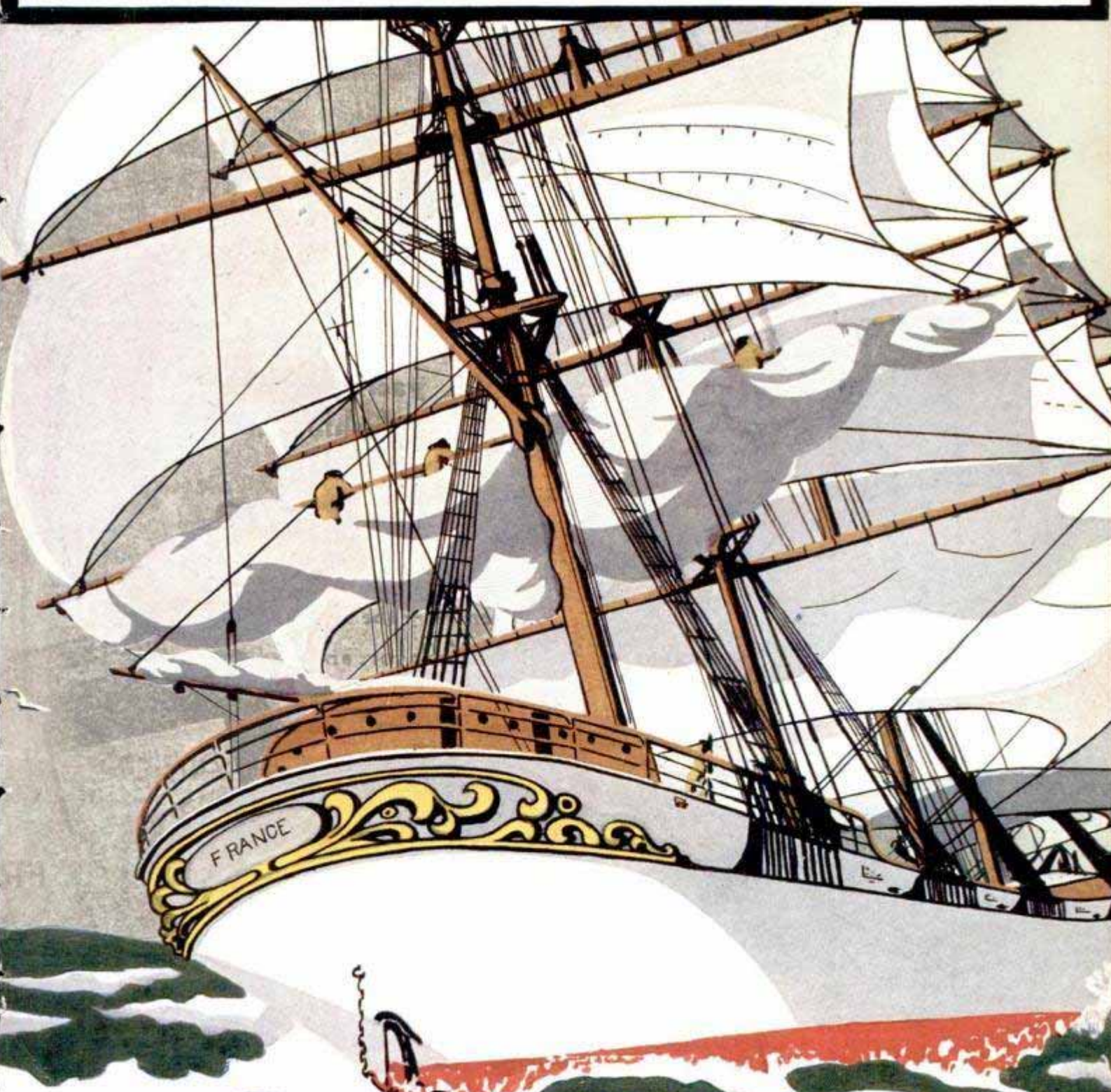
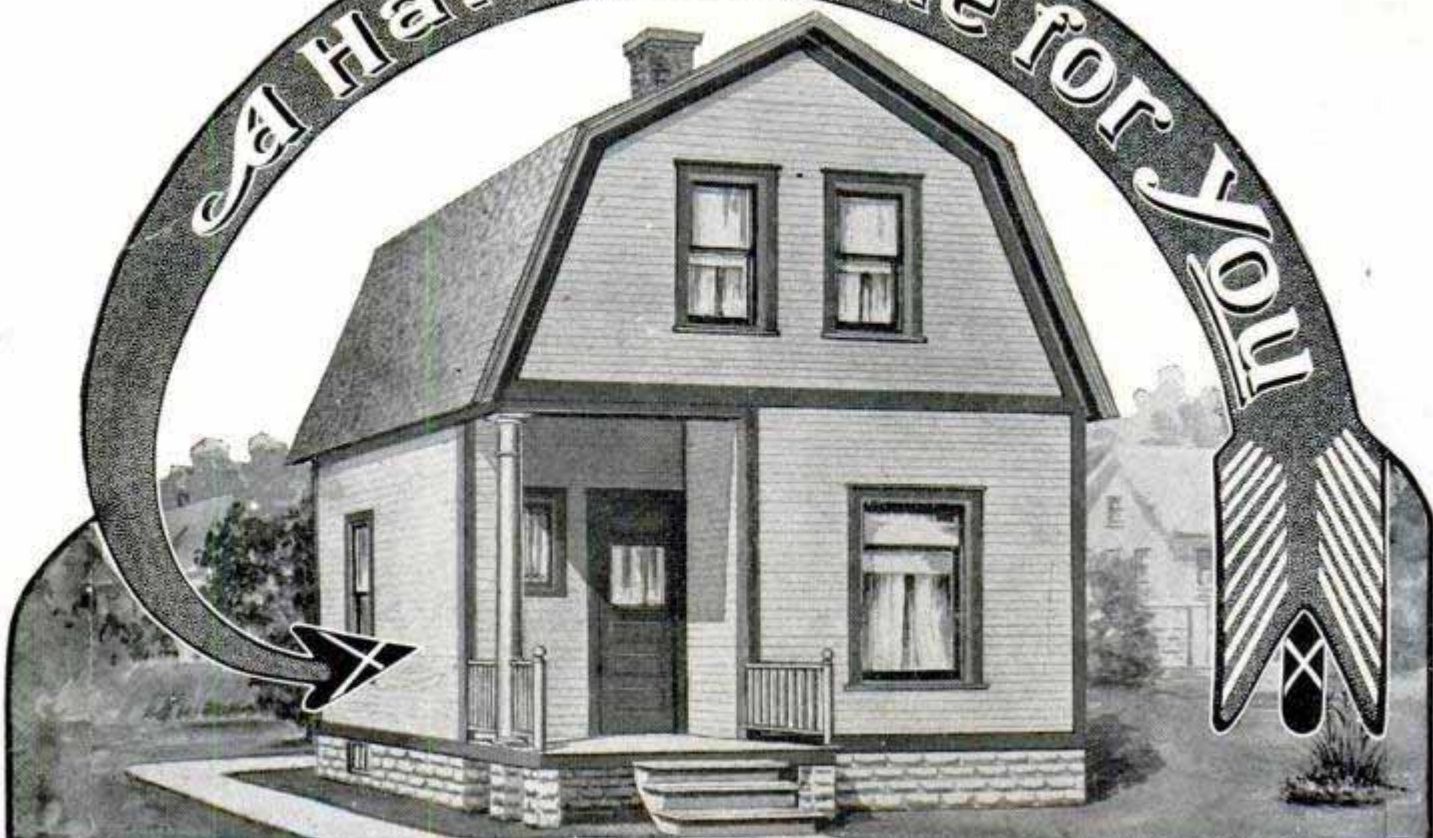


