT SELLS TIMBER FROM FOREST RESERVES

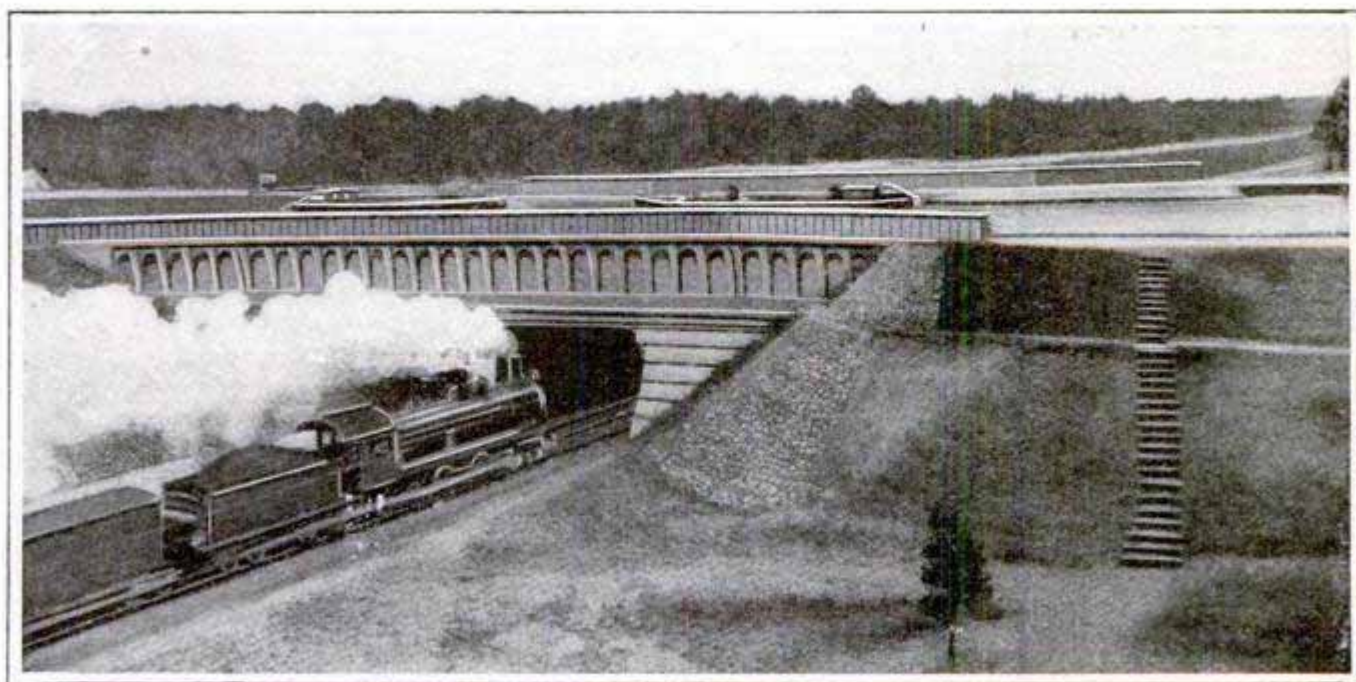
More than 2,000,000,000 board feet of timber was sold by the forest service last year with a value of \$4,500,000 on the stump, according to the annual report of the Department of Agriculture. The forest service aims first to prevent fire losses, and also to utilize the ripe timber which can be marketed. In this way forest permanence and restocking is assured, speculative monopolies discouraged, and the cost of administration and production paid. Already the Alaskan forests more than pay the costs of their supervision, and several national forests are paying their operating expenses. Twenty-five per cent of the receipts from the sale of timber in national reserve forests go to the particular states in which such reserves happen to be situated.

### MODERN SUIT OF ARMOR ADVERTISES WARES

An advertising novelty seen in a parade in an Illinois town consisted of a complete suit of armor made of galvanized sheet steel. The upper part of the suit was lipped on over the head of the man inside, resting on his shoulders, and bringing his eyes on a level with the white screen used as the shirt front of the giant, permitting him to see where he was going. The trousers were made in movable sections allowing free locomotion, and his shoes were painted to correspond with the galvanizing of the armor. The effect was fully as spectacular as a suit of genuine antique armor would have been.



### CARRYING A GREAT CANAL OVER A RAILWAY CUT



The Great Berlin-Stettin Canal Passes through Some of the Richest Farming Lands of Germany. It is Here Shown Carried across a Railroad on a Handsome Stone Viaduct



## NOVEL SIDECAR ADVERTISES WARES

A merchant of Paris who deals in sporting goods has designed an in-

Delivery Car  
in the Shape of a  
Boxing Glove



genious method of advertising his specialties, by constructing a delivery

van, built like a sidecar, in the shape of an enormous boxing glove, which bears his name and address prominently on the side. The curiously shaped car attracts much attention.

## ELECTRIC REGULATOR FOR STREET TRAFFIC

The traffic squad of Cleveland will control the movements of vehicles and pedestrians at street crossings by the use of an electric traffic regulator. Patrolmen stationed on slight elevations at street intersections operate the system, causing red lights to flash when the warning to stop is given, and white lights signal "proceed." An automatic bell takes the place of the whistle.

## WHAT THE AIRMEN ARE PLANNING

By L. J. LESH

The recent feats of Pegoud and Beachey, the new automatic stabilizer, the troubles of the dirigibles and the ever-present possibility of transatlantic flight are the constant subjects of conversation among airmen, and he who would forecast the future of aviation may obtain his best lead by talking with the airmen themselves.

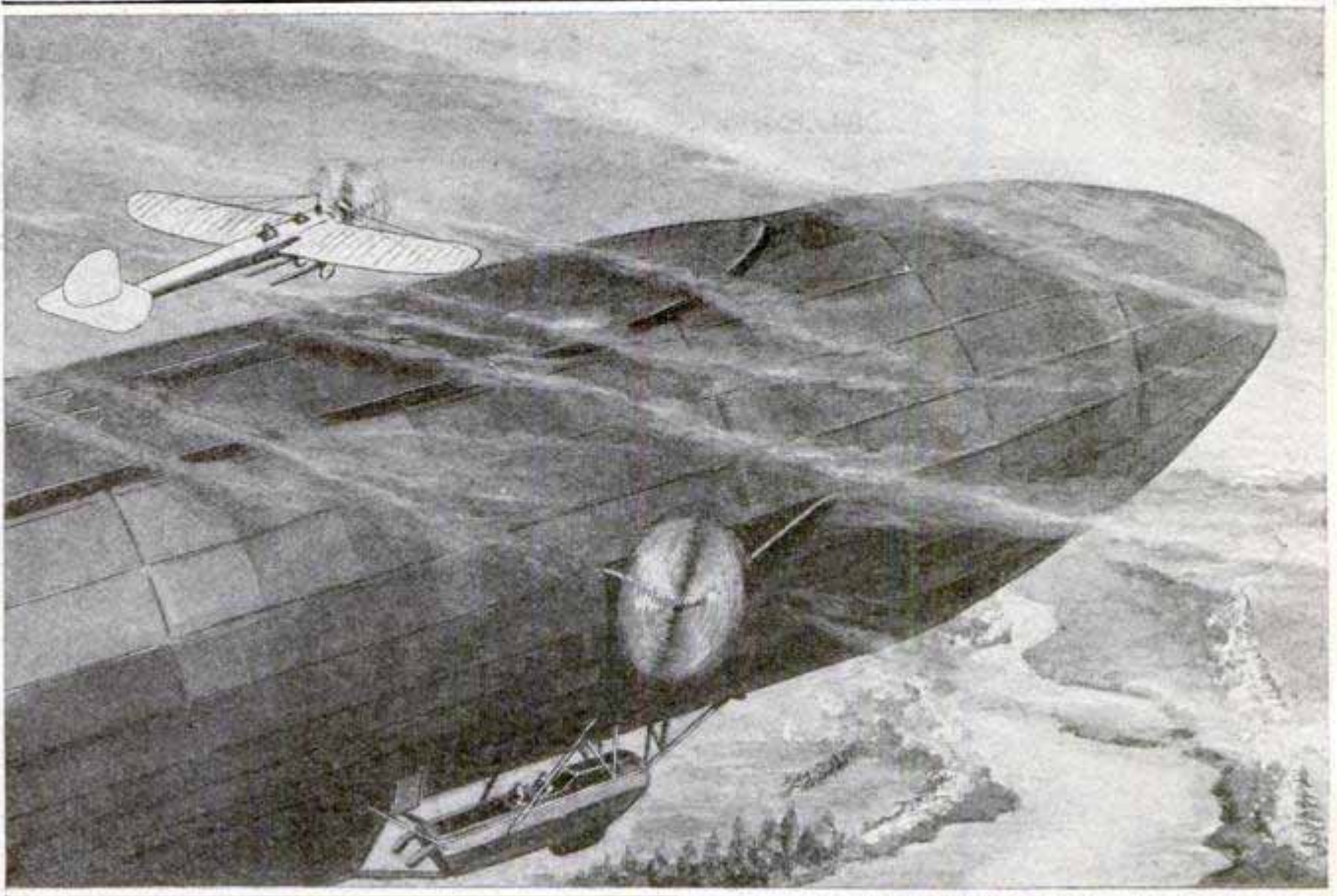
At Hammondsport, N. Y., there is a boarding house known as "the aviators' roost." Here 15 or 20 airmen and inventors of aeroplanes gather daily, and after dinner, under the soothing influence of good tobacco, the imagination of the most alert and practical men in the game is given free play.

Transatlantic flight is the center of interest, and among the problems considered is that of transferring gasoline from one aeroplane to another during flight. An ingenious solution was offered by one airman, which is illustrated in the accompanying picture. The upper machine has sailed up from the supply boat, and is letting gasoline down through a tube to the speedy monoplane which is winging its way

across the ocean. Thus there will be no time lost and no necessity to risk a stop on the sea. No difficulty is anticipated in accomplishing this feat, and all admit that under certain conditions it would be the only possible way of supplying the cross-ocean flier with fuel to continue on his trip. It was suggested that the tube must be equipped with a valve on its lower end so that no gasoline could be spilled when the tube is disconnected from the lower machine.

The possibility of launching an aeroplane from the top of a dirigible is much discussed, and we may expect to see this feat accomplished in the near future. As shown in the sketch, the plane might be launched from the broad back of a dirigible with little difficulty. It is pointed out that the speed of a Zeppelin is frequently 45 miles an hour, which would give the aeroplane sufficient speed for support without a preliminary run. The machine would simply be clamped down to the dirigible and then released to spring in the air. When it was suggested that eddy currents, developed

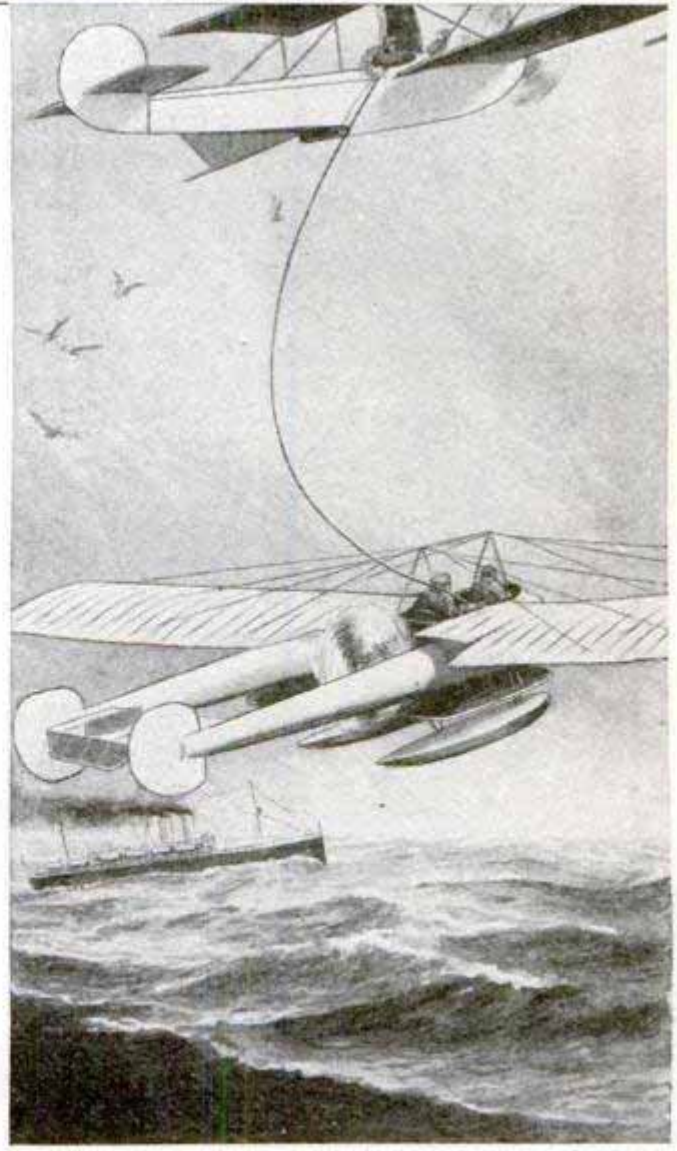




Monoplane Rising from the Broad Top of a Dirigible.  
Below, Proposed Method of Supplying Air Boat  
with Gasoline in Transatlantic Flight

around the body of the balloon, might present difficulties for the airman, an alternative was proposed. The dirigible, it is urged, might slow down, floating with little speed relative to the air, and then be pointed downward, so that the aeroplane could speed up and obtain a good start in undisturbed air.

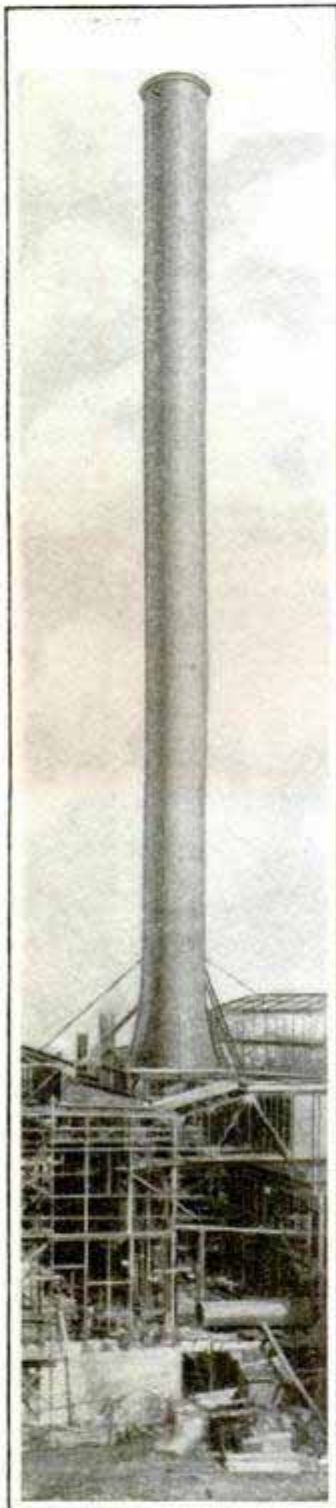
In landing on the back of a dirigible, both aeroplane and balloon would maintain the same speed, and the plane would drop slowly down and be held in place by half a dozen men until it could be securely fastened to the landing platform. The value of folding wings for the aeroplane, such as developed recently by foreign inventors, will be appreciated when it is desired to carry planes on the back of dirigibles, for it is apparent that an aeroplane with wings outspread would present a large item of resistance with the dirigible traveling at 45 miles per hour. That the motor of the aeroplane could be kept running and thus help the dirigible to speed was another suggestion received with enthusiasm.





## TALL STEEL STACK WITHOUT GUY WIRES

A steel smokestack, over 204 ft. high, which stands firmly without the support of guy wires has been built for an electric-light company in Louisville. The diameter of the stack at the bottom is 20 ft., gradually decreasing to 13 ft., which is maintained to the top. The stack is built of soft-steel plates, lined with fire brick, and is surmounted by a cast-iron cap, and also has an exterior circular Z-shaped bar, which forms a track for a painter's trolley. The space between the brick lining and the steel shell is completely filled with cement grout.



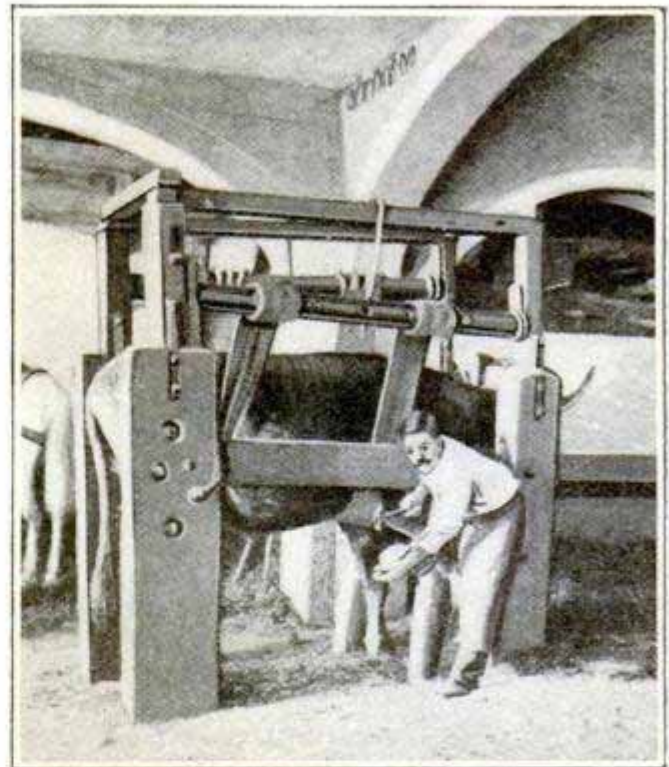
## COOLS HOUSE WITH AIR FROM DEEP WELL

An Oklahoma well digger who had sunk a shaft to a depth of 50 ft. was surprised when the bottom dropped out, revealing a cavern of considerable extent, from which there was a strong flow of ice-cold air. Upon sounding the cavern, an abundance of cold water of good quality was found, which affords an inexhaustible source of supply for house and farm. The top of

the well was sealed with a concrete cap, through which pipes lead from the well to the house. One pipe brings water for household use and the other carries cold air that is piped through every room of his residence. This reduces the temperature many degrees even on the hottest days.

## PORTUGUESE BLACKSMITHS SHOE OXEN

The ox is largely used in Portugal as a transport animal, and is shod in the same manner as a horse or mule, except that the cloven hoof of the ox necessitates the use of two shoes, in the form of semicircular plates, on each foot. To the tourist the sight is a strange one, for owing to the ability of the ox to administer a very swift and powerful kick, extraordinary precautions are adopted to protect the blacksmith while performing the operation. A ponderous wooden frame is provided, from which the ox is suspended by means of straps over rollers. Once in position and hoisted clear of the



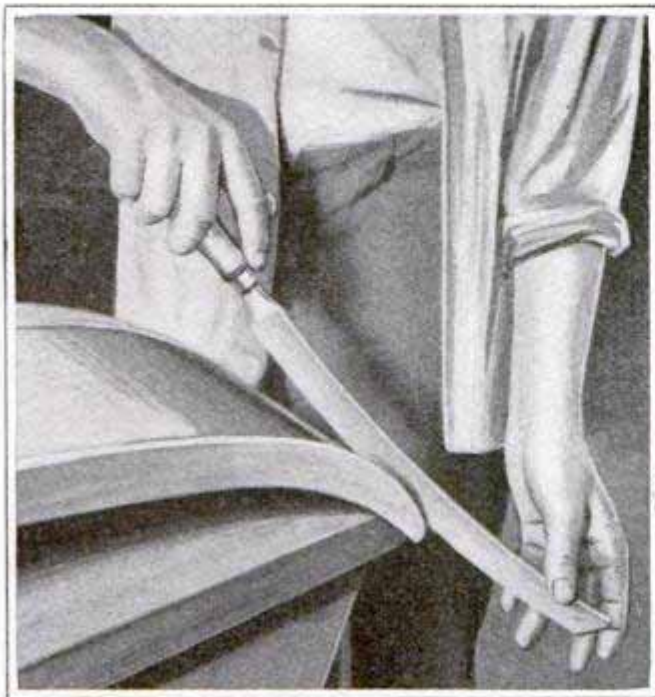
Scene in a Portuguese Blacksmith Shop

ground, there is no opportunity for movement until the curious job of farriery has been completed.



## CURVED FILES USED IN AUTOMOBILE WORK

Considerable filing has to be done in making up the sheet-metal bodies



Curved Holder for Flexible File Blades

for automobiles, such as in cleaning up the joints which have been brazed, and curved files have been found to give the best results. The latest file brought out to meet this demand consists of a curved base, upon which a file blade is mounted, made of steel which will withstand bending in a cold state. When the file wears out, it is easily removed, and a new one may be mounted in its place.

## NEW FENDER SETS BRAKES AUTOMATICALLY

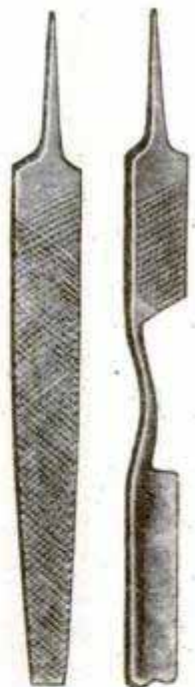
A patent has recently been issued for a safety appliance for vehicles consisting of a fender connected with the air-brake mechanism of street cars, by which a quick stop is made when any object is struck by the fender. The brakes are ordinarily set by hand control, as in common practice, but the automatic stop is independent of this manual control, and becomes a positive emergency brake upon impact on the fender. It is claimed the slightest obstruction will operate the device.

## AEROPLANE PASSENGER SERVICE

An aerial suburban passenger service is to be established in Chicago. Two flying boats are to be run from Grant Park, the down-town lake front, to the fashionable suburbs on the north shore. It is expected that the line will start May 15, 1914, and the advance time-table shows all suburban stops northward as far as Lake Forest, 28 miles distant. The speed planned will exceed a mile a minute, and a flat rate of 50 cents a mile will be charged. On Sundays the regular suburban trips will be cut, and excursions to other points on Lake Michigan are contemplated by the promoters.

## INDIAN MAKES RAZOR OUT OF OLD FILE

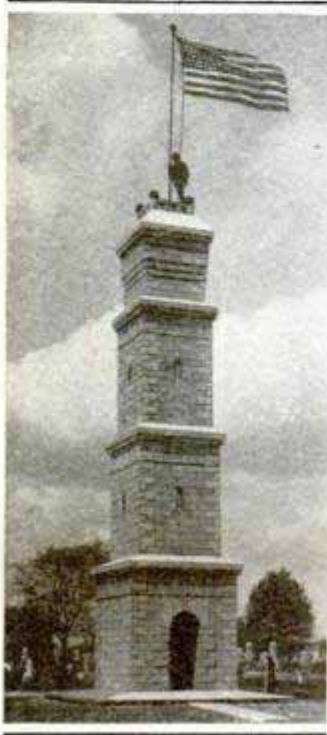
Among the Osage Indians it is a custom to shave the heads of warriors, leaving only a narrow strip for a scalp lock, running from the forehead to the back of the neck. A traveler saw in the Indian village of Pawhuska, in Oklahoma, a razor used by the Osages for ten years, which had been hand made from an old file. The work was done by a member of the tribe, now nearly a hundred years old, and his only tools were a hand bellows, a flint hammer and an emery rock. The razor is a demonstration of his skill, for it is nearly as perfect as if made by machinery, the edge of the blade being sharp and straight, while the handle is but the old file unchanged. The Osage Indians are wealthy on account of the royalties paid on oil lands owned by the tribe. Despite this, however, they maintain many tribal characteristics, and to this day the scalp lock is preserved, especially by the elder men.





## SOLDIERS' MONUMENT BUILT OF CONCRETE BLOCKS

The monumental shaft to the memory of the soldiers who fought during the Civil War, erected by citizens of Casey, Illinois, is constructed of concrete blocks after a design by an 80-year-old veteran. It is 60 ft. high and 18 ft. square at the base. There is a stairway inside by which the top of the pile may be reached, and a flagpole surmounts the monument, which is located in the village cemetery. The monument cost about \$1,600.



mounts the monument, which is located in the village cemetery. The monument cost about \$1,600.

## REINDEER HERD IN ALASKA THRIVES IN NEW HOME

Only a few years ago the Department of Agriculture sent a herd of

reindeer into Alaska as an experiment to solve a troublesome transportation problem. The animals have flourished and the herd now comprises over 2,500 head. The illustration shows some hundreds of these beautiful animals at a boat landing. The white, or albino, reindeer in the foreground is of unusual interest, as these specimens occur only rarely.

## PRECAUTIONS TAKEN IN POWDER MANUFACTURE

Powder manufacturers are constantly on the alert for methods and means to minimize factory explosions. So far as practicable, they maintain a large number of small factories scattered over a dozen states. Each of these plants is built with an eye to possible explosions, the foundation and three walls of each building being substantial, while the roof and the remaining wall are of the flimsiest character. When the accidental explosion occurs, the roof and weak walls readily give way before the charge, the remainder of the building standing practically uninjured. Semiautomatic machinery is also used wherever possible, designed so that it may be operated largely from points outside the structure in which it is housed. This combination of explosion-proof buildings



Where Santa Claus Recruits His Stable: One of the Reindeer Herds of Alaska

Courtesy The Valve World



and long-distance operation is steadily cutting down the losses due to explosions, if not their number.

### MIRROR MAKES WIRELESS FLASHES VISIBLE

A new wireless receiver, intended particularly for use on aeroplanes, is



equipped with a mirror which reflects the wireless flashes so that the operator sees the message instead of hearing it. This device serves to overcome one of the awkward and often dangerous features connected with the use of wireless apparatus by an airman. Heretofore the airman has been compelled to strap the receivers over his ears. This interferes with his hearing the engine distinctly, a thing of the utmost importance in the operation of air craft. Yet, without the earpieces, the noise of the engine interferes greatly with the sound of the wireless.

### HOTEL PLANS BALLROOM ON SPRINGS

A new hotel in Spokane is having a ballroom built which will lend a buoyancy to dancing that is impossible on the rigidly fixed floor. The novel dancing floor is suspended on resilient steel cables, and is constructed on the principle of a suspension bridge, to allow of "give" under the swaying of the dancers. It is stated that while this new construction has been used in private houses, this is the first instance of its adaptation on so large a scale for a public ballroom.

### CRUDE OIL AS LOCOMOTIVE FUEL

During the last few years crude oil has replaced coal as a locomotive fuel on many of the railroads of Texas, Oklahoma and Louisiana, and, in less degree, in some of the other states. More than 1,200 oil-burning locomotives are in use on the Southern Pacific and more than 800 on the Santa Fe. It is estimated that about 32,000,000 gal. of oil was used for fuel by the railroads of the United States in 1912, and that the total mileage of railroads operated with oil is now in the neighborhood of 30,000.

### METHOD OF SMOOTHING OLD ASPHALT PAVEMENTS

A smoothing treatment for asphalt pavements that is being successfully applied in some of the larger cities does away with the necessity of cutting out and replacing sections of pavement that have become rough through a combination of heavy traffic and hot weather. The asphalt surface is first heated to a semifluid state, this being accomplished by oil flames confined under a steel hood that is lowered over the section to be treated. The hood is carried at the front of a traction engine and is rigged in such a way that it can be easily raised and lowered. When the asphalt is heated to the proper working degree, the hood is raised and the machine is backed off to another position, leaving the hot pavement to be raked and leveled by hand, and surfaced by a light steam roller or with hand irons.





## CONSTRUCTION OF NEW AUSTRALIAN CAPITAL BEGUN

The biggest of problems in government and in national development are being worked out in Australia on an independent basis, without the interference of native or transplanted standards that have so much force in other countries. One of the most important enterprises now under way in that country is the building of a Federal capital city in a mountain valley that until recently was practically a wilderness.

Renewed interest in this project and in Australian affairs generally has been aroused in this country by the return of Walter Burley Griffin, the American architect who won the first prize for a plan of the new city and who has since been placed in full charge of the work as director of design and construction. This plan, which was described in the September, 1912, issue of *Popular Mechanics Magazine*, embodies the biggest city-building project of modern times. Although it was worked out in a period of only six weeks, the plan as a whole has been adopted with only such minor modifications as would naturally occur after a minute adjustment to site and other local conditions. Mr. Griffin expects to be back in Australia early in May.

In an interview with a representative of *Popular Mechanics Magazine*, Mr. Griffin said: "The city of Canberra is not to be built hurriedly, but in accordance with a carefully arranged schedule extending over a period of about eight years. For carrying out this schedule, appropriations are being made from year to year as required. For the fiscal year ended June 30, 1913, an appropriation of £145,000 was made, while an appropriation of £285,000 was made to cover the work of the fiscal year ending June 30, 1914. All the money so far has been used in buying construction material and equipment and in building construction plants, including a brick plant, a water plant, roads, and one unit of a steam-power plant for generating electric current." Mr. Griffin then ex-

plained that in Australia, public utilities, including railroads, are owned either by the commonwealth or by the individual states, and that in accordance with this practice the commonwealth will own and operate all public utilities in the capital and the Federal district in which it is located. The commonwealth now owns the land in the Federal district and will retain that ownership permanently, the plan being to lease the land required for private uses. The parliament building will be the first of the government group to be built, and the plans for this, like the plans for the city, will be obtained through an international competition open to all practicing architects.

There is now no railroad communication with the capital, the usual method of reaching the site being by automobile from a station on the railroad 40 miles to the east. This is a handicap that will soon be removed, as a railroad is now being graded north through the capital from Queanbeyan while a line is soon to be built from Canberra east to Jarvis Bay on the Pacific coast.

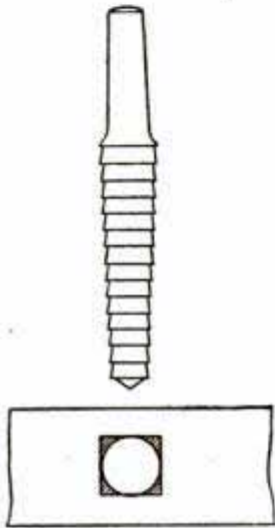
Speaking of conditions generally in Australia, Mr. Griffin said: "The rainfall is ample and the summers, from November to March, are quite hot, the climate appearing to be quite like that of southern California. Business is very active and prospects are particularly good. There appears to be a good opening for expert architects. The profession has not been commercialized there as it has been in the states. The architects in Melbourne and Sydney employ small staffs and are therefore able to give close personal supervision to the work." Heretofore, the architecture of Australia has been mainly British. Mr. Griffin believes that the conditions are now ripe for the development of a representative architecture, one free from historical precedents and adapted specifically to the social and climatic conditions of the country.





### Tool for Cutting Square Holes in Metals

A special tool for cutting square holes in iron, or other metals, is shown in the sketch. It is made of the best grade of tool steel with the body square and tapering and teeth cut, as shown, the top one being the size of the required hole. As accuracy in graduating the thickness and pitch of the teeth is of great value, it is advisable to cut them in a machine, although it can be done by hand with a file. In tempering the tool, be careful to secure an even hardness throughout.



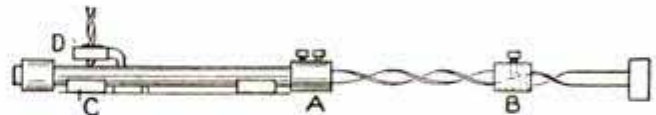
To cut the square hole, first drill a hole of the same diameter as the sides of the square hole desired. Hold the iron over the open jaws of a solid box vise, an anvil hole or a dressing plate, and insert the cutter, then, with a few blows of a hammer, start the cutter, which takes the corners out gradually as the tool penetrates the hole, the material removed dropping from the hole until finally the cutter passes through, giving it the desired dimensions.

In order to prevent the cutter from heating and to insure a smooth cut, it is advisable to dip the cutter in oil before using it. To protect it from striking the hardened surfaces of the vise jaws, pieces of hardwood should be used on the jaws.

With a properly made tool, round holes in iron,  $\frac{1}{2}$  in. thick, can be made perfectly square quickly. Holes of other shapes, oval, triangular, pentahedral, hexagonal, etc., can be cut successfully by using a tool made on this principle.—Contributed by Pierre Wagner, Indianapolis, Ind.

### Drill Press Used to Cut Spiral in a Shaft

Having a long spiral to cut in a shaft that was too long for the lathe or milling machine, I did the job very successfully in a drill press. After it was finished, mechanics who had varied experiences would not believe that such a good job could be done on a drill press. As the lead had to be four turns per foot, a piece of  $\frac{1}{4}$  by 1-in. bar iron of suitable length was cut and placed within a 1-in. pipe, 12 in. long. One end of the flat iron was gripped in a vise, while the other end was turned with a strong wrench to make four complete turns. The spiral thus formed served as a lead screw for the work. The spiral and stock were



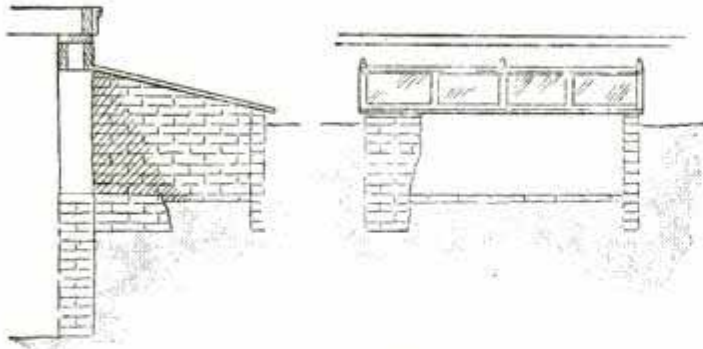
The Spiral Thrust Gave the Proper Turns to the Shaft under the Drill Point

fastened together with a coupling, at A, and a guide block, B, was clamped to the table, while the work was resting on V-blocks, C. The drill was guided with a jig, D, which was fastened to the platen of the machine.—Contributed by Albin P. Swaidmark, Orlando, Florida.



### A Basement Hotbed

What might be termed a greenhouse in miniature may be easily constructed in one side of the basement of the



The Hotbed is Merely an Extension of the House Wall and is Covered with Double-Glazed Sash, the Entrance Being from the Basement of the House, so That the Bed is Kept Warm by the Furnace and the Sun's Rays

average house at very small expense. If the hotbed is to be built in a new house it will be an easy matter for the workmen to build up the walls, as shown in the sketch, leaving the side open into the basement. As there is practically no weight to support, the walls need not be any thicker than 4 in. or the width of one course of brick.

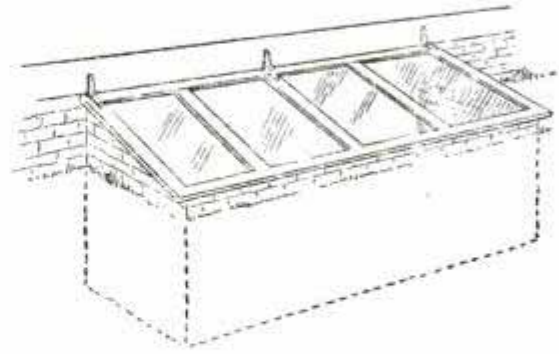
The bottom of the bed should be at such a height that it may be easily reached while standing on the basement floor, yet not so deep that the outside walls will interfere with the rays of the sun striking the bed.

The walls are built up a trifle higher than the surface of the ground on the outside and the ends slope up to the house until they are 1 ft. higher than the front. Make the surface of the sloping ends smooth with mortar so that a close joint will be made when the sash is laid on it.

Timbers, 2 by 8 in., are placed over the opening in the wall between the hotbed and the basement, so that their upper edges are level with the top of the wall for the house. The sash that cover the hotbed are hinged to the outside timber. If they do not fit on the walls snugly, pieces of felt may be cut in narrow strips and glued to the underside of the sash where they strike the upper surface of the walls.

The sash should be double-glazed, that is, have two pieces of glass with an air space between them. However,

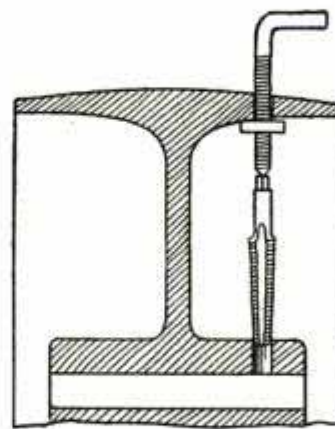
if the hotbed is built at the side of a room containing a furnace, sufficient heat will be provided by the furnace to enable one to raise tender crops even though the glass is only one thickness.



The bed is filled in with rich soil and fertilizer to a depth of 10 or 12 in. Such a hotbed will produce all the early lettuce, radishes, etc., required for the average table before the ground in the garden has thawed sufficiently to work it. It also provides an excellent place to force tender plants in the spring and to have them started and vigorous by the time they can be safely set out in the garden.—Contributed by O. J. Thompson, Petersburg, Ill.

### Starting a Tap in a Pulley Hub

It is not an easy matter to start a short tap in a hole drilled in the hub of a small pulley. Having a number



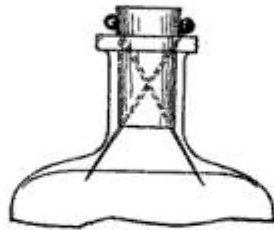
of these to tap for setscrews, I devised the tap starter shown. It consists of an ordinary bolt, of a size to pass through the drilled hole in the pulley face, and with its nut placed on the inner surface. If

the bolt does not have a square or octagon head, it can be turned at right angles, as shown, to make a handle. The tap can be easily started straight with the bolt.—Contributed by J. W. Madison, Oshkosh, Wis.



**Locking a Cork in a Bottle**

The sketch shows a bottle cork which will not slip out and spill the contents of the bottle while carried in the pocket, suitcase or grip, if bounced or jolted. I have found this a very efficient method and by using glass-headed steel pins a neat appearance is presented.



The pins are run through the cork so that their lower ends, or points, extend under the shoulders of the bottle neck.—Contributed by M. C. Erwin, Gallup, New Mexico.

**Inserting Rod in a Lace Curtain**

To put a rod through a sash or window lace curtain usually is a rather trying matter, as the rod often catches in the material, which is easily torn. To avoid this, place a thimble or a glove finger tip on the end of the rod before pushing it through the hem of the curtain. The result will be found satisfactory and the job done with little difficulty.—Contributed by Freda Nehls, New York City.