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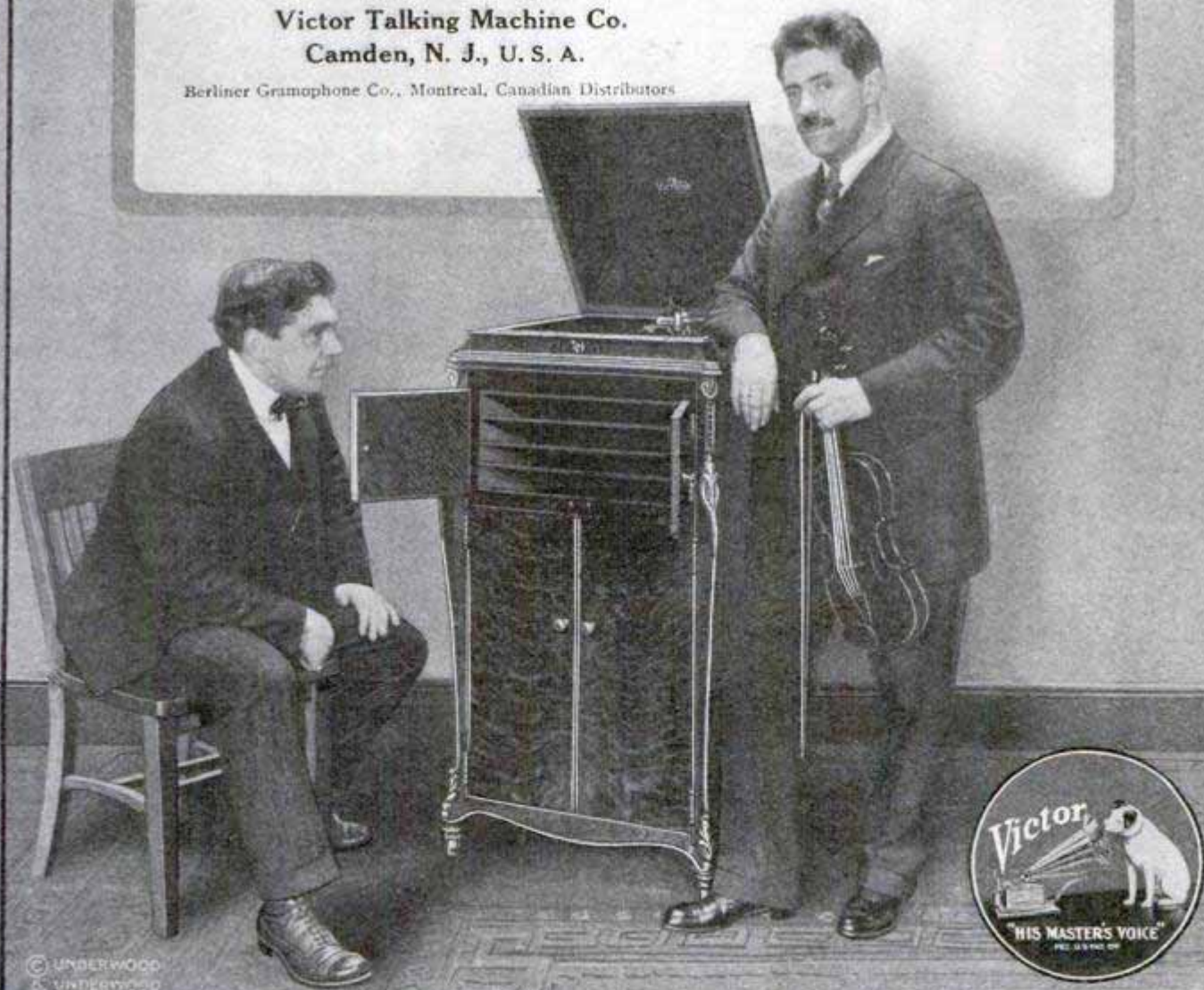
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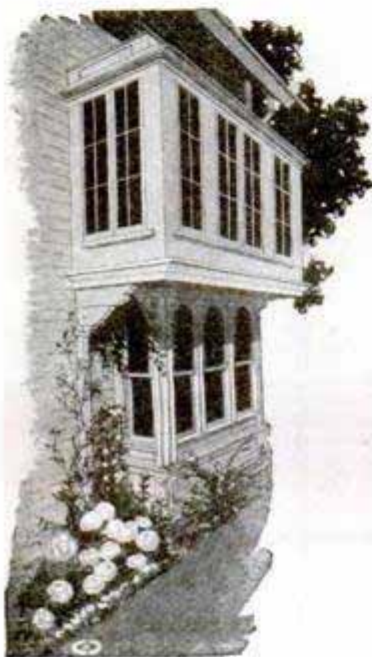
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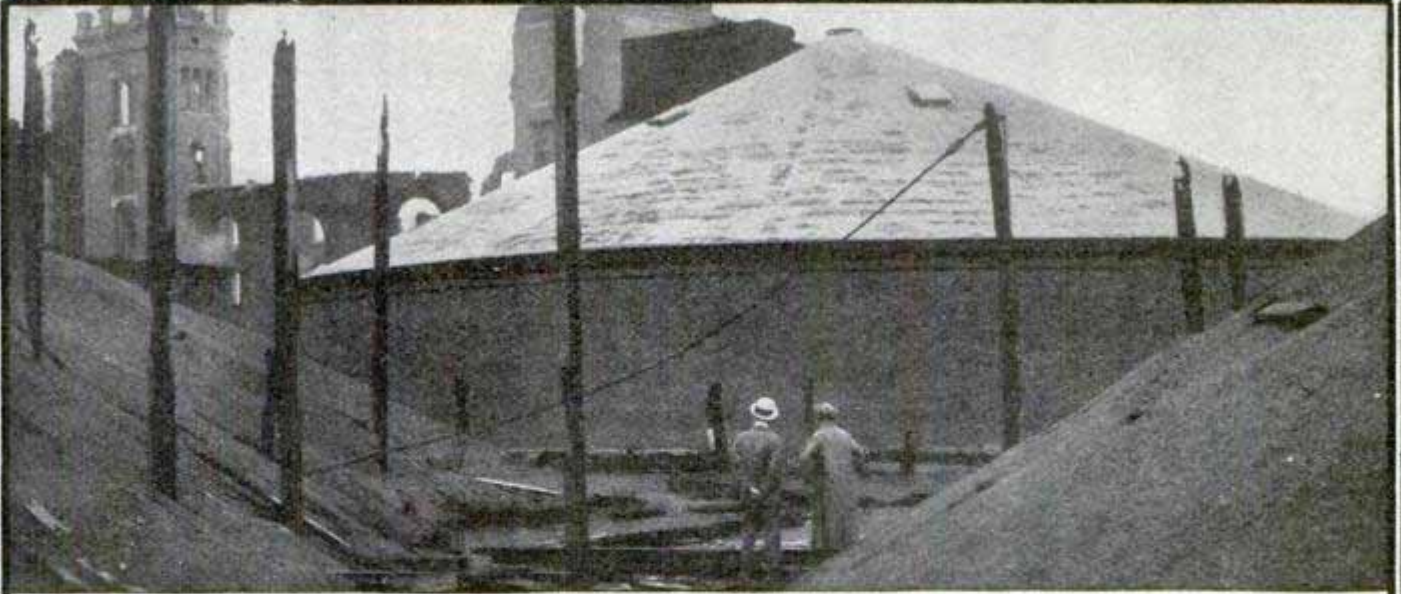
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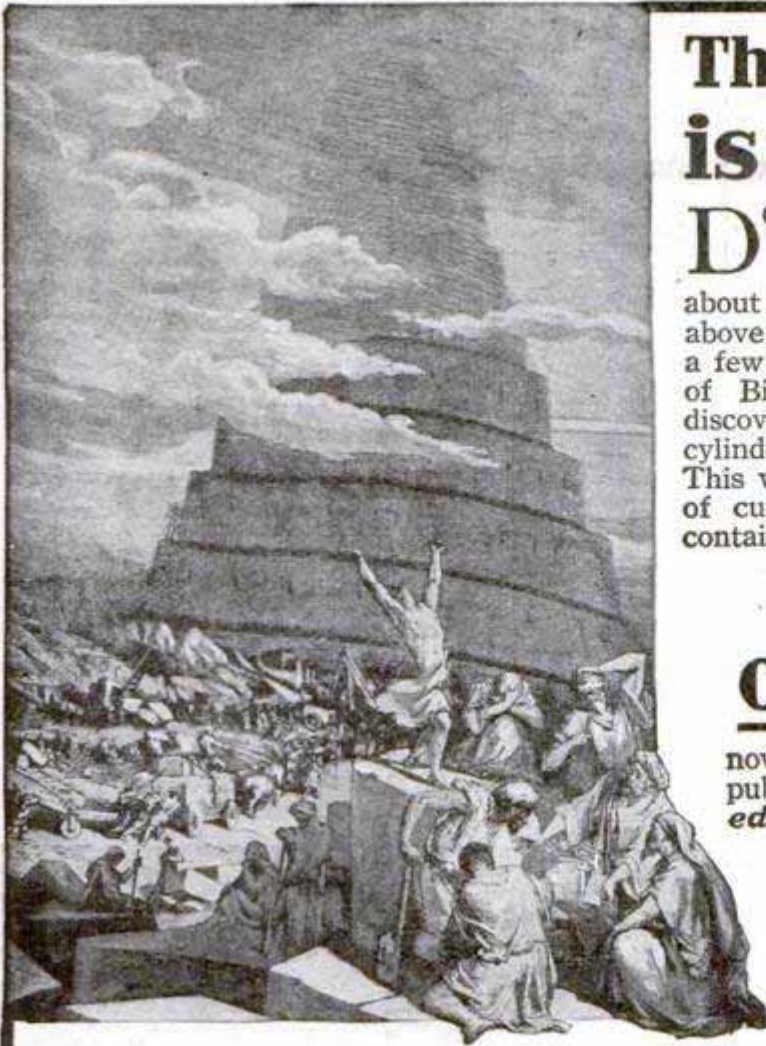
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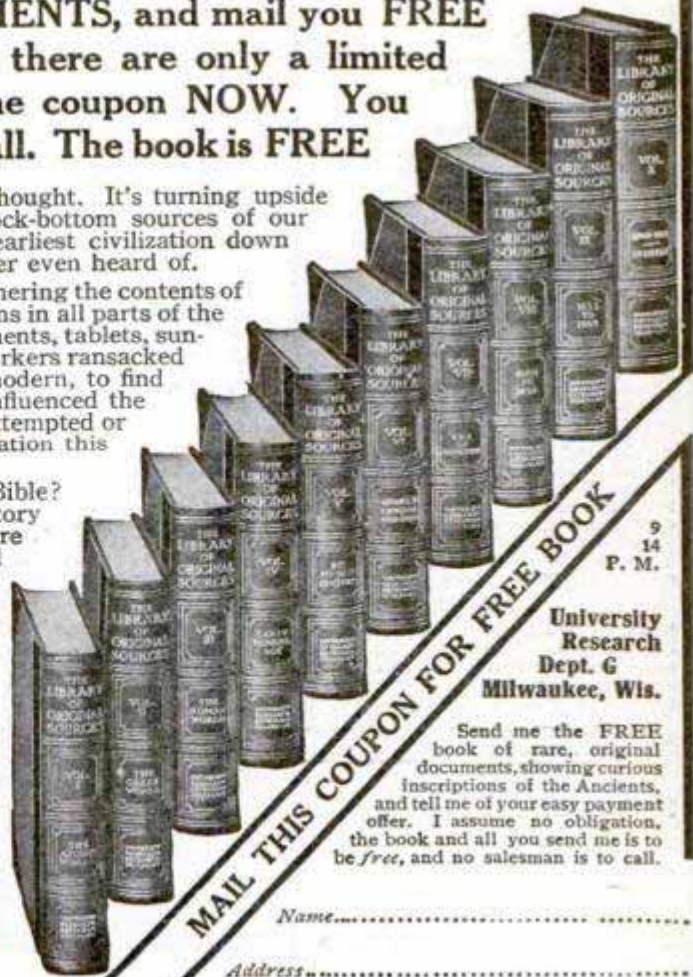
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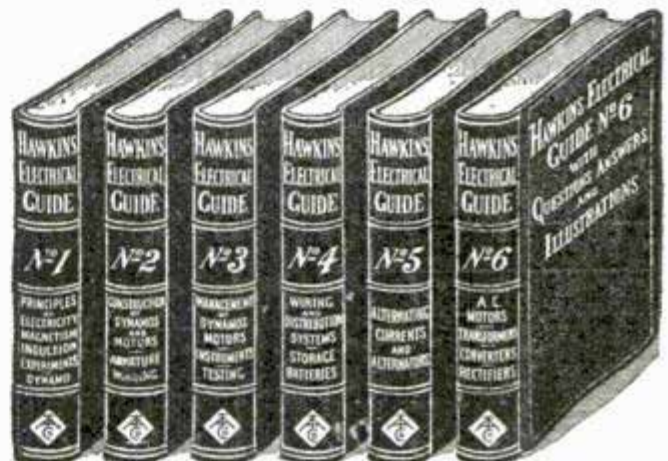
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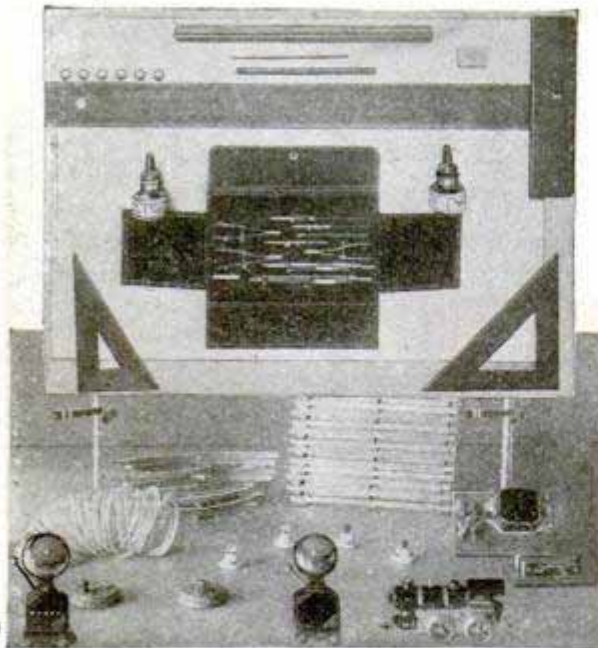
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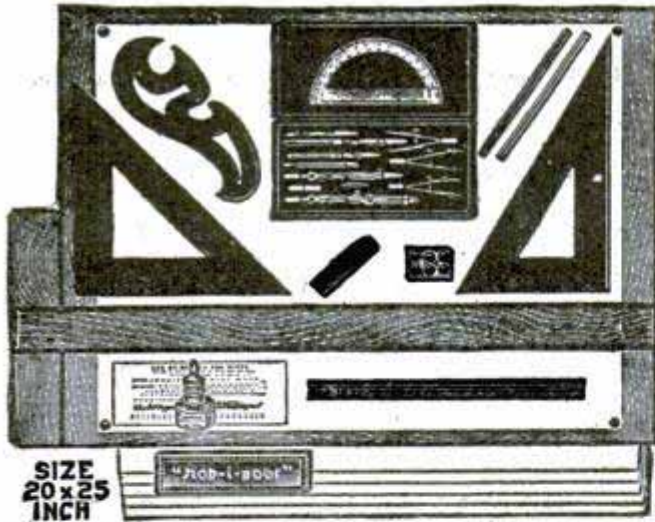
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LET the parcels post help you. Add (\$15 to \$25 weekly) to your present salary or income. Start during spare time and build up a permanent mail-order business of your own. We show you how and help you make good. No canvassing. Experience unnecessary. 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.

LEARN to collect money. Good income; quick results. Send for free booklet, "Skillful Collecting." Collectors' Association, Long street, Newark, Ohio.

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.

IF you want facts instead of fancies about Patents, address Benjamin & Bassett, 140 S. Dearborn St., Chicago, Ill.

PATENTABLE Ideas Wanted—Send for 3 free books. R. B. Owen, 30 Owen Bldg., Wash., D. C.

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.

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.

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.

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.

USE your spare time to build up a mail order business of your own. We help you start for a share in profits. 27 opportunities. Particulars free. Mutual Opportunities Exchange, Buffalo, N. Y.

OUR peanut or match machines make money everywhere. Ask more. Peerless Machine Co., Manufacturers, Syracuse, N. Y.

MAIL ORDER SUPPLIES

DIAMOND Bell-Ringer Transformer supercedes batteries; sells \$3. Write agents' proposition. Diamond Transformer Co., 315 Second Ave., Pittsburgh, Pa.

INCREASE your sales. Place your proposition before the readers of "Cartoons Magazine," 25,000 copies every month. Classified rate 2c per word. Mail in a trial ad today. Cartoons Classified Dept., 6 N. Michigan Ave., Chicago.

TO MANUFACTURERS

WANTED—Large lots good ten to fifty cent articles to sell through agents. Manufacturers send samples. Mardell Mercantile Co., Plainfield, N. J.

FOR ADVERTISERS

FOR Advertisers—Have your letters, circulars, catalogues and advertisement written in French language. Perfect translation guaranteed. Write for quotations to A. de Villers, 43 Notre Dame Street, Viauville, Montreal, Can.

YOUR 30-word ad in our big postcard magazine, 25c. Display, 50c inch. Elite Exchange, 3827 North Kenneth, Chicago.

YOUR 25-word advertisement in two issues 16-page 7x10 magazine reaching 10,000 boys, 25c. Additional words 1c each. Youths' Magazine, Chicago.

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 N. Michigan Ave., Chicago.

ADVERTISERS—Special—5c per word places your ads in 133 different magazines. Regular price, 7c. Lists free. Kings Magazine, Box 13-P, Little Silver, N. J.

ADVERTISERS—Here's your opportunity. Your proposition placed before the readers of "Cartoons Magazine" for only 2c per word. Circulation 25,000 copies. Send a trial ad for our next issue. Cartoons Classified Dept., 6 N. Michigan Ave., Chicago.

ADVERTISERS Special Offer! Your 40 word ad in Boys' Companion, reaching 16,000 live buying boys, 50 cents. Boys' Companion, Chicago.

AGENTS WANTED

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., 1106 Handy Light Block, Cincinnati, Ohio.

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 the American Woolen Mills Co., Dept. 914, Chicago, Ill.

AGENTS! Just out. 5 in 1. Smallest pocket scissors, key ring, cigar cutter, button hook, bottle opener. All 5 in 1. Size of article about size of half dollar. Everybody needs it. Just show to make sale. First time advertised. Agents will coin money. Send 10c for sample, price and territory. D. Hesjiah Mfg. Co., 21 Park Row, New York.

AGENTS: Our \$3.00 machines earn from \$10 to \$35 yearly for users. Sell 1 to 5 machines in every home, school, church or place of business. Sell for \$1.00 cash with \$2.00 to be paid after the user is satisfied that it has earned him \$5.00. We want agents in every city and town. Big profits. Agents pay us 50 cents—balance when user is satisfied. Write today for proposition. Get the agency now. Hardware Specialty Mfg. Co., 4411 Ravenswood Ave., Chicago.

BIG Textile Mills will employ everywhere reliable people to take orders for dress fabrics, hosiery, underwear, sweaters, and neckwear from samples. Factory prices. Many making over \$30 weekly. Spare or all time. No experience. Permanent. Credit given. Steadfast Mills, 30 Remsen St., Cohoes, New York.

NEW 1914 Model—Send no money. Just your name written plainly on a postal card and learn by return mail how to get the best Vacuum Cleaner on the market, without costing you one cent! We are putting them out for demonstrating purposes. Guaranteed 5 years. Reliable, live agents wanted everywhere. Write today to Warner Vacuum Cleaner Company, Dept. Z, Muncie, Ind.

NEW Automatic \$2 Adding Machine. Sell 10 a day easy. Big profit. Everyone buys. No competition. Repeat orders. C. Bassett, 5921 Indiana Ave., Chicago.

ENDLESS Neckties—Something new, twelve ties in one; costs no more than old style; man made \$70, three days; woman made \$92, week; write for special agents' offer, includes free tie. Endless Necktie Mfg. Co., Dept. 10, Kansas City, Mo.

AGENTS sell rich looking imported 36x68 Rugs. \$1 each. Carter, Tenn., sold 113 in 4 days. Profit \$57. You can do same. Write for sample offer selling plan; exclusive territory. Sample Rug by parcel post, prepaid 98 cts. Condan, Importer, Stonington, Maine.

AGENTS Wanted: Automobile power tire pump. Big commissions. Easy seller. Exclusive territory. Get our proposition. Advance Machinery Co., Toledo, Ohio.

PORTRAIT Agents make big money selling our goods. Prices Low. Quality High. Delivery Guaranteed. Credit for Rejects. Ask for Catalog No. 17. Adam J. Kroll & Co., 602 Blue Island Ave., Chicago, Ill.

WANTED—Representatives to sell small machine tool on commission. Universally used. Does work of lathe, miller and drill. Fine side line. Only first class men of good appearance with references considered. No other similar tool in world. Address 320, Lissner Building, Dept. P, Los Angeles, Cal.

YOUNG Man, would you accept and wear a fine tailor made suit just for showing it to your friends? 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. 797, Chicago.

WE need live wire representatives for unoccupied territory to handle The Fuller Sanitary Brushes. Our product is nationally advertised and covers every need. Your territory is valuable. Write for particulars. **Fuller Brush Co.**, 33 Hoadley Place, Hartford, Conn. Western Branch, Rock Island, Ill.

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. N-21, 20 W. Lake St., Chicago.

AGENTS: We sell Ornamental stock to householders. Permanent position. Good pay. Free outfit. Start now. No triflers. **First National Nurseries**, Rochester, N. Y.

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

LIVE Agents. Our new Carpet Cleaning Machine, biggest improvement yet made in vacuum or suction cleaners. New type just out. No bellows. No electricity. Unequaled for speed and power. Low price. Exclusive territory. **Feeny Mfg. Co.**, Dept. E-65, Muncie, Ind.

SELL Electrical Specialties. Our interchangeable Electric Signs make big money. High grade proposition to live agents. **F. A. Watkins**, 571 West Washington St., Chicago, Ill.

MAKE \$10 daily selling our household articles. **Brooks**, Midland, Tex.

REPRESENTATIVE Wanted—Exclusive territory. New invention guaranteed by reputable corporation, saving 25% to gasoline users or money refunded. Automobile, motor boat, stationary engine owners buy at first offering. Territory going quickly. **Gas Saver Sales Company**, 1788 Broadway, New York.

AGENTS—Newest spool holder and thread cutter. Sells itself. Big profits. Sample 25 cents. **Bickford Machine Company**, Greenfield, Mass.

GRAY or Tan plaid-lined Raincoats, cost Agents \$2.75 each delivered. Retail at \$5. Season now on. Remit for sample Raincoat or write for particulars. **Boston Raincoat Company**, Boston, Mass.

TERRITORY Manager Wanted: For guaranteed Wash Cake. We help make and guarantee sale of our product. Exclusive contract, to hustler, who can produce and handle agents. Dept. H, Washclean Manufacturing Co., Booneville, Mo.

AGENTS: Our all-metal adjustable rust-proofed window screen is a splendid seller. Brings large profit for you. We want one agent in every town. Write for proposition and territory now. **U. S. Metal Screen Sales Co.**, Dept. A, Stamford, Conn.

WANTED—Specialty Men—High Grade—to sell line of high class, fast-selling specialties in some open territory. "State experience and give three references." **Midland Supply Company**, 504 East Fourth St., Davenport, Iowa.

100% PROFIT—Evergrip Gliding Casters—No rollers; pocket samples free; anyone can attach; cost 3c, sell 15c; homes buy dozens, hotels hundreds; save floors and carpets. **S. Mfg. Co.**, 20H. Warren St., New York.

200 PER CENT Profit, Exclusive, Ideal Sanitary Brushes, Highest Quality. **Tappan Brush Company**, 252 Fourth Avenue South, Minneapolis, Minn.

AGENTS—A new one. Concentrated soft drinks. Every home, church-fair, picnic, lawn-fete, ball-park, stand, etc., buys them. Whirlwind sellers. Great profits. Small package makes 32 glasses—orangeade, grape, raspberry, etc. Hurry—don't wait—be ready for the hot season. Write quick. **American Products Co.**, 3011 Sycamore St., Cincinnati, Ohio.

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 N629, Pittsburg, Kans.

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. 914, Chicago, Ill.

AGENTS—Average \$5 to \$12 daily selling astonishing Aztec massage machine. New. Just patented. Different. No electricity or water power required. Nothing complicated. Affords exhilarating massage without cent expense. Lowest priced, but best outfit. Retail \$2.50 allowing you big end of profit. Particulars and "beauty" folder free. **Aztec Remedy Co.**, Dept. 132, Toledo, Ohio.

AGENTS wanted for Fireless Solder Cement; mends aluminum and all metals; can be applied cold or with heat; indispensable for household, automobiles and motorboats, neither heat nor water effect it, send 12c for sample and agents proposition. **Dexter & Halsey**, 16 Exchange Place, New York.

AGENTS! Double your income! Treble your sales. The Agents and Mail Dealer's Magazine shows how to buy Right. \$2 articles cost you 30c; Quarter articles, 2c. Fifteen other rare bargains. It puts you next to original manufacturing plans, mail-order schemes with enormous profits, etc. Two big money-making issues for 10c. Agents' Magazine, 100 Franklin Building, Chicago.

"**SEPTEMBER Morn**" Watch Fob. Real winner for agents. Has beautiful oxidized silver-finish with genuine leather strap. Classy, alluring. Sells on sight. Dandy sample and great easy-money proposition to hustlers. Postpaid, 25 cents. **Novel Jewelry Company**, 467 Lewis Block, Buffalo, N. Y.

AGENTS! Earn \$1.00 or more an hour, all or spare time. "Try-it-before-you-buy-it" plan sells Chimax Automatic Razor Sharpener to every man—150 per cent profit. Write for exclusive territory and guaranteed sales proposition. **Victor Specialty Co.**, 15 Victor Bldg., Canton, O.

AGENTS of ability and high character wanted on a new household article. Over 100 per cent profit. Special selling plan that pulls results. Address **Merritt & Brock**, 59 to 69 Temple Place, Boston, Mass.

AGENTS—Send 25c for household necessity, sells for 50c. Money refunded if not satisfactory. **Reichart Manufacturing Company**, LaFayette, Ind.

AGENTS' Bonanza—Our novelty sign cards. Catalog free. **Adam Fisher, Mfg. Co.**, 61 Fisher Block, St. Louis, Mo.

LEARN to make Name Plates, House Numbers, Signs; 500 per cent profit. Instructions, samples, 50c. **Attractive Sign Co.**, Scranton, Pa.

EASY Money. And lots of it for one smart man or woman in each locality. Send name. **A. J. Ross & Co.**, Buckeye, Ariz., Dept. A.

ANYONE wanting to make more money can learn something to advantage reading "Booster"—the magazine devoted exclusively to Agents and everyone interested in the mail-order business. Two months' trial, 10c. **Booster Magazine**, Northwestern Building, Chicago.

POSTCARDS, 90c per 1,000 to \$3.50, all kinds. Write for particulars. **Gross Onard Co.**, 2149 Arthur Ave., New York.

COST 1c, sell for 10c. Ready-made sign letters anyone can apply. Unlimited demand. Five samples, instructions, 10c. Particulars free. **Everbrite Co.**, 982 Third Ave., New York.

BOYS, earn money by becoming our agents for article needed by every woman in your town. Sells on sight; 100 per cent profit. **Adams Manufacturing Co.**, 3508 Cedar Street, Milwaukee, Wis.

KOKO Wheat Crisp—\$10 daily profit. Make it yourself. New confection. Beats pop-corn. 5c package costs 1c. Samples 10c. Machine \$7.50 prepaid. **Corneau & Co.**, 541 No. Parkside, Chicago.

AGENTS—Electric Sign: Flashes changeable wording in radiant sparkling beams of colored electric light. Outselling everything at \$10. Valuable exclusive territory. Sample free. **Flashtrac Sign Works**, Chicago.

AGENTS: Your opportunity. It's new. Starr's powdered enamel. Repairs chipped and rusty spots on graniteware. Stops all leaky metalware without heat, soldering iron or tools. Sample with prices, 10c. **Circulars**. Starr, 1906 Monroe St., Toledo, Ohio.

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 charge for fancy styles, golf bottoms, pearl buttons, etc., makes sales easy. Write for free samples and our new offer. **Knickerbocker Tailoring Co.**, Dept. 108, Chicago.

AGENTS wanted for our celebrated Ho-Ro-Co. skin and scalp soap; perfumes, toilet articles; goods guaranteed; large profits. **Hopfinger and Roth**, 212 North 2d, St. Louis.

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 and saves the purchaser an investment of \$25. Write for particulars. **The Handy Light Co.**, 158 Handy Light Block, Cincinnati, Ohio.

SOLICITORS Make Money, selling our Self-Heating Flat Irons. Profits 3 to 1. No Smoke, Odor, or Flames. No Oils, Gases or Explosives. Mfr., 506 Keystone Bank Bldg., Pittsburg, Pa.

WANTED—Resident Agents Everywhere, Male or Female, to introduce and handle our Seven Sight-Selling Household Necessities. Big profits. Write quick for our Liberal Terms and Particulars. **Hoyt and Phillips**, 5549 Wentworth Ave., Chicago.

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.**, 110 Handy Light Block, Cincinnati, Ohio.

FREE Raincoat Proposition: \$5 starts you in business, \$25 weekly easily made. Write **Warren Raincoat Company**, Box 655, Guthrie, Ky.

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

AGENTS—Get your name listed, 10c; many desirable propositions will be submitted to you without asking. **Canvassing Agents' Registration Bureau**, 123 Hart St., Providence, R. I.

GOLD Sign Letters, Immensely profitable. Instructions for making, \$1. Particulars free. **Johnston Co.**, Quincy, Ill.

MEN and women wanted for Government Jobs, \$65 to \$150 month. Over 15,000 appointments coming. List of positions free. **Franklin Institute**, Dept. J-22, Rochester, New York.

AGENTS—Either sex; kitchen article. **M. E. French**, Clyde, Ohio.

AGENTS wanted for splendid new specialty. Easily demonstrated, big profits. Write today for free particulars. **Wright Specialty Co.**, 938 30th Street, Milwaukee, Wisconsin.

MAGAZINE subscription solicitors earn liberal commissions and extra prize money working for Scribner's. It does not interfere with your present occupation. A postcard will bring full particulars. Address **Desk 15**, Scribner's Magazine, 597 Fifth Ave., New York.