**Plummet-Cord Adjuster on a Transit**

In using a transit, I have tried many different methods of adjusting the length of the cord supporting the plummet without perfect satisfaction, but I have now adopted a device of my own that I like best of all and which is as follows: A loop, about 3 in. long, is made on one end of a small silk or linen cord, having a length of about 10 in. This I suspended, loop down, from the leveling head. On the cord which suspends the plummet I tie single overhand knots, about 1 in. apart, for almost its entire length. By passing the end of the cord through the loop, I can use whatever length is needed, and a knot will prevent it from slipping when suspended.—Contributed by J. L. Bayley, Ione, Wash.

**Pipe-Thread Lubricant**

A lubricant for the threads on large pipe fittings is a mixture of 1/2 pt. black machine oil, 2 oz. white lead, 8 oz. graphite, and about half a teaspoonful of flour of emery. The emery will smooth the threads, and the oil and lead will make a fine lubricant of enough body to stop any leak.

**Location Board for Employees**

The whereabouts of any employe, regardless of the number of floors and departments, may be easily kept track of on a board similar to that shown in the illustration. The board and spaces can be of any size. A check is used for each employe with his or her name as well as the department lettered on it.

The board is placed at the doorway of each floor, or at the desk of the foreman in charge. If an employe works most of the time on the fourth floor, the check is kept as designated in the lower row, but on leaving to go to the second floor in the department employed, he hangs his check on the second-floor row of that department column.

PLACE CHECK IN RIGHT SPACE BEFORE LEAVING								
OUT	DEPT. 1	DEPT. 2	DEPT. 3	SMITH	DEPT. 5	DEPT. 6	DEPT. 7	DEPT. 8
1 <sup>st</sup> Floor								
2 <sup>d</sup> Floor							JONES	
3 <sup>d</sup> Floor								
4 <sup>th</sup> Floor			BROWN					

A Board on Which to Hang Checks to Designate the Place Where an Employe is at Work

Then, if the foreman should have a call over the telephone for anyone, he would only have to look at the board to know where to find that person. When anyone leaves the building his check would be placed on the space designating the department in which he is employed.—Contributed by Milton Pilhashy, San Francisco, Cal.



### Entrance Signal for a Garage

One ingenious garage owner rigged up an electric bell to ring when an automobile was entering the runway



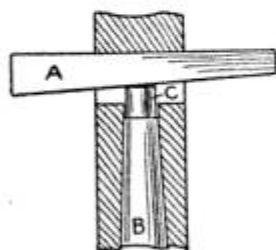
Trip Bar in an Entrance Runway to Make Connections for an Inside Electric Bell

on the outside, so that the assistant could be called to open the doors. This is an especially handy device for winter, or when the doors of the garage are kept closed. The device consists of the ordinary electric-bell connections with the wires running underground to the curbing on the runway, where they are connected to the switch. The runway has a trip bar, set in the paving with the end extending into the curb, where it works the switch when pressure is applied by the automobile wheels. A coil spring is placed under the curb end of the bar to keep it in its upper position and the electric contact broken. The runway end of the bar is hinged.

The electric switch, which is well protected from the weather by being boxed over, is a simple arrangement of two springs pressed together by a projection on the end of the bar.—Contributed by F. H. Tillotson, Chicago.

### Removing a Stuck Shank from a Drill Spindle

The usual method of removing drills or drill chucks from the end of a drill-press spindle is to use a tapered drift.

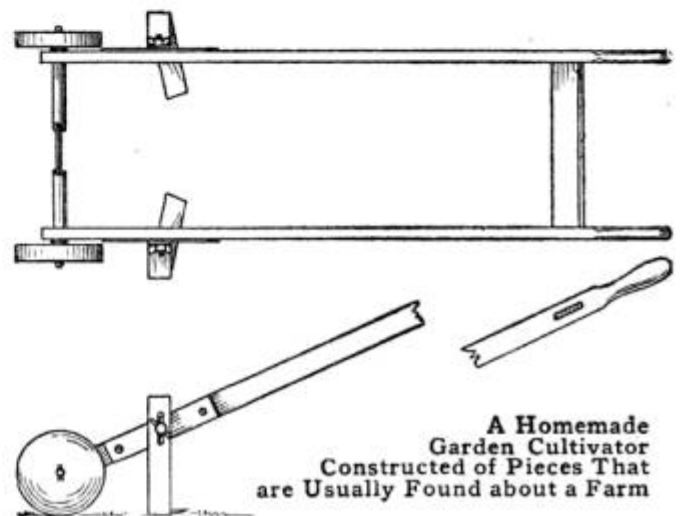


Occasionally, however, some one drives a drill in that has a short stem or shank, which does not reach up to the drift slot so that it can be driven out. The illustration shows such a condition. The drift A cannot touch the end of the drill shank B. Instead of pounding and twisting to get the drill out, procure a short piece of round rod, C, slightly smaller than the

drill shank and of such length that, when dropped in on the end of the drill, the drift may be entered in its slot. A little oil on the edges of the drift will be of assistance in either case.—Contributed by Donald A. Hampson, Middletown, N. Y.

### A Garden Cultivator

The cultivator can be constructed of ordinary materials found about any farm, but the stock can be purchased



A Homemade Garden Cultivator Constructed of Pieces That are Usually Found about a Farm

and the amount required does not make the cost very great. The width of the cultivator will depend on the width of the planted rows of seeds.

The wheels and handles are wood, the axle is a  $\frac{3}{8}$ -in. steel rod with  $\frac{1}{8}$ -in. holes drilled near each end for cot- ters. Two washers are used on each side of a wheel. A piece of  $\frac{1}{2}$ -in. pipe is placed on the axle to keep the handles apart at the lower end, and a tenoned crossbar, mortised in the upper part of the handles, separates them in a like manner.

The blades are made of suitable steel, bent as shown and sharpened on the edge where they touch the ground. The upper ends of the blades are slotted and fastened to the handles with a bolt having a thumb nut.—Contributed by W. E. Crane, Cleveland.

☞Heat together 10 parts lime, 12 parts resin and 1 part linseed oil, and when thoroughly dissolved and hot, apply to a wood surface. This will make a coating almost as hard as stone.



### A Homemade Solar Heater

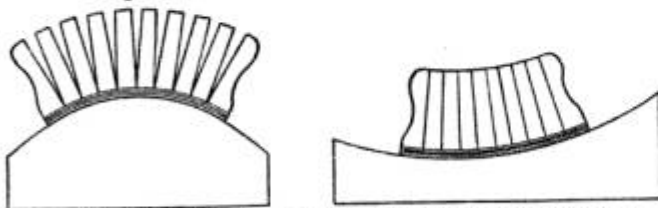
People living in sections having a goodly proportion of sun every day realize the value of a solar heater both in convenience and the saving of fuel. A heater equal in all respects to any factory-made can be built at less than one-fifth their cost by using an ordinary cylindrical range boiler or hot-water tank for the heater part. Select one of suitable size for all requirements, either new or second-hand. Make a box, into which the tank will fit, with about 1 in. space between the sides of the tank and box, leaving one side open for the glass. Nail narrow molding of door-size stop around the inside of the box and about  $\frac{3}{8}$  in. from the open edge, to form a rest for the glass, which must be set in with putty.

Bore holes in the box for the pipe connections, and any extra holes in the tank should be plugged. Paint both tank and the inside of the box with two coats of lampblack.

After placing the tank in the box and connecting the service pipes, stop all holes and joints with putty, fasten the glass on the face, just as a window pane, and the heater is ready for service. If pressure water is used, it can be placed near the ground and it will give as good service as if placed on the roof. The box should be placed in a horizontal position, the length running due east and west, with the face at such an angle as will expose it to the direct rays of the sun.—Contributed by E. C. Knopf, San Ysidro, Cal.

### Flexible Sandpaper Block

Plane a number of strips, 1 in. wide, and taper them from  $\frac{3}{16}$  in. at one



The Flexible Sandpaper Block will Shape Itself to Fit and Smooth an Uneven Surface

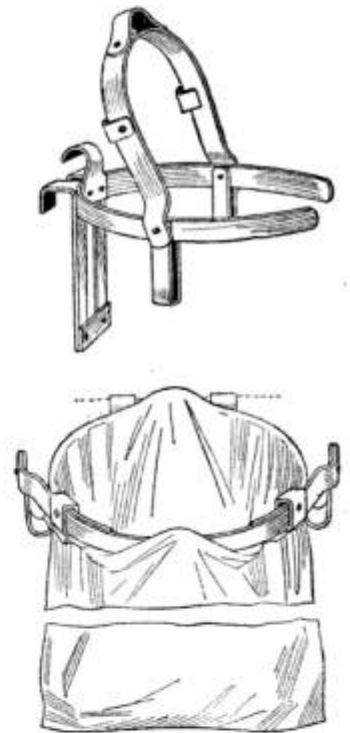
edge down to  $\frac{1}{8}$  in. at the other. If desired, the outside strips can be made thicker, to permit a groove to be cut

for the finger tips. After giving them a coat of shellac, assemble the strips to make the size of block wanted. A convenient-size block is one made 8 in. long by 2 in. wide. Obtain a piece of single-ply belting, the older the better, and stick it to the broad surface of the block with thick shellac.

When it is dry, drive some brads through the leather into the strips to securely fasten it in place. The sandpaper is glued to the leather, or held on with the ends extending under the grip of the fingers. This block is very handy, as it can be used on both flat, and convex or concave surfaces.—Contributed by C. White, Brooklyn, N. Y.

### A Bag Holder

The bag holder shown in the sketch is designed to hang on a barrel, bin, truck, or any other convenient place. The parts are made of strap iron and shaped as shown, requiring no exact lengths. The yoke should be the size of the bag top. The U-shaped pieces at the sides permit the top of the sack to be turned over the yoke. Two clips are riveted to the moving part, projecting over and catching on the yoke sides to prevent it from dropping too far down. The hooks and vertically extending parts are used to hold it on a box or barrel.

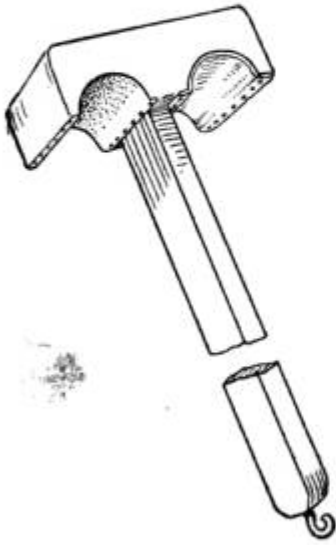


To fill the bag, place its upper edge over the hook at the back and between the yoke, so that the edge overhangs. The clamping band is drawn down over the bag top where it holds the cloth securely without injury.—Contributed by J. F. Reed, Johnstown, Pa.



### Line-Shaft Polisher

Nothing makes a better impression in a well-appointed and tidy shop than to see the line shafts free from rust and oil, and at the same time polished. A little attention each day with the polisher illustrated will keep a shaft in such a condition. The polisher is made of a piece of soft wood, about 4 in. thick, 5 in. wide, and 12 in. long, to which a hardwood handle, 8 ft. long, is



attached. A semicircular groove is cut on each side, as shown, a little larger than the diameter of the largest shaft in the shop. One groove is lined with several thicknesses of heavy cotton cloth, and the other, with a sheet of coarse emery cloth, both tacked securely in place.

Apply the emery side first, then use the cloth side, moving the polisher along slowly back and forth on the shaft while it is turning. This will produce the desired result. A hook is provided so that on long stretches of shaft a weight of 10 or 15 lb. may be hung on it, thereby making the operation easier.—Contributed by A. Dane, Pottstown, Pa.

### Calculating Pipe Size to Take Flow from Two Pipes

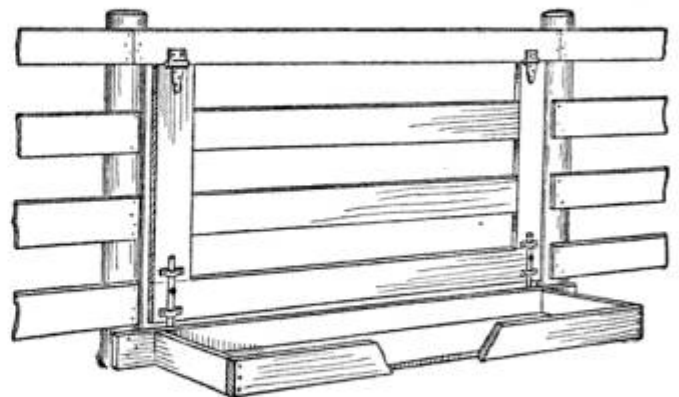
To ascertain the proper diameter of a pipe to take the flow of water from two pipes of any given diameter, lay out a right-angled triangle with the base equal to the diameter of one pipe and the height equal to the other. The length of the hypotenuse will be the desired diameter. A carpenter's steel square is handy for this problem within its limits.—Contributed by J. A. Shelley, Brooklyn, N. Y.

### Cleaning Marble Floors

A good way to clean marble or mosaic floors when the dirt clings in the crevices is as follows: Apply powdered table soda over the floor or the dirty spots. Then apply a 5-per-cent solution of acetic acid. This solution may be purchased at any drug store. There will be considerable foaming for a few seconds. As soon as this stops, the solution should be removed at once and the floors washed with clean soapsuds. The articles mentioned are harmless to the hands. The acetic acid should not be left where small children might drink it.—Contributed by Loren Ward, Des Moines, Iowa.

### A Feeding Trough

The feeding of hogs in a trough is always a troublesome task, as the hogs will get in the way of the food if it is in a liquid form, and prevent the trough from filling evenly. One farmer overcame this difficulty by setting the trough on the outside of the fence and hinging a panel of the fence so that the bottom would swing outward. A stop is placed at each end to hold the panel in place while the food is poured in the trough. The stops are also used to prevent the panel from being pushed farther than the outside of the trough. The food is placed in the trough evenly and then the stops



A Feed Trough on the Outside of a Fence to Prevent Swine from Getting in the Food

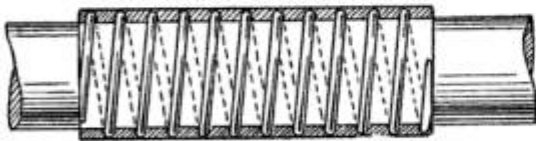
are raised and lowered to catch on the outside edge of the trough. The trough should be secured to the fence post at each end.



### Reinforced Babbitt Bearings

The sketch illustrates a valuable and easily applied improvement for pillow-block and all forms of bearings that are babbitted. The coiled soft-brass or copper wire prolongs the life of the bearing, makes a better fit, and will be found specially valuable in the upkeep of high-speed and heavy machinery.

The application is as follows: Before pouring the babbitt take a piece of soft, not hard, brass or copper wire



A Babbitt Reinforcement of Coiled Brass Wire to Make a Harder-Wearing Surface for Bearings

of such gauge that it will just fill the space allotted for the babbitt and make surface contact with the shaft, and prepare the coil by winding the wire around a piece of shaft or wood having the same diameter as the machine shaft, the coils to be  $\frac{1}{4}$  in. apart for the entire length of the bearing. Remove the arbor and place the coiled wire in the bore to be babbitted and pour the babbitt around the wire, then scrape to a fit.

Hard wire should not be used because of the extra care required in fitting, and, besides, the soft wire is better in many other ways. This is an easy and cheap way of producing bearings that will last, and also gives a chance to utilize the scrap wire about a shop or factory. Furthermore, it is a good method to use in constructing models or machines in the home workshop.

### Packing between Storage Cells and the Case

A toy hollow rubber ball forced into the space between a storage battery and its case is an effective means of keeping it from jostling around and also absorbs all jolts and jars. These balls can be purchased cheaply in various sizes suitable for the space to be filled.

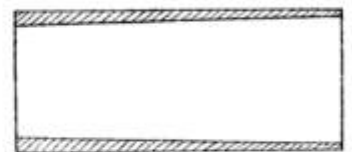
### Drawing Brass Tubes by Hand

Small tubes of light brass or copper are easily drawn by hand with a pair of pliers through a hole drilled in a piece of  $\frac{1}{4}$ -in. iron or steel held in a vise. The flat strip of metal should be exactly as wide as the circumference of the hole through which it is to be drawn, and it should be pointed on one end sufficiently to start it through the hole. Then it is grasped in a pair of pliers and drawn through with a good steady pull. If the metal has been cut the proper width, the resulting tube will be tight enough to convey oil without soldering.

### Ferrule for Straight-Shank Tools

The ordinary ferrule, as applied to file and chisel handles, is all right as long as the article to be held has a tapered shank, or tang, so that it can be tightened when becoming loose. When the shank is straight, it is not easy to tighten the tool in the handle. In order to cause a handle to grip a straight shank, I use a special ferrule as shown in the sketch.

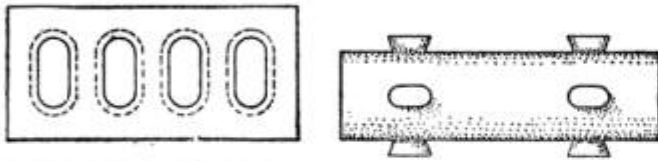
This ferrule is made of brass or steel tubing and is tapered on the inside. The taper is formed with a taper reamer. The ferrule seat on the handle is given approximately the same taper as the inside of the ferrule. After drilling the hole for the shank, the handle is sawed lengthwise, two cuts being taken at right angles to each other, as the sketch clearly shows. The saw cuts form the handle into a four-jawed chuck, so that when the shank is placed in the handle and the ferrule driven down on the seat, the jaws will grip the shank tightly. If the tool works loose, a few taps of a hammer on the ferrule will close the jaws and tighten it again.—Contributed by Clyde L. Adams, La Grange, Ill.





### Anchors for Babbitt Bearings

Usually designers of machinery give the patternmaker a great deal of trouble in allowing for babbitt anchors

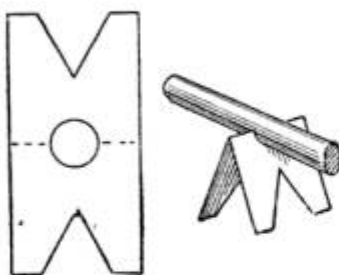


Box for Molding Cores to Make Holes in Machinery-Bearing Boxes for Babbitt Anchors

in bearings. With my method this is simplified. In making a bearing core box, only show some spots with red shellac and make a core box for the core maker, as shown to the left in the sketch. These cores can be kept as a standard by the foundry and used always for bearings. This will eventually save many dollars, as complicated core boxes are often needed. The manner of pasting and nailing sand anchors on the ordinary stock cores is shown at the right. If the bearings are cast in green-sand molds, the anchors will be placed on the green-sand mold.—Contributed by J. C. Hansen, Maywood, Ill.

### Supports for Reinforcing Rods

A support for reinforcing rods, used in concrete-floor construction, is shown in the sketch. The supports are made



of heavy galvanized sheet metal, about 2 in. wide and 4 in. long. A hole is punched in the center for the size of the rods used, and

notches are cut in the ends to facilitate the flow of concrete. The metal is then bent on the center line, leaving the ends 1 in., or more, apart, so that the support can stand alone. They are placed at proper intervals under the rods, to support the latter above the floor forms and allow the concrete to flow under them. Their cost is slight and they answer the purpose in every way.—Contributed by C. W. Thomas.

### Under-Inflation of Automobile Tires

Many automobile owners do not realize the importance of properly inflating their tires. This is mainly due to ignorance of the real nature of the tires. Two things must be considered in the construction of a tire, the envelope and the air cushion. The casing cannot support the weight; that is the function of the air cushion. Then it is evident that the greater the weight, the larger the air cushion must be, and as the air cushion increases in size the more pressure is required, hence there must be a certain pressure for a certain size tire.

If the air pressure is insufficient the tire itself must support some of the weight. The result of this is a flattened tire at the point in contact with the ground, and when the wheel is turning, every part of the casing is forced into this unnatural shape, then resumes its original size, so that each side of the casing bends out and springs back again at every revolution of the tire.

The casing is made up of several layers of rubberized canvas, vulcanized together. With a sufficient air cushion these layers all work together as one unit, but in the case of a flattened tire the working of the sides causes them to pull apart. This, in time, will result in the separation of the layers and then the working will cause them to chafe and heat so that the fabric becomes too weak to sustain the weight and a "blow-out" occurs.

There are several kinds of tire abuse, but under-inflation is the worst of all. The statistics of the leading tire manufacturers show that 75 per cent of the tires go out of service prematurely on account of insufficient inflation. Under-inflation not only wears out the various layers, but it also loosens the tread. The flattened condition of the tires, when the pressure is low, causes a little roll of rubber right in front of the point of contact of the tire with the ground. This tends to loosen the tread. In case of the clincher tire, under-inflation usually causes the tire



to rim-cut before the fabric gives way. The continual working in and out over the hook of the rim soon cuts the tire.

The standard rule for right pressure is 20 lb. to every 1 in. of width. The following table is adopted by the leading tire manufacturers for correct pressures as applied to tires:

2½-in. tire, 50 lb.	4½-in. tire, 90 lb.
3-in. tire, 60 lb.	5-in. tire, 100 lb.
3½-in. tire, 70 lb.	5½-in. tire, 110 lb.
4-in. tire, 80 lb.	6-in. tire, 120 lb.

To pump a tire up to the right pressure and then take for granted that it will stay at that pressure, will result in a flattened tire, sooner or later. No tire is absolutely air-tight; each one should be tested at least twice a week, and if possible, every day, and air added as required. It is surprising how quickly the pressure will be reduced although there is no visible leak.—Contributed by W. A. Yoakam, Granville, O.

### Care of Eyeglasses

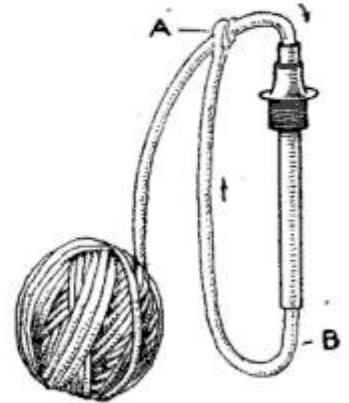
To prevent glasses from covering with a veil of steam when one enters a warm room, rub them with some moist soap of any kind—not a sand soap—and polish while the soap is moist. If an accident should happen to the lens and cause it to break, a temporary repair can be made by pasting the parts together with liquid shellac. The shellac dries quickly and the mended lens will give good service until a new one can be procured.—Contributed by H. Martine Warner, E. Orange, N. J.

### Clarinet-Reed Trimmer

Clarinet players will find a very cheap and efficient substitute for a reed trimmer in the ordinary fingernail clip. A perfectly new reed is sometimes useless on account of being too soft, but it can be used by clipping, or trimming, the end in the same manner as finger nails are clipped.—Contributed by Wm. H. Patten, Belleville, New Jersey.

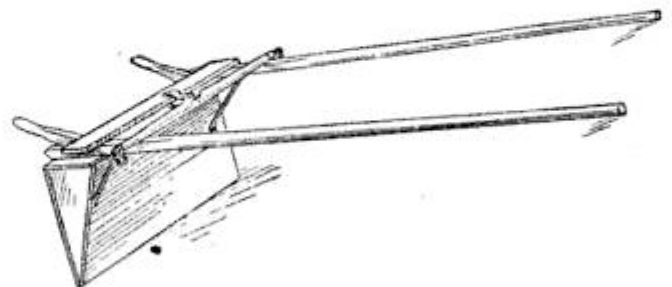
### To Fill an Engineer's Torch with Wicking

Pass the end of the lamp wick down through the sleeve in the usual way, then bring the end up and tie it, at A, so that in pulling on the wick, at B, it will increase in size until the hole is filled tightly. Cut the wick off at the top and assemble the torch parts. This will save the wicking, and the hole can be easily filled as tightly as desired.—Contributed by C. G. Green, Toronto, Canada.



### A Street-Gutter Cleaner

The superintendent of streets in a suburban city did not have a large number of street cleaners, and to quickly accomplish the work with a few hands, he devised the gutter cleaner shown in the sketch. The cleaner is made like a large hoe with shafts instead of a tongue or handle, and a horse is hitched to it. Two handles for the operator are attached to the rear part as on a plow. The scraping edge has a steel bar attached, and the scraper part can be set straight or at an angle as desired. The refuse



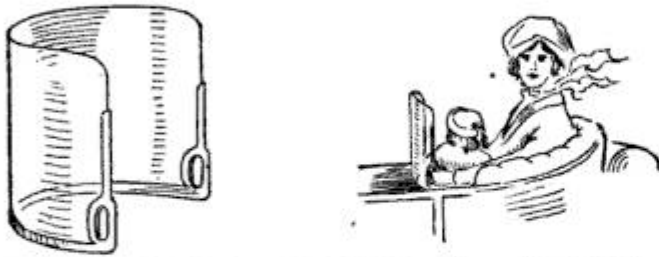
A Cleaner for Removing Dirt That Collects in the Gutters of a Street

falling into the gutter is thus easily and quickly scraped into piles and gathered into wagons.—Contributed by H. H. Sherer, Evanston, Ill.



### Automobile Windshield for the Baby

It is almost impossible to keep a pair of goggles on a baby and dust out of its eyes while taking a ride in an open

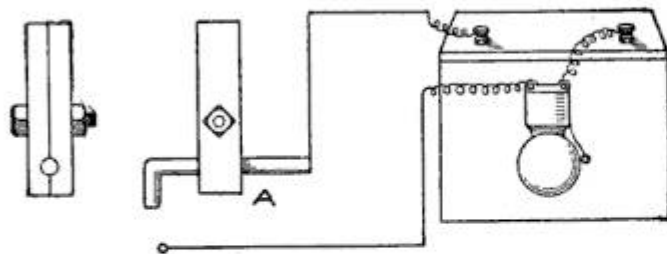


A Windshield Made of Celluloid with a Metal Edge to Hold in Front of the Baby

automobile not having a windshield. The illustration shows a simple device made of sheet metal, preferably brass, and a piece of celluloid. The metal may be of double thickness riveted together over the edge of the celluloid to keep it in place. The shield is held in front of the baby in a very comfortable position.—Contributed by R. F. Pohle, E. Lynn, Mass.

### Setting Difficult Work in a Chuck

In setting difficult work in a chuck to a finished surface that must not be marred by adjusting to the sound of a tool; where the part to be set true is out of reach to take a chalk mark; or where it cannot be seen, I find the appliance shown in the sketch to be indispensable.



The Work must be Set True to Make a Perfect Electrical Contact during the Entire Revolution

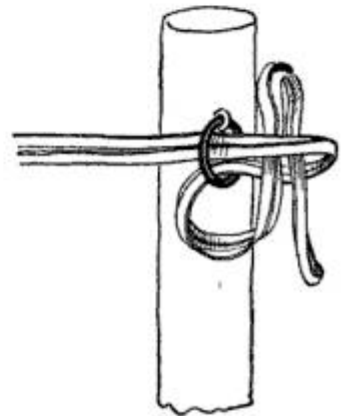
The apparatus is made of a square box, just large enough to contain one dry cell of battery, and a bell attached on one side of the box, the connections being made as shown. This makes an outfit of convenient size for the tool kit.

In use, one terminal is connected to the lathe or boring bar, and the other,

which is set in an insulated clamp, A, is used in the slot for the tool in the boring bar. Proceed to true up the piece in the same manner as if setting with a tool, and when the bell rings for the entire revolution of the piece, it is set absolutely true. On work in sight, this device in many cases produces quicker results than when setting to chalk marks.—Contributed by Ross Williams, St. Louis, Missouri.

### Tying Horses to a Hitching Post

The illustration shows a way of tying horses to a hitching post so that the tie can be easily loosened. Double up the lines and insert the loop thus formed through the ring of the post. Then also double up the remaining end and pull this loop through the first one. This tie will hold the horses securely, and is very quickly loosened by a quick pull on one end.—Contributed by C. H. Thomas, Norristown, Pa.



### To Prevent Mucilage Accumulating on the Receptacle Edge

In our office a quantity of mucilage is kept in open pots. These pots soon gather an accumulation of hardened mucilage on their upper edges, and the brush handles become covered with it. This causes great inconvenience on account of the brushes sticking to the pot edges.

This trouble was avoided by applying a thin coat of paraffin on the edge of the pots and on the brushes above the bristles. The paraffin was melted in a tin can over a gas jet and was applied by "painting" it on with an old brush. This treatment is very effective, as the mucilage will not stick to the paraffin.—Contributed by Jas. A. Hart.



### Hoisting with a Concrete Mixer

The problem of getting material out of an excavation for a reinforced-concrete job was solved in an unusual way by one contractor. The electrically driven concrete mixer was rigged up so it would do the lifting of the earth from the excavation. The mixer, which was of the cylindrical type, had a rope, leading out of the hole and fastened to the drum after passing over a set of sheaves. To hoist, the motor was run and the rope wound up on the drum of the mixer. For lowering, the weight of the empty bucket was usually sufficient and when it was not, or a braking action was required, the motor was reversed.—Contributed by Sidney K. Eastwood, Germantown, Pa.

### Inserting a Fiber Gasket

A round gasket, cut from sheet packing, leaves some waste, and if a small portion of this waste is left attached,

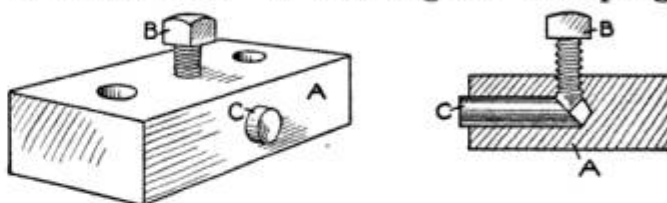


as shown, it can be used as a handle for inserting the gasket in place. Where flanges cannot be spread very far apart without removing a piece of the pipe, put one bolt through a hole in the gasket, and then it can be turned either way by the aid of the attached piece to locate the other holes. The piece can be cut off after the joint is tightened up.—Contributed by J. B. Bedore, Crivitz, Wis.

### A Planer Clamp

There is a certain amount of work done on metal planers that cannot be bolted down directly to the bed or held in vises on it. Such work is held by what might be called compression; that is, a block, rib or plate is fastened to the planer bed, the work is placed against this fixed piece and by means

of fingers, setscrew posts, etc., the work is pressed against the fixed piece hard enough to enable a cut to be taken on it. A holding or clamping

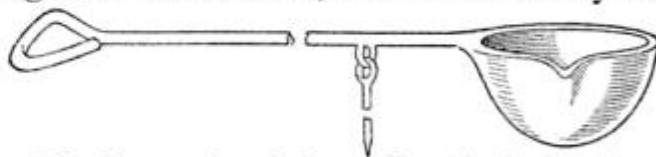


A Clamping Block Having a Laterally Sliding Pin Forced Out by a Vertical Screw

device for producing this lateral pressure is easily made as shown in the sketch. A block of steel, A, is drilled and tapped for a cone-pointed setscrew, B. At right angles to this hole, another hole is drilled in the block and a pin, C, fitted so that it will slide. The end of the pin on the inside is beveled to an angle of 45 deg., the same as the point of the setscrew. It is obvious that turning the screw downward drives the pin out of the side at the same rate. As many of the blocks as may be necessary or convenient may be grouped about a piece of work, or the device may be put in a long strip, in series. It is neat, simple and inexpensive, and should take the place of the various devices kept for the same kind of work.

### Large Hand-Ladle Supports

Large and heavy hand ladles, filled with melted metal, are just a little more than a person can handle, especially when slow, steady pouring is required after carrying the metal quite a distance. If a support is placed on the handle, it holds the entire weight and the operator merely steadies and turns the handle. When walking and carrying the ladle, the support is held against the handle, and when ready to



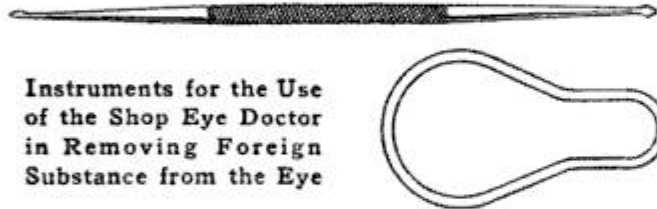
The Support Attached to a Hand-Ladle Handle Carries the Load for Steady Pouring

pour it is released. The pointed end prevents any slipping on wood or earthen surfaces.—Contributed by Bert Verne, San Diego, Cal.



### Instruments for Taking Foreign Matter from the Eye

The sketch shows two very handy instruments for the shop "eye doctor." The loop, formed of  $\frac{1}{8}$ -in. soft-iron wire, is pressed firmly over the outside



Instruments for the Use of the Shop Eye Doctor in Removing Foreign Substance from the Eye

of the eye. This loop holds the eye steady and the eyelid well down, thereby giving the operator a much better chance to remove the foreign substance.

The "pick" can be made of an old 6-in. round file, with the ends ground as shown. They should be stropped to a razor edge, and used only by one having a perfectly steady hand. These two articles have been in use for several years and have given complete satisfaction.—Contributed by A. Dane, Pottstown, Pa.

### Cutting Keyways in a Lathe

Few of the small garages or the amateur workmen have other facilities for making keyways than chipping them in the pieces. This is slow work, requires considerable skill and is never satisfactory. The ever-present lathe, the king of tools, may be made to do the work very nicely.

If the keyway is to be cut in a shaft, place the shaft between the centers of a lathe, then put a tool of the proper size and shape in the tool post—preferably a tool of the gooseneck or spring type, but turned one-quarter way around from the normal position of the lathe tools. Block the gears of the lathe so that the spindle cannot revolve, run the tool up against the work and move it lengthwise of the lathe by turning the carriage wheel. This will make the first cut for the keyway. At each succeeding travel of the carriage, move the tool in a little deeper, and soon a very creditable keyway will be produced. This may seem to be hard

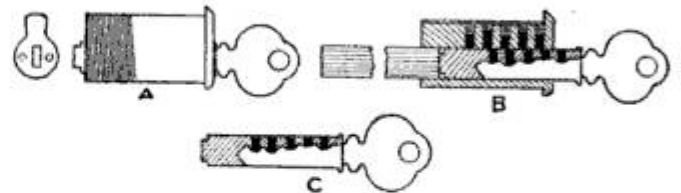
work, but it is a better way and easier to do than chipping out one with a chisel.

To cut an internal keyway, the principle is the same. Forge or grind a boring tool so that it will cut when moved lengthwise of the lathe. It is better to have the tool cut when it is being pulled out, as it is less apt to dig in when so operated. By this method a gear or pulley may be bored and key-seated at one setting.—Contributed by Donald A. Hampson.

### How to Repair a Cylinder Lock for Worn Keys

Remove the cylinder from the lock, insert the key and turn it  $\frac{1}{4}$  in.; loosen the screws in the cam on the back end of the cylinder and remove the cam, as shown at A. The plug is removed by placing the end of a  $\frac{1}{2}$ -in. rod against the end of it, as shown at B. Push the plug out of the cylinder and follow it closely with the rod to hold the driving pins and springs in place.

When the plug is removed from the cylinder, as shown at C, the ends of the pins will be below the surface, due to the worn condition of the key. Smooth the plug down flush with the ends of the pins to overcome the catching of the pins in turning the cylinder. Replace the plug in the cylinder, in the same manner as it was taken out. Be



The Cylinder is Removed and the Surface Filed Down to the Level of the Pin Ends

sure to fasten the cam in place securely, and the cylinder will work as well as a new one.—Contributed by Wm. J. Tolson, Lyons, Iowa.

### Substitute for a Demijohn

A handy demijohn for carrying drinking water in the fields, to laborers, on picnics, or to store liquids can be easily made of three large bottles



of uniform size. The bottles are held together with several thicknesses of burlap drawn tightly around them and sewed in place. The contents can be kept cool by wetting the burlap.

### To Make a Taper Hole with a Straight Reamer

If no taper reamer is at hand, a taper hole can be cut with a straight reamer by the method shown in the illustration, which is described by a correspondent of the American Machinist. A hole, the size of the small end of the taper hole wanted, is drilled into the work and a flat bottom cut, allowing a small portion of the drill-point depression to remain, which is drilled out slightly with a small drill to admit a steel ball halfway.

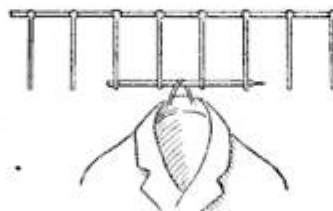


A Straight Reamer, the Shank of Which is Offset with the Tailstock, will Cut a Taper Hole

The center hole of the straight reamer is set on the ball as shown. The lathe tailstock is clamped to the ways solidly, and the holding-down bolt is loosened so that it can be crowded over with the adjusting screws to the taper required.

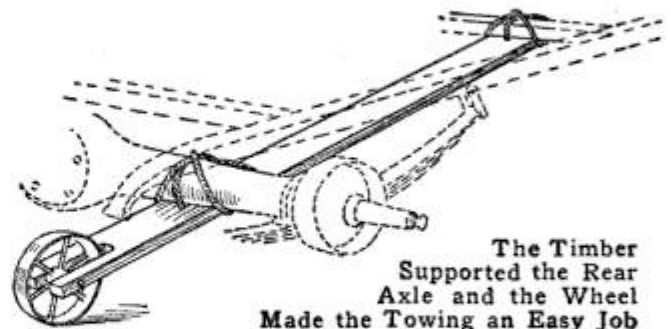
### Coat Hanger in Coaches

The top or overcoat is a bothersome garment on a rail trip. There is no place provided for one to keep it from becoming wrinkled. One traveler suspends his extra coat by inserting the hanging strap through the bars of the package shelf, as shown, then putting a lead pencil through the loop. The pencil resting on the bars will hold the coat firmly in place, no matter how long or rough the journey may be.—Contributed by Wm. N. Robson, Pittsburgh, Pa.



### Towing an Automobile with a Broken Rear Wheel

An accident left me several miles from a garage with a rear wheel brok-



The Timber Supported the Rear Axle and the Wheel Made the Towing an Easy Job

en off from my automobile. A timber, 3 in. thick, 6 in. wide, and 12 ft. long, was lashed to one of the transverse angle irons under the front seat and extended under the rear axle, the end resting on the ground, but a team of horses could not start the machine. I finally hit upon the scheme of inserting a cultivator wheel in the end of the timber, as shown in the sketch. A slot was sawed in the timber end as wide as the wheel hub was long, and the wheel was held in place with a bolt inserted in a hole bored through the extending ends.—Contributed by L. L. Llewellyn, Hayward, Cal.

### Oiling Piston Rings

It is necessary to use a sufficient amount of oil on piston rings, or they will score the cylinder bore. The neglect of this one thing often results in having to equip an engine with an entire new set of rings, and, in many cases, where the scoring is deep and reboring is necessary, new piston rings and piston also will be required to fit the new size.