"RICHARD" Knives sell in every family. Large profits. More agents, men and women, wanted. The Stephen Richard Co., Southbridge, Mass.

WANTED—Distributors, Men and Women—to give away free pkgs. Perfumed Borax Soap Powders; no money or experience needed; good pay. S. Ward & Company, 218 Institute, Chicago.

AGENTS—Self-filling fountain pens, \$1 dozen. Sell for 25c each. Sample 10c silver. Walbrook Watch Co., Dept. A, Walbrook, Baltimore, Md.

WANTED—Specialty Men—high grade—to sell line of high-class, fast-selling specialties in some open territory. Midland Supply Company, 504 East Fourth St., Davenport, Iowa.

AGENTS Wanted—For the most useful 10c article on the market. Easily sold. Good profits. Send 5c for sample. S. H. Swope, Greenville, Ohio.

SALARY \$2.50 a day and additional big commissions. Easiest seller ever offered. Craig Brothers, Niagara Falls, N. Y.

AGENTS—Live hustling men to canvass the homes and offices, selling my new electric device. Cuts electric bills in half. A demonstration sells it; repeat order getter. You can make big money without previous experience. Complete outfit and selling instructions \$5.45 and I guarantee money back if not satisfactory. Exclusive territory is going fast. Write me today for my proposition. Stanley B. Freiberg, 134 Station F, Cincinnati, Ohio.

200% PROFIT. You can't beat it. Sells everywhere. Free pocket sample. Our goods get the orders. Wm. J. Dick, Mgr., Dept. N-4, 20 W. Lake St., Chicago.

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 O-3, Chicago, Ill.

\$5 STARTS business, any locality, paying 500% profit. Beats working for others. Write B. Eldins, Farmington, N. H.

HOUSEHOLD Articles, big profits. Four big sellers. Jacobsen Supplies, Racine, Wis.

GUARANTEED hostery manufacturer selling direct to consumer wishes agent in every county. Permanent, big paying business. Protected territory. Credit. D. Parker Mills, 2733 No. 12th St., Phila., Pa.

SAVES Money, Time and Labor—"Penkala," the ever-pointed pencil—any color lead. Guaranteed. Price 25c, 50c, \$1; will last for years. Refills 5c. Agents make \$10 a day. Wm. Muller, 419 Pine St., San Francisco.

AGENTS Wanted—(Cellulose) Door Plates, new lettering pure gold. Send for sample case. Nothing invested. 100% profit, sell to every house. Public demands them. La Fontaine, Mfr., Sherburne, N. Y.

AGENTS—You can sell our tailor-made raincoats. You need no money. Outfit free. Temple Raincoat Co., Box 100, Templeton, Massachusetts.

U. S. GOVERNMENT uses Richmond Chemical Extinguishers that kill gasoline fires. Auto and factory sizes. District managers make 500% profit. Auto free. Richmond Chemical Co., Div. J, Wheeling, West Virginia.

WIDE-AWAKE agents are coining money with our easily demonstrated specialties; write today for particulars and new catalog. H. B. Essex, Box 476, Baltimore, Md.

SINCLAIR, the Entomologist, buys insects, butterflies. See under "Help Wanted."

PORTRAIT Agents—Write for prices on Solar, Bromides, Convex Prints and Pillow Tops. We ship orders back promptly. Try us. Horne Copying Co., 113 S. Jefferson St., Chicago.

LIVE Agents Wanted. Sample 25c. Fast sellers. O. U. Wire Novelty Co., Howell, Michigan.

EVERYBODY write for our special propositions; 400% profit; send 10c for samples worth 50c. Catalogs free. Merchants Specialty House, Chicago.

AGENTS wanted in every town and city to sell the greatest agents' article ever found. Particulars free. Wilson McClintock & Co., Three Lakes, Wash.

AGENTS—Salesmen: Seasonable seller, latest \$3.50 electric invention fills demand never before supplied; home, office, store, everywhere eagerly sought. Repeat orders outnumber first sales; you control territory, no competition, unlimited possibilities. Write Frank W. Alden, Agency Manager, 146 Station F, Cincinnati, Ohio.

THE Fuller Dustless Mop and Furniture Duster are advertised in leading magazines. We need live representatives for unoccupied territory. These articles contain exclusive features. Fuller Brush Co., 55 Hoadley Place, Hartford, Conn., Western Branch, Rock Island, Ill.

AGENTS!! Will you take a steady job paying \$25 to \$30 weekly to start if we give you a chance to work up to yearly profits of \$3000 or more? No experience required! Great Crew Manager's proposition! We are big Manufacturers. Write quick for Exclusive Territory. Need 150 men at once. E. M. Davis, Pres., R 64 Davis Block, Chicago, Illinois.

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 N. Michigan Ave., Chicago.

IDEAL Lamp Filler saves bother filling Lamps. Men and women canvassers and agents. Good opportunity to make money. Samples A & B 25c. Mayo, P. O. Box 2298, Boston, Mass.

SELL Dry Goods Remnants. Greatest bargains on earth. Remnant Store Co., Cincinnati, O.

LET me start you Manufacturing and Selling Extracts. H. Lake Co., Adair, Ill.

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.

MAKE and sell your own goods. Manufacturing processes and formulas by expert chemists. Government information obtained. Formula catalog free. B. Mystic Co., Washington, D. C.

AGENTS—Raincoat Free. Big cash commissions. Low prices. Guaranteed. Made to measure. Men and women. Free samples. The Brookline Co., Dept. B, Springfield, Mass.

WE manufacture the largest line of Aluminum Utensils and Specialties in the world. Sales course free. \$50.00 a week easy to hustlers. Answer quick. American Aluminum Mfg. Co., Div. P.M., Lemont, Ill.

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., 1023 Jefferson, Toledo, Ohio.

SOAP Agents—Our Vegetable Soap, toilet articles flavorings, remedies, excel and out-sell. Sample free. Buchanan & Co., 54 N. Main St., St. Louis, Mo.

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.

GOOD Profit selling our milk-bottle cap lifter and handle to dealers or consumers. Postal brings particulars. P. Simco, Rosebank, New York.

AGENTS—Can you sell to farmers? Get Hill's System of Farm Bookkeeping, price \$1.00. Large demand, big profits, particulars free. C. A. Hill, Grove City, Pa.

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.

WE will pay you \$120 to distribute religious literature in your community. Sixty days work. Experience not required. Man or woman. Opportunities for promotion. Spare time may be used. International Bible Press, 110 Winston Building, Philadelphia.

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.

THEY Sell Themselves. Agents reaping rich harvest on new adjustable floor and wall mops, dustless dusters and other sanitary brush specialties. Write today. Silver-Chamberlin Co., Maple St., Clayton, N. J.

FROM Dance Hall to White Slavery. 400-page, cloth book, illustrated, \$1. Immense sale. Experience unnecessary. Outfit free. Big money quick. Charles C. Thompson Co., Manufacturing Publishers, 1128 Wabash Ave., Chicago.

AGENTS make \$100 monthly selling our 500 handy household articles. Catalogue free. Scheff Company, Desplaines, Ill.

AGENTS Wanted. If you can sell to Bands, Offices, Homes or Hotels, send 10c for samples, which you can put in vest pocket; sells at sight for 50c. Venus Co., 21 West Illinois St., Chicago.

AGENTS—Students and others: Our wonderful luminous Crucifix. Shines in darkest room. A great summer seller. Pioneer Portrait Co., 1259 W. 63rd, Chicago.

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

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

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.

AGENTS and Salesmen wanted to sell Morhanqik Parcel Post Calculator. 100% profit. Every tradesman a customer. Pocket sample free. Morgan Mfg. Co., Dept. U, Newport, R. I.

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., X6, La Crosse, Wis.

ANYBODY can earn \$30 weekly selling our household and office specialties. Lake Shore Manufacturing Company, Michigan City, Ind.

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.

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

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.

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.

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. 305, Boston, Mass.

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.

MEDALLIONS—300% profit. Make up your own goods and be independent. Catalogue free. Resag Co., 1205 Randolph St., Chicago.

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.

SPECIALTY Salesmen Wanted—A quick seller to automobile owners. Write for particulars. J. Manning, 5627 Prairie Ave., Chicago, Ill.

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.

LIVE Agents—If our Specialties don't net you \$10.00 daily, the loss is all ours. If they do, you're losing \$10.00 every day you delay writing to Modern Specialty Co., Racine, Wis.

AGENTS—Sell the Primus, genuine Swedish wickless, coal-oil stoves. Smokeless, odorless. Twice the heat of gasoline at one-eighth the cost. No danger of explosion. Big profits. James Anderson & Sons, Sidney, Ohio, American distributors.

SALESMEN WANTED

AN Opportunity for Salesmen. We have several territories, open, for business producers to handle our lines of Showcases, Mirrors, Garment Racks and Hangers, etc., as a "Side Line." Strictly "Pick Up" business, and straight commission pays from 20 to 35%. State territory desired. American Fixture & Showcase Mfg. Company, St. Louis, Mo.

EXCEPTIONAL opportunity for side line specialty salesmen, calling on Wholesale and Retail Drug, Department Stores, Automobile or Hardware trade. Patented, nationally advertised, guaranteed specialty. No competition. \$50 to \$250 per month easily earned. Give full particulars, present line, territory, experience and references. Write at once for territory. Sanitax Co., 2339 S. Wabash Ave., Chicago.

A WHIRLWIND side-line for Salesman. Descriptive matter submitted on application. Unique Novelty Co., Independence, Iowa.

SALESMEN: Get our plan for mono-granulating automobiles and motorcycles by transfer method; very large profit. Motorists' Accessories Co., Ashland, Ohio.

WANTED—Men who desire to earn over \$125 per month write us today for position as salesmen. Every opportunity for advancement. Box 210, Cleveland, Ohio.

VOLTA Electric Lighting System for Automobiles offers a good steady job for live auto repair men and electricians. Write for particulars. Irwin D. Grook Engineering Co., Commercial Department, 2009 Michigan Avenue, Chicago, Ill.

SALESMEN—We have some excellent territory open to salesmen of ability. This is a proposition that appeals to the best class of concerns. Sales are easy and your profits large. Write us today, for catalog P. M., covering the Schick All-Steel Paper Baler. Davenport Mfg. Company, Davenport, Iowa.

EARN \$50 to \$150 weekly selling new specialty to merchants. Retail \$12.50, your profit \$8.50. No competition. Exclusive territory. Free samples and descriptive matter. Sayers Co., 408 Olive St., St. Louis, Mo.

WANTED—Distributors, Men and Women—to give away free pkgs. Perfumed Borax Soap Powders; no money or experience needed; good pay. S. Ward & Company, 218 Institute, Chicago.

WANTED—First-class reliable specialty salesmen. When replying give references. Worcester China Co., Sebring, O.

LIVE Wire wanted in every county. Something entirely new. Hustling salesmen write now. The Peter Van Woert Co., Oneonta, N. Y.

SALESMEN—If you don't sell Japanese Meerschmum Health Pipes, we both lose money. Sample outfit and order book 25c. Japanese Novelty Co., Clinton, Iowa.

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.

HAVE just patented and are marketing the Hoover Disc Grinder, the Hoover Axle Set and the Hoover Luggage Carrier; the first two will eventually be in every blacksmith shop, and the Carrier will be used by every automobile owner. Desire salesmen to assist in placing on the market immediately, and also desire assistance in selling either or all of the patents. The Hoover Mfg. Co., Beloit, Kan.

HELP WANTED

YOUNG Man, would you accept and wear a fine tailor made suit just for showing it to your friends? 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. 798, Chicago.

FIREMEN, Brakemen, all railroads, \$120. Experience unnecessary. Send age, postage. Railway Association, Dept. 298, Brooklyn, N. Y.

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.

MEN and women wanted for Government jobs, \$65 to \$150 month. Over 15,000 appointments coming. List of positions free. Franklin Institute, Dept. J21, Rochester, N. Y.

WANTED—Railway mail clerks. Examinations everywhere soon. \$75 month. Sample questions free. Franklin Institute, Dep't J-21, Rochester, N. Y.

BIG Money to represent us in spare time. Malalane Company, 1475 Longfellow Ave., New York.

SALESMAN to handle line of roofing materials and paints on commission. Splendid opportunity to earn good money and to work permanently into large growing business. The Garland Co., Cleveland, O.

U. S. GOVERNMENT wants men and women over 18, \$65 to \$150 month. Thousands appointments coming. Common education sufficient. List of positions open free. Write immediately. Franklin Institute, Dep't J21, Rochester, N. Y.

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 S-29. No obligation. Earl Hopkins 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.

BE a detective; earn \$50 to \$100 weekly; travel all over the world. Write Dept. A, United States Detective and Adjusting Agency, Railway Exchange Bldg., St. Louis, Mo.

15,000 GOVERNMENT jobs open to men and women. \$65 to \$150 month. Write for list. Franklin Institute, Dep't J21, Rochester, N. Y.

BE prosperous. Win success and wealth. Free booklet, "How to Win." Address, Mental Efficiency League, San Francisco.

WANTED—Circular Distributors send 6c stamps for application contract sample magazine. American Distributor, 102, Blairsville, Pa.

I PAY big prices for butterflies, insects. Instructions on attracting, killing, preparing, shipping. Send 2c stamp. Sinclair, Entomologist, Dept. 6, Los Angeles, Cal.

EARN \$500 annually, spare time, furnishing reports; stamp brings particulars. "Cico"—PMC—Peru, Ind.

GOVERNMENT jobs, \$90 month. List free. Franklin Institute, Dep't J21, Rochester, N. Y.

MONEY—Spare time. Local information, news, names wanted. We have established markets. Particulars for stamp. "Nisco"—HDB—Cincinnati.

GOVERNMENT wants help, \$65 to \$150 month. Fall examinations everywhere. Examination schedule, free. Franklin Institute, Dep't J21, Rochester, N. Y.

EASY pleasant work for Mechanics. Shop Men, Clerks during spare hours, will add many dollars to their salaries. Also want persons who can give full time. Big wages assured. Novelty Cutlery Co., 67 Bar St., Canton, Ohio.

GET a Government Job! See ad on page 14. Write now—today! Patterson Civil Service School, Rochester, N. Y.

WRITE moving-picture plays, \$50 each. No school. Plays revised and sold in 16 studios here. Details free. Photoplay Bureau, Box 335 "C," Los Angeles, Calif.

WRITE motion picture plays; \$50 to \$100 each; experience or correspondence course not necessary; details free. New Writers Association, 1679 Wright Building, St. Louis.

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.

YOUNG Man! Learn Drafting—one of the most practical subjects of study today—indispensable in many occupations—engage in individual study successfully with the aid of our new book. "A Practical Course in Mechanical Drawing," 160 pages, 157 drawings, cloth, 50 cents, postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

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

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.

WRITE Moving-Picture Plays, \$50 each. All or spare time. Correspondence course unnecessary. Details free. Atlas Publishing Co., 3045, Cincinnati, Ohio.

BE a Detective—Earn \$25 to \$75 weekly; chance to see the world with all expenses paid. Loraine System, Dept. 304, Boston, Mass.

GO on the Stage. Vaudeville career offered you. Experience unnecessary. Managers endorse my method. Instructive vaudeville book free. Write today. Frederic LaDelle, Sta. 10, Jackson, Mich.

WANTED—Distributors, Men and Women—to give away free pkgs. Perfumed Eorax Soap Powders; no money or experience needed; good pay. S. Ward & Company, 218 Institute, 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.

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.

WANTED

WANT to buy established legitimate mail-order office business; give average earnings past six months. T. B. Ray, 1213 Shorb Ave., Canton, Ohio.

FOR SALE

FOR Sale—Well equipped blacksmith and wagon shop, four lots, dwelling house and barn, in good agricultural country. Reasons for selling, ill health in family. A money-maker. E. M. Havlick, Sitka, Kan.

FOR Sale—Machine shop, new machinery, good business, fine location. Give reasons. Toledo Mch. and Motor Co., 56 Main St., Toledo, Ohio.

FULL equipped auto garage, machine and blacksmith shop in town of 2,000 population. F. A. Wilson, San Augustine, Texas.

SODA water fountain cheap. Howland, 254 Butler St., Cincinnati, Ohio.

SAVE Money. Do your own printing. New press for sale very cheap. Advertisement, 14 N. Henry St., Madison, Wis.

OUR service: National Service Selling Co., Box 326 Sag'naw, Mich.

FIELD, Marine, Day and Night Glasses, with Case, 25-mile adjustment; \$30 value; on approval only, \$6.50. Ye Curiosity Shop, 20 S. Second St., Philadelphia, Pa.

AERO Vacuum Cleaning Wagon. Bargain price, quick sale. Roy Creamer, Jeffersonville, Ohio.

SALE OR EXCHANGE

ONE hundred articles for exchange; list free. Seaco, York, Neb.

GUNS, SPORTING GOODS, ETC.

GUNS—Target and Trap Guns, reborning, restocking, repairing a specialty. C. T. Harner, Xenia, Ohio.

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.

TAXIDERMY

TRY us on your next trophy—Expert mounting of fish, birds, animals and fine rugs. Taxidermist supplies. Karl W. Kahmann, 2455 Lincoln Ave., Chicago.

FOR Sale—Deer heads and mounted animals cheap. Reuben Sayler, 497 Broadway, Dayton, Ohio.

MACHINERY, TOOLS AND SUPPLIES

BROWN & SHARPE Lathe 14 in. x 5½ ft., hollow spindle, power feed, screw cutting, taper attachment, rise and fall rest, two face plates, two chucks fitted, oil pan under bed, condition first-class, cost new over \$500; will sell \$198. Baird-O'Hara Co., 54-56 Jefferson Ave., Detroit, Mich.

REBUILT Leather Belting. Half the price, equal new in service, excellent appearance, all sizes, satisfaction guaranteed. Also new, 25% under dealers' prices. Canvas Thresher Belting. Fredrich Belting Co., Manufacturer, St. Louis, Mo.

OXYACETYLENE welding outfit, \$100. Fred Booth, 19605 Kimberley, Cleveland, Ohio.

PULLEYS, Gears, Sprockets, Shafting, Hangers; see page 126. W. A. Jones Foundry & Machine Co., Chicago.

FOR Sale—Needle machinery; send for list No. 28. Lucas & Son, Bridgeport, Conn.

FOR Sale—25 Lincoln milling machines, \$25 to \$100 each. 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 9½", takes 25" between centers. Complete set gears cutting all size threads 3" to 40", \$43.50. Grammes & Sons, Allentown, Pa.

HOW to Run a Lathe. A 50-cent book for 10 cents postpaid. S. B. Lathe Works, South Bend, Ind.

LIGHT weight gasoline engines, ½ H. P. Weight, 2½ lb. Guaranteed. The Weiss Co., Torrington, Conn.

COMPLETE machine shop, \$2,000. 3 Lathes, Shaper, Cincinnati Miller, Welding outfit, other machinery; cost over \$4,000. Rent \$20, long lease plenty room, or will sell by piece. Must change climate. Cedar Falls Machine Shop, Cedar Falls, Iowa.

ENGINES AND MOTORS

FOR Sale—A 40 hp. Otto Stationary engine, about five years old, but used very little; serial number 8962. This engine is in perfect condition, thoroughly guaranteed, and to a quick buyer we will make an exceptionally low price. Address: Bruns, Kimball Company, 115 Liberty Street, N. Y. City.

GUARANTEED 60-cycle, single-phase motors, 1-6 hp. General Electric, 1,200 speed, \$20; same ¼ hp. new, \$30; ½ hp. Wagner, \$38; 1 hp. Wagner, \$53; three-phase ½ hp. Westinghouse, \$22. Motors bought and sold. Guaranteed repairs. Hyre Electric Co., 613 So Dearborn St., Chicago.

LOT small AC and DC motors and generators taken for debt, ½ up to 3 hp., about ¼ regular prices. Write for list. Johnston, Evans Ave., Ingram, Pa.

FOR Sale—¾ hp. water motors for buffing, grinding, and light power. Price \$3.50 postpaid. W. N. Manufacturing Co., Manchester, Conn.

FOR Sale—¾ hp. 220-volt direct-current motor, speed 1,250. Price \$45. Fred Norton, Manchester, Conn.

PATTERNS, Blue Prints, Special Tools and figs of 4-cylinder en bloc, 2 cycle motor; also one finished motor, latest design of experts. E. S. Clark, Freeport St., Boston, Mass.

FOR Sale—One Westinghouse 50 hp. Gas Engine, size 11x12, direct connected to one Western Electric type L-35, 220 volt, 152 amp., DC generator, complete with compressed air starter and accessories; almost new. Address L. A. Davies, Room 509 Gates Bldg., Kansas City, Mo.

FOR Sale at a Bargain. New 5x6 four-cylinder governor-controlled engine, fully equipped with carburetor magneto. Will sell for much less than cost. Fred Hanson, 570 Prior Ave., St. Paul, Minn.

REBUILT Engines—We have on hand a number of "rebuilt" "Buffalo" engines, guaranteed, at greatly reduced prices. Write for bargain list. Buffalo Gasoline Motor Co., 1293-1305 Niagara Street, Buffalo, N. Y.

ENGINE CASTINGS AND BLUE PRINTS

GASOLINE Engine Castings, with drawings. Cheap. Catalog for stamp. Novelty Manufacturing Co., 853 West 6th St., Cincinnati, Ohio.

FLOUR & FEED MILLING MACHINERY

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.

BOATS, LAUNCHES, ACCESSORIES

AUTO-PNEUMATIC Swimming Belt—"pocket" life preserver. Special high-class material. Waterproof. Inflates automatically. Weighs 1 pound. Self-instructor in swimming. Protects bathers and sea-goers from drowning. Guaranteed. Price \$4 (send chest measure). 309 Broadway, New York.

CHART of a modern submarine boat showing and naming over 200 parts. Size, 14x28 inches. Printed on plate paper. Shows clearly and distinctly all the interior. Mailed in a tube for 25c. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

MOTORCRAFT Encyclopedia—A 150-page book that tells 1001 things every motor boatman should know. How to overcome engine troubles. Price \$1, postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

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HERE is your opportunity to be an expert blacksmith without help. As life is short, get Toy's Modern Methods of doing hard jobs easy, forging and welding all kinds of steel solid. Also tempering all tools to a standard by colored charts. This is real plain information, not theory, all for \$1. Send for free samples first. W. M. Toy, Sidney, Ohio.

SHOP Notes—Many valuable kinks for blacksmiths are contained in our series of Shop Notes books, 10 volumes, 50c each, postpaid, or \$5 per set prepaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

BLACKSMITHS—Learn hand-wrought ornamental ironwork. Our 200-page book "Hand Forging" points out clearly all the guiding principles and methods which underlie all forge work. Written by a practical authority. 122 illustrations, cloth, \$1 postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

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FOR That Boy—He will appreciate a copy of the great boy's book "The Boy Mechanic" that tells about 700 different things for boys to do and has 800 pictures. 480 (7x10) pages, cloth, big, handsome book for the price, \$1.50 postpaid. Popular Mechanics' Book Dept., 6 N. Michigan Ave., Chicago.

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BUY Bell-Ringing Transformers to connect with the alternating-current light service and discard batteries. Write Vindex Electric Mfg. Co., Aurora, Ill.

"**BOY** Electrician." Make Batteries, Dynamos, Motors, Electric Engine, Telephone, etc. 75 illustrations, 10c. Renew Dry Batteries, 3 guaranteed processes, 20c. Service Bureau, 3311-P, Belleplaine Ave., Chicago.

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WIRELESS Set. How to Make—96-page book telling how to construct at small cost an outfit suitable for transmitting four or five miles. Price, 50 cents, postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

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CONCRETE Molds. Catalogue free. Market St., St. Louis, Mo.

IF you want the best information on cement and concrete construction, subscribe for Concrete-Cement Age, leading cement and concrete monthly. Sample copy, 10 cents. Yearly subscription, \$1.50. Concrete-Cement Age, 135 Newberry Bldg., Detroit, Mich.

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STAMPS Free—100 different or a fine set of 15 King George Colonials. Send 4c postage; mention gift E153. "A. B. C." Illustrated priced Catalogue of World's Stamps, 930 pp. 70c, post free. Bright & Son, 164 Strand, London England.

SURPRISING Bargain: Dominican Stamps. I am able to offer duarte commemorative stamps (Domestic issue), any quantity, at cost or issue price. Pedro E. Itavels, Chief of Registry Dept., Santo Domingo, Rep. Dominican.

SET of Russia free to those getting our approvals. N. W. Helwig, Hanover, Ontario.

FINE approvals—Premiums. Reference necessary. Mrs. Oughtred, 28 Lincoln Ave., Montreal, Que.

STAMPS on approval at 50% discount. Kankakee Stamp Co., Kankakee, Ill.

FOREIGN Stamps Free; 52 different foreign, including China and Venezuela, to all who apply for our high grade approval selections. Send two cent stamp for return postage. Edgewood Stamp Co., Dept. H. Milford, Conn.

CHEAP Coins, Notes, Stamps, Post Cards, Curious things. Big Catalog for 2c Stamp. Coin Exchange, Box 254, New Rochelle, New York.

150 ATTRACTIVE foreign revenue stamps, 35c. Best Hinges, 10c. Oscar Hartmann, 1219 16th St., Denver, Colo.

WE pay good prices for canceled parcel post stamps. Send dime for price list. Aurora Mail Service Co., Aurora, Ill.

STAMPS wanted from original sources of supply. Beebe, Yonkers, N. Y.