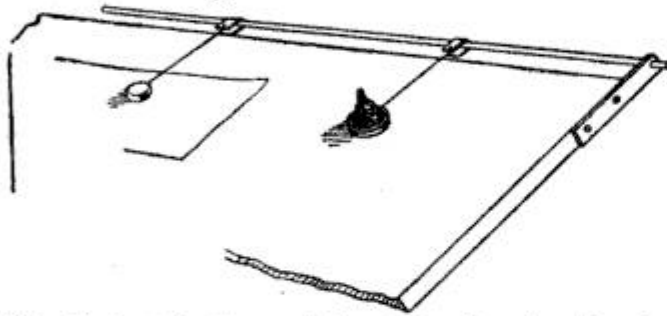
### Ground Colors for Paint

For vehicle painting it is found that while the very pale yellows, such as straw, light primrose, chamois, and canary appear best placed over a white groundwork, some of the deeper tones of yellow, such as primrose, sulphur, and deep chrome yellow, are at their best on an ivory-white ground.



### Ink-Bottle and Print Holders on a Drawing Board

Sometimes it is required to incline the drawing board more than the



The Rod at the Upper Edge of the Drawing Board Has Holders for Ink Bottle and Prints

usual angle and it is then impossible to hold the ink bottle or the reference prints on its sloping surface. An attachment for this emergency, simple to make and also very effective, is shown in the sketch. A rod,  $\frac{1}{4}$  in. in diameter, is held to the top of the board by means of supports at each side. U-shaped holders of sheet metal, with holes drilled through their ends, slide on the rod and provide means of attaching cords for holding a weight or the ink bottle.

The weight, which is made of  $1\frac{1}{2}$ -in. cold-rolled stock, about 1 in. thick, is placed on the reference print to hold it in position. The ink bottle is held in a wood base and is connected to the rod with a cord. Thus they can be moved to any part of the board without trouble, and the device will prove helpful to those who do not possess other means to attain the same results.—Contributed by H. P. Reston, Rochester, N. Y.

### How to Set a Lathe Steady Rest

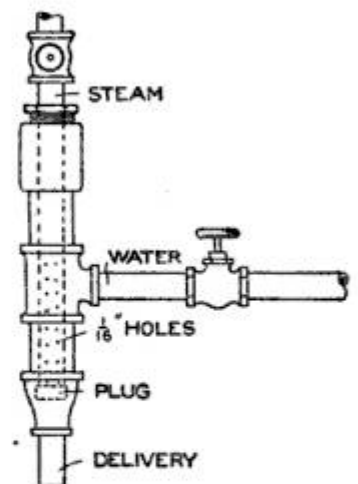
There is quite a variety of lathe work that demands the steady rest to support one end of the work, while drilling, boring, centering and special turning are some of the jobs in which the tailstock is removed and the steady rest used. It is a well-known fact that a piece of work, held by the chuck and supported by the steady rest, will work out of the chuck if the steady-rest jaws are not set to bring the work in a true center line of the lathe.

Many mechanics can set the jaws of a chuck near enough central by eye, but there are some that cannot do this quickly. Of course, a piece of work can be put in true in the jaws and laboriously measured to center it, but a much quicker method is as follows: Place an arbor of the same diameter as the piece to be worked, between the centers of the lathe. Set the steady-rest jaws to the arbor with the fingers and tighten the binder screws. Put away the arbor and slide the tailstock out of the way. It is assumed that the steady rest is made with one or two V-shaped projections on the bottom and that, in setting it up, these projections are placed in position on the ways, or guides, of the lathe. The steady rest can be pushed along on the ways to the point where it is needed, and the work will be truly centered. The rest can be removed from the lathe and, if later on it is desired to do more of the same work, it will center as truly as before when replaced.

### A Small Engine-Room Water Heater

In a boiler room, not having up-to-date conveniences, it is difficult to secure easily and quickly water of the right temperature to wash

with at the termination of the shift or the day's work. The sketch is descriptive of a small water heater that can be constructed of old pipe fittings, and from which steam and water are very easily

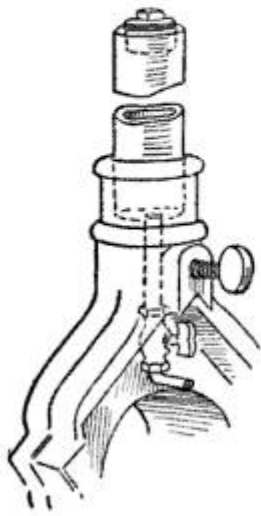


tapped so as to supply hot water whenever such is required. A little experimenting with the two valves will enable anyone to get a stream of water instantly of the exact temperature desired from the delivery.—Contributed by J. W. Bently, Jr., Milwaukee, Wis.



### Oiler on a Diestock

Plumbers always do most of their work on the job wherever it happens to be, and it is, therefore, difficult to keep



an oil can handy and filled with oil for lubricating the threads of the die. For this reason I provided an oil reservoir in one of the handles on my diestock, with  $\frac{1}{8}$ -in. pipe connections at the end near the die and a petcock fitted in it for regulating the flow of oil. The illustration shows the connection. Only

a few parts are required to have this oil supply always at hand, and one filling will last a long time.—Contributed by E. I. Beicher, Marion, Ohio.

### Inserting Wires in Gas Pipes

Inserting electric wires in gas pipe is very difficult, especially if the pipe has any bends in it. A contractor having one of these pipes in a newel post that had three 90-deg. turns easily overcame the trouble by inserting a line for drawing in the wire with the use of a vacuum cleaner. A string was made into a ball almost as large as the inside diameter of the pipe and, fastening one end, the ball was started in the pipe at one end and the smallest nozzle of the cleaner placed over the other end. The ball was quickly sucked through the pipe, leaving a line that was used to draw in the wire.

### Resilvering an Old Mirror

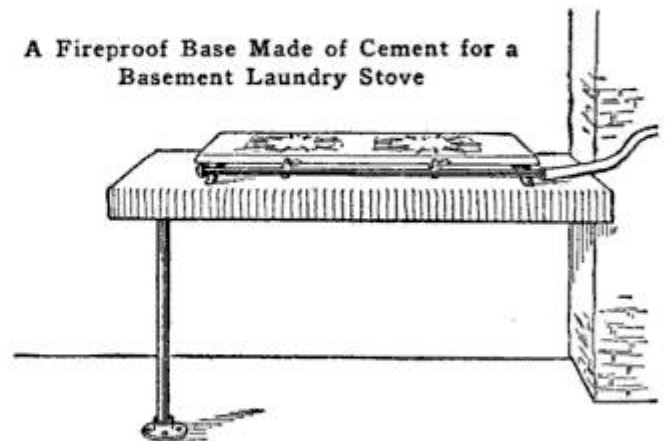
Clean the glass with powdered chalk, being careful not to scratch the glass. Dampen the chalk with a little alcohol and rub it dry with tissue paper. Make a liquid preparation by melting, in a porcelain vessel, 1 dr. of lead, 1 dr. of tin, and 1 dr. of bismuth. When these are melted together add 10 dr. of quick-

silver before the mass cools. This will cool it sufficiently for use. Lay the glass flat, with the cleaned side up, and pour the liquid over it, completely covering the surface. Raise the glass to almost a perpendicular position and let the amalgam drain off quickly. When the coating has become perfectly hard and dry, coat it with drop black, ground in japan and then thinned with turpentine.

### Fireproof Base for a Laundry Stove

To eliminate all danger of fire resulting from a laundry stove in the basement, I made a concrete base or shelf, as shown in the sketch. A form was made and set against the wall, the back being 6 in. lower than the front, with a border, 3 in. high, on the two outer sides. A hole was bored in the projecting corner large enough to admit a piece of 1-in. pipe, which was fitted with a floor flange on the bottom and set up in the hole, the top extending into the form about half as high as the edge. The wall and side of the chimney were cleaned and plastered with a rich mixture of cement to make it binding, then the form was filled to the top with cement. The form was removed after the setting of the cement, and it left a hard stone shelf firmly cemented to the wall with an iron leg in the outer corner fastened

A Fireproof Base Made of Cement for a Basement Laundry Stove

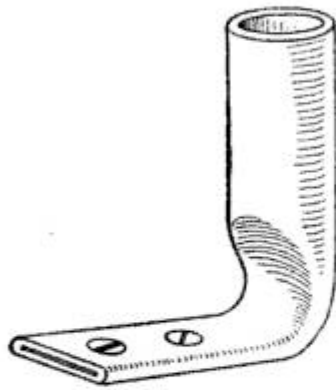


solidly in the cement. The shelf is 30 in. long by 24 in. deep, 3 in. thick in front, and 9 in. thick at the back.—Contributed by L. M. Johnson, Emsworth, Pa.



### A Homemade Whip Socket

A whip socket can be made quickly from a length of pipe flattened on one end and bent at right angles, as shown. Two holes are drilled and countersunk in the flattened end for screws, to hold it in a convenient place. — Contributed by F. H. Tillotson, Chicago.



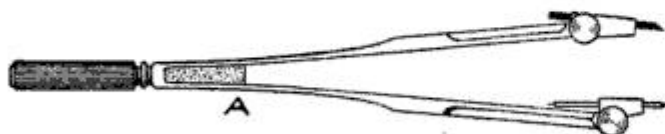
### To Straighten a Miter Saw

In using a miter saw on wood with a spring to it, the saw is apt to stick so that a warp or uneven cutting edge is produced, which can be seen by sighting lengthwise of the teeth.

This warp can be removed by striking the top of the metal flange on the back of the saw, directly opposite the warp or kink, a sharp blow with a hammer. The necessary force can be determined by beginning with a light blow and increasing the force until the edge is straight.—Contributed by E. C. Knopf, San Ysidro, Cal.

### Stiffening the Legs of a Bow Pencil

It is very common that a bow pencil has a tendency to run from its previous mark on account of its being weak, or having lost its rigidity. This can be easily remedied by placing a small piece of soft rubber, A—a piece cut from an old eraser will answer the purpose well—between the



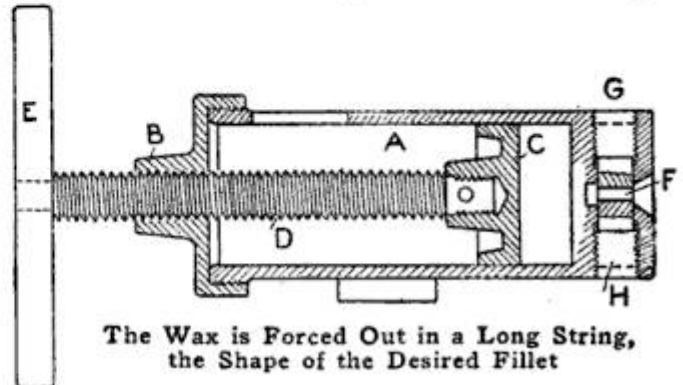
A Piece of Soft Rubber Placed in the Crotch of the Bow Pencil Makes It More Rigid

springs. The stiffness can be varied by the thickness of the rubber.—Contributed by Ralph D. Curtis, South Bend, Ind.

### A Wax-Fillet Machine

The construction of the machine shown in the illustration allows it to be fastened with screws to the bench, or it can be attached to a block and the block gripped in a vise. The machine consists of a cylinder, A, cap, B, and a plunger, C, all of brass; and the screw D, T-handle, E, and screws of steel.

The wax should not be mixed too hard. It should be of such consistency that it can be easily inserted through

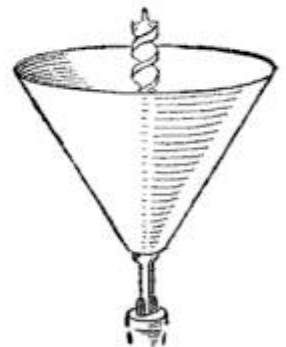


The Wax is Forced Out in a Long String, the Shape of the Desired Fillet

the hole in the side of the cylinder A, then the plunger C is screwed down to compress the wax and force it through the opening F, formed by the screws G and H. The opening in these screws can be made in any shape desired. The forming hole should be cut into the end of the screw G, the other screw H acting as a lock screw.—Contributed by E. W. Voss, Cincinnati, Ohio.

### Boring Catcher on a Bit for Ceiling Work

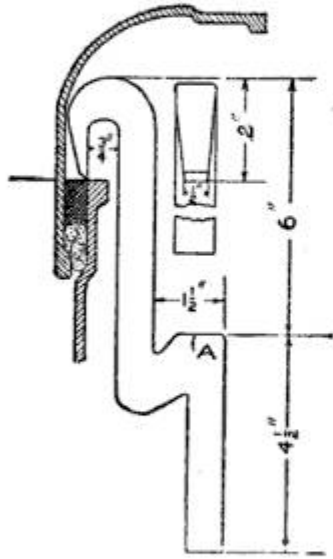
Having some wiring to do in an office, several holes had to be bored in the ceiling. To accomplish this without covering the rosewood desks and tables with plaster dust seemed to be unavoidable, but a paper cone or funnel, about 8 in. deep and 5 in. in diameter at the top, was fastened firmly around the bit to catch the borings. After boring the holes not a particle of plaster could be found on the furniture; the funnel had caught it all.—Contributed by F. E. Searl.





### Calking Tool for Elbow Fittings

Finding it a hard job to properly calk the lead into soil-pipe connections where the fittings have a close bend, such as a short-sweep elbow or a Y-fitting, with ordinary tools, I designed one as shown in the illustration. The tool is made of  $\frac{3}{4}$ -in. octagon steel. The part, or anvil, A, is made as shown,



to provide a striking surface. This tool will be found very useful to stop a leak in a fitting near a ceiling.—Contributed by O. F. Germaine, Mansfield, Ohio.

### Cover for a Stair

A very convenient contrivance for moving heavy articles up and down stairs consists of a door of hard wood, so hinged that it will fit down snugly over the steps when in use. When not in use, it is turned up against the cellar wall and held there by means of a catch. Barrels, bags, machinery, etc., may be lowered into a basement or elevated to upper floors with comparative ease in this manner.—Contributed by J. G. Allshouse, Avonsmore, Pa.

### Draining an Automobile Radiator

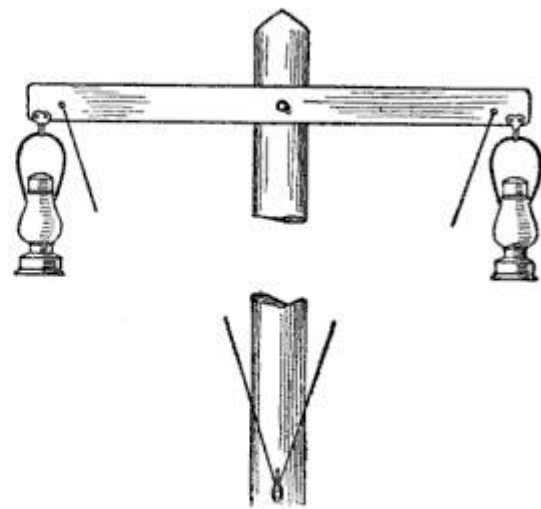
Never open the petcock at the bottom of an automobile radiator and then go away supposing that the cooling system will be drained. Scale, rust or any foreign matter may clog the mouth of the petcock, and a frozen and burst radiator will be the result. Always wait and dislodge any particles that may stop the flow, or, better still, dilute the water in the radiator with alcohol and glycerin, about half and half.—Contributed by D. C. Goff, Knoxville, Tenn.

### Tying Strings on Tools

A wrench, dropped accidentally into the gear case of an automobile, caused the workman to spend about one hour's time trying to fish it out with a piece of wire. This could have been avoided, if one end of a length of string had been tied to the wrench and the other to his wrist. It is always best to tie a string to any tool and fasten it to the person, if the tool is to be used where dropping it would cause trouble.

### A Homemade Block Signal

A homemade block signal, like the one shown in the illustration, has been in use for some time in a freight yard of an Ohio railroad. An upright pole holds in place a horizontal arm which is fastened in the center, and on each end of the arm is suspended a trainman's lantern of appropriate color. The device is operated by a rope, fastened to either end of the arm, by means of which the arm can be held at any angle desired, the rope being fastened like an ordinary awning rope. The crosspiece is called a target, and the device is stationed where one road crosses another. When the target is in



The Target with Two Lanterns Used for a Block Signal on Railroad Crossings

one position the track is clear for one road, and when in the other position the road is clear for the other line.—Contributed by Wm. N. Robson, Pittsburgh, Pa.



### Displaying Hosiery on the Ends of Stock Boxes

The usual way of keeping hosiery in stock boxes on shelves is to allow a part of the top pair to extend out and

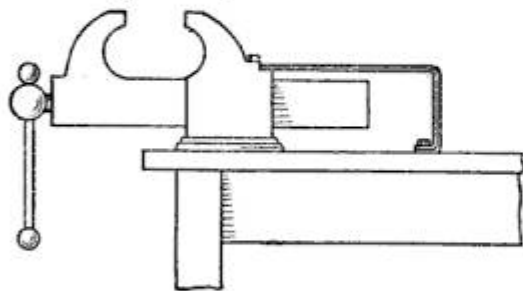


Showing How to Exhibit the Color and Kind of Hose Contained in a Stock Box

over the end as in the first illustration to show the kind and color contained within. In selling hosiery from the box the top pair is taken out or displaced in getting out a pair below. Instead of allowing a part of the top pair to extend out, place the bottom pair in the box as shown in the second illustration, so that a part of it will lie on the inside of the box against the end and a portion overhang on the outside. Then, in selling a pair from the box, the pair used for display need not be disturbed and the trouble of rearranging the contents is lessened.—Contributed by Miss J. Schwartzberg, Shreveport, Louisiana.

### Guard for the Sliding Jaw of a Vise

There is no member of the bench vise more abused by the careless workman than the screw of the sliding-jaw part. It affords a ready but costly means of cutting wire and other small stuff with a hammer, to the destruction of this part of the vise and its roughing so that it will not pass freely through the slot in the guide-jaw head.



A Guard to Protect the Sliding-Jaw Part of a Bench Vise

The sketch shows a guard strip securely bolted to the bench over this portion of the vise, to afford a permanent and lasting protection for it. In a large shop, where laborers of all kinds

are allowed access to vises, this safety device would reduce repair expenses to a great extent.—Contributed by F. W. Bently, Jr., Milwaukee, Wis.

### Commutator Lubricating Stick

A very simple little device that can be made by anyone, and yet serves the purpose very well, is shown in the illustration. Select

a cylindrical piece of wood, about 4 in. long and 1 in. in diameter. Bore



a  $\frac{1}{2}$ -in. hole through the center longitudinally, then saw one end off diagonally, to fit the surface of the commutator. A piece of fine muslin is tacked over the sloping end. The hole is kept filled with vaseline, which is a good commutator dressing.—Contributed by Stanley Radcliffe, Laurel, Maryland.

### Refitting an Automobile-Engine Wrist Pin

In a great many automobile engines, the wrist pins are made a tight fit in the pistons and are held in place by a setscrew and lock nut, or a pin and cotter, on the inside of the piston. With such a construction the rod turns on the wrist pin. Generally the rod end is solid and is bronze-bushed. When the wear in the bushing and on the pin becomes great enough, a "knock" develops in the engine. As the thrust of the engine's work is all one way, the bushing will soon be worn out of round, the wear being on the side toward the cylinder head, and the pin will be flattened on the side next to the crankshaft. Where such damage has been done, the best kind of repair is, of course, to supply new bushings and pins.

Sometimes, however, for reasons of economy or because the automobile's condition will not warrant the new parts, the repair is made without them. One of the best ways of doing this is as follows: Mark the position of the



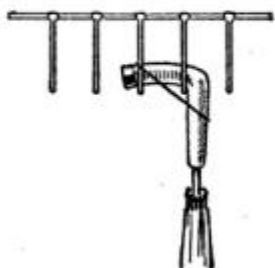
bushing in the rod, remove the bushing and turn it 90 deg., then replace it. This will place the short diameter on the thrust. Remove the wrist pin, after marking the position, turn it also 90 deg. and replace it, then "spot" the pin for the setscrew in its new position, or drill it through for the cotter, as the case may be. With a little scraping, the fit of the rod and pin may be made as good as when new in the direction of the engine's thrust. The play sideways, of course, is as great as it was endways, but this will not cause any knocking of the engine. This will make a cheap but good and satisfactory repair.—Contributed by Donald A. Hampson, Middletown, N. Y.

### A Nonspilling Soldering-Acid Can

Soldering fluid can be conveniently kept and carried in a small copper receptacle to which a cover has been soldered. A hole is cut in the center of the top and a  $\frac{3}{8}$ -in. tube soldered to it, the tube being long enough to extend almost to the bottom. Should the holder tip, the acid will not be spilled. When carried in a tool bag where it is liable to be roughly handled, a cork can be put into the tube as an extra precaution.—Contributed by Gertrude M. Bender, Utica, N. Y.

### Umbrella Hanger for Day Coaches

An umbrella is a friend in need, when it is raining, but usually a nuisance at other times, especially when traveling by rail.

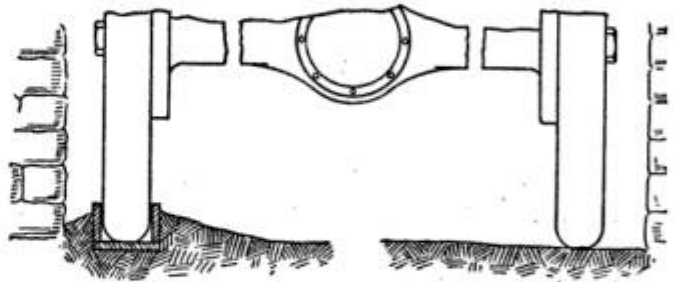


There is no convenient place to put it, and if laid in the package shelf it is often forgotten. Then, too, the shelf is generally filled with parcels. Simply

hook the handle through the bars of the package shelf and secure it with a rubber band, as shown, and the umbrella will remain where it cannot be broken or forgotten.—Contributed by Wm. N. Robson, Pittsburgh, Pa.

### Automobile Guide Rail in a Narrow Passage

A narrow passage that requires careful driving, to keep from scratching the body of an automobile, can be fitted



The Rail Guides the Automobile in the Passage so That Neither Side will Strike

with a guide rail that will make the driving easy. The rail consists of three pieces of lumber, one for the bottom of the rail, which is 1 in. thick and 6 in. wide, and two for the sides, each 1 in. thick and 5 in. wide. These are nailed or screwed securely together, as shown, in the form of a miter box. The rail should be somewhat longer than the passageway and if possible the sides should spread out a little to enable the driver to start the wheel into it without difficulty.

When ready to set the rail, drive the automobile into the passage, carefully centering it, and mark the location. Remove a sufficient amount of earth to permit the rail to be sunk to within 1 in. of the top and tamp the dirt in solidly on both sides.—Contributed by James W. York, Ottawa, Can.

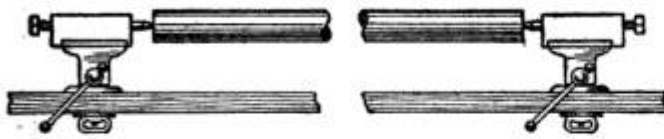
### Testing Rollers for Straightness

A mechanic was asked to straighten some long rollers of a printing press that had been bent, and having no lathe long enough to take in the rollers, he was momentarily at a loss how to test them after in part straightening them. However, he hit upon a plan that was as good as it was simple. It is illustrated in the sketch.

The workbench was supplied with two vises about 8 ft. apart. In each of these was placed a large center used on the planer. When they were tightly gripped by the vise jaws and approximately lined up they were as



good as the lathe centers for the work. A block on the bench brought up close to the roll showed exactly the high



Testing Long Rollers for Straightness by Placing Them between Centers Clamped in Vises

spot when the roll was turned by hand. Repeated bendings at the high spots, followed by checking or testing between centers, produced a most satisfactory job.

### A Deaf-Mute and a Blind Man Conversing

For a time I was employed in a private sanitarium and while there I noticed two men who were very fond of each other, but had no means of communication whatever, one being a deaf-mute, the other having become blind by accident some time after having made the mute's acquaintance. I was called on several times to transmit messages between them, which led to the following idea: I purchased two telegraph keys, a sounder and a small green electric bulb, and wired them in the same way as two sounders, the deaf-mute using the light and the blind man the sounder. Both being very intelligent men, they soon learned the Morse code and made very rapid progress; in fact they became nearly expert telegraphers and were both very much delighted with the result of the idea.—Contributed by Joseph C. Laackmann, Philadelphia, Pa.

### A Holder for Loose Papers

One of the most convenient methods of holding loose papers, which are very apt to be thrown around and blown off a desk, consists of a piece of fiber board with clips at one end. All papers which are sent to the different departments in a large factory are always put on these boards with clips, and by means of them any additional sheets can be easily attached with red tags on

the clips to designate rush work. Two sizes of this board are used, one  $5\frac{1}{2}$  by  $8\frac{1}{2}$  in., and the other  $8\frac{1}{2}$  by  $11\frac{1}{2}$  in., made of fiber,  $\frac{1}{32}$  in. thick. These boards accommodate practically every size of paper ordinarily found in an office.—Contributed by Geo. L. Colburn, Norfolk Downs, Mass.

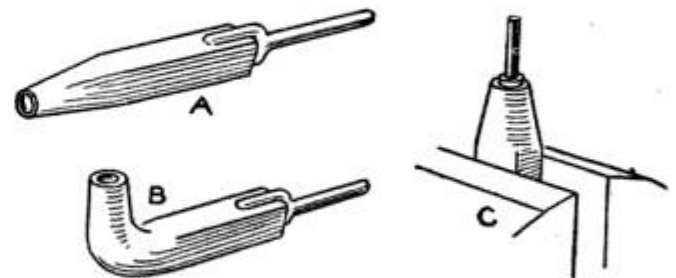
### Reducing Gearing Noise

The space, on each side, between the rim and the boss of the hub is fitted with disks of sheet metal, and the spaces between the disks, with sawdust and small shot. This will eliminate vibrations. Wheels with a diameter greater than  $1\frac{1}{2}$  ft. should be fitted with wooden instead of sheet-metal disks. A packing should be used between the disks and the metal of the wheel so that the sawdust will not sift out when the wheels are in motion.

The disks with the sawdust-filled space will not only prevent much of the noise, but will also make it impossible for a workman to get his arm or tools caught in the wheel.

### Soldering Irons for Rivet Heads

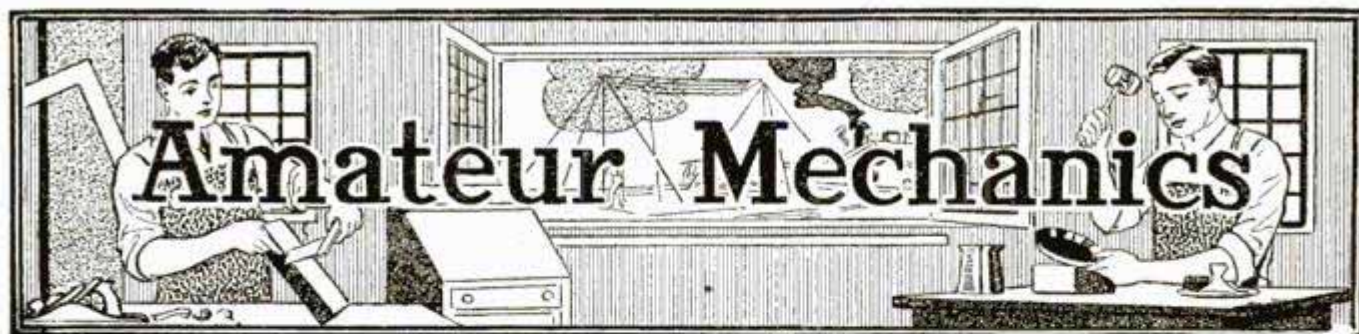
Where a large number of rivet heads are to be soldered to make them air or water-tight for tanks or blower pipes, a pair of coppers, shaped as shown at A and B, will do neat and quick work. The irons are shaped by heating them red hot, clamping each in a vise, C, and driving a rivet head into the end.



Soldering Coppers Having a Cup-Shaped End to Fit the Heads of Rivets

The edges are then filed to the right shape and tinned in the same manner as an ordinary soldering copper.—Contributed by Lorin A. Brown, Washington, D. C.





### A Telescoping Support for a Hinged Shelf

The supporting arm of the hinged shelf is constructed of a piece of gas pipe and a length of iron rod which



When the Shelf is Lowered the Support Telescopes and is Out of the Way

slides snugly into the pipe. A spring catch is set in the pipe at the proper height to engage the end of the iron rod when the shelf is up. This spring must be of good size, as it holds

the entire weight of the shelf. A large clock spring is suitable. One end of the spring is bent outward and upward to form a releasing handle. The other end is drilled for the two machine screws which hold it to the pipe. The spring works in a rectangular slot, cut lengthwise of the pipe. The pipe must extend 8 or 10 in. beyond the spring. The ends of the rod and of the pipe are pivoted with screws or rivets on angle pieces screwed to the shelf and wall.—Contributed by Donald A. Price, Wilmington, Del.

### A Bug Powder

To secure a nonpoisonous roach and bug powder mix dry 3 lb. plaster of Paris with 2 lb. of sugar, then add 1 oz. of pulverized aniseed. The addition of a little corn meal will help to draw the pests.—Contributed by Loren Ward, Des Moines, Iowa.

### How the Capacity of an Incubator may be Doubled

About 10 days after setting the incubator one may easily start another hatch by placing more eggs on top of the incubator in the following manner: Make a pad about 1 in. thick of any cotton material and place it on top of the incubator. Cut four pieces of boards, 1 by 4 in., and fit them around the top of the incubator. Nail them together as in making the sides and ends of a box. Pad the inside of this frame about 1 in. thick and tack it on top of the incubator, being careful that none of the material comes too close to the lamp. Place the eggs inside of this tray and cover them with a pad about 3 in. thick. Turn the eggs the same as those on the inside. When the first hatch comes out, place the eggs kept on top in the incubator after having cleaned it with a solution of carbolic acid.—Contributed by Hattie J. Day.

### Homemade Rivet Set

Desiring to rivet some pieces of leather together and having no rivet set, I hastily made one from a strip of heavy sheet tin,  $\frac{3}{4}$  in. wide. This was rolled at one end, as shown in the sketch, and the other end notched to fit over the rivet end. The rolled



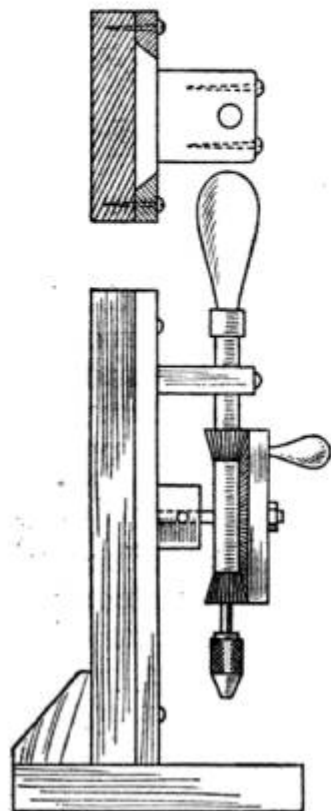
A Strip of Tin Shaped to Take the Place of a Rivet Set

end formed the part for setting the washer and the slotted end held the washer down while the first blows of the hammer were struck.



## How to Make a Small Vertical Drill

A small hand drill with a three-jaw chuck that will take the smallest drill can be purchased very reasonably.



For ordinary work these drills do very well, but for comparatively deep holes, or when using long, slender drills, some sort of a stand should be made, if for no other reason, to avoid breaking the drills, which is almost invariably due to the side motion of the hand. There are other reasons, however, for making such a stand, and

these lie in the fact that it is impossible to drill by hand at right angles with the surface of the metal, or to hold such a drill sufficiently steady to avoid widening the hole around the top.

As each make of hand drill will require a somewhat different form of stand, no detailed description need be given of the one illustrated. The principal point is to have the base and standard securely set at right angles to each other, and then provide a smoothly sliding piece to which the hand drill may be clamped. The edges on this slide and the corresponding guides should be planed off to an angle of 45 deg. One of the guides should be adjustable, which may be arranged by elongating the screw holes and placing small washers under the heads of the screws that hold this guide to the main standard.

A neat little hand drill, arranged in this manner and firmly secured to the bench, may also be used for finishing the ends of small shafts, either flat or pointed, for polishing screw heads,

etc., to all of which it gives that workmanlike appearance that can only be had when things are polished with a true rotary motion.—Contributed by John D. Adams, Phoenix, Ariz.

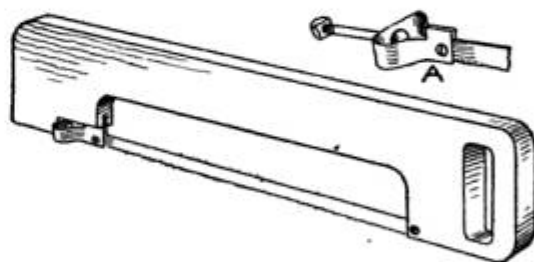
## Decorating Candles

Candles can be easily decorated by the following method: The designs can be selected from paper prints which are tightly wrapped around the candle with the design in contact with the wax. Strike a match and play the flame over the back of the paper. Allow time enough for the melted wax to harden and then remove the paper. The print will be transferred to the wax.

Select designs that are not larger than the circumference of the candle. A good impression of ink on thin paper works best.—Contributed by J. J. Kolar, Maywood, Ill.

## Homemade Hacksaw Frame

A home workshop not having a complete set of tools may be supplied in many ways with tools made by the owner. The hacksaw frame illustrated is one of these. The frame is made of hard wood. The saw end is inserted in a slot sawed in the handle end, and a screw or small bolt holds it in place. The other end is equipped with a bolt having a sheet-metal head, as shown at A. The blade is kept from turning



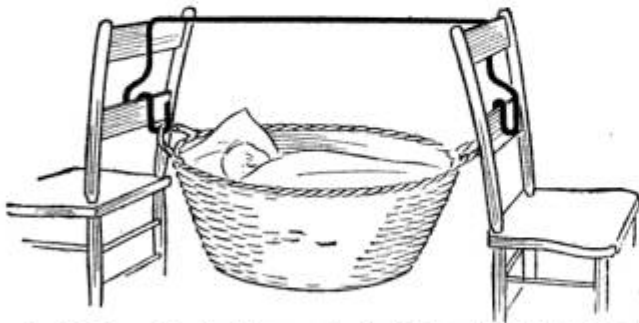
Hacksaw Frame, Cut from Hard Wood, with Fittings Attached to Draw the Blade Taut

by a projection of the sheet metal which fits in a saw cut made in the frame.—Contributed by W. A. Henry, Galesburg, Ill.



### A Homemade Cradle

The cradle shown in the sketch can be made quickly and easily at home and will be found far more serviceable than, and possessing several advantages over, the ones purchased. It is made of a clothes basket, an iron rod and two ordinary chairs. It can be

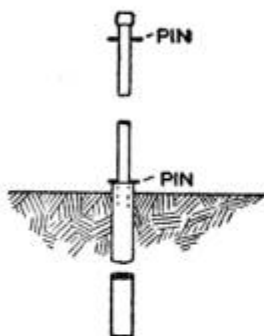


A Clothes Basket Supported with a Rod between Two Chairs Makes a Good Cradle

taken down and the parts used for other purposes. The upper portion of the rod prevents the chairs from slipping. A light cloth can be placed over the rod, in tent fashion, to keep flies out, while at the same time permitting air for ventilation.—Contributed by Bert Verne, San Diego, Cal.

### A Removable Post

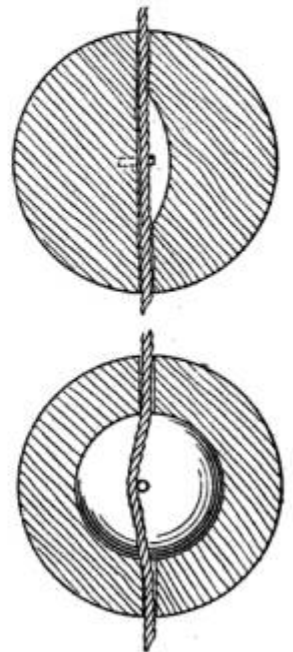
It is often desirable to have football and baseball grounds in public parks roped in during the game, but after the game the ropes and stakes must be removed. To drive in iron stakes and then remove them is hard work and requires considerable time. The sketch shows a much better way. A



piece of 2-in. pipe, about 18 in. long, is sunk level with the ground in the right location for a post. The post is made of 1½-in. pipe of the length desired. This will just fit inside of the 2-in. pipe. A wood plug is fitted in the upper end of the pipe in the ground to keep out dirt when the post is removed.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.

### String-and-Ball Trick

The stopping of a ball on a string at any desired point is understood by almost every person, but to make one that can be worked only when the operator so desires is a mysterious trick. Procure a wooden ball, about 2 in. in diameter, and cut it into two equal parts. Insert a small peg in the flat surface of one half, a little to one side of the center, as shown, and allow the end to project about  $\frac{3}{16}$  in. The flat surface of the other half is cut out concave, as shown, to make it  $\frac{1}{2}$  in. deep. The two halves are then glued together, and a hole is drilled centrally on the division line for a string to pass through.



To do the trick, hold an end of the string in each hand tightly and draw it taut with the ball at the top, then slacken the string enough to allow the ball to slide down the string. To stop the ball at any point, pull the string taut.

Before handing the ball and string out for inspection, push the string from each side of the ball and turn it slightly to throw it off the peg. This will allow the string to pass freely through the ball, and it cannot be stopped at will. To replace the string reverse the operation.—Contributed by Wm. O. Swett, Chicago.

### Wall-Paper Cleaner

The following mixture I have used with the best results for years. Thoroughly mix together 3 pt. of wheat flour and 1 pt. of powdered whiting, then add sufficient water to make a dough. To clean a dirty papered wall, take a piece of the dough that can be easily grasped in the hand, press it

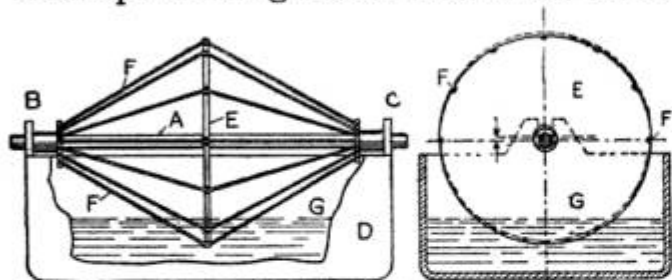


against the surface and make a long stroke downward. During the process of cleaning, keep kneading the dirt into the dough. The preparation can be mixed in any amount desired by using the proportions named.—Contributed by C. W. Bause, Jr., E. Troy, Wis.