STAMP Album with 538 Genuine Stamps, incl. Rhodesia, Congo (tiger), China (dragon), Tasmania (landscape), Jamaica (waterfalls), etc., 10c. 100 diff. Jap. N. Zid., etc., 5c. Big list; coupons, etc. Free. We buy stamps. Hussman Stamp Co., St. Louis, Mo.

PACKET of 23 stamps; no two countries alike, 500 hinges. Set of \$1 and \$2 U. S. Rev., all for 5c. Mention paper. Miami Stamp Co., Toledo, Ohio.

STAMPS—105 China, etc., stamp dictionary and list, 2c. Bullard, Sta. A, Boston.

STAMPS, 100, all different, free. Postage 2c. Mention paper. Quaker Stamp Co., Toledo, Ohio.

24 VARIETIES Cuban stamps, 10 cents. List of 6,000 low-priced stamps free. Chambers Stamp Co., 111 P. Nassau St., New York City.

205 DIFFERENT foreign stamps, 101 United States, 60 Japanese or 50 Asiatic free. Remit 25c six months subscription. McKee's Stamp Weekly, Boston, Mass.

RARE COINS

ALL for 40c—25c California Gold Piece; 10 Nickel Coins; 1 Premium Catalog; 1 Selling Catalog. C. J. Carey, New Rochelle, New York.

\$1.00 TO \$1,000.00 paid for thousands of rare coins to 1909. Many of great value in circulation. Get posted. Send only 4c and get our large illustrated Coin Circular. It may mean much profit to you. You certainly have nothing to lose. Send now. The Numismatic Bank, Dept. 5, Fort Worth, Tex.

\$.25 EACH Paid for U. S. Flying Eagle Cents dated 1856. We pay cash premiums on hundreds of Old Coins. Send ten cents at once for New Illustrated Coin Value Book 4x7. It may mean your fortune. Clarke & Co., Coin Dealers, Box 15, Le Roy, N. Y.

FORMULAS AND TRADE SECRETS

1,000 TRADE Secrets and formulas, 25c. 500 special formulas, 20c. Resilver mirrors, guaranteed process, 20c. Make Sneezing Powder and Itch Powder, 10c each. Entire lot 50c. Service Bureau, 3311-P, Belleplaine Ave., Chicago.

WE can furnish you with a high-grade, up-to-date, guaranteed formula for almost any occasion. Prices nominal. Write us your needs. Cole Chemical Company, 1309A West Madison St., Chicago.

DAINTY Fruit and Nut Chocolates. Learn to make them. Original instructions, 25c. J. L. Hardway, Normal, Ill.

FORMULA for a fine silver and metal polish, 10c. Lem Ives, Loveland, Colo.

MAKE your own Asbestos cement, big saving, ton in 20 minutes, and Asbestos molded covering; full instructions \$5. Lewis Grace, Winfield Ill.

FORMULA for making genuine Custard Powder without eggs. Guaranteed, one dollar. Pacific Manuscript Co., Los Angeles, Calif.

"GUARANTEED formulas of all kind for sale. List on request. Milroy Chemical Laboratories, 54 So. 6th St., Brooklyn, N. Y."

ANY formulas you wish to know? Correspond with Information Bureau, 128 George Street, Brooklyn.

BUSINESS SERVICE

INCORPORATE. Our lawyers do the work, saving you time, annoyance and money in incorporating under the most liberal laws of Arizona. Laws and forms free. Southwestern Securities & Investment Co., Box D488, Phoenix, Ariz.

ESTIMATING and Contracting by Radford—A 900-page manual of up-to-date methods for rapid, systematic, and accurate calculation of costs of all types and details of building construction, with quotations of ordinary prices for labor and materials, standard schedules and forms, labor-saving tables and other data useful to the building trades. Flexible leather illustrated—\$2 per copy postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

FOR MEN

WHEN the Head Barber shaves you, the razor feels like a "velvet brush." Your razor is as good as his. The way he sharpens it makes the difference. For 25c I send you "Velvet Shaves," a shave a day for life. Barber Lawrence, 632 Polson Ave., Winnipeg, Man., Can.

SHAVING Comfort—To demonstrate quality of our blades, a holder and one blade will be sent postpaid for 25c and 5 names of men who shave. Satisfactory or your money back. Agents wanted. V. W. Ferris, Mineola, N. Y.

SEPTEMBER Morn stick pin, 25c (mounted on pink cameo). F. Johnson, 625 E. 40th St., Chicago.

BINOCULARS—Genuine L-Fils, eight power, with case. Value, \$48. On approval only \$18. Ye Curiosity Shop, 20 S. Second St., Philadelphia, Pa.

SAVE money on shoes! Factory to feet. You save retailer's profit and get better shoes. Fit and entire satisfaction guaranteed or money back. Style book free. Pathfinder Shoe Co., Dept. P. Dudley, Mass.

SAFETY BLADES SHARPENED

SAFETY razors sharpened; two cents each. Guaranteed. Blade box free. Electro Stropping Co., 134 Shelby St., Detroit, Mich.

FOR THE HOME

FOR Sale—Full size patterns for library table and lamp. Instructions for construction and finish, 25 cents. Taylor, 240 Bird Ave., Buffalo, N. Y.

ARTISTIC Lamps and Shades in metal and art glass easily made by the amateur craftsman from instructions given in our book of 18 designs ranging from ordinary reading lamps to pretentious chandeliers. Expense only slight. Price of book 50c postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

BEAUTIFUL arts-crafts lamps—Anyone can make them out of paper, cardboard and wood. 16 designs. Inexpensive yet artistic. Complete book of instructions. Price, 50c postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

MAKE your own mission furniture at the minimum of expense. Our 3 books "Mission Furniture. How to Make It." Parts 1, 2 and 3, tell in plain, simple language just how to make 98 different pieces. Full dimensions, working drawings and half tones of finished articles. Price, 50 cents each or \$1.50 for the three volumes, postpaid. Popular Mechanics Book Dept., 6 N. Michigan Ave., Chicago.

LAMP Shade Frames, all descriptions, made to order. Cooley Mfg. Co., 553 W. Monroe St., Chicago.

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BEAUTIFUL Women Succeed. Madame La Belle offers free information. Box 493, Chicago, Ill.

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MAGIC Goods Cheap! Direct from manufacturers. Thimbles from Everywhere, 50c; Amateur Coin Catcher, 35c; Thurston's Rising Cards, 30c; Handkerchief to Egg, 30c; Handkerchief to Ball, 30c; Handkerchief Color Change, 25c; Lighted Candle from Pocket, 25c; Vanishing Cigarette, 25c; Vanishing Deck, 25c; Multiplying Billiard Balls, 25c; Dice Through Hat, 20c; Vanishing Thimble, 15c; Disappearing Ball, 12c; 84 New Card Tricks, 10c; Book of 250 Tricks, 10c. All above tricks, only \$2.40. Latest illustrated bargain catalogue and souvenir trick free. Honest service guaranteed. Eagle Magical Company, 1215 Nicollet, Minneapolis, Minn.

SURPRISE Bulbs—Boys, if you want to have some real fun get a box of surprise bulbs. Greatest thing ever. Have more than a barrel of monkeys. By mail 10c. Fisher Novelty Co., 721 Sterling Place, Brooklyn, N. Y., Dept. A.

FREE—250 magic tricks and big illustrated catalog. Send 6c. Novelty Shop, 3311-P Belleplaine Ave., Chicago.

BASEBALL—The greatest game of all \$1 parlor games. Send 10 names (male) with addresses, 5c and 2c stamp. Ye Curiosity Shop, 20 S. Second St., Philadelphia, Pa.

WONDERFUL Magic Trick Cards Free! To introduce our catalogue, Address, Walwen Co., Dept. M, 150 Nassau St., New York.

KISOLEGY—Learn secret language of lips—few hours. Tell character, past, present, future. Make money, entertainment. Complete outfit for making kiss prints and reading them. Prepaid, \$1. Shack, 405 King St., Charleston, S. C.

MAGIC Catalogue. Best on earth; ten cents. Amateurs supplied as well as the Great Professionals. Chicago Magic Co., Dept. B, 72 West Adams Street, Chicago, Illinois.

NOVELTIES. Tricks, puzzles, useful articles. Illustrated catalogue free. Excelsior Novelty Co., Dept. F, Anderson Realty Building, Mount Vernon, N. Y.

FUN: September Morn Squirt Ring, for dime. Stovers, Millersburg, Pa.

WIGS and Makeups (for Theatricals). Percy Ewing, Decatur, Ill.

BE a Shadowgraphist; anyone can learn. Instruction book fully illustrated, 25c. M. Germanoz, Box 420, Bridgeport, Conn.

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FOUR Ace Trick, and Catalogues, Tricks, Novelties. All 6c. Home of Magic, Albany, New York.

MAGIC pocket trick free. Worth 25c. With illustrated catalog of 250 tricks, puzzles, illusions for 6c. Stamps. Magic Co., Sta. 10, 249 West 38th St., New York.

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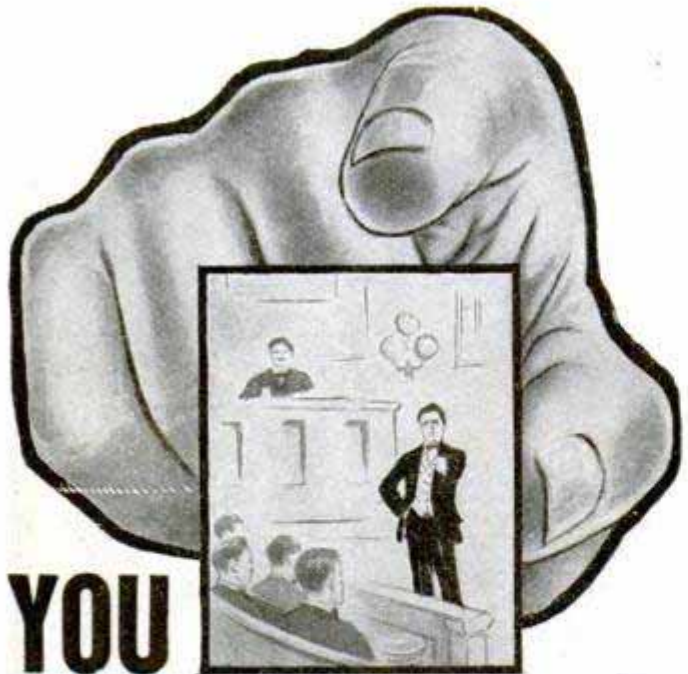
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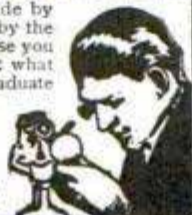
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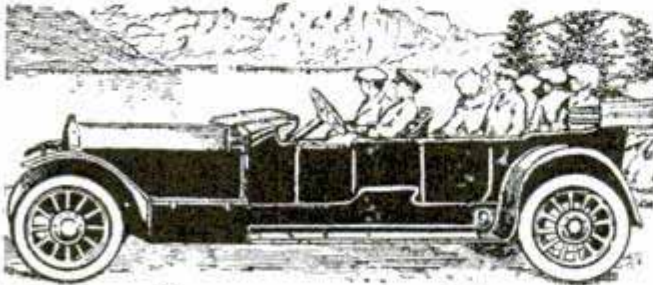
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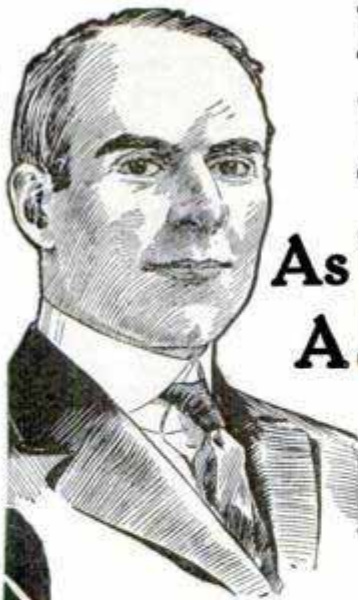
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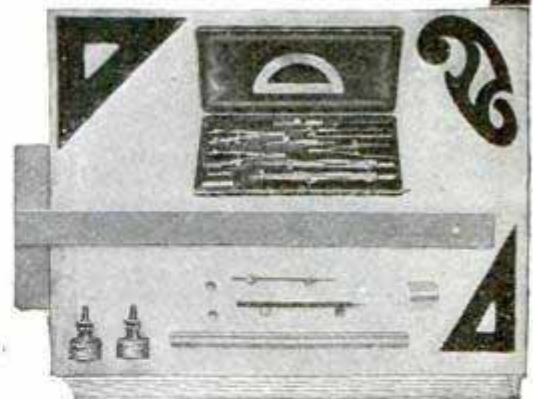
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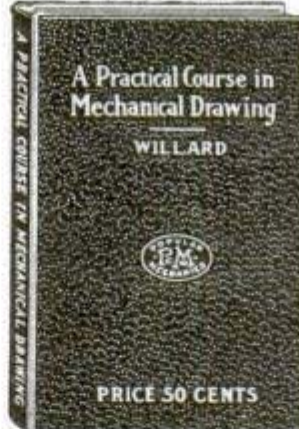
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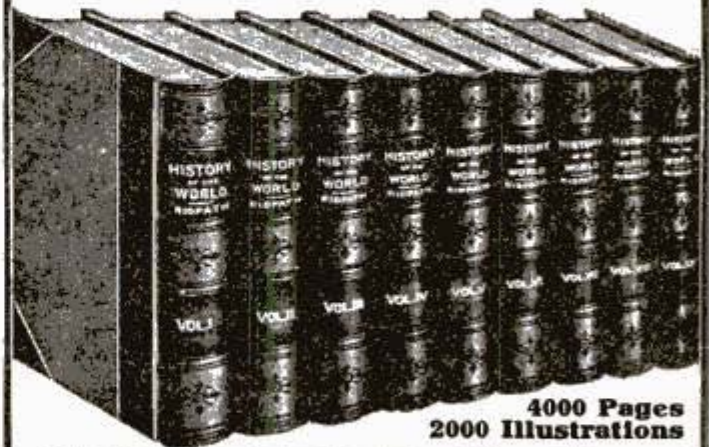
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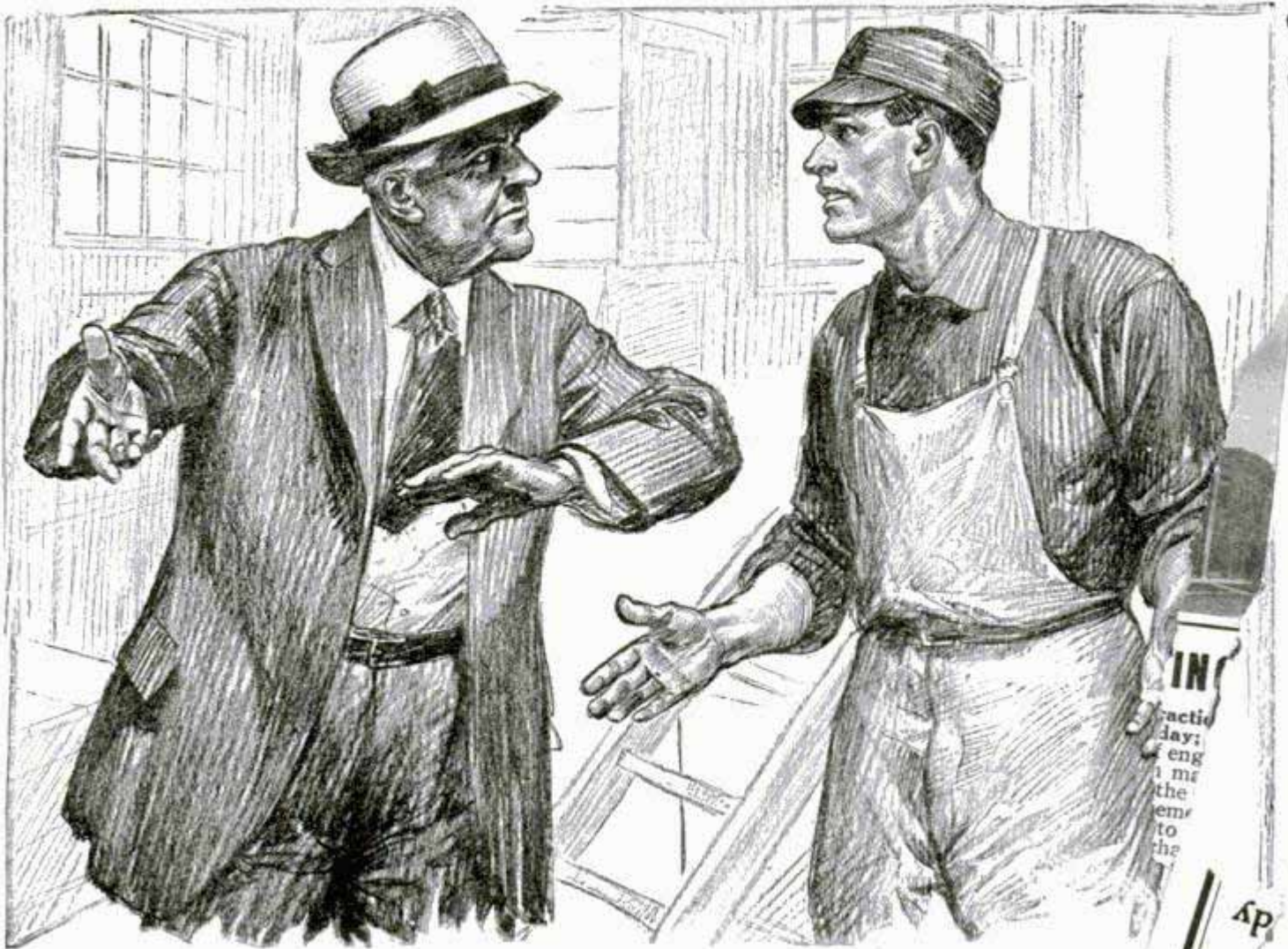
☐ **THE NAVY** offers many advantages to the ambitious young men. These advantages cannot be explained fully on this page, but if you feel that your present occupation does not give you the training and the opportunity you want, then investigate the Navy offer. Talk it over with your parents or guardian, and if you are an American citizen, write for pamphlets on enlistment.

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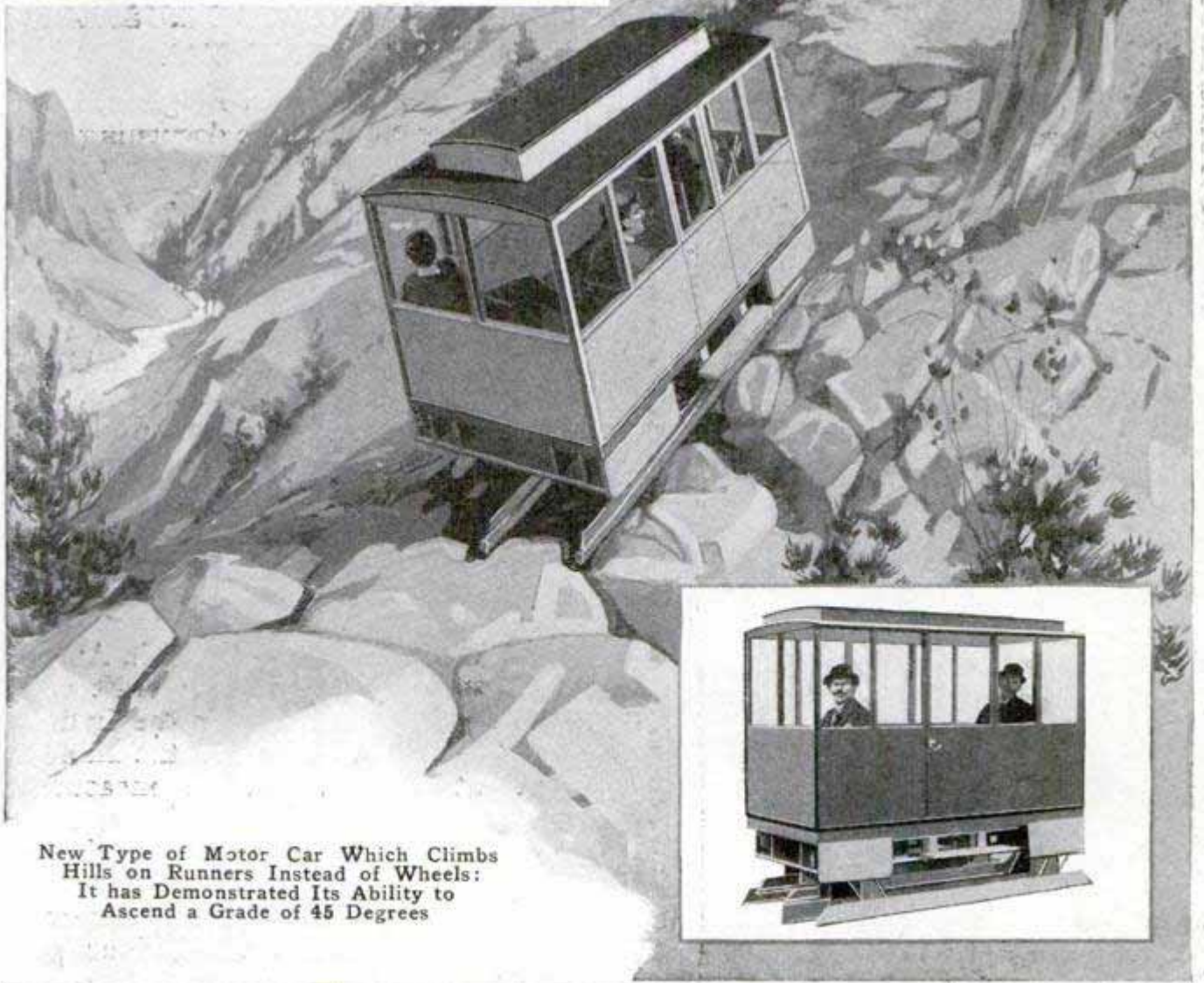
Vol. 22

SEPTEMBER, 1914

No. 3

Motor Car That "Walks" on Moving Runners

A MOTOR car without wheels has been constructed and set to practical tests. Instead of wheels there are three parallel pairs of runners, like those on sleds, except that they are movable. When not in motion the car rests on all three pairs of runners, but as soon as the motor is started one pair is raised, moved forward, set on the ground, and so on. Thus the car is always resting on two pairs and by the forward movement of the runners moved also forward. The motion is said to be much smoother than one would anticipate, without jars or noise.



New Type of Motor Car Which Climbs Hills on Runners Instead of Wheels: It has Demonstrated Its Ability to Ascend a Grade of 45 Degrees

Among the advantages claimed for this new kind of motion is a comparative absence of friction. Obstructions which cannot be overcome with other vehicles are easily negotiated. In a demonstration in Berlin the car moved from one table to another through an open space of about 18 in. It is also capable of climbing very steep hills.

On an inclined plane at an angle of 45° this new vehicle climbed to the top and descended on the other side.

The German military authorities are studying the possibilities of this car for the transportation of ammunition, guns, etc., over rough country. The speed is, of course, not high, but may be increased by changes in design.

TELEPHONE LINE ACROSS THE CONTINENT

With the completion of the line from Denver to San Francisco there is now



Making the Last Splice in the Transcontinental Telephone Line

a continuous commercial telephone line stretching across the continent from New York to the Pacific coast. Con-

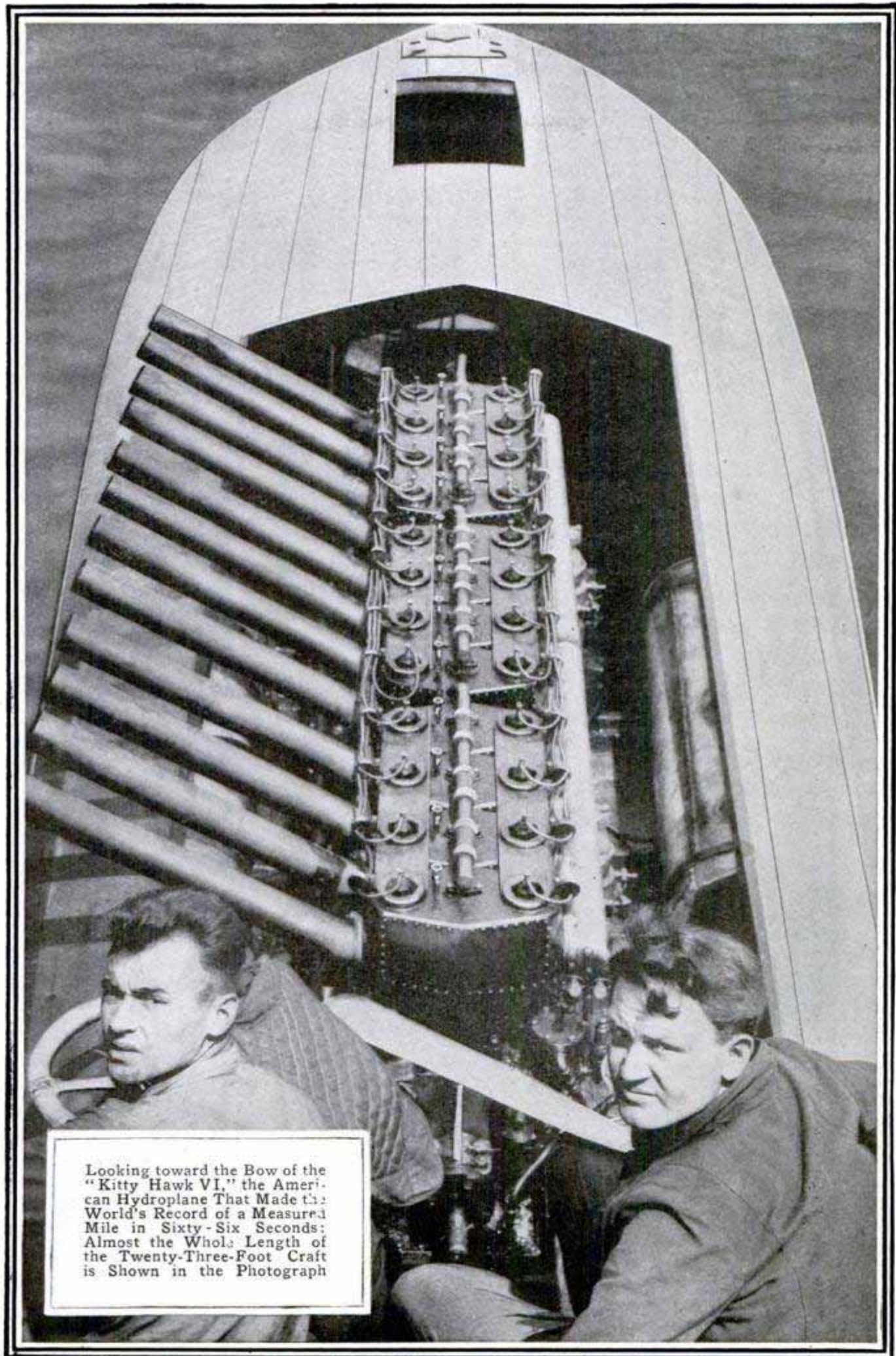
struction parties working westward from Salt Lake City and eastward from San Francisco met in the desert at the Nevada-Utah state line on June 17, 1914, and the junction of the two lines was made at a pole erected on the state line. Flags were unfurled and the work of making the last splice was accompanied by a ceremony much like that of driving the last spike on a transcontinental railway.