### Revolving Shaft without Power

The device illustrated seems paradoxical for it apparently works without any power being applied to it, making from two to three revolutions per hour, which, though slow, is nevertheless motion, requiring energy.

The shaft A is supported on the edges, in the bearings B and C, of a tank, D. A disk, E, having a central hole larger in diameter than the shaft, is located at the middle of the latter. The disk is supported by 12 or more cotton ropes, F. The tank is filled to the level G with water. The lower ropes, being immersed in the water, shrink and lift the disk slightly above the center in the position of an eccentric, as shown by the dotted lines in the sketch. The center of gravity of the disk in this position, being higher and slightly to one side of the shaft, the disk has a tendency to turn around. The motion drives the next rope into the water where it becomes soaked and shrinkage takes place again, lifting the disk to a higher position, while the rope coming out of the water dries

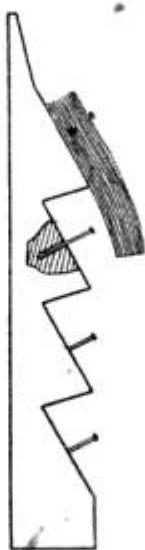


The Expansion and Contraction of the Ropes Keep the Disk Up and to One Side of the Center

out. The ropes emerging from the water but not yet thoroughly dry cause the upper part of the disk to be in an eccentric position laterally with reference to the center of the shaft, thus causing the center of gravity to be not only above but also slightly to one side.—Contributed by Charles Roberts, Brooklyn, N. Y.

### A Paper-Bag Holder

A holder, to accommodate the different-sized bags used in a store, can be easily made of a board, 6 in. wide and 30 in. long. One edge of the board is cut with notches similar to the teeth of a rip saw and their back-sloping edges are drilled to admit a nail point. A sufficient quantity of bags is placed in a pile and a nail is driven through the edge near their upper ends, and the projecting point of the nail is stuck into one of the holes. Proceed in the same manner with bags of other sizes. To remove a bag, take hold of the lower end of the outermost one and tear it from the nail. Be sure to drive the nails through the bags close to the top.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.



### Covering for Chalk Trays

The chalk trays fitted at the lower edge of blackboards soon collect considerable chalk dust and the chalk sticks dropped into it are, therefore, disagreeable to handle. A simple way of keeping the sticks clean is to cover the trays with wire mesh which is shaped like a tray but not so deep as the chalk tray. Thus the chalk dust will fall through this screen and be out of the way of the sticks.

### A Curtain Hanger

A close-coiled spring, about  $\frac{1}{4}$  in. in diameter, makes a much better hanger for a short curtain than a small rod. The spring should be about 1 in. shorter than the width of the window and fastened with screwhooks. The spring is preferable not only because it is less apt to tear the fabric, as it will give some if the curtain is pulled, but also for the reason that it is much easier to put it through the hem than the rod.—Contributed by Walter Ramm, New York City.



## Electrical Heating Apparatus for the Home

By ARTHUR MOORE

## Part II—An Electric Toaster

The frame and base of the electric toaster described in this article are made from sheet brass, approximately  $\frac{3}{64}$  in. thick. Five pieces will be required having the following dimensions: 11 by 8 in., 6 by  $1\frac{1}{2}$  in., 15 by  $3\frac{1}{4}$  in., 8 by 7 in., and 16 by 3 in., respectively. Some parts of the toaster, such as the doors and outer portion of the containing case, may be made from

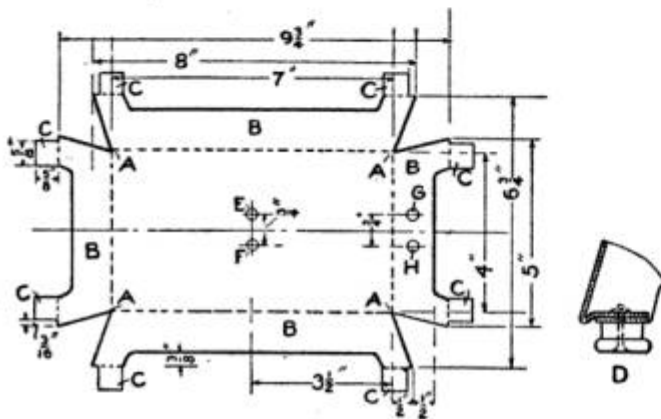


FIG. 1

Shape and Size of the Metal Which Forms the Base, and Manner of Attaching the Feet

lighter metal, but the selection of the proper thickness will be left to the builder.

Lay out on the largest piece of sheet brass, which is to form the base, an outline of the dimensions and shape given in Fig. 1. Drill four  $\frac{1}{16}$ -in. holes, one in each of the four corners A, and then cut away all metal outside of the full line. The four parts, B, are to be bent down along the dotted lines so as to form the sides and ends of the base, respectively. Before doing this, however, the edges along the ends of these parts should be beveled by means of a file so as to fit neatly together when bent into place. The eight projections, C, are bent under at the four corners along the dotted lines, and the two in each corner will overlap each other, thus affording a means of fastening the ends and sides together. One of these pieces in each corner should

be given an extra bend, as shown at D, to improve the appearance. Four small legs are then made from some insulating material that is not affected by heat, and fastened to the overlapping projections by means of a small bolt or rivet through a counter-sunk hole in each leg, as shown at D. This bolt or rivet thus serves the double purpose of fastening the legs and holding the sides and ends of the base together.

Two  $\frac{3}{8}$ -in. holes, E and F, are drilled in the central portion of the base for the leads to the heating element. Two other holes, G and H, are drilled in one of the end pieces to be used in mounting the terminal clips; these holes should be at least  $\frac{1}{4}$  in. in diameter and exactly  $\frac{3}{4}$  in. apart.

The main support for the heating element is made from the 15 by  $3\frac{1}{4}$ -in. piece of brass and should have the dimensions and shape shown in Fig. 2. Saw four slots, J, in the sides of this piece to a depth of  $\frac{1}{4}$  in. In each end of the piece drill two  $\frac{1}{8}$ -in. holes, K, for mounting it on the base. The centers of these holes should be  $\frac{3}{8}$  in. from the end. Next drill four  $\frac{5}{32}$ -in. holes, L,  $\frac{3}{4}$  in. from the ends and  $\frac{1}{2}$  in. on either side of the center line. The holes M and N are not drilled until the heating element is ready to be put in place, as their position will depend upon its dimensions. Four  $\frac{1}{8}$ -in. holes, O, are drilled in the four corners,  $\frac{1}{4}$  in. inside of the horizontal and vertical dotted lines respectively. The 20 holes laid out between the dotted lines near the center are drilled  $\frac{1}{16}$  in. in diameter; the rows should be  $\frac{3}{4}$  in. above and below the center line, and the holes in each row should be  $\frac{1}{2}$  in. apart, the odd spaces being at the ends.

Bend the  $\frac{1}{4}$ -in. side projections of the central part up at right angles on the dotted lines; the end projections containing the holes K are next bent



up at right angles; and finally the side pieces, containing the holes L, M, N and O, are bent down at right angles to the center portion on the vertical dotted lines.

The 16 by 3-in. piece of brass is bent

Procure two pieces of  $\frac{5}{8}$ -in. square brass rod,  $5\frac{3}{4}$  in. long; two pieces of  $\frac{1}{8}$ -in. rod,  $5\frac{3}{4}$  in. long, and a piece of  $\frac{1}{16}$ -in. brass wire,  $7\frac{1}{2}$  ft. long. Turn the ends of the square brass rods, for a distance of  $\frac{1}{8}$  in., down to a  $\frac{5}{8}$ -in.

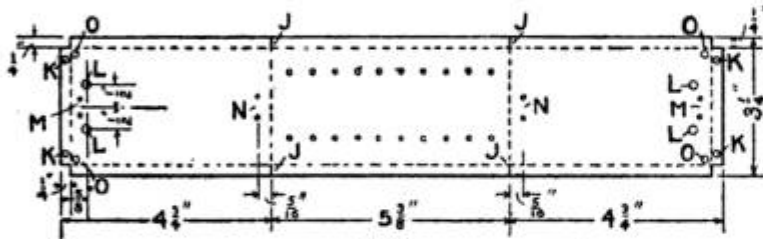


FIG 2



FIG 3

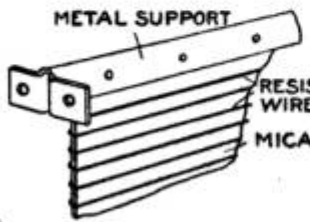


FIG. 4

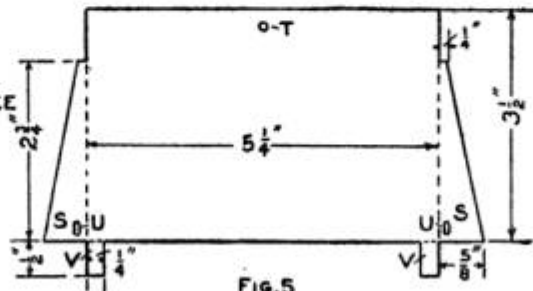


FIG. 5

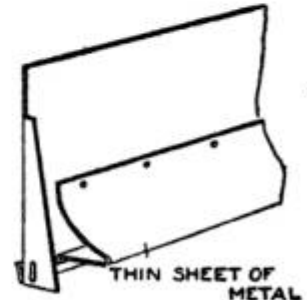


FIG 6

Patterns, with Dimensions, for Making the Supports for the Heating Element; and the Method of Attaching the Resistance Wire on the Insulator. The Door Dimensions and a Sheet-Metal Strip for Keeping the Bread Close to the Heat

into such a shape that it will fit snugly over the outside of the piece just completed. This piece is to form the outside of the case for the heating element, there being an air space of approximately  $\frac{1}{4}$  in. between it and the main support, which is quite an advantage in that it protects the outside of the case from the extreme heat, and also serves as an insulator, confining the heat better than a single piece.

Holes are now drilled in the top of the base to correspond to the holes K in the ends of the main support for the heating element. In locating these holes, divide the space at the ends and sides equally, and make sure the vertical portions of the support are the same distance apart at both top and bottom; in other words, parallel. Next locate and drill the holes for mounting the outer portion of the containing case. The piece forming the outer part of the containing case will extend beyond the piece forming the inner part, and this extension should be the same on both sides. Both these pieces should be fastened by means of small bolts, as it may be necessary to remove them to make repairs in the heating element.

diameter, and then drill ten  $\frac{1}{16}$ -in. holes in one side of each of them, not quite through,  $\frac{1}{2}$  in. apart, or so they correspond to the holes in the center portion of the piece shown in Fig. 2. These pieces are to be supported in the holes L, Fig. 2; and pieces should be cut from the  $\frac{1}{16}$ -in. wire of such a length that they extend from the holes in the  $\frac{5}{8}$ -in. square rods through the  $\frac{1}{16}$ -in. holes in the upper portion of the support and protrude  $\frac{1}{4}$  in. The pieces of  $\frac{1}{8}$ -in. rod are to support the doors and are to be placed in the  $\frac{1}{8}$ -in. holes, O, Fig. 2. After these pieces of wire and rods are all in place, they will be held by the outer portion of the case when it is fastened to the base.

Cut from the 6 by  $1\frac{1}{2}$ -in. piece of brass two pieces, each  $\frac{5}{8}$  in. wide and  $5\frac{7}{8}$  in. long, like the one shown in Fig. 3. Two  $\frac{1}{16}$ -in. holes, Q, are drilled in each end of each of these pieces. A slot, R, is cut in the center of each end to a depth of  $\frac{1}{4}$  in., and the four perforated pieces are bent up on the dotted lines at right angles. Then bend the main portion of the piece along the dotted line in the center, forming a piece like that shown in Fig.



4, with a space of  $\frac{1}{2}$  in. between the two sides. The  $\frac{1}{16}$ -in. holes in the main portion of the piece, indicated in Fig. 3, may now be laid out and drilled.

Obtain two pieces of good sheet mica,  $\frac{3}{8}$  in. thick,  $2\frac{1}{4}$  in. wide and  $4\frac{1}{8}$  in. long. The  $2\frac{1}{4}$ -in. sides of the mica pieces are inserted in the space between the sides of the metal pieces just described and the parts riveted together, as shown in Fig. 4, the mica pieces being so placed that their inside edges are  $\frac{3}{8}$  in. apart and the outside space at the ends is the same on both sides. Two terminals should be provided near the inside edges and as close to the lower end of the pieces of mica as possible, which may be made by drilling a small hole in the mica and placing a small brass bolt, provided with several washers, in each hole. These terminals should be as near the holes E and F in the base, Fig. 1, as possible, and for this reason it might be best to drill the holes in the base to the right and left of the vertical center line instead of as indicated.

Procure 15 ft. of No. 23 gauge "Nichrome" resistance wire and proceed to wind it on the pieces of mica. One end of the wire is fastened under one of the terminals; 19 turns are taken about one mica piece and then across to the top of the other piece on which 19 turns are also made, ending at the other terminal. The turns should be placed a little closer together at the bottom of the element than at the top, as this will give a somewhat better distribution of the heat, which naturally rises, making the upper part hotter.

The heating element may now be mounted in the previously made frame as follows: Place the heating element inside the U-shaped frame with its upper edge  $\frac{1}{8}$  in. from the upper surface of the frame and the ends of the metal strips in the center of the sides of the frame and then mark the location of the holes M and N, Fig. 2. These holes should correspond in size with those in the ends of the pieces shown in Fig. 3, and after they are drilled the heating element may be fastened by means of small rivets, or the holes may be

threaded and small screens used instead. Two doors for the sides of the toaster are cut from the 8 by 7-in. piece of brass to the dimensions given in Fig. 5. The projections S in the lower corners are bent over at right angles to the main portion of the piece: A small handle of insulation material is attached to each door at the point T. Two slots, U,  $\frac{1}{4}$  in. long and  $\frac{1}{8}$  in. wide, are cut in the projections S. These slots should be  $\frac{1}{8}$  in. from the dotted lines and  $\frac{1}{8}$  in. from the lower edge of the door. The projections V, Fig. 5, are bent back, as shown in Fig. 6, so as to form a stop to prevent the door from dropping too far. A piece of thin metal is riveted to the inside of each door, as shown in Fig. 6.

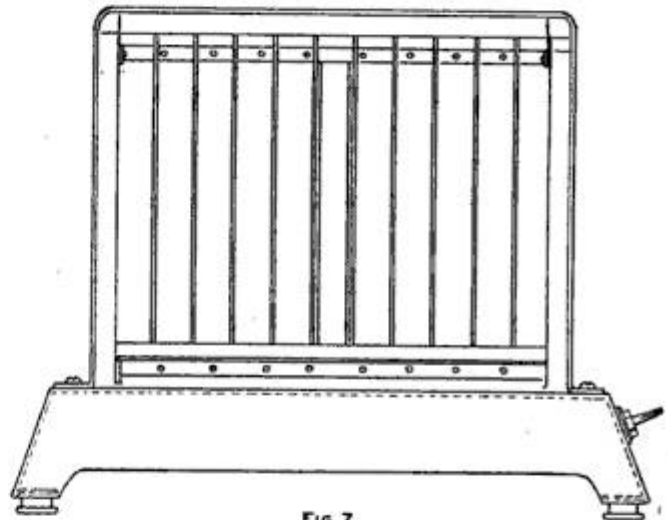


FIG. 7  
The Parts Assembled, Showing the Appearance of the Completed Toaster without the Doors

The bread is placed upon this piece and, as it is sloping, the bread slides over against the vertical wires.

A side view of the assembled toaster with the door removed, is given in Fig. 7.

The terminals of the toaster may be made as shown in Fig. 8, and consist of two pieces of  $\frac{1}{8}$ -in. brass, about  $1\frac{1}{4}$  in. long, mounted in the end of the base. Each of these pieces are threaded on one end, for a distance of  $\frac{5}{8}$  in., and the other end is rounded off and slotted with a hacksaw, as shown. Three brass nuts and two washers should be provided for each piece. Procure two pieces of thin mica, about  $\frac{5}{8}$  by  $1\frac{1}{4}$  in., and drill two  $\frac{1}{8}$ -in. holes in each piece,  $\frac{3}{4}$  in. apart, so that they



will center with the holes G and H, Fig. 1, in the end of the base. Mount the terminals on the base, first placing a sheet of mica on either side and a

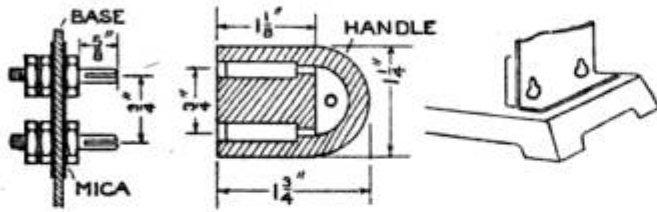


FIG. 8

FIG. 9

FIG. 10

Method of Insulating the Terminals; the Flexible-Cord End, and Covering for the Door-Rod Ends

washer outside of the mica; then draw the inside nuts up good and tight. Two pieces of asbestos-insulated copper wire, about No. 14 gauge and long enough to reach from the terminals of the heating element to the terminals on the end of the base, are then fastened by bending small eyes in their ends and placing them under the nuts provided on the respective terminals.

A special plug should be made from a piece of insulating material, and connected to a cord leading from the source of electrical energy. A cross section through a suitable plug is given in Fig. 9. It is made from a piece of composition insulation,  $\frac{1}{2}$  in. thick,  $1\frac{3}{8}$  in. wide and  $1\frac{3}{4}$  in. long. One end of the piece is rounded off, and an opening is cut to form a handle as shown in Fig. 9. Procure two pieces of thin brass tubing,  $\frac{3}{4}$  in. long and of sufficient inside diameter to just slip onto the terminals on the end of the base. Cut two slots in the end of each tubing with a fine hacksaw to a depth of  $\frac{3}{8}$  in., ream out the end, and spring the sides of the tube inward so that it will fit snugly on the terminals. Two holes,  $\frac{7}{8}$  in. deep, are drilled in the end of the piece of insulation, with their centers  $\frac{3}{4}$  in. apart and of such diameter that the brass tubes will just slip into them. Continue these holes with a smaller drill into the opening under the handle. Two small holes are now drilled through the side of the piece of insulation and through one wall of each tube, near the back end. Remove the tubes and thread the holes in them to take a small brass screw.

Countersink the holes in the insulation and increase their size so as to take the threaded screws.

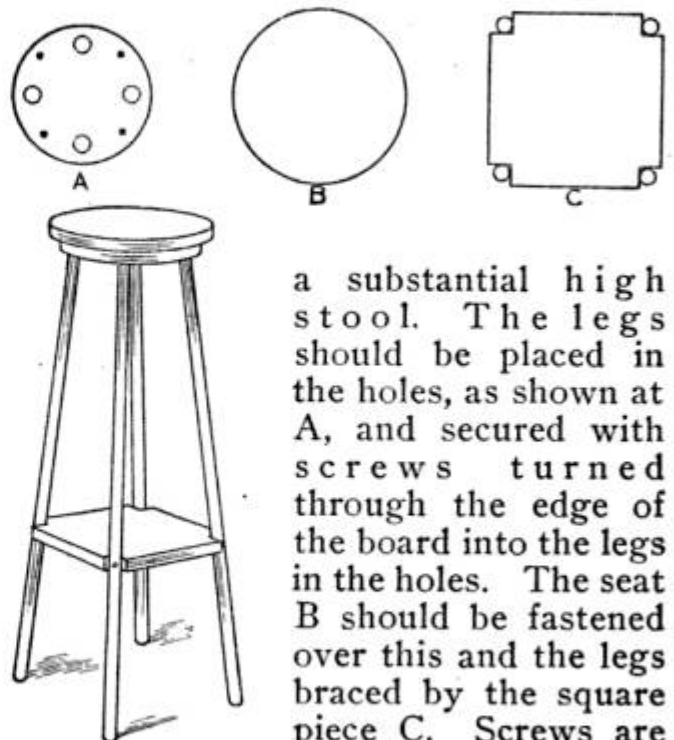
The ends of the cord are now tied about the handle, so as to take care of the strain, and the ends are passed through the holes and fastened under the two screws, which also serve to hold the brass tubes in place.

The doors may be made removable by drilling two  $\frac{5}{32}$ -in. holes in one end of the outer part of the containing case opposite two of the holes O in the piece shown in Fig. 2, through which the  $\frac{1}{8}$ -in. rods may be removed. Two metal drops, as shown in Fig. 10, should be placed over these holes to prevent the rods from working out. Two handles of insulating material may be attached to the ends of the containing case, so that it can be handled or moved while hot. A collapsible wire rack may be arranged on top, upon which the toasted bread is placed to keep it warm.

The appearance of the completed toaster may be greatly improved, if desired, by having it nickelplated.

### How to Make a High Stool

The cast-off handles of four old brooms, three pieces of board, cut as shown, and a few screws will make

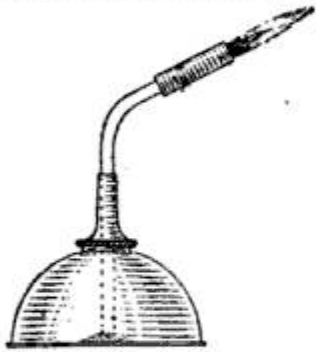


a substantial high stool. The legs should be placed in the holes, as shown at A, and secured with screws turned through the edge of the board into the legs in the holes. The seat B should be fastened over this and the legs braced by the square piece C. Screws are turned through the legs and into the square piece to keep it in position.



### A Homemade Blowtorch

The torch shown in the sketch requires no air pump. Instead of forcing a small stream of gasoline into a heated



burner it converts the gasoline into gas in the chamber and blows a small jet of it through a very small hole into the combustion chamber.

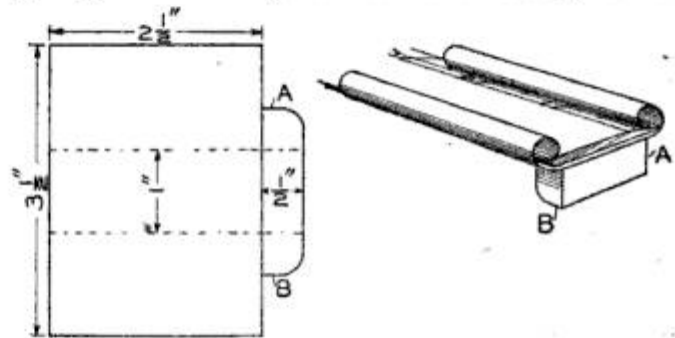
A medium-sized and strong oil can is used for the reservoir, the spout being cut off close to the screw part and a steel or brass tube, about  $\frac{5}{16}$  in. in diameter, soldered to the stub end. The tube is bent as shown. A piece of wicking is drawn into the tube so that the upper end is within  $\frac{1}{4}$  in. of the tube end. The end of the tube is then fitted with a piece of brass rod with a very small hole in the center. The hole is made in the following manner: Before the piece is cut from the rod, it is held in a vise and the sharp end of a scriber is carefully driven into the center. A little oil placed on the scriber point will keep it from sticking in the metal. Measure the depth of the hole and cut the rod off just above the point. File the end of the piece cut off with a fine file until the point of the hole is reached. This hole must be so small that light can be barely seen through it.

The combustion chamber is made of a piece of brass tubing driven over the end of the smaller tube on the spout. About  $\frac{1}{2}$  in. from the back end of the larger tube four or more holes are drilled to admit air to the gas.

Fill the can about three-fourths full of gasoline and allow time for the wick to become saturated to the upper end. Hold a lighted match to the rear of the burner, and the heat will convert the gasoline into gas which will then burn with a nice white flame about 1 in. long. The success of the torch depends altogether on the fineness of the hole in the end of the tube and the tight soldering of all the joints.

### A Rule Gauge

The method of using the thumb as a gauge on a rule in scribing long boards is not always satisfactory, especially if the board has a rough edge. It is always best to have a regular gauge, but in the absence of one, an attachment for an ordinary carpenter's rule can be quickly made from a piece of tin, although one made of sheet brass is better, in appearance as well as for service. Cut out the metal, as shown by the dimensions, and roll the two sides up, stopping at the dotted lines. The ends A and B are turned out slightly so that they will slide easily along the edge of the board. The gauge will snap on a rule easily and

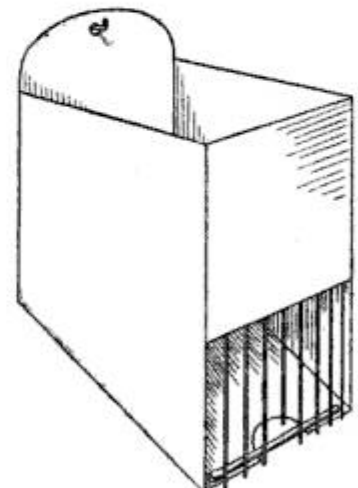


Gauge Made of Sheet Metal Which will Easily Snap on a Carpenter's Rule

will stay where it is placed.—Contributed by H. J. Blackledge, San Rafael, Cal.

### A Match Holder

The holder consists of a small box, the same size as a match box, with a sloping spring bottom and spring wires covering the lower part of the front side. One end of the match box is removed and the contents dumped into the holder. The matches fall to the lower sloping edge, where one match at a time can be easily removed.



—Contributed by Bert Verne, San Diego, Cal.



### A Homemade Hydrometer

The hydrometer is an instrument used in determining the specific gravity of a liquid, such as acids, etc. The specific gravity of any material is the ratio of the weights of equal volumes of the material and water. Thus if a pint of acid weighs 1.2 times a pint of water, its specific gravity is said to be 1.2.



A very simple and inexpensive hydrometer, similar to the one shown in the sketch, may be easily constructed, and will give quite satisfactory results, if the scale on the instrument is carefully marked when it is calibrated.

Purchase from the local druggist or doctor two test tubes, one large enough to contain the other, as shown. The smaller tube is to form the hydrometer proper, while the larger one is to serve as a containing vessel in which the liquid to be tested is placed. The large tube should be mounted in a vertical position, by placing it in a hole bored in a small block of wood, or a suitable metal or wooden frame may be made that will accommodate one or more tubes.

The small tube is loaded at the lower end with a quantity of shot, or other heavy metal, in such a way that it will stand in a vertical position when it is placed in a vessel of water. The amount of the loading will depend upon whether the hydrometer is to be used in determining the specific gravity of liquids heavier or lighter than water. If the liquids are heavier than water, the loading should be such that the tube is almost entirely immersed when placed in water; if lighter, only sufficient loading should be used to make the tube stand upright in water. After the amount of loading has been determined it should be fastened in place by means of a small

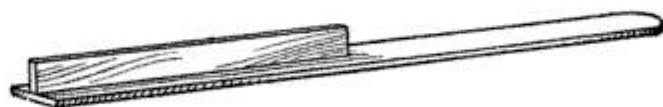
quantity of calcined plaster. A small cork should now be placed in the open end of the tube, and the tube sealed by coating the end with shellac, or melting a small quantity of resin or sealing wax over the top of the cork with a hot soldering iron.

Now place in the large tube a quantity of as pure water as can be obtained—fresh rain water will answer very well and distilled water still better. Immerse the small tube in the water in the large tube and allow it to come to rest. Make a small mark on the small tube with a file, level with the surface of the water in the large tube. If the hydrometer is placed in a liquid lighter than water and allowed to float, the mark made on the tube will always be below the surface of the liquid in which the instrument is placed, and the mark will be above the surface of the liquid when the liquid is heavier than water.

The hydrometer may be calibrated by making use of a hydrometer borrowed from the druggist or doctor. The two hydrometers should be immersed in the same liquid and the tube of the newly made instrument marked to correspond with the markings on the borrowed instrument. If the liquid is heavier than water to start with, its specific gravity can be reduced by adding water, and as the water is added the hydrometers will both rise.

### A Stirring Stick

The stirring, or mixing, stick shown in the sketch deserves its name, as it will stir evenly all the way around. It consists of two flat sticks, one two-thirds the width of the other, which



A Flat Surface Strikes the Liquid No Matter Which Way the Stick is Moved

are nailed together as shown. The narrow one is only long enough to enter the depth of the liquid.—Contributed by Frank J. Rempe, Oakland, California.



### A Pea-Shooting Gun

The gun consists of only two parts. The barrel may be either a piece of bamboo fishing pole or a section of sweet alder. The spring is a piece



A Pea-Shooting Gun Made of a Piece of Alder and a Corset String

of corset steel, such as can be usually found about the home.

Sweet alder can be found in the summer growing along the fences in the country almost anywhere. Find a stalk, about 1 in. in diameter, which is good and straight, and cut it off to a length of 6 or 7 in. Make a ram rod of wood and use it to punch out the pith of the alder, rendering the bore as smooth as possible. An old bamboo pole of like dimensions may be used instead.

Cut out a section of the wood,  $2\frac{1}{2}$  in. long, beginning  $1\frac{1}{2}$  in. from one end of the tube. The depth of this cut should be almost halfway through the piece. The corset steel is then inserted into the short end of the tube and bent over so that its other end will touch the bottom of the open part of the bore. A nick is made with a knife across the bottom of the bore at this point, to let the spring catch a little. The ammunition is placed before the caught end of the spring, as shown, and discharged by hooking the forefinger over the spring at the point A and pulling backward as when pulling the trigger of a gun.

It is necessary to keep the muzzle elevated a little after the ammunition is placed in position, otherwise the pea will roll out before the spring has a chance to strike it.

### Coloring Electric-Light Globes

Often it is desired to produce certain effects in lighting which demand a different-colored light than that given by the modern tungsten lamp. As an example, a soft, mellow light is some-

times desired similar to that given by the old carbon-filament lamp. In such cases it is a great mistake to install the carbon lamps on account of their exceedingly poor efficiency.

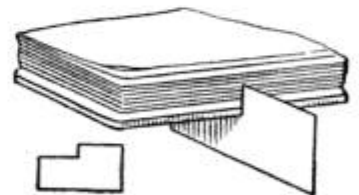
The ordinary tungsten lamp has an average efficiency of about 1.2 watts per candlepower, while the carbon-filament lamp requires about 3 watts per candlepower. Therefore, it is much more economical to color the globe of the tungsten lamp so as to produce the required color than to use the carbon lamp. Of course, both lamps must be colored when any color other than a soft, yellow light is desired.

A cheap coloring solution may be made as follows: Soak a small amount of gelatin in cold water for several hours, then boil it and strain it through a piece of fine cloth. While the solution is still hot, add a small quantity of aniline dye of the desired color that has been previously mixed in a small quantity of cold water. The lamps are dipped in the solution and then allowed to cool in a vertical position so that the coating will be more uniform.

A more satisfactory coloring solution may be made from celluloid. Obtain quite a number of old photographic films and remove all the gelatin by washing them in hot water. Then dissolve them in a solution of equal parts of ether and alcohol. Add the coloring solution and dip the lamps. The coating produced by this method is impervious to water.

### Support for an Open Book

When a book is laid on a table for reading the pages at the beginning or end, it will not stay open flat on account of the difference in the thickness of the open parts. One person, doing a great deal of reading, uses a small card, with the corner cut out, which is placed under the side of the book having the smallest number of leaves, as shown.





## INTERESTING NEW PATENTS



FIG. 1



FIG. 3



FIG. 5



FIG. 7

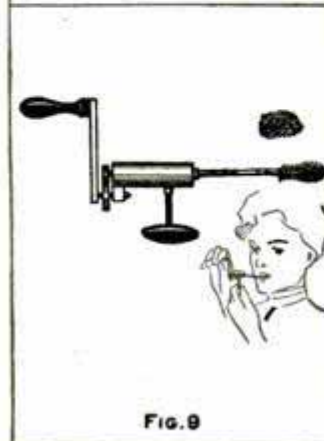


FIG. 9

**TRAVELING ELECTRIC FAN** (Fig. 1)—This apparatus, which is intended to distribute the effect of a fan over a room, consists of an ordinary electric fan hung from a carriage which travels back and forth on a horizontal wire track. The fan is propelled by the lateral force of the air current, since it is so mounted as to rotate alternately in two planes that are slightly inclined to the horizontal. When the fan has run the length of the cable in one direction, the impact with a metal disk inclines the motor in the opposite direction and the fan propels itself back to the other end.

**WEED PULLER** (Fig. 2)—This device consists of a hollow tube terminating at its lower end in a blade having straight teeth and provided with a pivoted arm for grappling the weed, the pivoted arm having curved teeth that engage the teeth in the blade. The pivoted arm is operated by a lever arm to which is connected a rod that runs up the side of the hollow tube and through the top to a connection with the lower or movable handle, by which it is controlled.

**COMBINED EYE SHADE AND FAN** (Fig. 3)—The fan is held to the hat by a clamp which is attached securely to the brim and which draws into position a spring tongue which bears against the lower side of the fan. In order to use the clamp it is necessary to make a notch in the edge of the fan.

**FAN ATTACHMENT FOR ROCKING CHAIR** (Fig. 4; British patent by an American)—With this apparatus two motions are imparted to the fan when the chair is rocked. The rockers are mounted on a base, and through the gearing, as shown, and the shaft on the back of the chair, an up-and-down motion is given to the shaft that carries the fan. A wire that passes over a grooved roller on the fan shaft and is attached to the lower part of the chair gives the fan shaft a rotary motion as it is raised and lowered, a spring bringing the shaft back to its original position after each movement.

**FUNNEL WITH DUCTS FOR ESCAPE OF AIR** (Fig. 5; British patent)—The outer walls of the funnel are provided with spiral grooves which permit the air to escape while the vessel is being filled, and, forming corrugations on the inside, also give a swirling motion to the liquid.

**LAWN TRIMMER** (Fig. 6)—This trimmer is made of a single sheet of metal which is bent to a channel shape and formed to a sharp point at each end and to a sharp blade on the side which forms the cutter of the device. A handle is attached to the other or vertical side of the channel.

**EQUILIBRATOR FOR BOAT** (Fig. 7)—This device is designed for stabilizing a small boat in a rough sea or for equilibrating under uneven loading, and consists simply of an adjustable weight suspended under the boat as shown. Chains running from the bow and stern make it possible to shift the weight to a position under any part of the boat.

**MOISTENING BELL** (Fig. 8; British patent by a Hungarian)—This bell or cover is intended to be placed over foods, plants, flowers, tobacco or other substances which it is desired to keep moist. The recesses in the wall extend around the cover, and when the cover is dipped into water and withdrawn the recesses remain filled.

**ROTARY TOOTHBRUSH** (Fig. 9; British patent by an American)—The shaft that carries the brush is rotated by a crank handle that is geared to the shaft in such a way that a moderate speed of turning gives a rapid rotation to the brush. The brush is held in place by friction and is easily detachable.

**RAILWAY MOTOR CAR** (Fig. 10; British patent)—The purpose of this curious construction is to provide room for the motors under the center of the car. The motorman's compartment is at the center of the car, over the motors, and has windows that project above the roof.



FIG. 2



FIG. 4

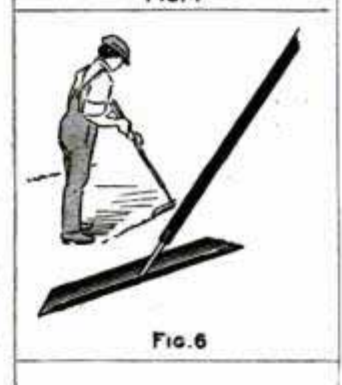


FIG. 6

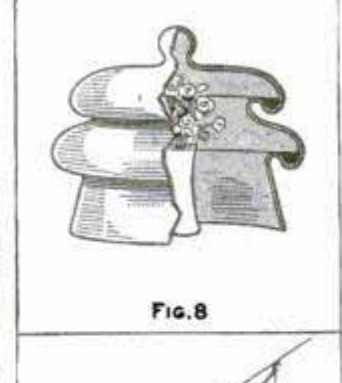


FIG. 8

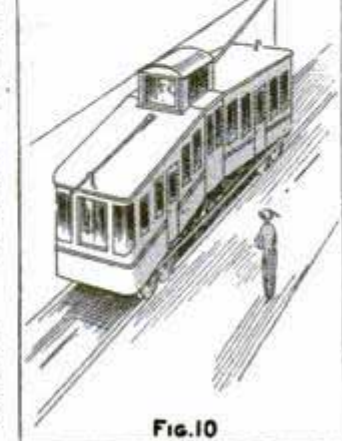


FIG. 10



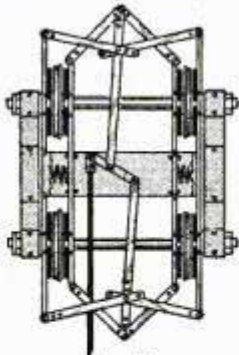


Fig. 11

**BRAKE FOR RAILWAY TRUCKS (Fig. 11)**—In this novel apparatus the brake shoes bear against the sides of the wheel and not against the tread, and it is claimed that by this arrangement all danger of lifting the wheels by the force of the brakes is eliminated. The brake shoes work in pairs, one bearing against each side of the wheel. They are set by a system of levers, as shown, and are returned to their original position by springs as soon as released.

**EXTRA HANDLE FOR SHOVEL (Fig. 12)**—This extra handle, intended to give a more convenient hold in handling a shovel, is attached by means of a clamp which is secured in place with a setscrew. To give the utmost freedom of movement the handle has a pivotal connection with the clamp.

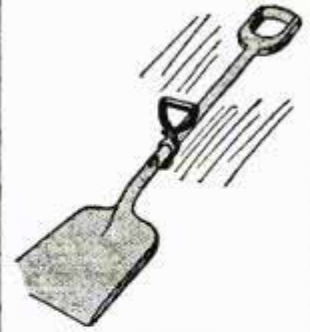


Fig. 12

**COMBINED KNIFE AND SCISSORS (Fig. 13; British patent)**—This implement is designed principally as a fruit knife and grape cutter. The long prong comprises the knife, while the short prong, or grape cutter, has a ledge which projects over the back of the knife blade and is adapted to hold the stalks of the grapes as they are severed.

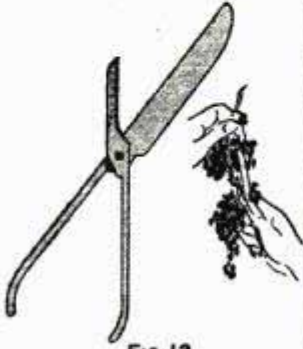


Fig. 13

**HORN ATTACHMENT FOR VIOLIN (Fig. 14; British patent)**—A hole is cut in the back of the violin, and this is closed with a dish-shaped sounding board on which the sound post of the instrument rests. The horn is attached to an elbow which is pivoted to the instrument, and can therefore be turned to direct the sound in any direction. This device is particularly suited to making graphophone or similar records.



Fig. 14

**SOIL PULVERIZER (Fig. 15; American patent by a Canadian)**—This simple device, designed to pulverize and level the soil, consists of three beams rigidly attached to a frame at right angles to the direction of movement. The crushing is done by the two forward inclined beams, and the leveling by the rear beam, which has one face resting flat on the ground.



Fig. 15

**CLOTHESLINE REEL (Fig. 16)**—This reel consists of cross arms which have brackets for carrying the clothesline and are pivoted by a stub shaft to a straight supporting bar. The supporting bar has a handle on one end and a guide for the clothesline on the other. The reel portion is turned by a small handle placed just inside one of the brackets.



Fig. 16

**LIFE-SAVING BUOY (Fig. 17; British patent by a Russian)**—The sides of this buoy have double walls, between which are air spaces for securing buoyancy. Water is kept out of the vessel by a water-tight jacket which is attached to the top of the buoy and is strapped around the waist of the user. A weight is attached to the bottom of the vessel to add to its stability, and a small force pump is provided for pumping air into the air spaces.



Fig. 17

**ROLLER SKATE WITH BRAKE ROLLER (Fig. 18; British patent by a German)**—The drawings accompanying this patent show a type of skate that is uncommon in this country, since it has only one supporting wheel. The essential features of the patent are the mounting of the wheel on a spring and the provision of a brake roller at the rear of the skate.

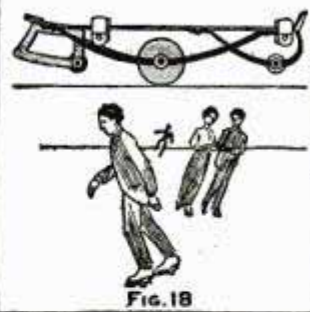


Fig. 18

**CLOTHES-WASHING APPARATUS (Fig. 19; British patent)**—This apparatus is designed for permitting the clothes to be effectively stirred while they are being boiled. It consists of a cage with slatted sides and a perforated bottom, that is set into the wash boiler. A lid fits closely over the cage, and through a hole in the center of this lid there projects a stem which is used in turning the stirring device.



Fig. 19

**ROAD-IRONING MACHINE (Fig. 20; British patent by a German)**—The plate at the bottom of the machine is heated by the combustion of gas in the closed chamber above it and is rotated on the section of pavement to be treated, melting the asphalt and ironing it to a smooth surface. The shaft is hollow, and through it the gas is admitted to the chamber. A compact engine for rotating the chamber and plate is contained in the upper and stationary part of the machine.

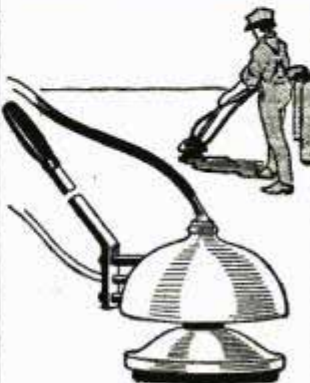
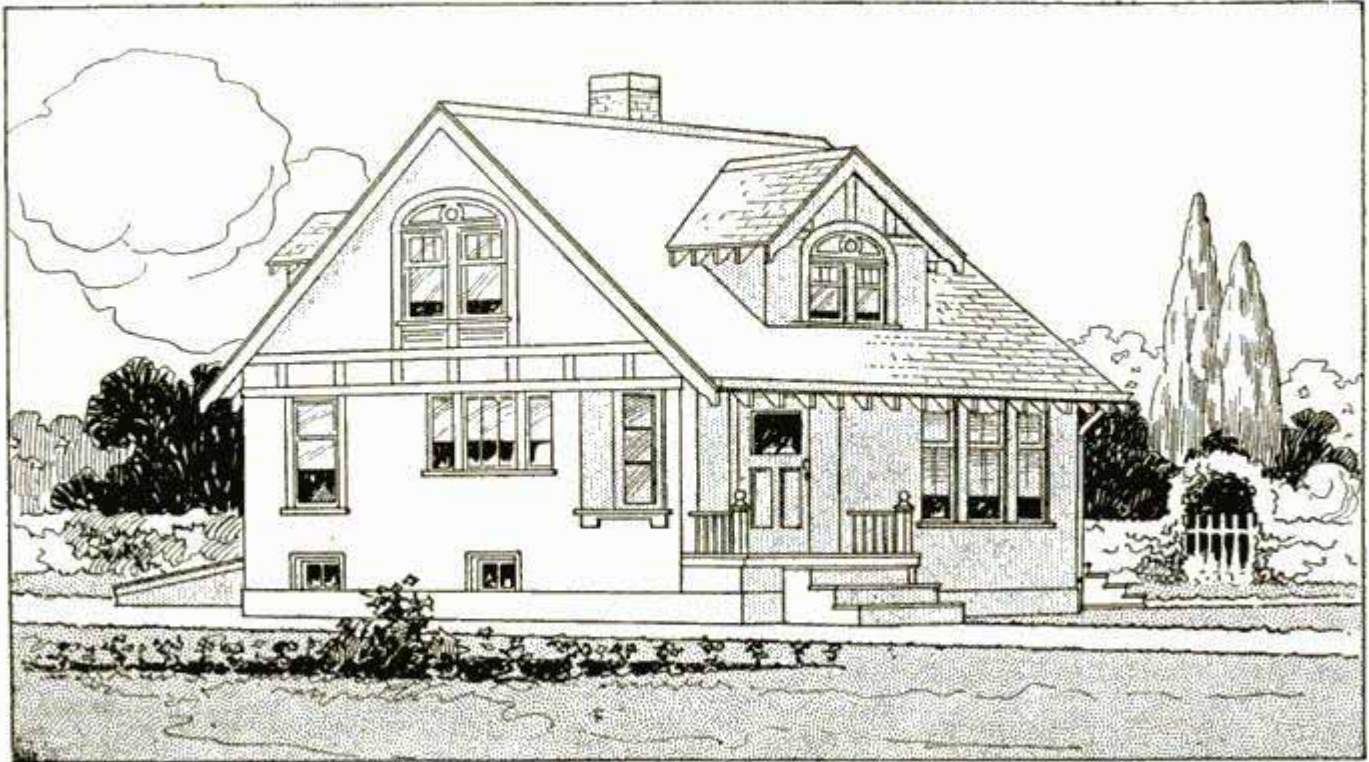


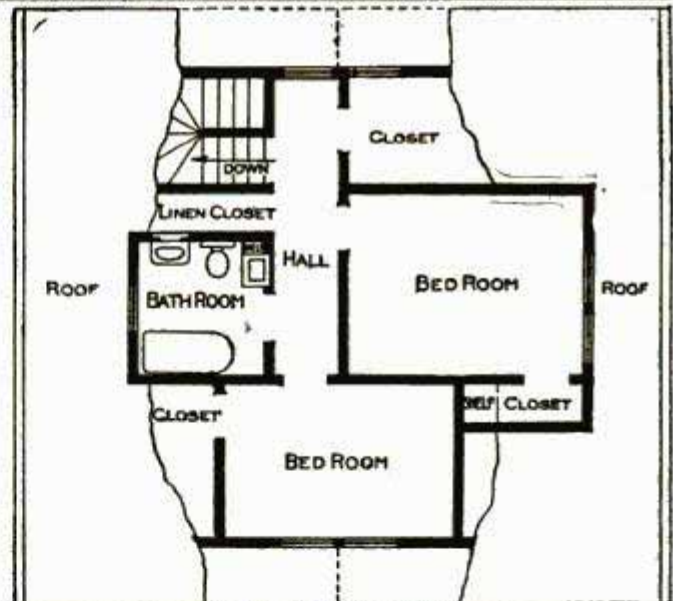
Fig. 20



## AN ATTRACTIVE CEMENT-STUCCO COTTAGE



First-Floor Plan

W. A. Abell & Sons, Architects, Elgin, Ill.  
Second-Floor Plan

The exterior of this compact six-room cottage consists of cement plaster laid on metal lath, with a roof of stained shingles. Although of the simplest form of construction, the building as a whole produces a picturesque effect, owing mainly to the treatment of the dormers, the spacing and form of the windows and the suggestion of half-timber construction at the ends of the building.

The plan of the first floor is of a rather unusual type. The dining room has an outlook on the street, with a window opening on the front porch, while the living room overlooks a garden at the opposite side of the building. The living room is entered through a vestibule, and from this room an archway leads into the dining room, there being no outside entrance to the latter. The front porch is partly under roof, but is open on two sides. A feature worthy of note as being unusual in buildings of this class is the dressing room, placed adjoining the dining room. This room is provided with a closet and with a cupboard under which a sliding bed may be placed, an arrangement that makes the room available as a spare bedroom when required. The dining room opens directly into the kitchen, a recessed sideboard being located at the side of the doorway. The stairways are arranged in what appears to be the most convenient way, the stairway to the basement leading from the kitchen and that to the second floor leading from the dining room.

The second floor contains two bedrooms and bathroom, with a hallway that gives direct access from each room to the stairway. Each bedroom is furnished with a closet of ordinary size, while there is one large closet for general storage, that is independent of the bedrooms, having its entrance opening into the hallway. The building was erected and equipped at a cost of about \$2,600.

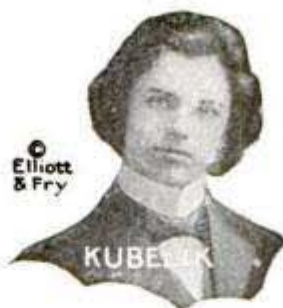




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**Victor Talking Machine Co., Camden, N. J., U. S. A.**

Berliner Gramophone Co., Montreal, Canadian Distributors

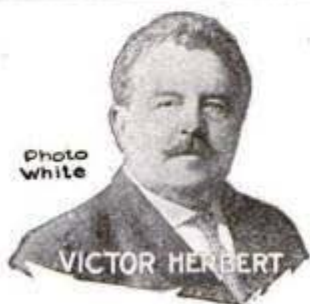


Photo White

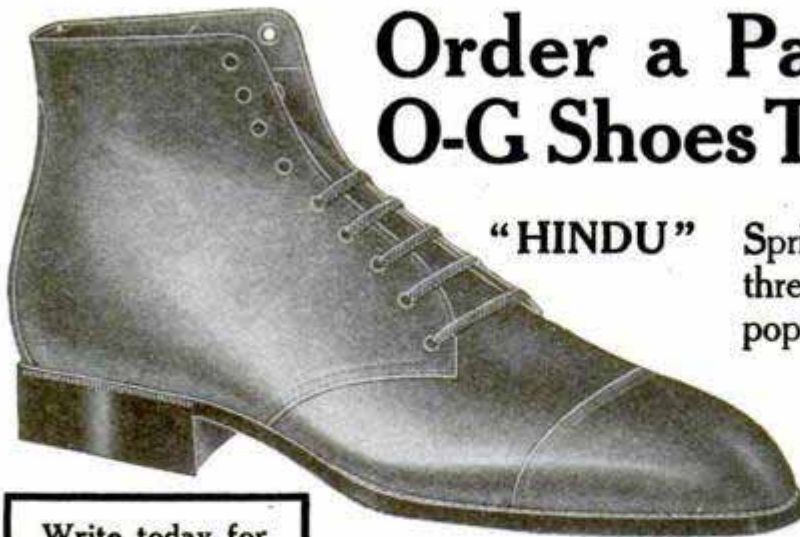


Photo White



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TOBACCO CO.**  
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*Please Mention Popular Mechanics*





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# Indian MOTOCYCLES FOR 1914

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Made by the

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**MAKE \$250.00 A MONTH**

**Repairing AUTO-TIRES  
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answers to all of these requirements of Old Dame Fortune—the certainty of success in this  
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 Automobile Owners—they need YOU to keep their tires in service.

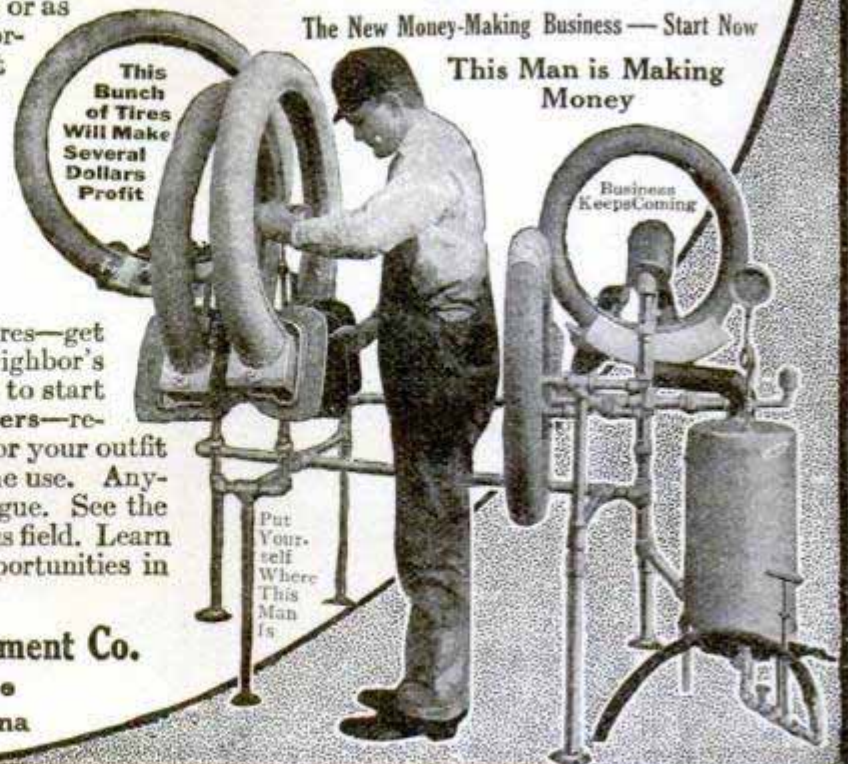
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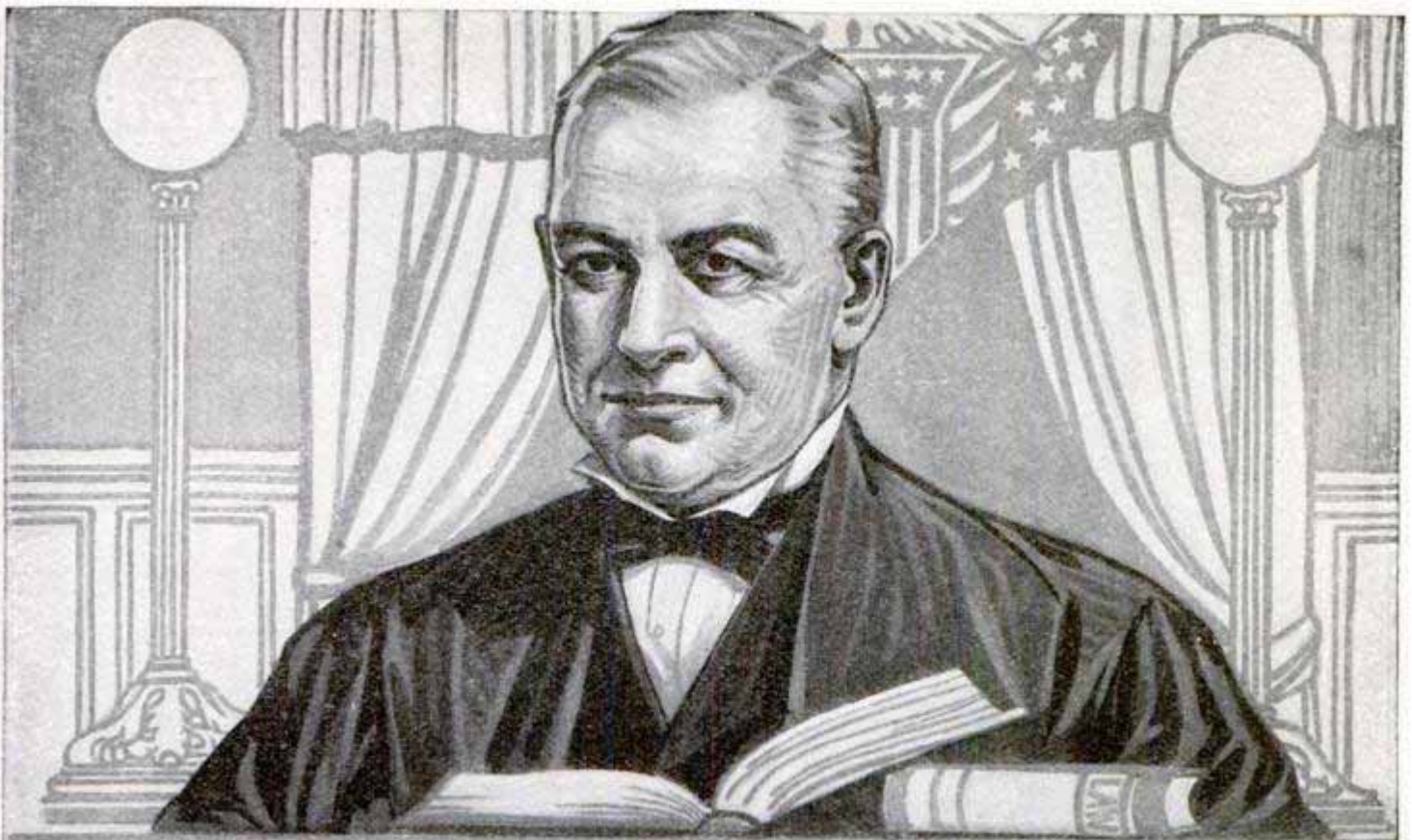
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This Man is Making  
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Business  
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Put  
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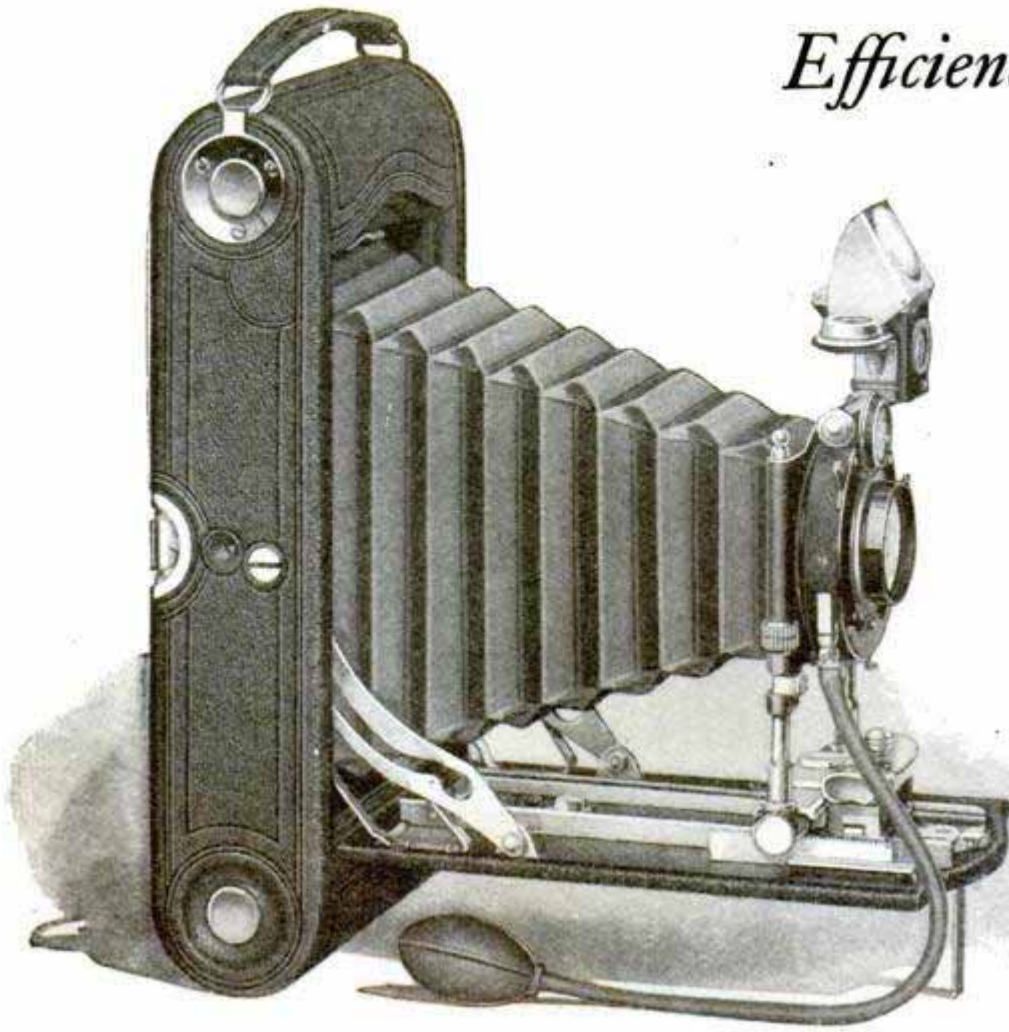
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- "\$5.40 to heat four rooms."  
Simon Kocher, Breeze, Ill.
- "Reduced coal bill from \$109 to \$53."  
Geo. J. Pfeiler, 6322 Halsted St., Chicago, Ill.
- "Heats two flats for \$30 per year."  
M. Tinnis, 3848 Robey St., Chicago, Ill.
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I. A. Ruess, Grand Rapids, Mich.
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Back in 1906, W. L. Williams of Belknap, Ill., whose 12-room house is shown above, wrote us that he had comfortably heated his home the entire winter with \$14 worth of slack. Recently he wrote us again, saying, "My Underfeed, after eight years, is just as good as new and has been in use throughout each winter since it was installed." Could there be stronger evidence of merit than this? Think it over. We'll send you copies of the original letters if you wish.

We'll send you the names and addresses of over 2,000 Underfeed users—some right in your vicinity—who know by experience that clean, even, economical heat is obtainable only with the Underfeed.

Clean,  
Economical,  
Even Heat

**WILLIAMSON  
UNDERFEED  
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The  
Guaranteed  
Heating System

Cut Coal Bills  $\frac{1}{2}$  to  $\frac{2}{3}$

With the Underfeed coal is fed from below. All the fire is on top. Smoke and gases are burned up, making more heat. You can use cheapest slack and soft coal or pea and buckwheat sizes of hard coal and secure same heat as highest priced coal with no smoke, smell and dirt. No other furnace or boiler made can do this. Underfeed heaters slash coal bills 1-2 to 2-3 in 25,000 homes, stores, churches and other buildings. Soon pays

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The **WILLIAMSON Co.**  
Peck-

41 W. Fifth St.  
Cincinnati, Ohio

### Mail This Money-Saving Coupon Now!

**THE PECK-WILLIAMSON COMPANY** (4)  
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I would like to know how to cut my coal bills from one-half to two-thirds with an Underfeed.

Warm Air..... Steam or Hot Water.....  
(Mark an X after System interested in)

Name .....

Address .....

My Dealer's Name is .....



Coal Goes in Here

Out-out View of Underfeed Furnace

### To Dealers!

Thousands of keen minded people are buying Underfeeds because they cut coal bills 1-2 to 2-3. Furnace Dealers, Plumbers and Hardware Dealers, send for exclusive sale proposition. A small amount of territory still open. Act!



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THE telephone instrument is a common sight, but it affords no idea of the magnitude of the mechanical equipment by which it is made effective.

To give you some conception of the great number of persons and the enormous quantity of materials required to maintain an always-efficient service, various comparisons are here presented.

**The cost of these materials unassembled is only 45% of the cost of constructing the telephone plant.**



## Poles

enough to build a stockade around California—12,480,000 of them, worth in the lumber yard about \$40,000,000.



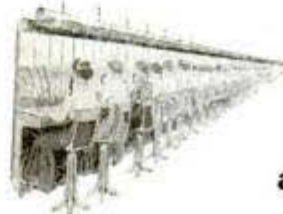
## Telephones

enough to string around Lake Erie—8,000,000 of them, 5,000,000 Bell-owned, which, with equipment, cost at the factory \$45,000,000.



## Wire

to coil around the earth 621 times—15,460,000 miles of it, worth about \$100,000,000, including 260,000 tons of copper, worth \$88,000,000.



## Switchboards

in a line would extend thirty-six miles—55,000 of them, which cost, unassembled, \$90,000,000.



## Lead and Tin

to load 6,600 coal cars—being 659,960,000 pounds, worth more than \$37,000,000.



## Buildings

sufficient to house a city of 150,000—more than a thousand buildings, which, unfurnished, and without land, cost \$44,000,000.



## Conduits

to go five times through the earth from pole to pole—225,778,000 feet, worth in the warehouse \$9,000,000.



## People

equal in numbers to the entire population of Wyoming—150,000 Bell System employees, not including those of connecting companies.

The poles are set all over this country, and strung with wires and cables; the conduits are buried under the great cities; the telephones are installed in separate homes and offices; the switchboards housed, connected and supplemented with other machinery, and the whole Bell System kept in running order so that each subscriber may talk at any time, anywhere.



**AMERICAN TELEPHONE AND TELEGRAPH COMPANY  
AND ASSOCIATED COMPANIES**

**One Policy**

**One System**

**Universal Service**

*Please Mention Popular Mechanics*





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In 17 shades—for the  
artistic coloring of wood  
—*soft and hard.*

## Johnson's Prepared Wax

A complete finish and polish for  
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furniture.*

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for Free trial packages and Instruction  
Book, "*The Proper Treatment for  
Floors, Woodwork and Furniture.*"

S. C. Johnson & Son

"The Wood Finishing  
Authorities"

Racine,  
Wis.



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**45c—Value FREE—45c**

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- 1—25c Instruction Book
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- 1—10c Can Johnson's Prepared Wax

S. C. Johnson & Son, Racine, Wis.

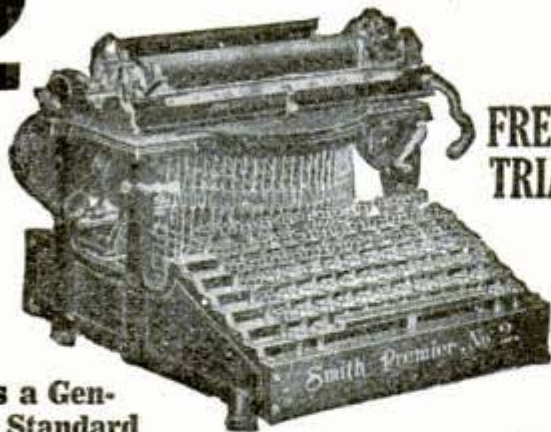
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PA4



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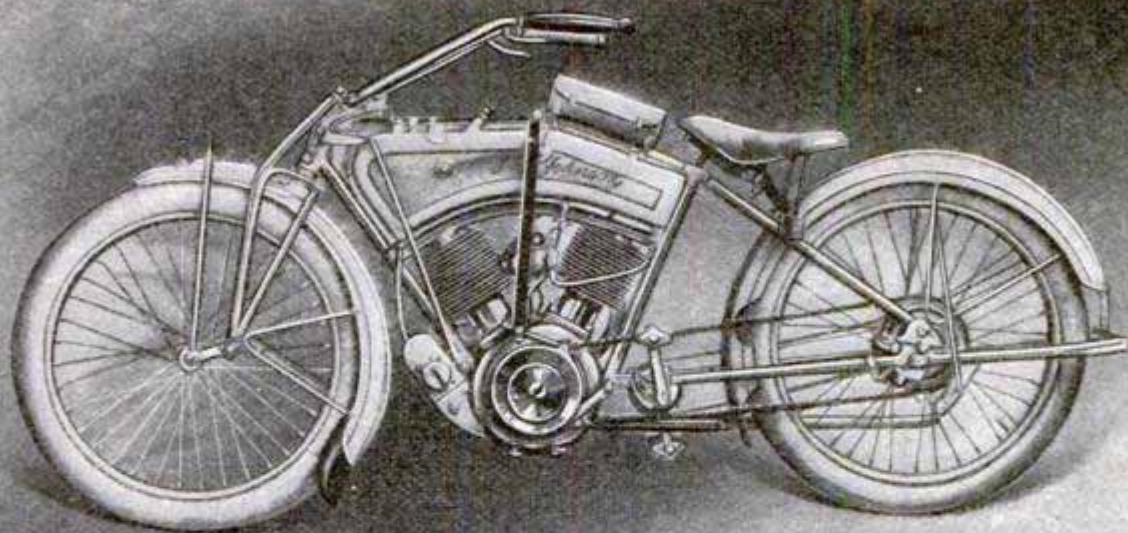
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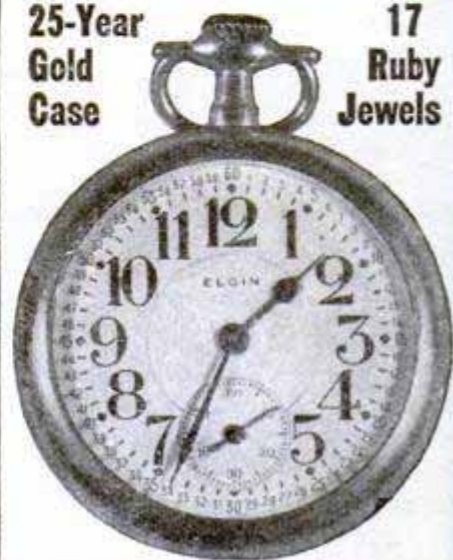
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Steamboat Bill  
O You Circus Day  
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Name.....

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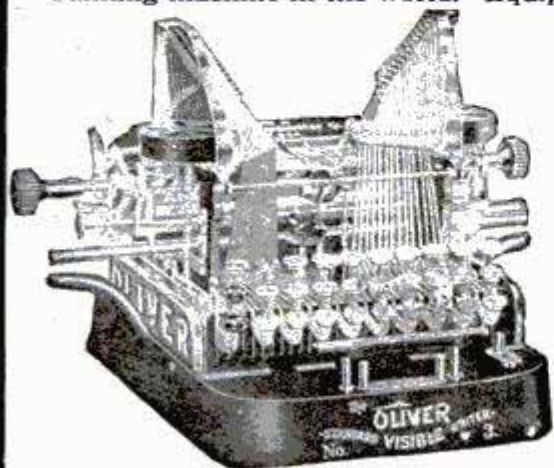
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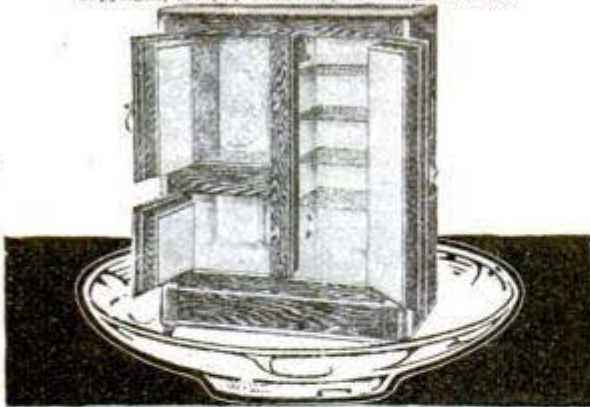
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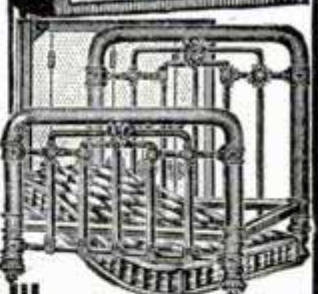
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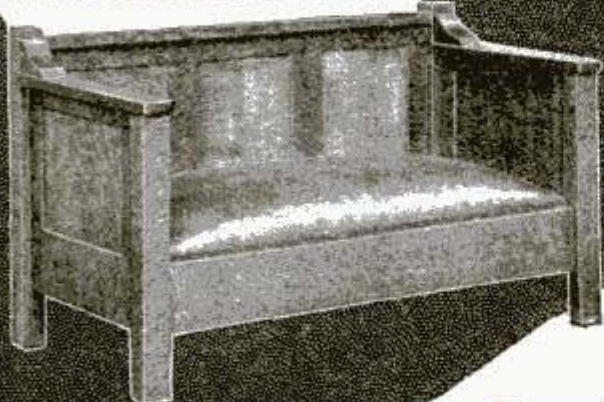
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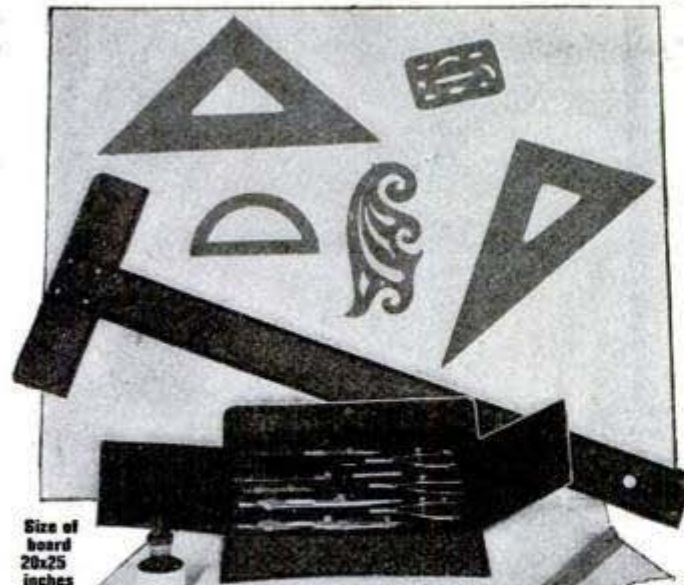
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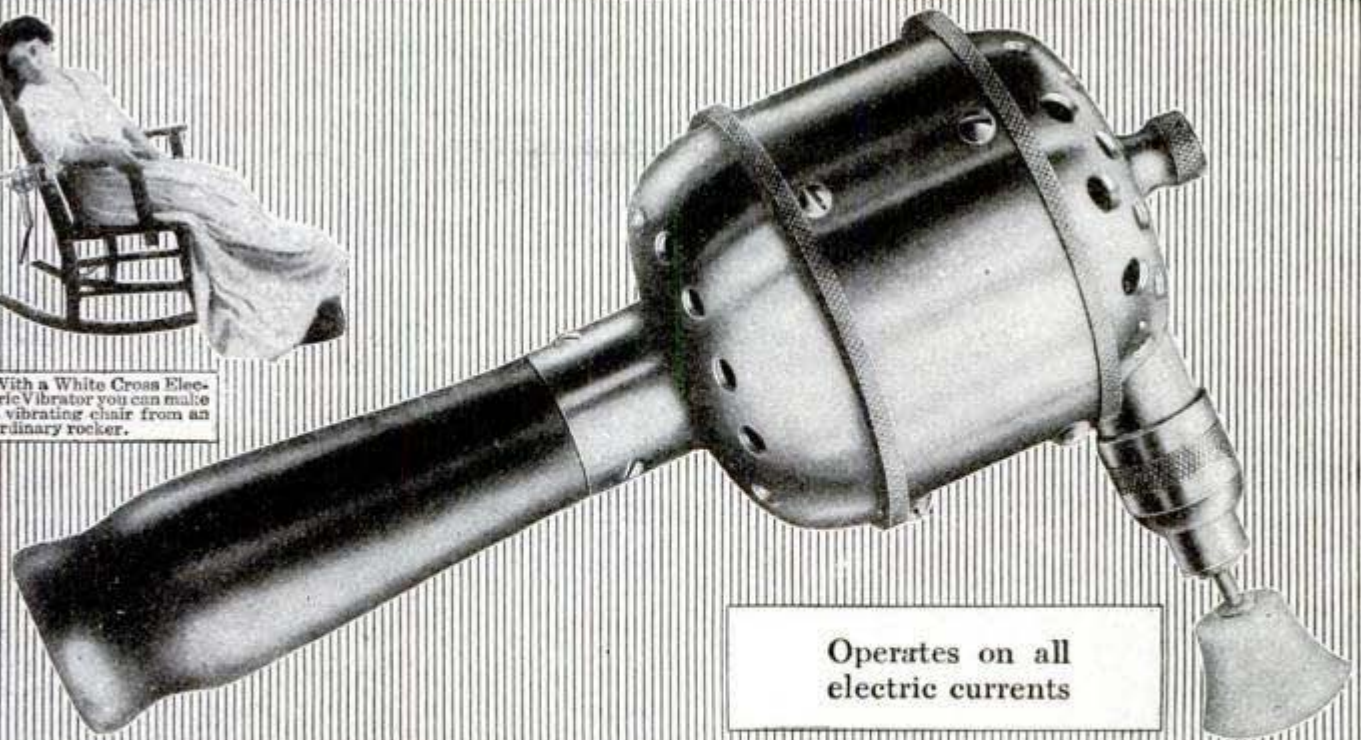
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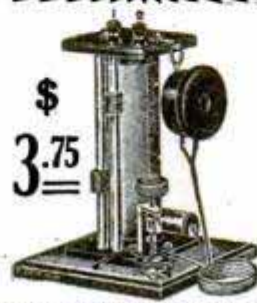


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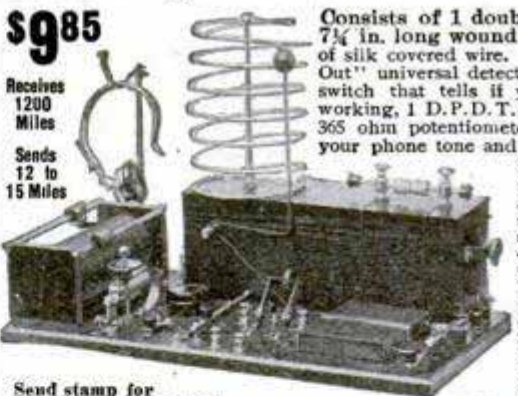
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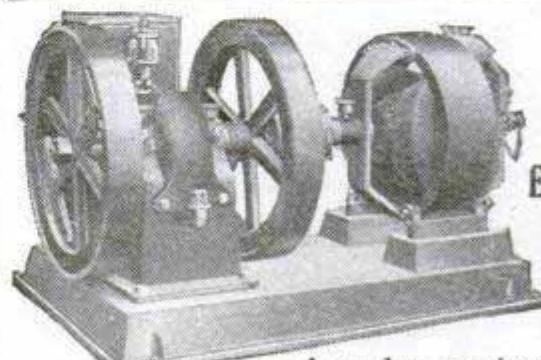
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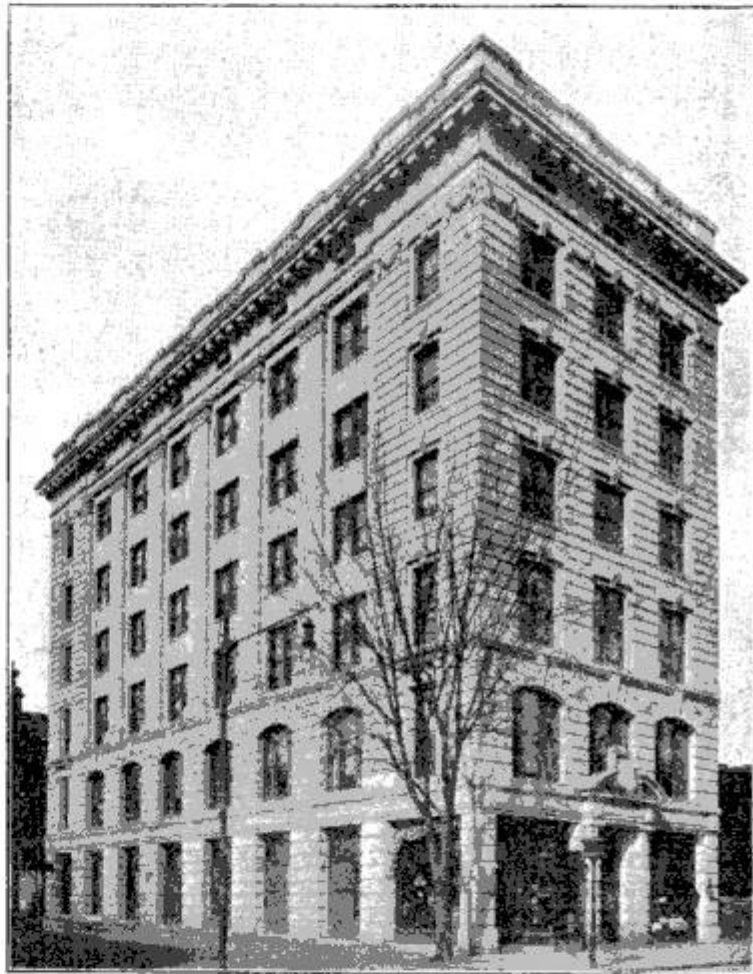
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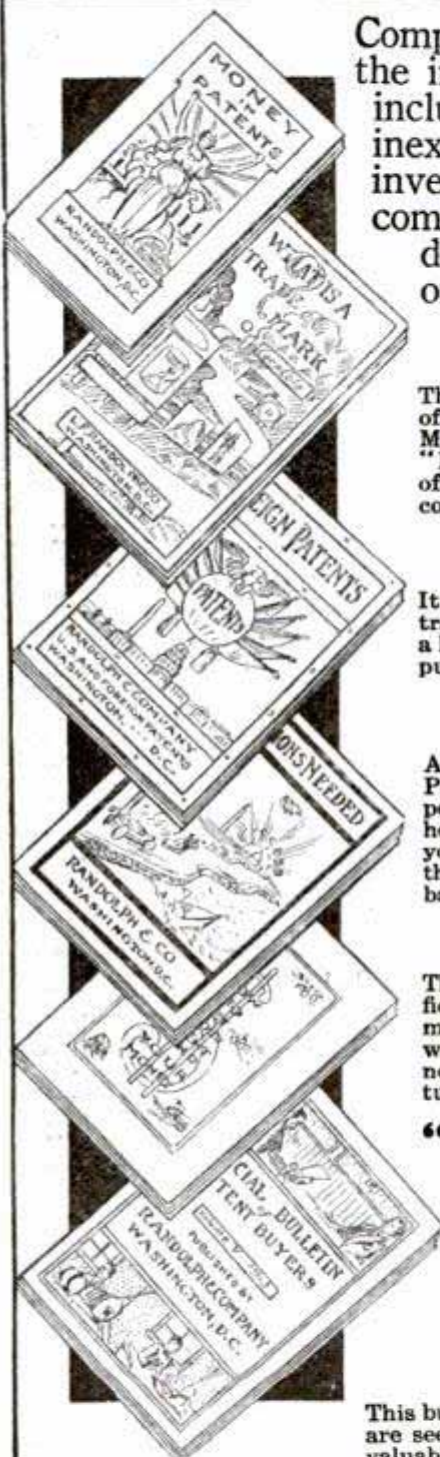
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5. Can a demand be created at reasonable expense?
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7. Who are likely to be interested in the manufacture and sale of such inventions?
8. Where can I get reliable information and advice on the above points?

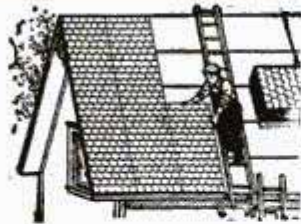
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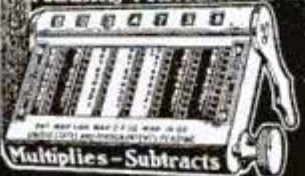
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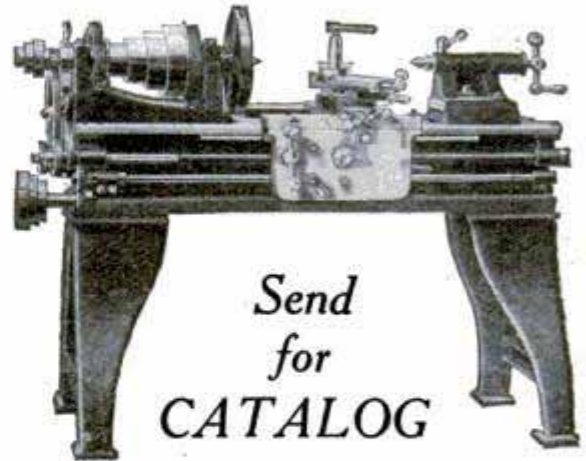
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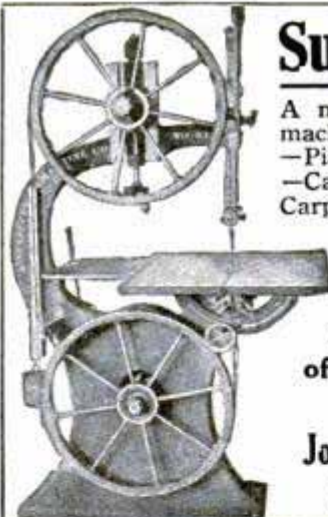
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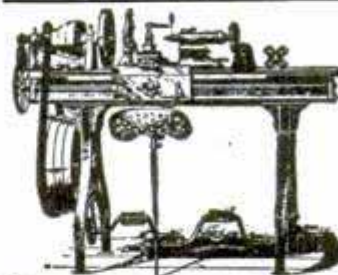
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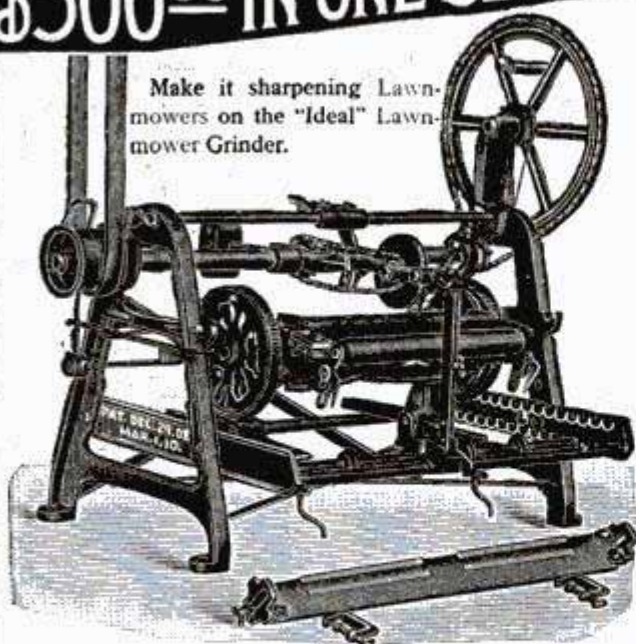
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Find out all about camping. Get ready for your vacation. The new 1914 Camp Guide gives you all the latest information about camps and camping—tells you how to prepare for trips—how to locate your camps and pitch your tents—what to take along—clothing, provisions, cooking, etc.—also expert advice on hunting and fishing.

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Grinder Head**



**C**OMPACT, serviceable, well balanced and constructed upon the right mechanical lines. The grinder head has a crucible steel shaft, real babbited bearings, and the main casting is of the best grade of grey iron, nicely finished. Each grinder head is fitted with two genuine

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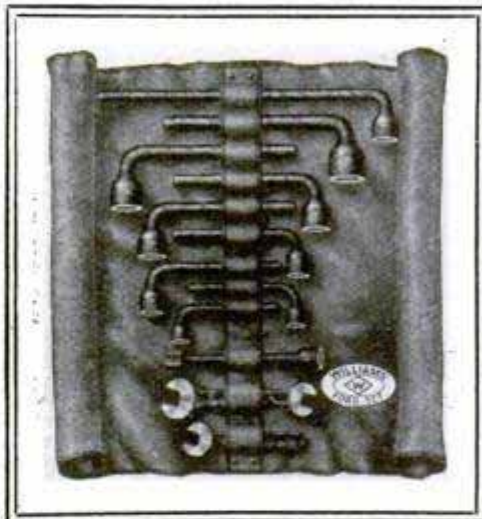
the fastest, cleanest, coolest cutting wheels for general grinding—it's a great machine for the small shop where power is available.

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Price, complete with two wheels, one coarse, one fine, . . . \$12.50

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Drop-forged from special steel and designed for extreme and convenient service upon the Bolts and Screws common to the "Ford" construction, the Williams' Superior Drop-forged Wrench Set is without an equal for this service—barring none!

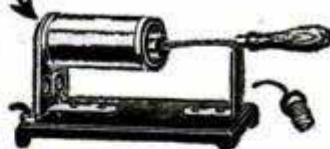
Every tool illustrated in the set is a guarantee of better service and of a longer life of mechanical comfort and usefulness than has ever before been offered for the purpose—an investment in which you must have the utmost of satisfaction.

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With the use of the Current Electric Furnace, any voltage, comes in three sizes complete. Cost of operation very low, cheaper and by far superior than any other known method. No more expensive delays and dangers caused by the use of gas, oil, gasoline, etc. Furnace absolutely guaranteed, money refunded if not

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Keep your tools orderly arranged in a Gerstner's Portable Tool Case. There's a place for every tool in one of the felt lined drawers. Every up-to-date mechanic needs one and you'll find our Cases the best built, neatest and most practical on the market. We guarantee to please or refund all money.

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No matter whether you require hack saws in the course of your day's work or only for an "odd job" about the house, you will find there is a Starrett hack-

saw blade and frame suited to your requirements. Starrett hack saws are made of the best tungsten steel, tempered by our secret process, and the teeth are evenly milled.

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World's Greatest Toolmakers



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The thousands who are using U. S. Ratchet Wrenches find them wonderful time and money savers. **STRONG—DURABLE.** Last a lifetime. Write for Free Circular and Special Introductory price.

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"VANDOR" - Hammers are drop forged from Vanadium Steel, tempered in oil and are **Warranted Against All Defects for a Lifetime**

Attached to every "VANDOR" - hammer is a numbered guarantee certificate, insuring lifetime service.

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Send us \$1 and your dealer's name. We'll ship the postpaid by return mail. Please state whether wanted for light, medium or heavy work.

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Reference 1st Nat. Bank, CHICAGO

\$1.00

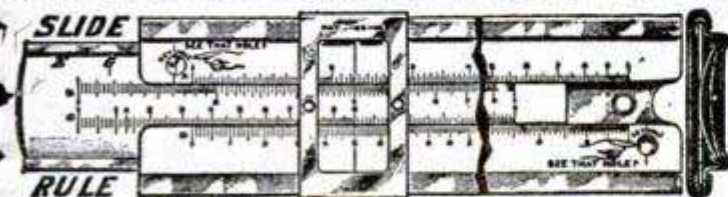


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sews leather, canvas, shoes—anything, heavy or light. Complete repair shop in itself. Saves many trips to town. Mends harness, saddles, wagon covers, blankets, buggy tops, belts, etc. Can't get out of order. Original and only awl with diamond point full grooved needle to protect the thread. **HIG MONEY FOR AGENTS.**

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## NEW SLIDE RULE—ADDS—SUBTRACTS—MULTIPLIES—DIVIDES



For years the Slide Rule was considered so complicated an instrument that it was used only by Technical men, and there are people today who still have this opinion. The **Richardson Direct Reading Slide Rule** has put an end to the mystery surrounding this machine, and my 52 p. book, **The Slide Rule Simplified**, shows the actual setting of the rule by 90 full size engravings, for problems which confront men in any vocation. It is written so that you can understand it, and makes the use of the Slide Rule possible for everyone. The examples selected are those which frequently come up for solution by the **Banker, Broker, Auditor, Inventory and Insurance**

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Price 10" Rule, Add, Subtract, Multiply and Divide, \$3.00; 10" Rule (non-Add and Subt.) \$2.50; leather case, 50c extra; 5" Rule (non-Add and Subt.), leather case, \$2.50. 10" Dummy Rule bristol board scales, \$1.00. Postage prepaid. If ordered now the book, **The Slide Rule Simplified**, goes Free with each rule. If interested in forming clubs, write for large list of tools GIVEN FREE.

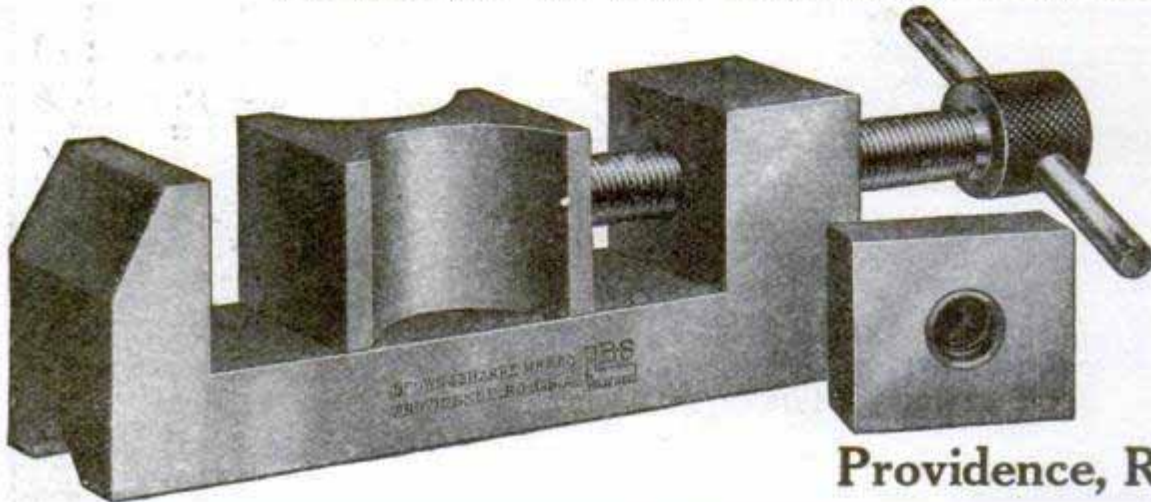
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## The New Britain Drill Chuck

Ball Bearing

Hand Operated Wrenchless

This chuck gives the tightest gripping power of any Drill Chuck now on the market. The greater the pressure on the drill, the tighter it grips.

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(which means washermen). Their usual charge for washing varies from 1 cent to 2 cents per piece. They depend more on physical effort in beating, pounding, and rubbing the clothes than they do upon soap. A small amount of very cheap soap of native manufacture, in which sand is the important constituent and which is sold in large balls for about 2 cents apiece, is applied to the clothes. Most municipalities in India set apart certain small ponds, lakes, and parts of rivers where the dobbies are permitted to do their washing. Fre-



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Twelve styles, felt-lined drawers, solid brass trimmings, best of material, beautiful finish, low prices, satisfaction guaranteed. Ask for booklet of cases built for service.

**The Pilliod Lumber Co.**  
SWANTON, OHIO



"AMERICAN"  
Key Cutter

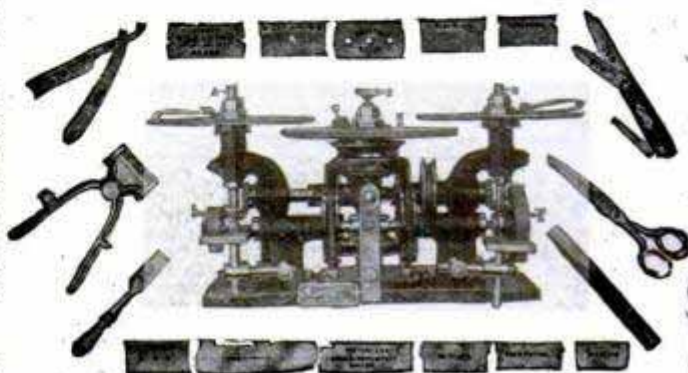
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It fastens heavy fixtures, electrical and otherwise, with a vise-like grip, to hard surfaced walls, floors and ceilings so they cannot break loose nor wobble, as they are sure to do sooner or later by the wood plugging or leading in method. The fixture sets neatly and tightly to the wall and cannot be pulled down.

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The most dependable fastener known for fixtures, push buttons, lamp brackets, telephones, chandeliers, heaters, motors, etc.

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SEWS LEATHER LIKE A MACHINE

Price \$1.00

Send for terms to Agents

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Improved Interlocking Rust Proof Fool Proof

the only RULE IN THE WORLD whereby inside measurements of doors and windows, etc., can be taken rapidly and accurately. Also superior to any other rule for outside measurements of walls and ceilings, etc., as it can be extended and closed instantly. **MECHANICS, BUILDERS, AND ARCHITECTS, TRY ONE TODAY! DON'T WAIT.** Ask hardware dealer for it.

On receipt of 15 cents per lineal foot, a 4, 5, 6 or 8 foot rule will be sent to you prepaid. Large profits to agents. Write for circulars and particulars.

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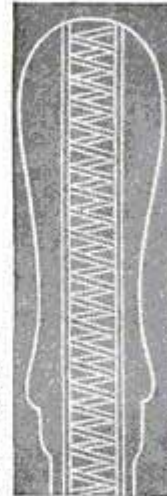
Insist on "Ohio" Tools when buying Planes, Chisels, Drawing Knives, Auger Bits, Screw Drivers, etc.

CATALOGUE FREE

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The quick acting spring in the handle of this "Yankee" Spiral Ratchet Screw-driver brings back the handle in position each time, for the next drive. You can drive or draw screws, one handed in deep narrow places, or way above your head where you can't use both hands. The spring pressure keeps the bit in the slot. A big time saver—where you have many screws to drive. No pulling or twisting with hand or wrist—"just push."—They're accurate workers, every one of these—

## "YANKEE" TOOLS

*Make Better Mechanics*

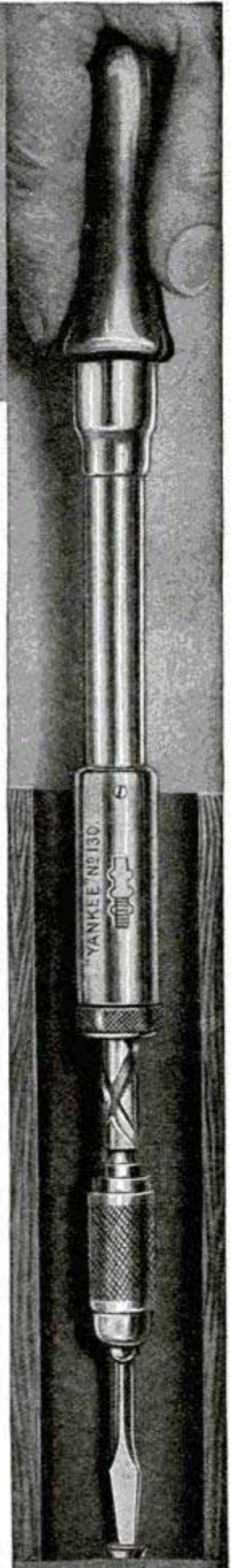
There is a right, a left hand ratchet and rigid adjustment. Supplied with 3 sizes of bits. Attachments obtainable for drilling, counter-sinking, etc.

## "YANKEE" QUICK RETURN Spiral Ratchet Screw-driver No. 130 price \$1.85

Your Dealer Can Supply You

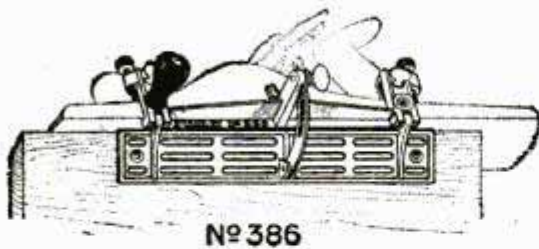
"Yankee" Tool Book "free— for the mechanic or householder. "Yankee" Tools in the Garage"—for the automobilist.

**NORTH BROS. MFG. CO. PHILADELPHIA**





# Stanley Tools



No. 386

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¶ A new STANLEY TOOL that will enable you to plane bevels of any angle between 30 and 90 degrees, or to square up the edges of boards with extreme accuracy.

¶ All parts except the knob are of metal—nickel plated and all the joints and bearing surfaces are machined.

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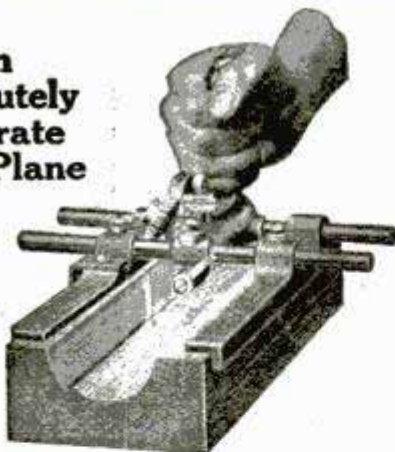
¶ If you cannot procure this tool from your Hardware Dealer, we will upon receipt of price send same postage prepaid to any part of the United States.

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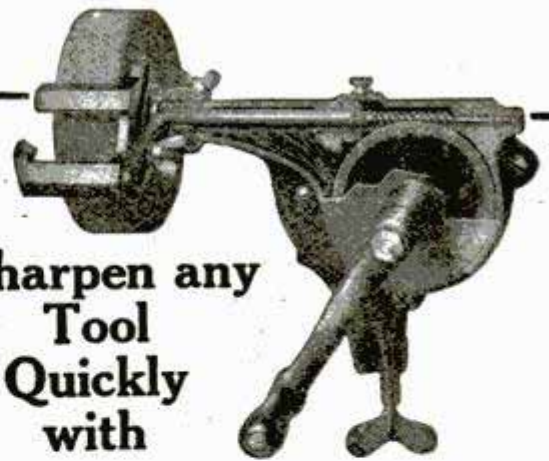
An  
Absolutely  
Accurate  
Core Plane



EVERY patternmaker realizes the need of a plane that will cut half circle  $\frac{3}{4}$  to 6 inches. This is the only tool ever devised that will do it. Mechanics who are using this tool tell us it is worth one hundred dollars. Sold on a guarantee—your money back if dissatisfied in any way.

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Sharpen any  
Tool  
Quickly  
with

## LUTHER "Best Maide" TOOL GRINDERS

Handy, light running, accurate—easily the best of all hand-power tool sharpeners. Ball-bearings, worm gear, steel shaft, improved tilting frame, dust-proof parts, oil bath. Runs true and without vibration. Special attachments for drill sharpening, drilling, etc.

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Besides its use as a Level it can also be used for running straight lines, getting angles, taking vertical sights, etc. for which ordinarily a Transit is required.



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a Good Mechanic by his Tools and the **best** Mechanic because he is sure to have our

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Saves time and labor. It doubles efficiency.

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Handiest device ever known for drilling, tapping, grinding valves, sharpening tools, etc.—quickly and easily. Does away with tiring hand work.

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Weighs only 11 pounds. Perfect balance between handles makes it seem doubly light and free to place and hold. Has famous Temco motor. Connect with any lamp socket (A. C. or D. C.) Costs only 1 cent per hour to run. Reverses instantly on full speed. Changes tap to drill in one minute. Has multitude of uses. Saves cost quickly in time and hard work. Guaranteed not to burn out.

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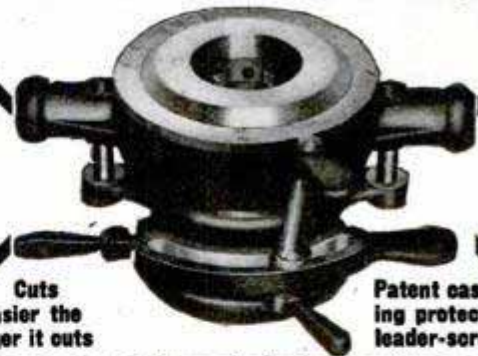


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Cuts easier the longer it cuts

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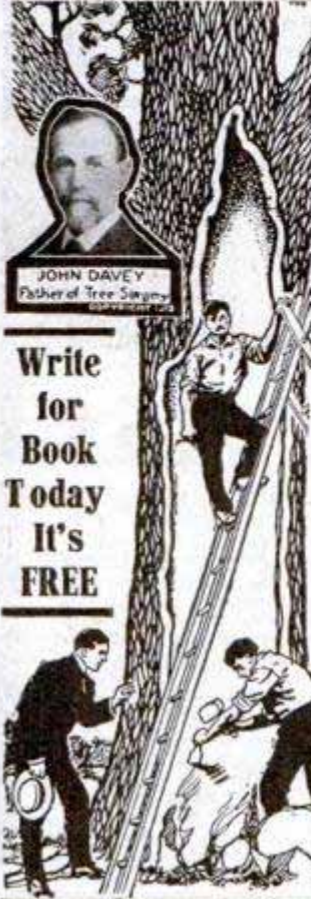
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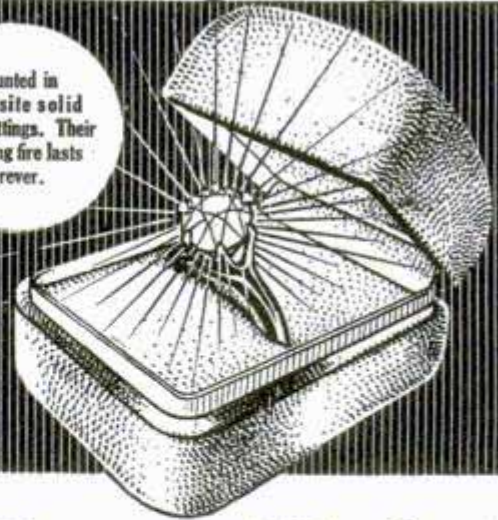
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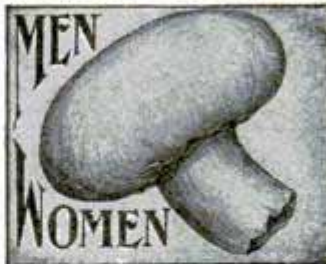
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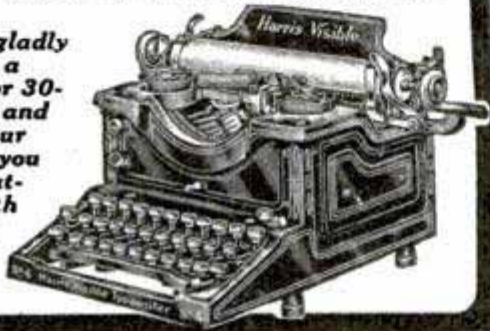
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20 ft. deep, accompanied by Mr. R. D. Fletcher, now of Titusville, and after viewing the well, father began almost immediately to have a well going down for himself. He used the old gin-pole drilling outfit (kicking



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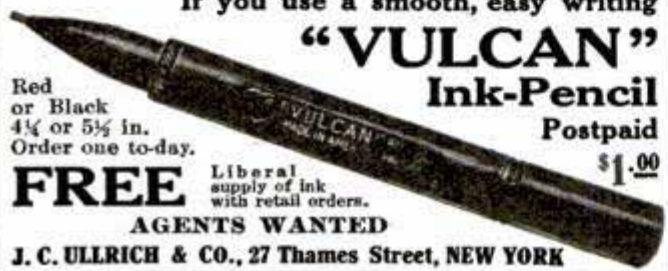
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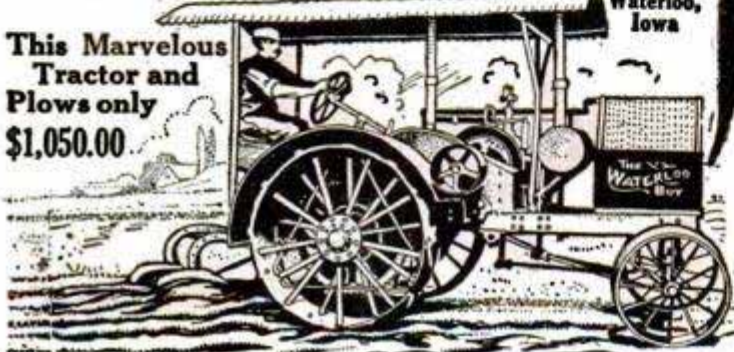
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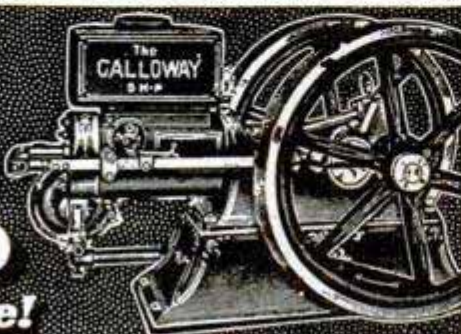
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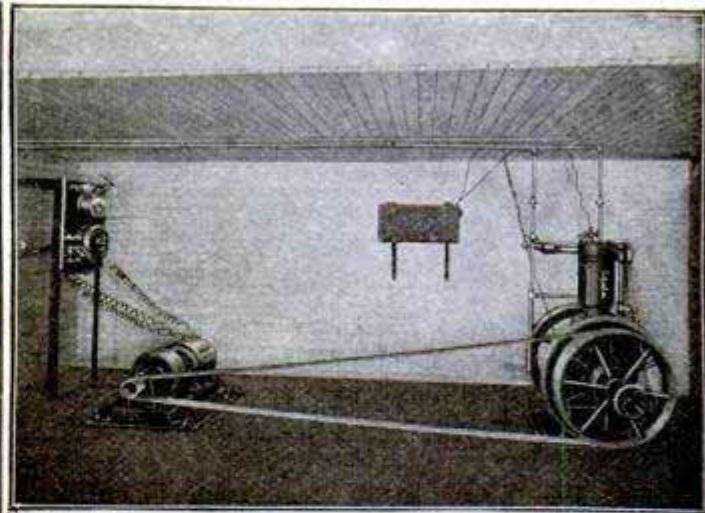


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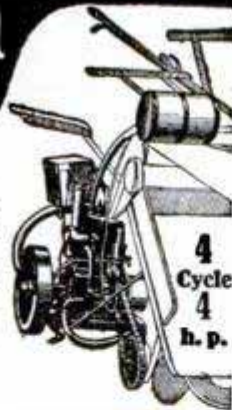
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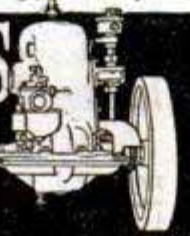
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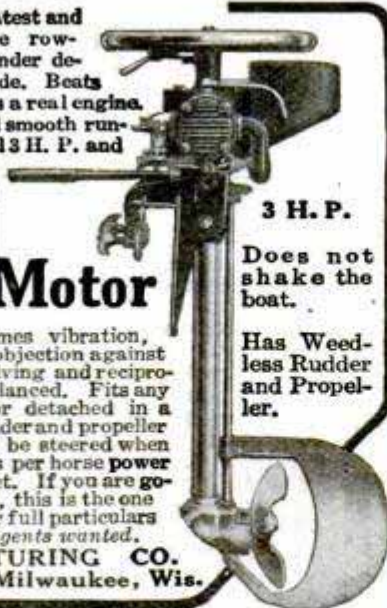
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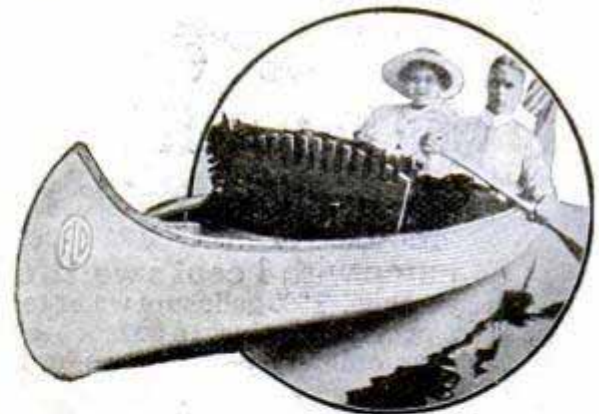
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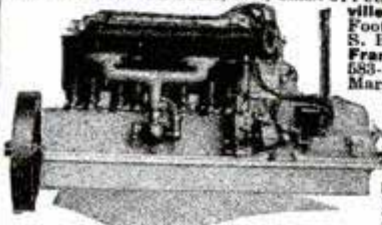
of the new season, every up-to-date Naval Architect, Boat Builder, and Motorboat Enthusiast is eagerly scanning the new designs for improvements and desirable refinements. Scripps Motors will be found to be worthy of careful examination for several reasons—"Simplification of design, Improvements in the ignition system, Refinements in details, and Accuracy of workmanship."

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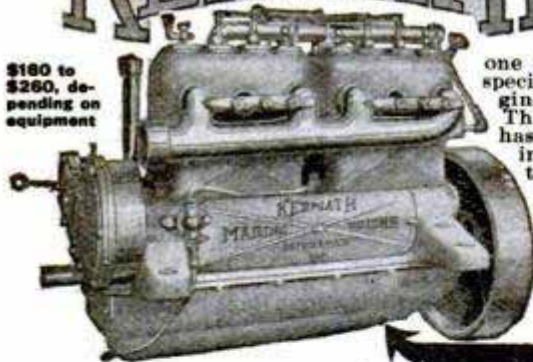
**Cost Less - Last Longer than Wood Boats**

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Cycle  
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\$180 to  
\$260, de-  
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Made in one size only by specialists in engine building. The Kermath hasn't an equal in this size and type, absolutely regardless of price. Catalog request

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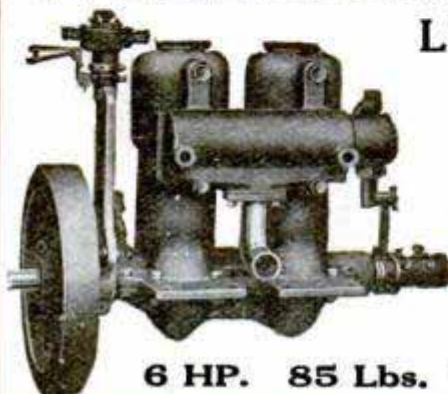
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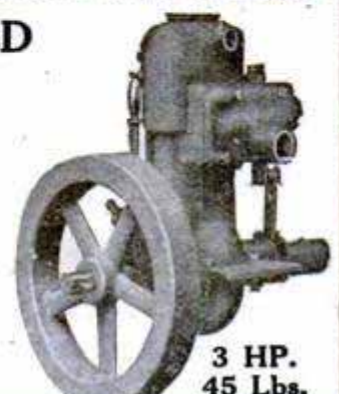
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2½ to 3 H.P. Weight 59 lbs.

Makes Any Boat a Motor Boat The original outboard motor. 9th year—25,000 in use. Guaranteed for life. Fits any shaped stern. Drives rowboat 8 miles an hour on quart of gasoline.

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That we have brought out a new High Speed "Buffalo" Model—Four cylinder, 16-20 h.p.; bore, 3¼"; stroke, 5"; speed, 800 R.P.M.; weight, 525 lbs.; all working parts enclosed; constant level splash lubrication. Write for details.

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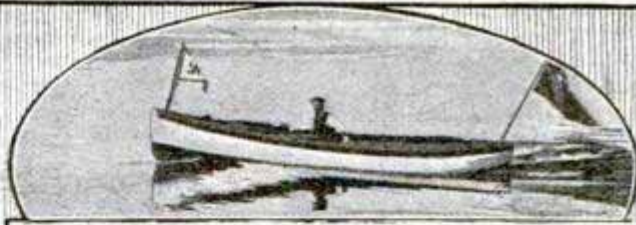
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Complete, ready to run. Converts any row boat into an efficient motor boat in one minute. Guaranteed to please you in every way or money returned. Write us a postal card now for "Motorgo Folder No. 801P."

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PRICE \$49<sup>95</sup> =



J. P. Brittan, Grenfell, Sask., Can., writes: "I'm still running my 210 I built two years ago and if anything else is better now than ever. I installed a 6 H. P. and have beaten everything on the lake. Before I started making boats by your system I couldn't saw a straight line and in this boat everything was saved out by hand except ribs and I had those cut out with a machine."



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All the parts come to you cut, shaped and fitted. Illustrated instructions show you how to put them together. You know where every piece—even every nail and screw is to go. You know that the very best material goes into your boat and you can always have the feeling that it is designed right and built right. All the technical or skilled work is done here in the factory. We build a complete, full size boat—then take actual size patterns of every piece in the boat, marking each pattern to show you where it belongs. Difficult work is taken care of, too. Erect the frame, put on the plank and your boat is ready for painting, finishing, etc.

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Largest Plant of its kind in the world. Originators of the Pattern System of Boat Building.

Only \$33.00 Buys the complete frame for this fine 23 ft. launch, including full size patterns and illustrated instructions to finish. Speed 9½ to 14 miles an hour—12 passengers. This and other models in Free Boat Book. Write for it.

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Buys full size patterns and full instructions for building any model.

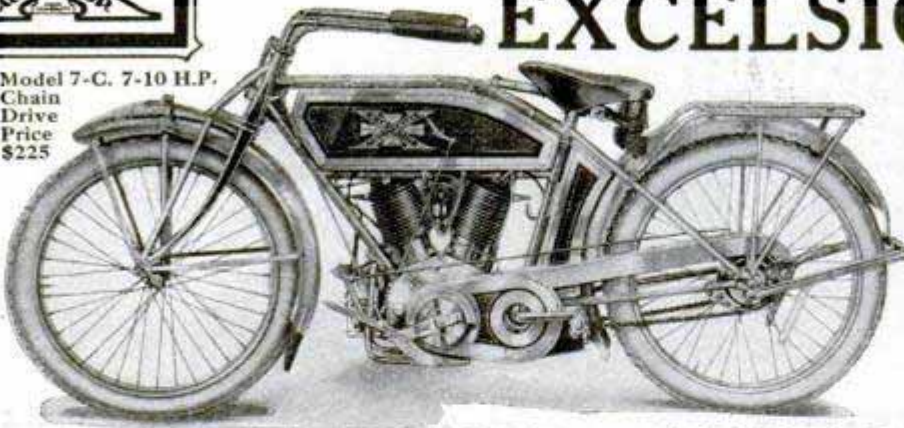






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Model 7-C. 7-10 H.P.  
Chain Drive  
Price \$225



**SAFETY and CERTAINTY of EXCELSIOR CONTROL**

The grip control of all functions of the

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is the greatest assurance of safety to the rider that is found in any motorcycle on the market. Throttle, Spark, Compression and Clutch are all controlled by the handle bar grips without removing the hands or in any way interfering with the steering or other details of operation. This simplicity and Certainty of control is of equal value to the beginner and the experienced rider, as it enables you to get through crowded streets and bad roads with every part of the machine under absolute control. One hand governing the speed, the other the clutch, and as on no other motorcycle built. 100% Efficiency in control is only one of the great features of the EXCELSIOR. Our catalog or the nearest dealer will tell you the rest. Get Wise — get an "X" and be Satisfied.

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7 H.P. develops actual 9 H.P.

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Attaches to any row boat or canoe. Just the motor for your vacation. Has several superior mechanical features found on no other outboard motor. You will find the Gray Gearless Boat Motor is

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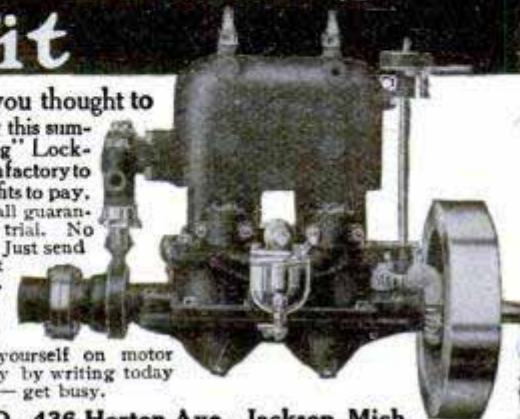


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The 6 H.P. Motor with Outfit complete, shown in illustration, freight paid, only..... **\$96.00** — a clear saving of at least \$29.00. Post yourself on motor boating and the safest, cheapest way to buy by writing today for our 1914 catalog. It's soon time to start — get busy.

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Only \$80.00 buys a garage 12 feet wide by 15 feet deep. Shipped to you in sections. Put it up yourself with a wrench and screwdriver.

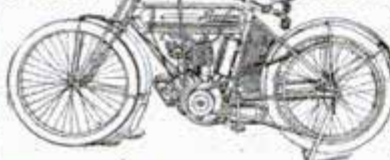
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Illustrates and describes the above and other ready made portable garages; also houses, barns, chicken houses, boat houses, summer cottages, from \$62.00 up. Write for Ready Made Building Catalog No. 80P94. SEARS, ROEBUCK AND CO., CHICAGO.

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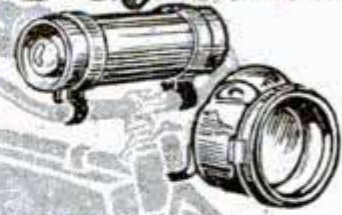
**IT ONLY COSTS** a cent to write a postal and **FREE** by return mail. You will get much valuable information. **Do Not Wait; write it NOW!**

**TIRES, Coaster-Brake, rear wheels, lamps,**

parts, repairs and sundries of all kinds at *half usual prices*.  
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Special  $\frac{1}{2}$  in.  
75c

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The Ford Manual, which is issued for the guidance of Ford agents, says: "The make of plugs with which Ford engines are equipped when they leave the factory, are best adapted to the requirements of our motor, notwithstanding the opinion of various garage men to the contrary."

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Their high quality is based not only on the superior materials used, but upon our manufacturing processes.

There is a **Champion Spark Plug** for every type of Motor Car, Motor Truck, Motorcycle, Motor Boat, Aeroplane or Stationary Motor.

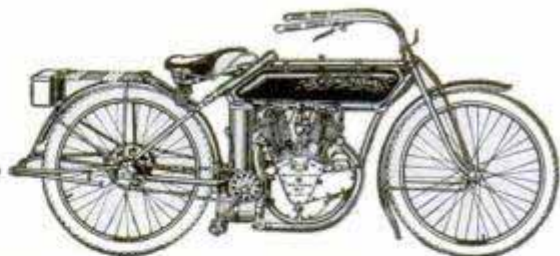
**Special  $\frac{1}{2}$  inch Champion X  
sells for 75c everywhere**

Consult with your dealer as to the "Champion" which will give your motor its highest efficiency.

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5.00 Complete Tool Kits.....	1.09	
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Send for a Big Bargain list of new goods being sold at this sale. Get on our mailing list. Hundreds of other automobile parts and accessories are shown on our Big Bargain Sheet of goods sold at this sale. Write for this quick.

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Very latest design, classy looking, simple in construction. Boys! here's a real little auto that you can build yourself. Send 25 cts. for a set of our easy to understand plans, instructions and list of parts, telling you just how to build the 1914 model Motor-Bob.

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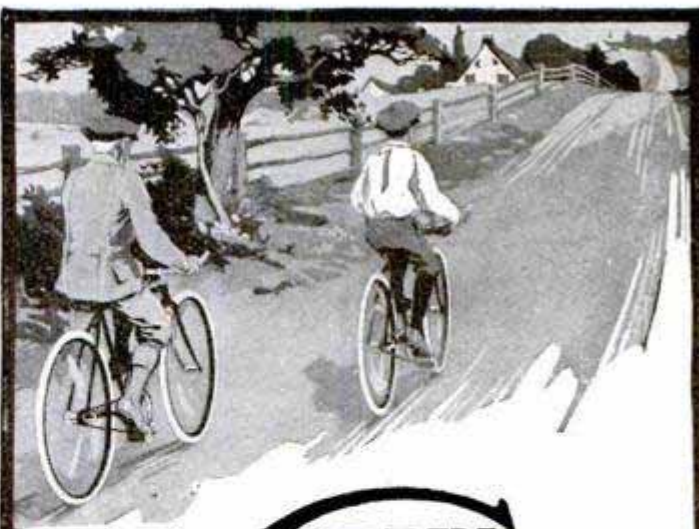
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## In One Minute Photography No Experience Required

A new, live profession, offering to red blooded, ambitious men and women, a real chance to make money. Now, as you read, you are facing an opportunity that may be a turning point in your life. Strike out for yourself! What's a mere job? What kind of future do the time clock and pay envelope promise? Invest your brains! Better your position! Double your income! **Do Something.** You want opportunity—don't you? Listen!

### \$28.50 PROFIT IN ONE DAY

That's what John Hancock, of Lamoni, Iowa, earned. Rev. J. W. White, Okla., made \$3.50 in 3 hours. Miller, Ia., says: "I made \$13.65 in one afternoon." Shearer, Mont., made \$22.35 in 5 hrs. Hundreds of letters like these show the stupendous possibilities—the enormous money-making power of

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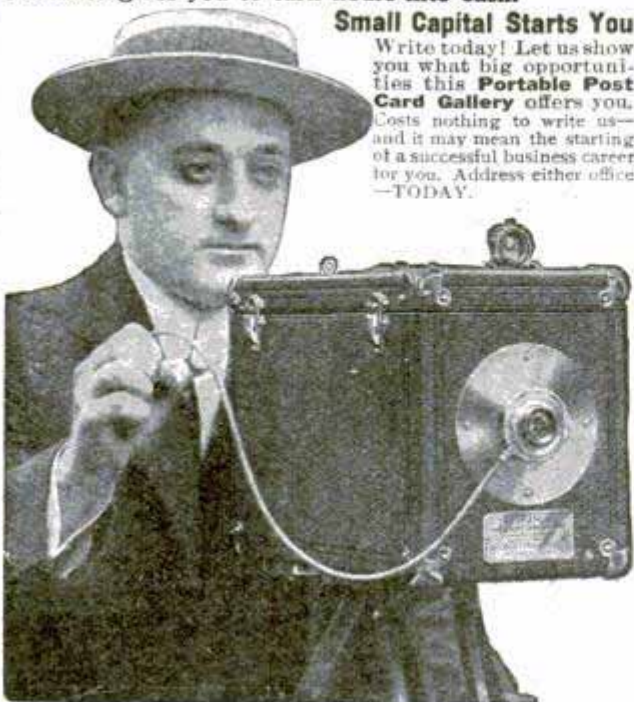
A new one minute picture machine, taking and finishing original photographs on post cards and buttons at the rate of 3 per minute. Five different styles of pictures made with the same machine. **No films, plates or dark room required.** The pictures are taken and finished right within the machine in less than a minute's time. No waiting. No delays. You collect your money right away.

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Here's a business that gives you an unlimited money-making market. Fairs, carnivals, picnics, circus grounds, aviation fields, busy corners, in small towns and large cities—all that, and more is your field for profit. You can travel and see life and make money besides expenses. Or you can work right in and around your own town—all or spare time. There are a thousand chances, a thousand advantages the "Mandel" Machine gives you to turn hours into cash.

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Write today! Let us show you what big opportunities this **Portable Post Card Gallery** offers you. Costs nothing to write us—and it may mean the starting of a successful business career for you. Address either office—**TODAY.**



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No more lost-key troubles. No buttons to fumble. Just turn knob as directed. 40,000 combinations possible. No one can open yours but you. Operated as easily in dark as in light.

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in each town to ride and exhibit sample 1914 model. Write for Special Offer. Finest **\$10 to \$27** Guaranteed 1914 Models with Coaster-Brakes and Puncture-Proof Tires. 1912 and 1913 MODELS ALL OF BEST MAKES..... **\$7 to \$12**

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All makes and models, good as new  
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### The D'LIGHT

This small portable electric lamp will stick to a mirror. Has an invisible spring clamp that holds it to the back of a chair, head of a bed—anywhere you want the light—an adjustable shade CONCENTRATES THE LIGHT, bringing it directly upon any object. For shaving, dressing, sewing and reading—saves your eyes and light bills—is a COMFORT in homes, offices and stores; a JOY TO TRAVELERS—can be packed in your grip. At dealers. Sent prepaid complete for \$5.00.

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Positive guarantee of money back if not satisfactory.



**VACUUM CONVEYOR FOR COAL**—An Austrian power plant is handling all its coal by vacuum pipes. Coal, graded as dust coal and nut coal, is delivered in car loads to the plant, and a suction pipe, dropped into the car, conveys the coal to the storage bin.

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A rich, luxurious lather that softens the beard without being rubbed in with the fingers. Send 4c in stamps for trial size of your favorite method.

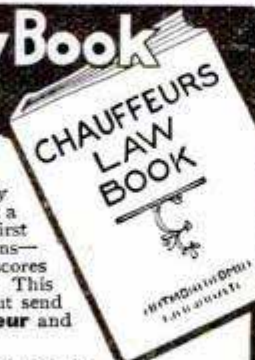
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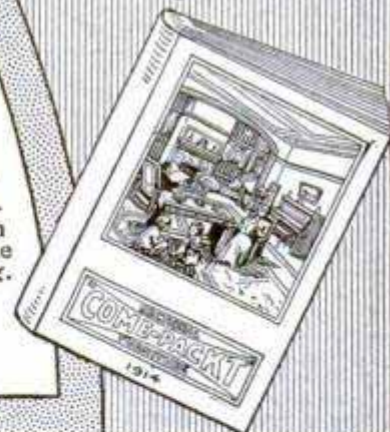
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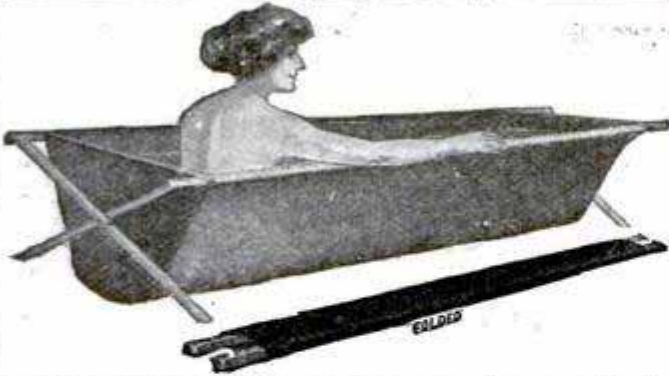
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Wyoming makes it safe for us to pay 6 per cent—because Wyoming legal int. rate is 8 to 12 per cent. Our stringent banking laws give you the same protection you get at home. Why be content with 3 to 4 per cent when we will pay you 6 per cent. Resources over \$100,000. Write today for booklet.  
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Maker of Engel's Famous 75c Gem Cleaning Outfit. Buy it at special price, 50c. Use it often and retain the sparkle of your jewels.

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The Burlington Special

19 Jewels Fully Adjusted

The Burlington Special

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*New Ideas in Watches*

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You may secure one of these superb time-pieces—a watch of the very latest model, the popular new thin design, adjusted to the second—19 jewels—adjusted to positions AND temperature AND isochronism—at the same price that even wholesale jewelers must pay—and in order to encourage everybody to secure this watch at once pay this rock bottom price, either for cash or \$2.50 a month! We send the watch on approval, **prepaid**. You risk absolutely nothing—you pay nothing—not one cent, unless you want this **exceptional offer** after seeing and thoroughly inspecting the watch.

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Please Mention Popular Mechanics



# Stewart Motorcycle Speedometer

MAGNETIC PRINCIPLE

## Front Fork Jars Cannot Injure This Front Wheel Drive Model

Before this Stewart Front Wheel Drive Motorcycle Speedometer was put on the market, you had to choose between two evils—

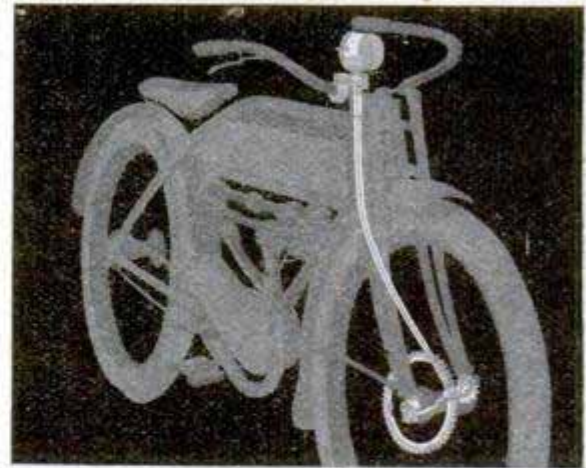
You had to accept a front drive motorcycle speedometer *with drive through flexible tube*, which soon whipped itself to pieces, or—

Content yourself with a rear wheel drive model which constantly registered false mileage through rear wheel slippage and whenever the motor was tuned up on the stand.

But this Stewart *Front Wheel Drive Motorcycle Speedometer* solves all difficulties. Its drive chain operates through a *solid, rigid tube*. The tube supports the bracket which holds the angle joint and fibre pinion. This bracket swivels freely on the front wheel axle. Thus all the vicious front fork shock, jar and twist is taken up without the slightest injury to any part. The pinion simply moves up and down on the sprocket with each up-and-down movement of the wheel.

# \$12

Complete and Fully Guaranteed



We also make the best *rear wheel drive* motorcycle speedometer on the market, but in spite of this we recommend the Stewart *Front Drive* instrument because it will give you better, longer, safer, more accurate service. The instrument itself is our famous *magnetic* type, and the price is only \$12 complete and fully guaranteed. For sale by dealers everywhere. Accept no other.

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Write for Catalog



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Pants cut in the latest style. Made to your individual measure. Fit, workmanship and wear guaranteed.

**No Extra Charge** for peg tops, no matter how extreme you order them.

**Agents Wanted**  
A good live hustler in every town to take orders for our celebrated made-to-measure clothes. Samples of all the latest materials **FREE**.

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The Progress Tailoring Co., Dept. 604, Chicago

## I WANT 200 SALES AGENTS AT \$1200 TO \$3600 A YEAR

To introduce my new **Compress and Vacuum Washing Machine** to every home in the country, I want 200 additional representatives to begin work at once in their home counties. I consider this machine the most brilliant inventive achievement of the age in household necessities. It is selling faster than anything I have ever heard of—**going like wildfire**.

### PROFITS START FIRST DAY

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**NO EXPERIENCE REQUIRED** Just follow instructions. Failure impossible. **Success assured**. Frank Greene sold 45 first three days—profit \$45. Mrs. L. C. MARRICK made \$90 first three weeks in spare time only. J. H. Goddard took 18 orders first three hours. **No talking necessary**. Just show it—the order is yours right on the spot.

H. F. WENDELL, Pres., Wendell Vacuum Washer Co., 202 Oak St., Leipsic, Ohio



**\$1.50**  
Selling Price

Every machine sold on money-back guarantee. **A child can use it**. Abolishes labor of wash day. Women discard \$15 and \$20 machines for it.

### MAIL YOUR APPLICATION TODAY

**Don't delay**. Get your county under contract. **No charge for territory**. To wait means to lose. Write me a letter or a postal card today. If you are honest and willing to work I will give you the position. **Do not let someone else get in ahead of you**. I want agents, general agents and managers. Write today—then you will have done your part. **Do it right now**. Address



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Don't consume from 10 to 20 minutes of a high-priced expert's time lacing your belts by hand. Get a

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It will lace your belt in 3 minutes and do it better. Your cheapest man or stout boy can handle it. No skill necessary.

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Increase the family income. Making canvas gloves offers the opportunity. Start in spare time on your sewing machine. Add more machines as business grows. Large factories have developed from a modest beginning like this. We started that way. Let us start you. The work is easy—no skill needed. The demand for canvas gloves is big. Send no money. Write today for our free book that explains the business.



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**PUT A LITTLE CALIFORNIA IN YOUR HOME**

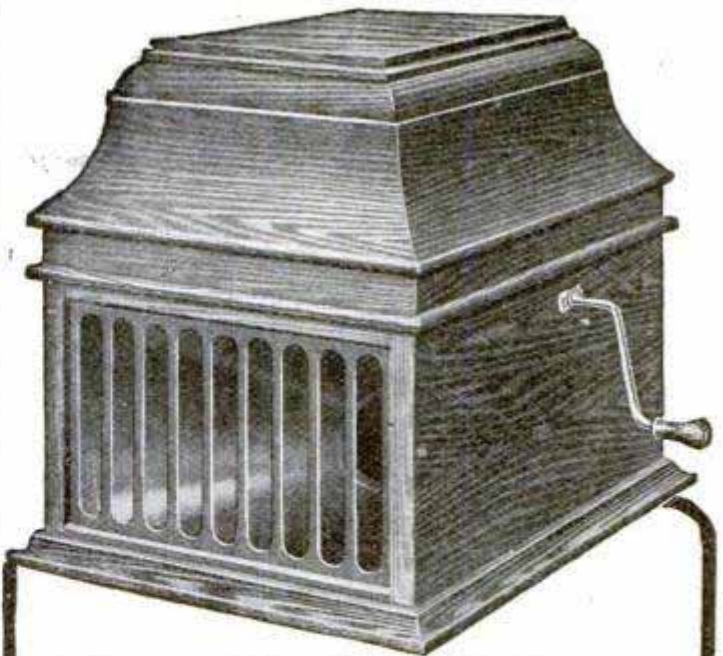
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Every railroad man who has worn a Signal Shirt will have no other. You'll make it a point to try the Signal, too, when you have seen how stylish and well-made it is, and the many exclusive features it has.

## SIGNAL Coat-Shirts

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**UNION MADE**

Has all these improvements; Easy-on, easy-off coat style. Extra big armholes that give plenty of arm movement. Specially cut skirts overlapping 3 inches in front and with extra button at bottom to prevent gapping. Two detached or attached collars; cuffs made with both button and extra buttonhole so they can be buttoned or used with detachable cuffs. Double needle machine stitching (prevents rips), buttons sewed on extra strong; 2 pockets, one a triple combination pencil, watch and handkerchief pocket. Signal Shirts are made from fast color percales that won't shrink or fade. Big variety of neat patterns. Only expert union labor employed.

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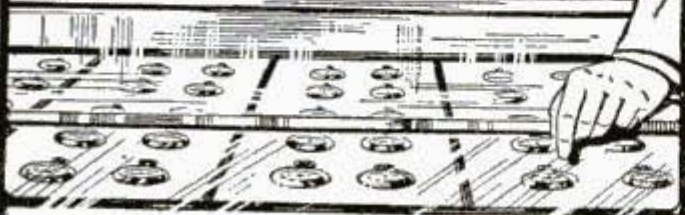
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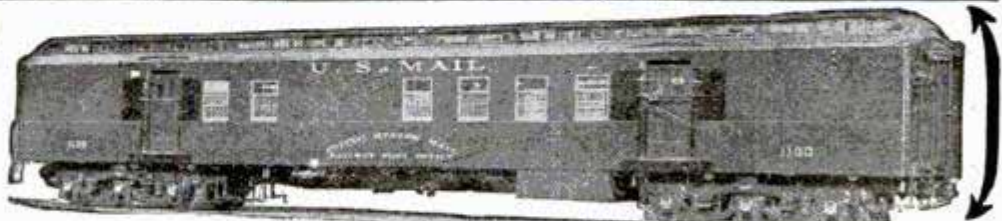
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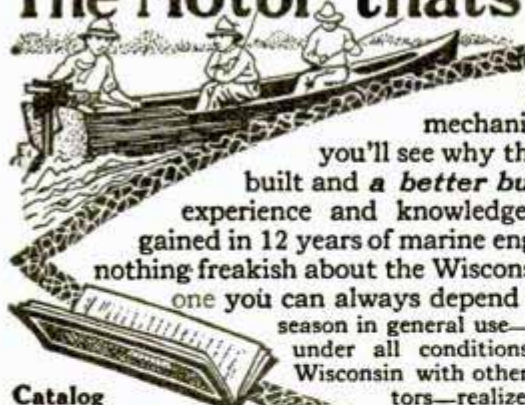
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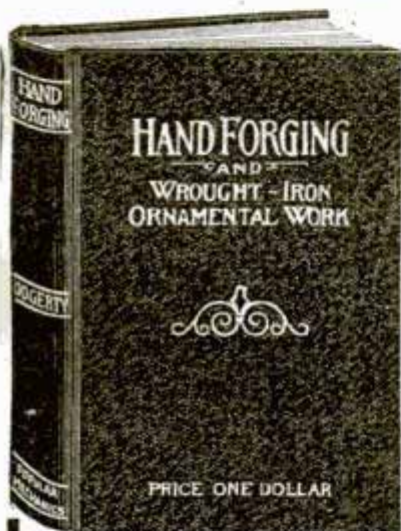
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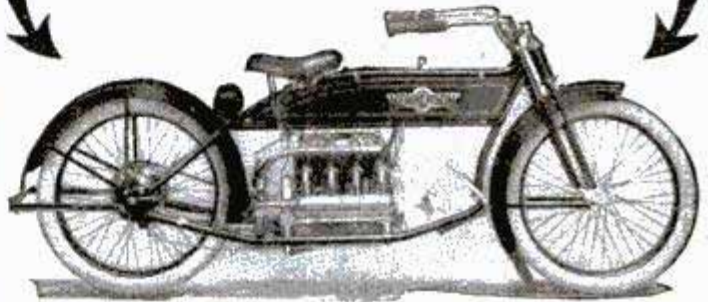


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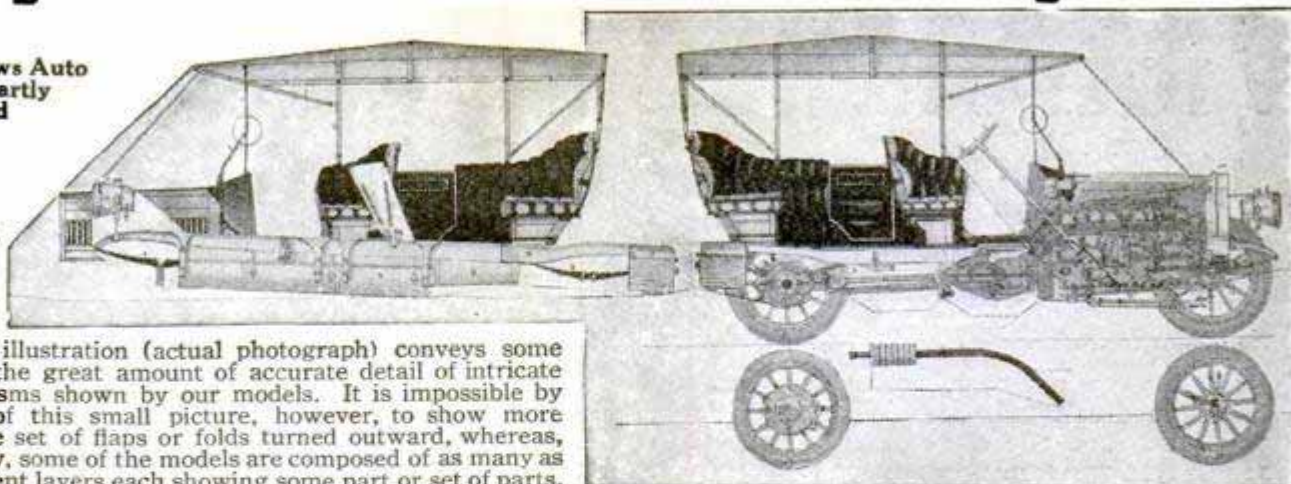
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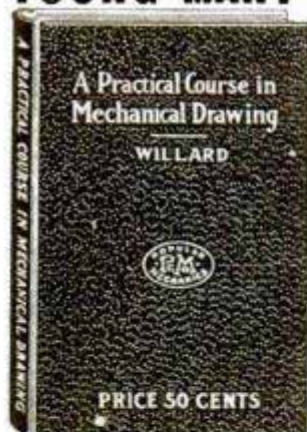
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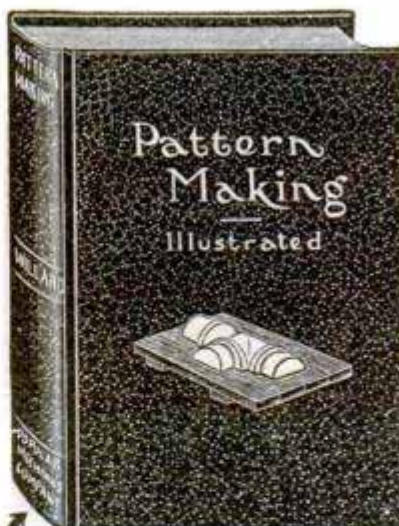
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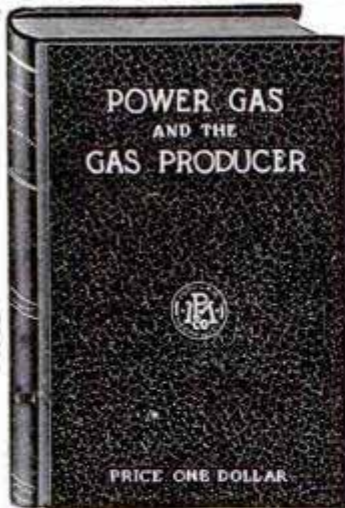
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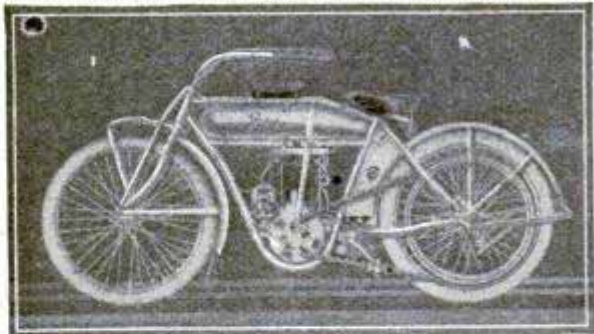
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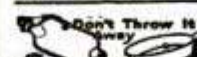
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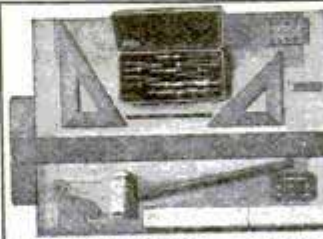
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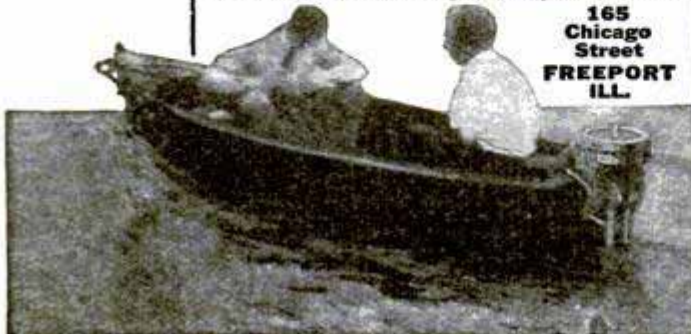
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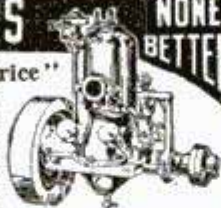
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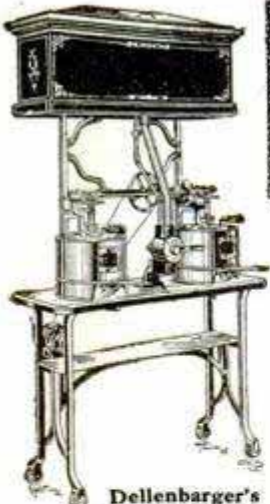
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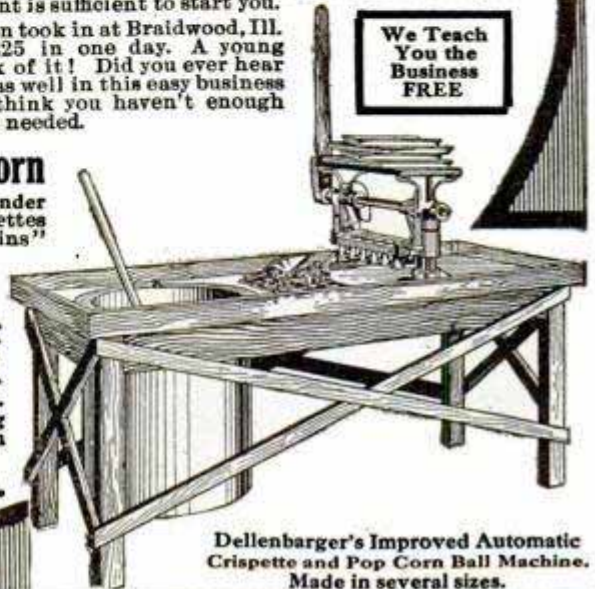
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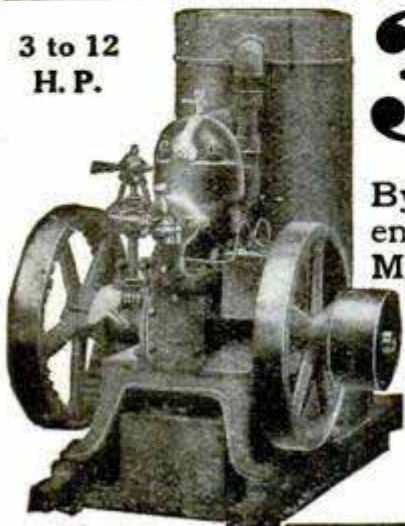
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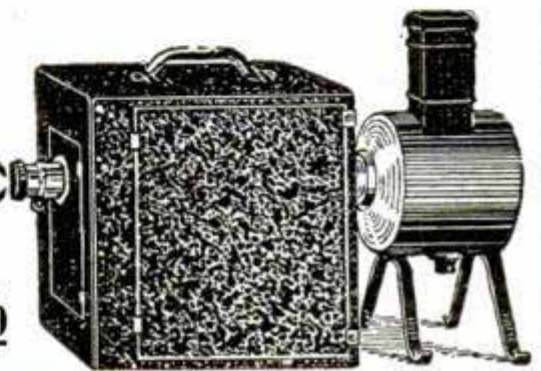
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(Location of the railway station site approved by the Board of Railway Commissioners, April 9, 1912. Order number 16,278.)

The key to a whole new empire—that's Vanderhoof. Think of 1,000 square miles of the richest soil waiting for market places. Think of 800 miles of navigable waterway waiting for towns to link its traffic with the railroad. Grasp the fact that the last spike in the wonderful new transcontinental line will soon be driven near Vanderhoof. THESE ARE FORTUNE FACTS FOR YOU.



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Vanderhoof is the center of the rich Nechaco Valley. Government investigators say: "The Nechaco Valley is the greatest connected area of lands susceptible to cultivation in the whole province of British Columbia." Vanderhoof is the heart of this great agricultural region. It has the combined transportation advantages of the greatest transcontinental railway

and an 800-mile navigable waterway. It is only 400 miles from the Pacific Ocean and direct steamship lines to the Orient. Short route via Panama to European markets. Vast timber and mineral wealth are easily accessible by both rail and water. Grain, fruits, dairy products, poultry, fish, vegetables, cattle, timber and minerals will come by rail, road and river to Vanderhoof. So Vanderhoof is bound to be an important supply center. Today you can cash in on this knowledge.

Either start in business there and supply the settlers with what they need at big profits or, if you can't leave home or don't want to, simply buy business-center lots at present low first-sale prices and hold for the rise in values after the railroad is completed in the spring.

That's your big chance at Vanderhoof. But you must act quickly. This advertisement may never appear again, so keen are those who know the possibilities of British Columbia to invest and settle there. Anyone can take advantage of this chance. The prices are low. The terms are easy. We are authorized to take applications for a short time at low figures in order to encourage quick development. It makes no difference whether you wish to invest big money or only a few dollars a month.

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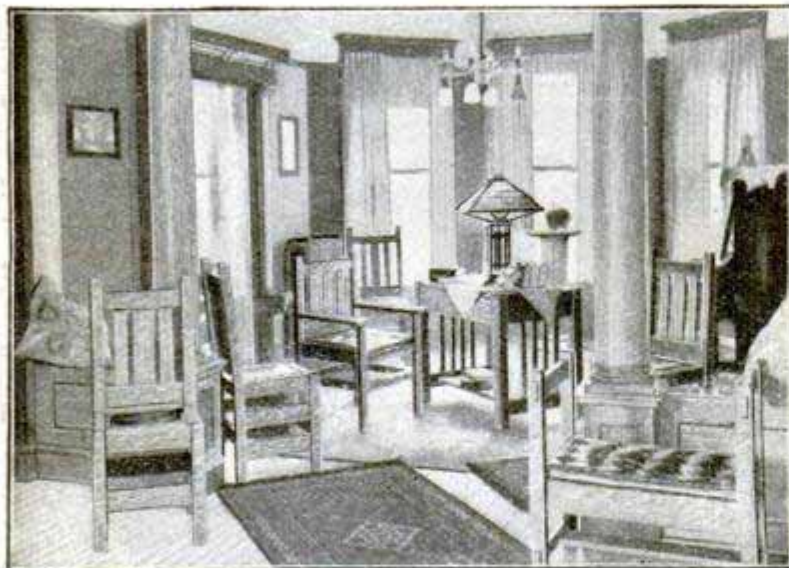
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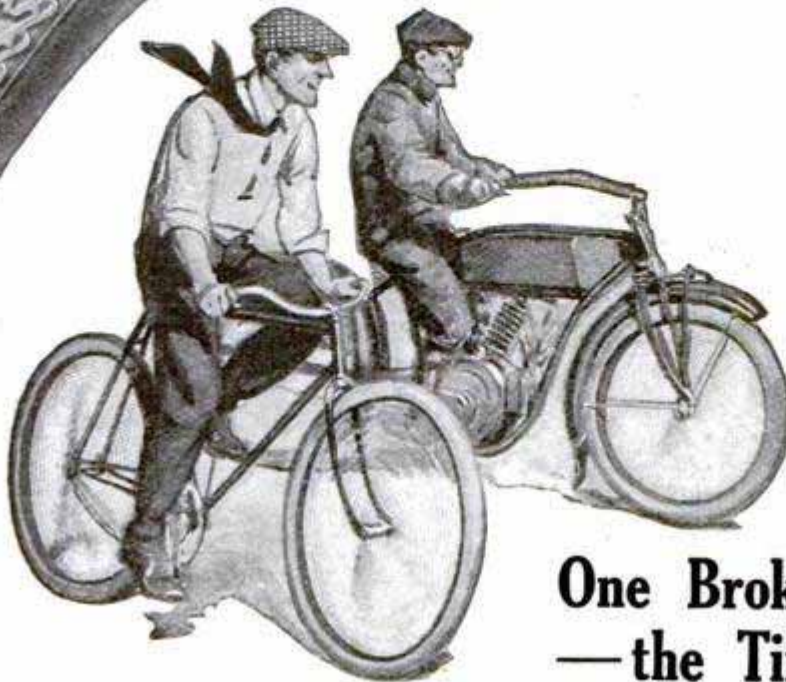
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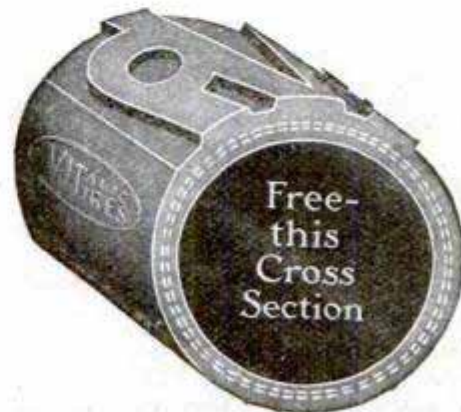
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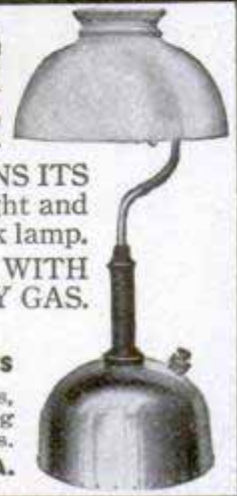
**The "Quicklit"** Gasoline table lamp can be **LIT WITH AN ORDINARY MATCH LIKE CITY GAS.**

*Both styles equipped with automatic cleaning needle.*

**NO smoke, no smell, no wicks to trim. A splendid proposition for dealers**

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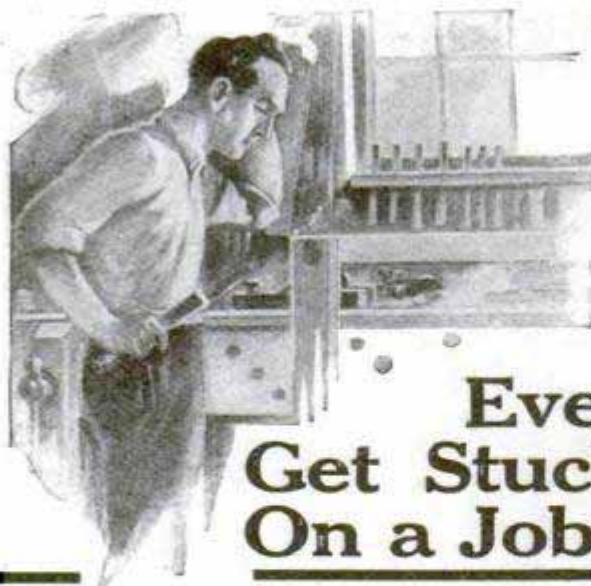
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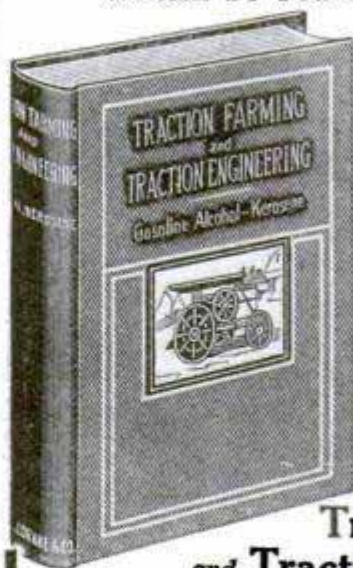
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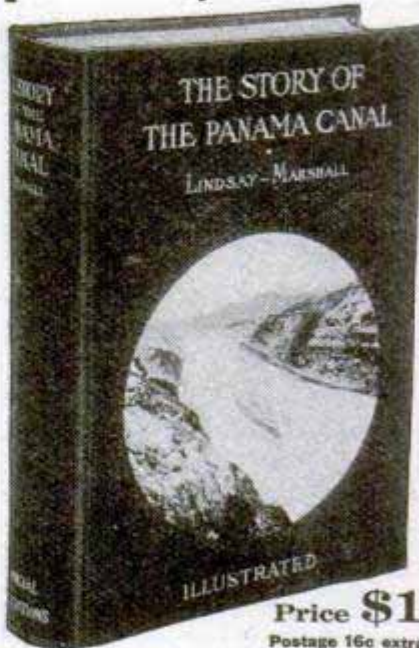
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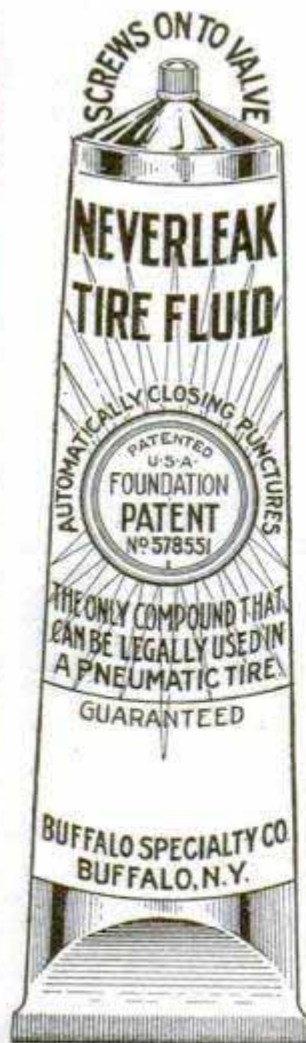
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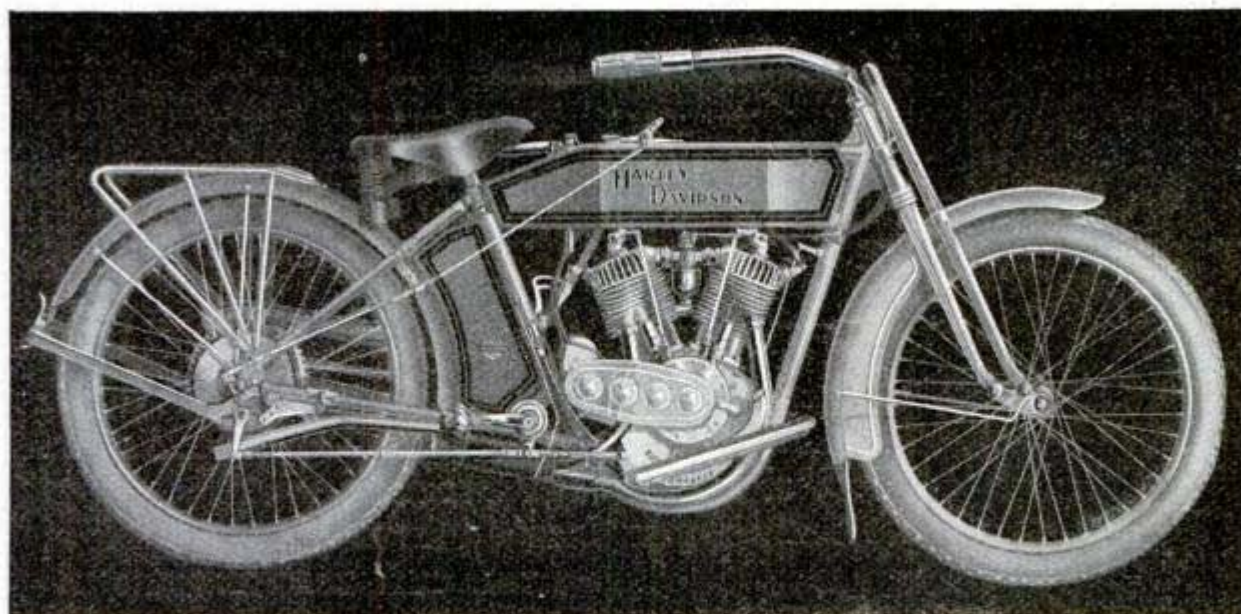
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is a preservative of both the fabric and rubber of which bicycle tires are made and keeps them in the best of condition. It makes tires wear for months after they would otherwise have to be thrown away; it stops all trouble on account of tires getting porous; stops thread leaks and those caused by previous defective repairs. It instantly heals all punctures within the bounds of reason; does away entirely with plugging and patching except in the most severe accidents.

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Other features are Double Brake Control, Double Clutch Control, Folding Foot Boards, Ful-Floteing Seat and Substantial Luggage Carrier

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### OTHER IMPORTANT FEATURES

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The patented Harley-Davidson clutch can be operated either by a foot lever on the left foot board or by a hand lever. This foot control does away with the necessity of taking either hand off the handle-bars.

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Producers of High Grade Motorcycles For More Than Twelve Years

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**By This Man**

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LISTEN—take that money you have saved up against the day of opportunity—invest it in a Long Popcorn Crispette Machine, and make fortune smile on you—build up a big paying business. Think of the fortunes made of 5c pieces—street cars—moving picture shows—5 and 10c stores. Everyone will spend a nickel—everyone likes Crispettes—children—parents—old folks. You don't need any experience—you can start anywhere—in a store window, a small store room where rent is cheap, or the kitchen of your home. The Crispette machine and Long's secret formula to the man of limited means is a Gold Mine—a sure way to independence and fortune—to make money from the start.

## ALMOST 400% PROFIT

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It's unnecessary to write that you are coming—just drop in any time. It will pay your travel expenses within a 300 mile radius if you buy a machine. I will give you reference after reference from responsible merchants, bankers, citizens—satisfy yourself and then go over the Crispette business with me.

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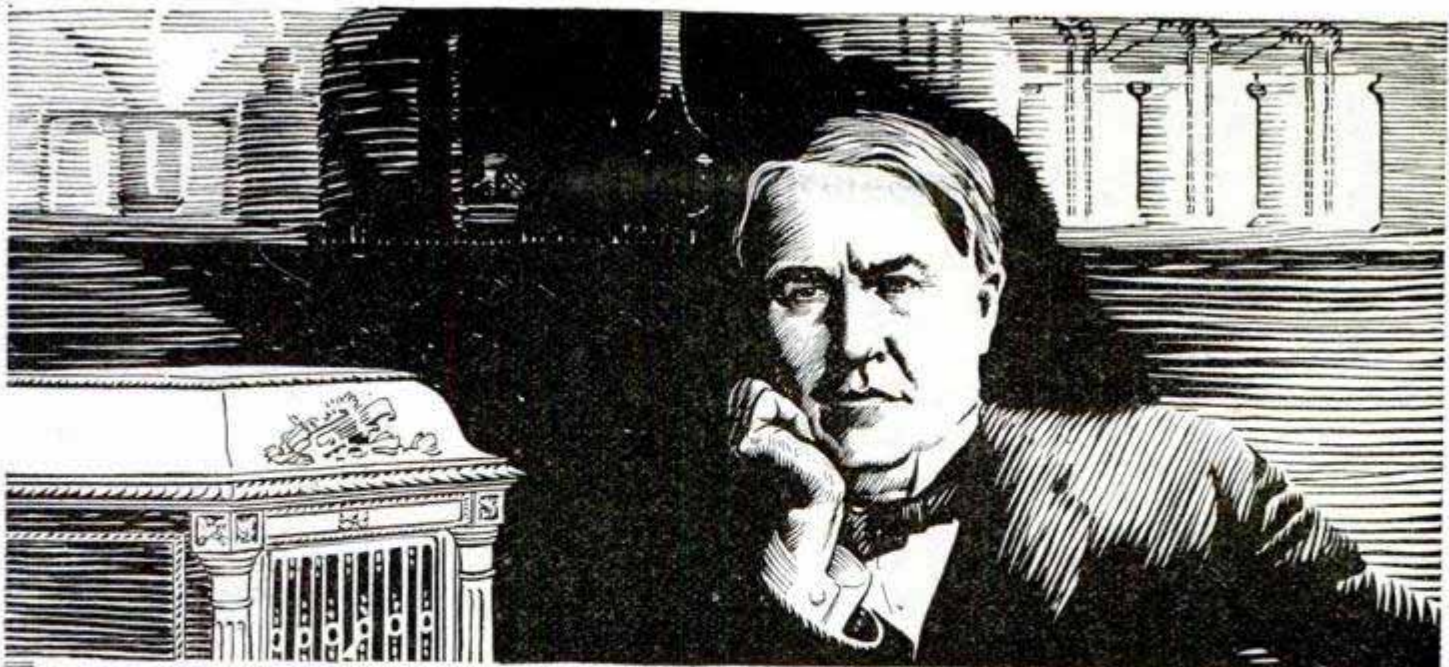
The big spring and summer trade is waiting for you right in your own city. Send for my free booklet "Dollars & Sense In The Crispette Business." It tells the whole story—how and where to start—how to succeed, proved by the experience of others. It's worth reading even if you don't start. If you are looking for a good thing and easy money, send for this book—TODAY.

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We will send you the *new* model Edison and your choice of all the brand new records on an *absolutely free loan*. Hear all the waltzes, two-steps, v. audevilles, minstrels, grand operas, old sacred hymns, every kind of comic and popular music, also your choice of the highest grade concerts and operas, as rendered by the world's greatest artists. Entertain your family and your friends. Then, when you are through with the outfit, you may send it back at our expense.

Send for our new Edison Catalog.

**REMEMBER**, not a penny down—no deposit—no guarantee—no C.O.D. to us—no obligation to buy—a full *free trial* in your own home—*direct* from us—*direct* to you. Returnable at our expense or payable (if you want to keep it) at the actual rock-bottom price direct from us.

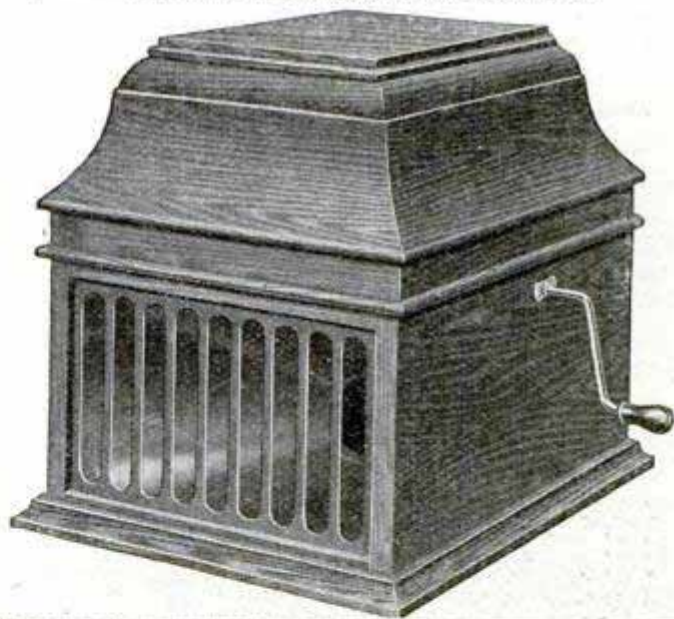
**The Reason:** Why should we make such an ultra-liberal offer? Well, we'll tell you:—we are tremendously proud of this magnificent new instrument. When you get it in your town we know everybody will say that nothing like it has ever been heard—so wonderful, so grand, so beautiful, such a king of entertainers—so we are sure that at least some one, if not you, then somebody else, will want to buy one of these new style Edison's especially as they are being offered now at the most astounding rock-bottom price and on easy terms as low as \$2.00 a month.

## Our *New* Edison Catalog Sent *FREE!*

Your name and address on a postal or in a letter (or just the coupon) is enough. No obligations in asking for the catalog. Get this offer—*while this offer lasts*. Fill out the coupon today.

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9194 Edison Block, Chicago, Ill.

Canadian Office: 355 Portage Avenue, Winnipeg, Man.



To  
**F. K. BABSON,**

Edison Phonograph Distributors,  
Dept. 9194, Edison Block, Chicago, Ill.

Gentlemen:—Please send me your New Edison Catalog and full particulars of your free trial offer on the new model Edison Phonograph.

Name .....

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## BIG, NEW, MONEY-MAKING PROPOSITION—JUST OUT



Marvelous invention—perfected after years of experiment by famous mechanical and chemical experts. Wonder of the age. Biggest novelty ever invented—**gold mine money-maker**. Instantly gathers crowd anywhere—everywhere. \$20 to \$40 a day net profit.

### A Photo—A Minute—A Dime

Nothing like it. Customers amazed—delighted—try it over and over. Think of it! You do not need to be there to operate or watch it. Customer just drops dime in slot—**machine automatically takes, develops, frames and delivers complete, perfect medallion photo all in sixty seconds**. Takes post card photos also. Write today. Get complete information. Within a week you can have one of these machines dropping dimes for you at the rate of

### \$6.00 An Hour—75% Profit

One man at Atlantic City averaged 400 to 650 pictures per day. Another at Brighton Beach, with two machines took in \$134.00 a day. No experience required. No knowledge of photography needed. Machine is entirely automatic. Absolutely guaranteed. A child can take a picture. Act now. Write at once—today. Make \$5,000 to \$10,000 this year. Send post card or letter for free complete information. Address

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We want 750 five-thousand-dollar a year salesmen. Experience unnecessary. Do not delay. No charge for territory. Exclusive field. Success assured. 150 per cent. profit. Remarkable opportunity. Harvest of real money-making.

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# 30% to 250% Now Being Earned

by large Eastern fire insurance companies, proves these statements. Last year, twenty-five stock fire insurance companies earned 30% to 250% (the latter in one instance) on **original capital**; while average **dividends** for all in the United States, for the past six years, has been 34%. Can it be disputed, then, that for **stability**, fire insurance stock measures up to the highest conservative standard—while for **profitable returns**, it easily outclasses every other safeguarded investment?

## Extraordinary Legal Safeguards

—afford "CONSERVATION" absolute protection. Fire Insurance Stock investments (under control of Illinois law) are safeguarded by the **highest-grade securities**—**gilt-edged bonds and mortgages**. Every dollar invested (save **5%** legitimately set aside for organization) is therefore, always remain **intact**, and **merely earning** basis. Unlike ordinary **common fire-insurance** shareholdings, not so carefully controlled. Who need **not** see capital cannot be depleted, or **mortgage** satisfied with ordinary bank **rentals**—to interest, or real-estate **rentals**—when 30%, or more, may be had—as **surely**, as **steadily**, and as **surely**, in "CONSERVATION!"

## One Hundred Per Cent Efficiency

**Negotiability** is one of the many desirable characteristics that distinguish Fire Insurance Stock. Any time the fortunate shareholder in an established company wishes to realize on his stock, he has but to **endorse it at bank**. But this he seldom does—because good Fire Insurance Stock is **better than cash**. This convertibility can be easily confirmed by writing to any leading Eastern bank, as to opportunity of purchasing old-line stock. Because fire insurance investments are **100% efficient and convertible, legally safe and double-earning**, they are highly prized by astute financiers. They are consequently next to impossible to purchase.

**SUBSCRIBE NOW;**  
**KEEP YOUR MONEY**  
TILL  
**\$200,000**  
IS  
**RAISED**

## Perfect Control

Equality of ownership rights and simplicity of organization make shareholdings in progressive fire insurance companies an incomparable investment. There are none of the usual discriminations as to preferred and common stocks—for stock is **all one kind and non-assessable**. Shareholders will control the Company in perfect **equity**. Their rights cannot be subordinated to other holding obligations. Since in control, therefore, they can elect officers and mould the policy of the Company, in a way to conserve their own interests. Returns must, consequently, bountifully vindicate investors' judgment.

## You Don't Pay Now

Ordinary business projects ask immediate cash remittance from subscribers. The "CONSERVATION" does not. **Subscribe TO-DAY—pay when success is assured.** THE GREAT ADVANTAGE to you, under our plan, is clear. You can send in your application for "CONSERVATION" stock—little or much—fully assured you are assuming **no obligation whatever**, for payment, until the full amount necessary to organize (\$200,000) is subscribed. Even then, you have 5 months to complete payments. Reliable Bank holds funds pending organization.

# The Conservation Fire Insurance Company

—now organizing—offers **Westerners** their first equable opportunity in this rich investment field, hitherto all but monopolized by wealthy Easterners and Europeans. While full capital and surplus will reach near **\$2,000,000**, Company will begin **actual operation** when **\$200,000** is subscribed—assuring generous **earnings** long before capital is fully paid in. And, remember—**not a cent to pay, until this \$200,000 has been raised**. This removes every shadow of risk. Get the facts on this superlative investment. **Mail Coupon, secure full evidence.** No obligation—and the biggest and best **opportunity you'll ever have**.

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Kerosene, Distillate, Gasoline, Naphtha & Gas

WITTE Engine power is cheaper than muscle or brute power, for any work that can be hitched to a belt. No need to let any such work go undone, for lack of dependable hired man, or team, help. Let me send you a WITTE Engine to earn its own cost, while being paid for.

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For 27 years the WITTE has set the standard of engine quality. It has **always** proved itself **dependable**—so simple

in construction that you can easily understand, start, and run it, whether you are experienced with any engine or not. Guaranteed steady power with small fuel consumption. No gas or oil engine has outlasted the WITTE, and few, **ve** few, of them work for an equally low fuel cost.

## 60 Days' Free Trial Five Year Guarantee

I don't consider any sale closed until the engine has made good—sold itself under actual test in the user's hands. Under my New Plan, you are sure of knowing what any engine **ought** to do, besides knowing what my engine **can** do, before you finally decide to buy.

I am the only man in the U. S. who makes his own engines, in his own debt-free factory, from his own designs, using his own special machinery and selling his output **under his own name, direct from factory to user.**

I don't owe any money for stock, bonds, notes, or mortgages, or for anything else. My entire plant and every other dollar I have—a total of over half a million—is behind my **five year guarantee.** I have never done anything else but make WITTE Engines. When I started making WITTE Engines, 27 years ago, the gasoline engine business was new. Today, I am the only man in the business, who started when I did and my factory is the only one which has come through successfully under the continuous management of the man under whom it was started and who made his own first engine. WITTE Engine-quality is the only thing that did it. I challenge anyone to show stronger proof of reliable engine-quality.

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With no obligation on my part, I should like to receive your latest and finest Engine Book, with your new liberal Selling Plan.

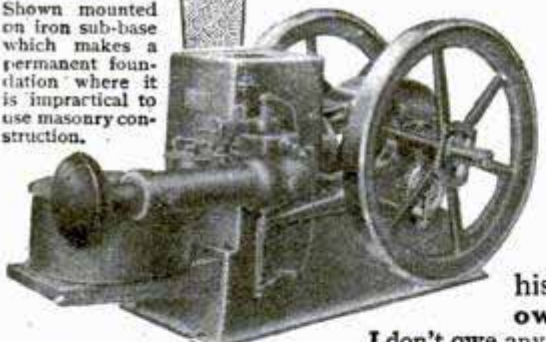
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**WITTE  
Gasoline  
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Naphtha  
Engine  
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Shown mounted on iron sub-base which makes a permanent foundation where it is impractical to use masonry construction.



**WITTE  
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Burns Kerosene, Distillate, Solar Oil, Toppings and all fuels of like grades. Also Gasoline, Naphtha and Gas.





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**T**HE famous Disability Clause embodied in the Guaranteed Low Cost Life Insurance policies of The Travelers protects the policyholder as a breakwater does a disabled ship in a storm.

In case you become permanently and totally disabled from accident or disease before age sixty, the policy immediately matures for the full value by the payment to you of a guaranteed yearly income.

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The Travelers Insurance Co., Hartford, Conn.

Pop. Mech. E.

Tear Off

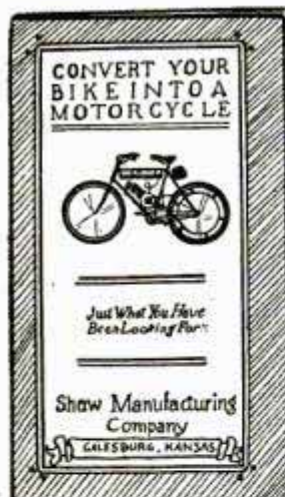
Please send me particulars regarding your policies with the Disability Clause.  
My name, address, occupation and date of birth are written below:



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Yes, thousands of others have turned their old-fashioned bicycles into up-to-date, swift, sure, easy riding, high power motorcycles with the easily attached, inexpensive **Shaw motorcycle attachment!**

Fits bicycles of any make or size. Everything is complete and we send it to you all ready to attach to your bicycle in just a few minutes without the aid of an expert mechanic and without any special tools—just an ordinary wrench and screwdriver. Built of highest grade, most serviceable materials; every part guaranteed; plain easily understood directions sent with each equipment. Thousands of enthusiastic owners everywhere. Here is your chance to get a powerful, dependable, durable, fine looking and speedy motorcycle at a price so small you will wonder how you ever got along with the old-fashioned "leg power" machine.



## Read What These Users Say of Shaw Motorcycle Attachment

### "300 Miles for 40 Cents"

The SHAW Motor which I purchased of you about a month ago, is doing excellent work. I have ridden it about 300 miles with about 40 cents expense. It is certainly the cheapest and best running machine I ever saw. Having ridden several makes of motorcycles, I find it the simplest and easiest controlled of any of them.

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I have climbed hills with your motor that large motor cars get stalled on; the sand is several inches deep.

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### "Power, Speed and Reliability"

I received my attachment from you in first-class condition. The motor was easily attached and runs fine. It does not take an experienced person to run the SHAW. I recommend it to anyone desiring, at small cost, a motorcycle for power, speed and reliability.

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I have found your motor attachment to be all you claim. Have been using the one I bought for six months, have bought no repairs for engine at all. I find it very speedy and powerful, and very useful in many ways.

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The motor which I ordered of you in the summer of 1910 has proved to be a perfectly reliable outfit. I have had no trouble whatever with the engine. The cam and gears show no wear, and I have probably ridden it 2000 miles. I can honestly recommend the SHAW Motor to anyone that wants a motorcycle at a small cost and have a satisfactory motor.

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Please send me, free and postpaid, copy of your book illustrating and describing the SHAW Motorcycle Attachment as advertised in the April issue of POPULAR MECHANICS. Quote me your lowest net cash, factory price.

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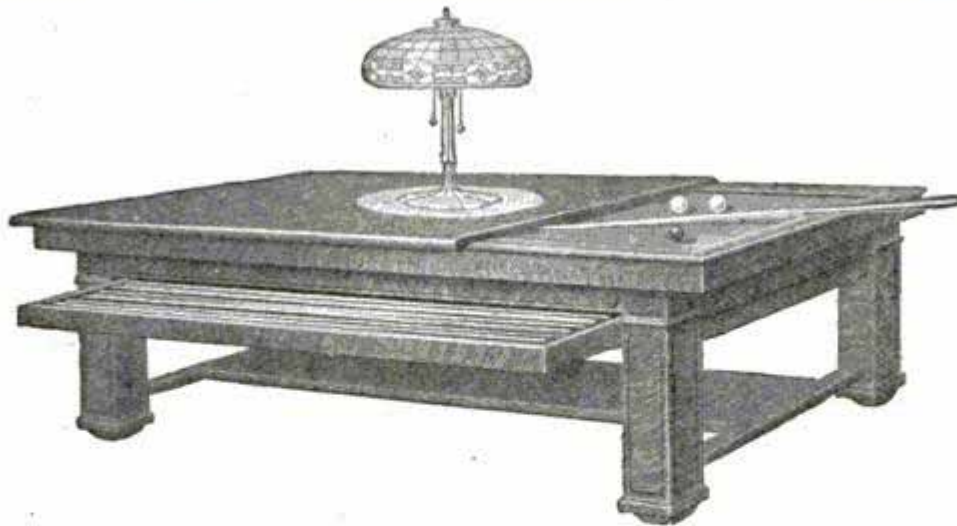
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We want to send you, free and postpaid, a copy of our booklet illustrating and fully describing the SHAW Motorcycle Attachment. When you read about the simplicity and the low cost of the SHAW attachment you will no longer be satisfied with your old-fashioned, slow-going, tiresome bicycle, but will want to send and join forces with the thousands of other go-getters who are now hitting the high speed trail with a SHAW!

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**Shaw Manufacturing Co.**  
Department F  
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# Billiard-Library Table

## —20 Cents a Day

The trifling sum of 20 cents a day will pay for this beautiful Brunswick "Convertible" Billiard-Library Table, including complete Playing Outfit.

The table is made of finest Quarter-sawed Golden Oak, handsomely finished. Equal in playing qualities to the famous "Baby Grand."

Concealed Cue Rack and Accessory Drawer hold entire playing equipment. Adapted for use in library, living room or den—no extra room required.

## Brunswick "Baby Grand" Home Billiard or Pocket-Billiard Table



### The Home Magnet

No indoor game has such charm for the young folks as billiards or pocket-billiards. It is a refined and innocent pastime which keeps them contentedly at home, away from harmful influences. Endorsed by eminent educators and trainers of young men. Ask for a little book entitled, "Our Boy Now Lives at Home."

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**THE BRUNSWICK-BALKE-COLLENDER CO.**  
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The Brunswick "Baby Grand" is a masterpiece in Mahogany. Fitted with a genuine Slate Bed, the celebrated Monarch Quick-Acting Cushions and Accessory Drawer to hold entire playing equipment. Sizes 3x6, 3½x7, 4x8. Furnished as a Carom, Pocket-Billiard or Combination Carom and Pocket-Billiard Table. Attractive prices and easy terms.

### A Year to Pay

#### Complete Playing Outfit Free

We offer these beautiful tables at very moderate prices, and on wonderfully attractive terms, as low as 20 cents a day. A year to pay if desired.

Complete Playing Outfit goes with table, including Cues, Balls, Bridge, Rack, Markers, Chalk, Cover, Billiard Brush, Book on "How to Play," etc., etc.

**The Brunswick-Balke-Collender Co.** (240)  
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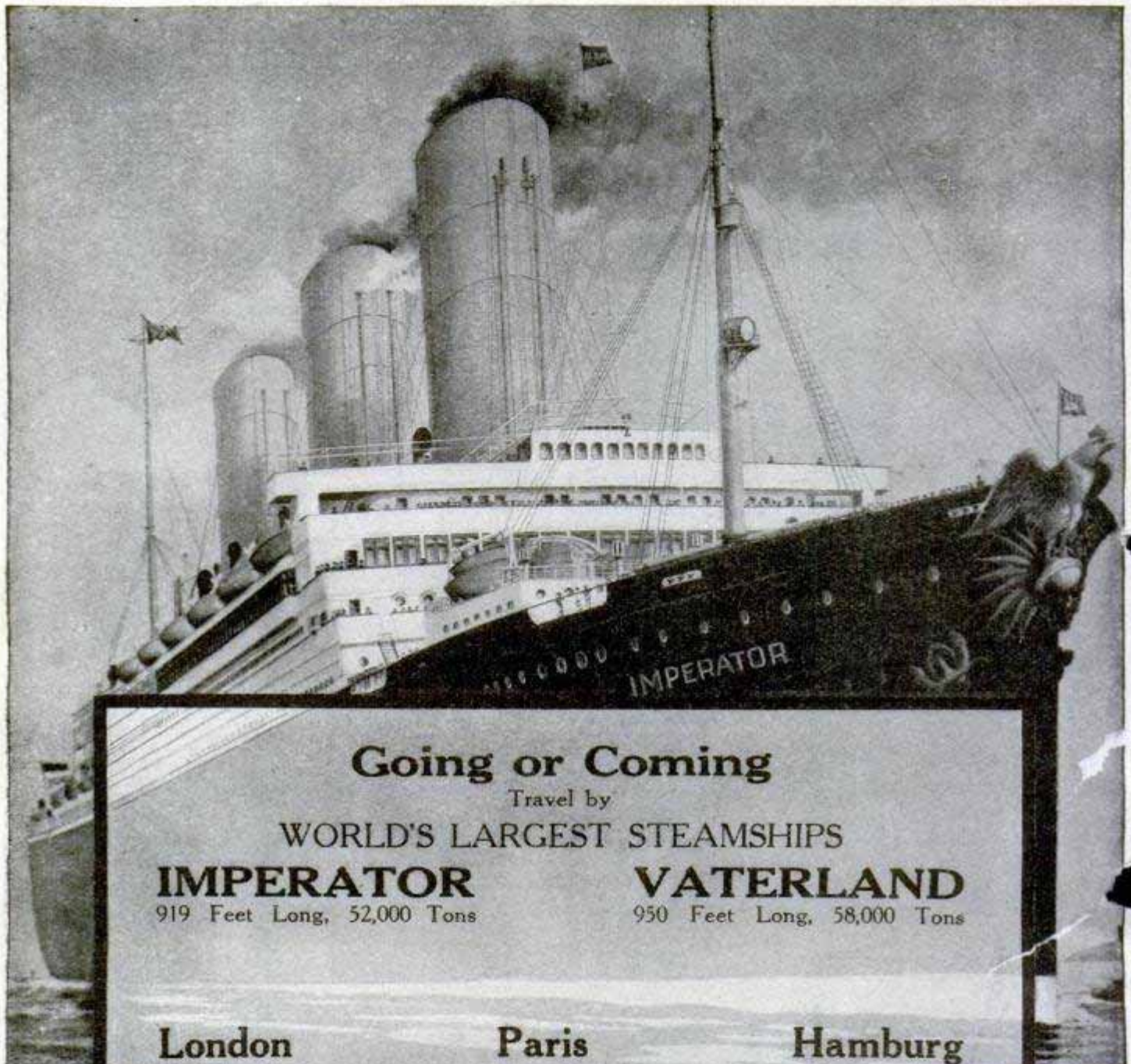
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These are the millions of men all over the earth who find complete, healthful enjoyment and lasting satisfaction in "Bull" Durham hand-made cigarettes! There is a fresh, peculiar fragrance—produced by the original and exclusive "Bull" process—which gives a special pleasure to "Bull" Durham in a handmade cigarette.

# GENUINE "BULL" DURHAM SMOKING TOBACCO

(Enough for forty hand-made cigarettes in each 5-cent muslin sack)

Ask for **FREE**  
book of "papers"  
with each 5c sack

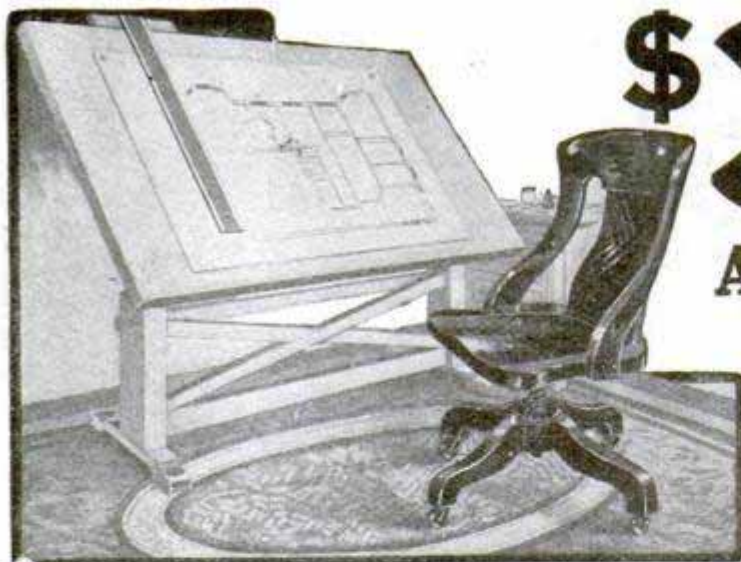


Note that unique aroma! It gives a greater relish and savor to your cigarette. "Roll your own" and learn this *distinctive form* of tobacco enjoyment.

An Illustrated Booklet, showing how to "Roll Your Own," and a Book of cigarette papers, will both be mailed, **FREE**, to any address in U. S. on postal request. Address "Bull" Durham, Durham, N. C. Room 1124

THE AMERICAN TOBACCO COMPANY





# \$3,000

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There's many a vacant chair like this waiting for you. I am training young men to fill them. Will you send your name to me? Many a man who has written to me now earns \$3,000 or more. The draftsman's training they got from me gave them the power to demand this price. There will be no obligations on you if you send me your name. Then I'll tell you just exactly how I train you personally.

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**I'll teach you drafting in your own home. I'll teach you personally—**

give you private instruction. This instruction is given to you by me. I make you see how I do it. For 20 years I have been doing the highest paid expert drafting work as Chief Draftsman of a large and well known Company. One day the manager said to me, "Why is it that there are not more high quality men like you? *I would pay thousands of dollars a year if I could get them.*" Right there I made up my mind that I would give to ambitious men the highest quality, personal instruction in the very things which had enabled me to earn my big salary. So the kind of training I will give you is the **practical** kind. The kind you need to hold one of the big paying positions.



I know what the big firms demand and this is what I teach you. I do it all during your spare time in your own home. Remember you get my personal training. Don't hesitate about sending me your name—just cut out the coupon below—write in your name and you'll hear from me at once.

## Positions Open Right Now

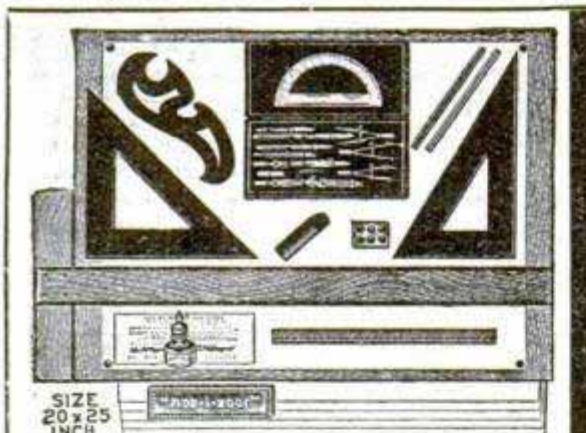
Right now—this very minute—there are many positions open which pay \$3,000 and more per year to the right men who have learned drafting. There is lots of room at the top. I got there myself but have found all around incompetent men holding poor positions. They had not been trained right. The thing I want to do is to train you in the practical way you ought to be trained; to show you what to avoid and how to do things right. **YOU** can get into one of these chairs soon if you will merely send me your name on the free coupon below.

## You Can Earn While Learning

I have even perfected a plan which gives you an opportunity to begin earning money as soon as you have enrolled as one of my personal and private students. This enables a few young men or older men who could not otherwise take up this practical, personal training which I give, to pay their way as they go along. Write for this plan today. Put your name on the coupon at the bottom and get it in to me right away. If you have been one of those who have dreamed of the future of greatness and power, send the coupon.

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To instruct you until competent and in a position at a regular salary, paying from \$125.00 to \$175.00 per month and furnish you free \$15 Working Outfit at once.



SIZE 20 x 25 INCH

**This \$15.00 Draftsman's Working Outfit FREE**

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It will positively help you to find out all about the things which I can do for you. I will tell you what I have done for other men. Then you can make up your own mind about what I can do for you. I say I can put you into a chair paying a big salary. If you want to sit in this chair

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There are no obligations in your sending your name and address to me on this free coupon. Send it today. I will mail you absolutely free and prepaid my new book, "Successful Draftsmanship." This tells you about the wonderful opportunities there are in this great profession. About the big jobs that are open. The big future ahead for the man who gets in now and knows what to do. Now, the first thing to do. Send the coupon. Do it today.

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**\$3000 SALARY EARNING OFFER COUPON**

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Without any obligation to me whatsoever, please mail your book, "Successful Draftsmanship" and full particulars of your liberal "Personal Instruction" offer to a few students. It is understood that I am obligated in no way whatever.

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10%  
Increase in Tariff  
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**GENUINE  
PERFECT CUT  
DIAMONDS**  
**\$97.50**  
PER CARAT

25%  
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## Fixed as the Sun! Our Old Price \$97.50 Per Carat!

In spite of increased tariff on diamonds; in spite of a general advance of 25% in diamond prices and values—we continue to offer Genuine Perfect Cut Diamonds at the old price—**\$97.50 per carat**. Diamonds of richest brilliancy, full \$160 per carat quality at a saving of more than one-third! Made possible by direct importing, cash methods which require no advance payment, low expenses and small profit. Read the wonderful features of the Basch Plan.

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You can buy and wear a diamond with the **absolute certainty** that you can return it to us for a **cash refund**. We legally guarantee in writing to refund the full price **IN CASH** less 10% any time within 2 years; and also to allow the full price in exchange at any time. We legally certify the carat weight, quality and value of every diamond.



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	Price Complete		Price Complete
<b>\$101</b> —Two $\frac{1}{8}$ c. dia.	<b>\$19.50</b>	<b>\$108</b> — $\frac{1}{2}$ carat dia.	<b>\$48.75</b>
<b>\$102</b> — $\frac{3}{8}$ carat dia.	<b>\$36.75</b>	<b>\$109</b> — $\frac{3}{8}$ carat dia.	<b>\$71.25</b>
<b>\$103</b> — $\frac{1}{2}$ carat dia.	<b>\$63.25</b>	<b>\$110</b> — $\frac{1}{2}$ carat dia.	<b>\$10.50</b>
<b>\$104</b> —Two $\frac{1}{8}$ c. dia.	<b>\$65.50</b>	<b>\$111</b> — $\frac{1}{2}$ carat dia.	<b>\$22.50</b>
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