CANAL CONNECTS BRUSSELS WITH THE SEA

The city of Brussels, Belgium, is to become a seaport by the deepening and widening of the Willebroeck Canal, connecting with the Rupel River a short distance from Antwerp, whence there is deep water to the North Sea. This work, as well as the construction of docking facilities for seagoing vessels, is now practically completed, the cost of the whole project being \$12,454,000. The Willebroeck Canal is about 18 miles long and has been deepened from $10\frac{1}{2}$ to 21.32 feet.

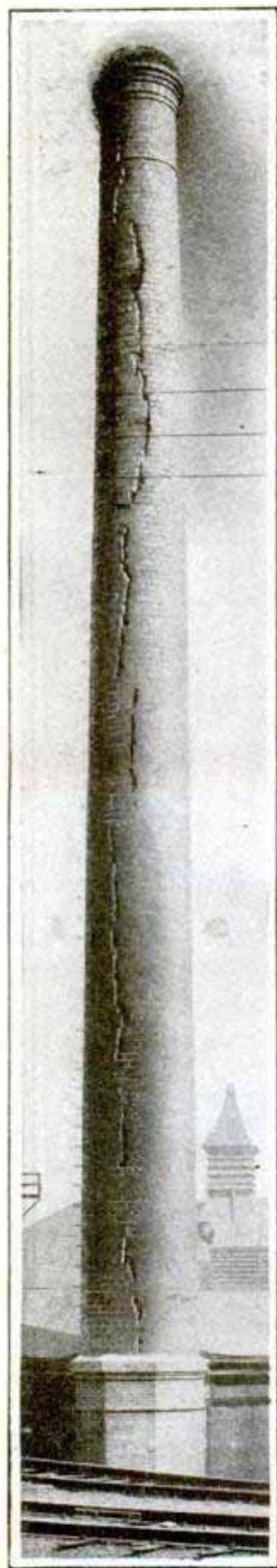
AMERICAN SPEED BOAT GOES MILE IN 66 SECONDS

The fastest time ever made in American waters by any sort of craft was made on July 3, 1914, by the hydroplane "Kitty Hawk VI" on the Illinois River at Peoria, Ill. A measured mile was covered in 1 min. 6 sec., or at the rate of 54.54 miles an hour. This tiny vessel, only 23 ft. long, has a 24-cylinder gasoline motor, generating 300 hp. at 1,600 revolutions per minute.



Looking toward the Bow of the "Kitty Hawk VI," the American Hydroplane That Made the World's Record of a Measured Mile in Sixty-Six Seconds: Almost the Whole Length of the Twenty-Three-Foot Craft is Shown in the Photograph

LIGHTNING'S ODD TRACK DOWN HIGH STACK



Lightning struck a 90-ft. brick smokestack at Homestead, Pa., recently and plowed an irregular path down the side of it, knocking out bricks in long vertical lines, as the photograph shows. The stack was not equipped with lightning rods. Close to the stack run the wires of a 6,600-volt electrical transmission line protected by an overhead ground-wire. This line was not affected in any way by the discharge.

EAST TO HAVE CYCLECAR TAXIS

The establishment of a cycle-car-taxi service at New York, Philadelphia, and Boston is planned, with the rate of fare fixed at 25 cents for the first mile, and five cents for each quarter mile thereafter. A company has been incorporated and it is the intention to construct 1,000 of the small machines, each capable of carrying

two passengers and luggage in addition to the driver, for use in the three

cities. The cabs will be fitted with four-cylinder engines and landaulet bodies. They will be sold under agreement that the rate of fare will not exceed that set by the manufacturer. A similar service has been maintained for some time at Long Beach, Cal. By using a light and inexpensive car, it has been found that there is profit in carrying patrons on regular routes between the business district and the residential sections of the city for a five-cent fare. A large number of machines are being used by the company, and active competition is being waged with the street cars.

COTTAGE SCHOOLS ERECTED AT COLORADO SPRINGS

The plan of providing each grade of a public school with a separate building, which is styled the "cottage system," has been tried at Colorado Springs and found to be advantageous in many ways. The individual class buildings are grouped about a central or administration building. Disturbance caused by the passing of classes from one room to another, or through the halls, as is common in most large school buildings, is in this manner eliminated so that no recitation is interrupted by the noise made by another department. Fire and panic dangers are obliterated, since each cottage is a single room, built on the ground floor without stairs or fire escapes. In the case of an epidemic of disease, opportunities are afforded to prevent its spreading, since, in theory at least, it may be confined to a single building if discovered immediately. The central cottage contains two classrooms and the principal's office, with the partitions arranged so that the whole floor may be thrown into an auditorium capable of seating 400 persons. In the basement is a small gymnasium, fitted with shower baths for the use of pupils and their parents alike, making the structure really a social center. Ventilation and lighting are no longer problems, while heating is cared for by a large plant situated some distance



Group of Separate Class Buildings Forming Cottage System of Schools

away from the class buildings. A full block of ground is occupied, so that there is sufficient room for adequate recreation plots. One feature of the plan, which has an especial appeal, is that the cottage type of school may be built to fit the needs of a district and then may be added to as the population increases, thus eliminating the necessity of constructing an expensive and large structure in a sparsely settled place in order to provide for future requirements.

DIESEL SHIPS MAKE GOOD RECORD

Of the 24 oceangoing vessels equipped with heavy-oil internal-combustion engines of the Diesel type that are now in operation, troubles of various kinds have been experienced by 15, while the remaining nine have absolutely clean records. In the opinion of experts this is a remarkable record in the use of a new kind of power in a heavy and trying service, and there is little doubt that the problems presented will work themselves out in time. Among the troubles that have occurred air-compressor troubles have been the most frequent, while cracked pistons, cylinder heads, and water jackets, due to faulty circulation of the cooling water as a result of scale deposits or restricted passages, practically complete the list.

NIGHT GOGGLES SAVE EYES FROM HEADLIGHTS

Goggles for use at night to protect the chauffeur's eyes from the dazzling headlights of an approaching car are a recent invention intended to overcome some of the objectionable features of powerful automobile lights. The upper part of the lens is supplied with a segment of dark amber, while the lower two-thirds is of a lighter color suitable for daylight use. When a driver is confronted with a brilliant searchlight glaring in his face, by tilting his head downward to bring his vision through the dark segment, the approaching machine and the roadway



Goggles Which may be Used Either Day or Night

may be seen clearly and without discomfort, the glare being eliminated and the sources of light sharply defined.

APRON ON IRONING BOARD KEEPS CLOTHES CLEAN

Fitted with a single supporting leg so arranged that skirts and similar garments may be placed around the board



Ironing Board Freed from Obstructions

without interference, an ironing table has been made with an apron attachment which prevents clothes from brushing against the floor while work is being done upon them. It is designed to be hinged to a table or wall, and either folded back or removed entirely when not in use. The protecting bag is swung from two rods which extend parallel from socket supports on both sides of the board. The absence of a framework underneath makes the apparatus especially useful in ironing things of a sack shape, while the apron is of material service when large pieces such as sheets are being ironed.

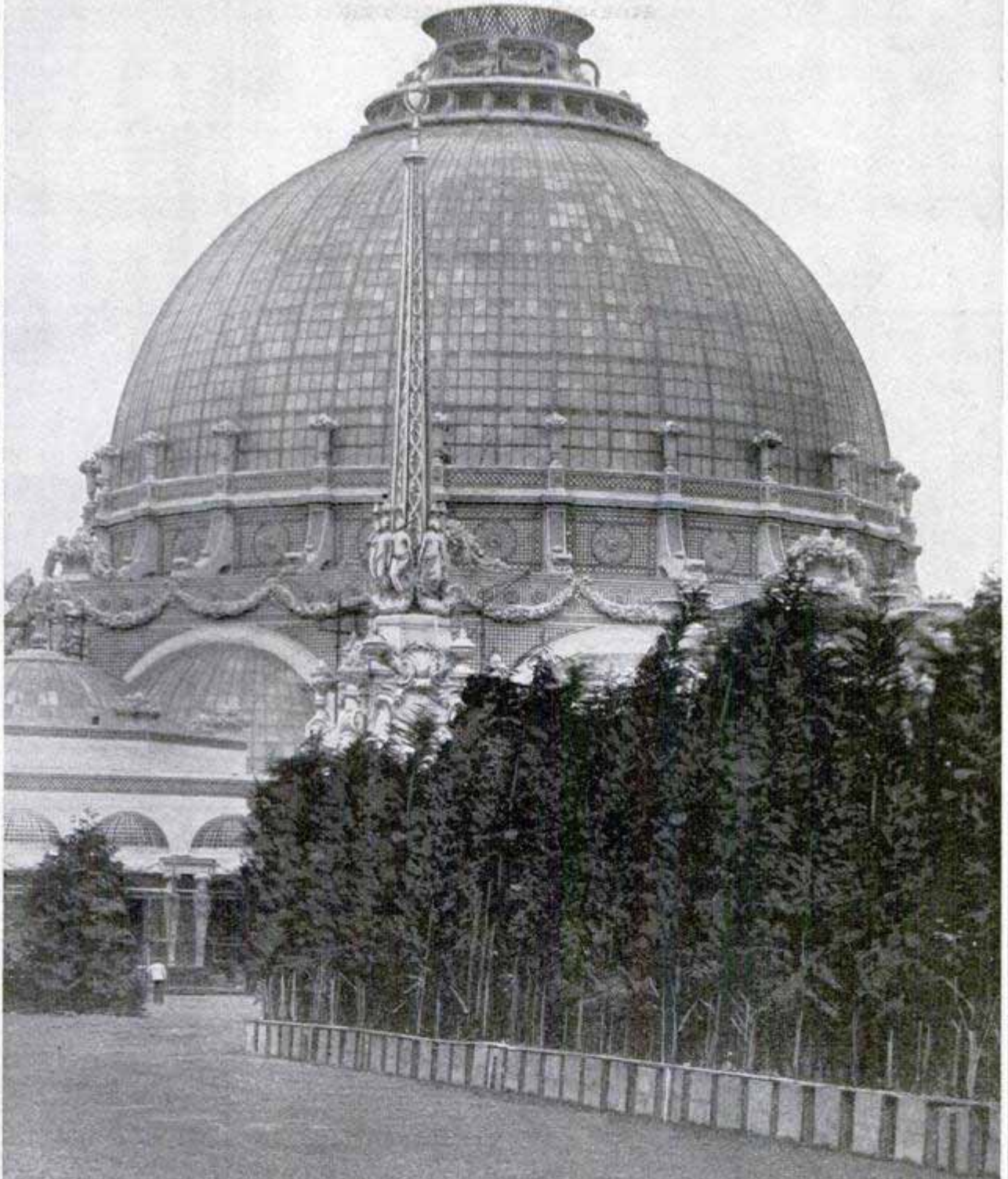
¶With the completion of the transcontinental railway which is now being built in Australia, it will be possible to travel by rail from Rockhampton, Queensland, along the eastern and southern coasts to the west coast, and inland to Kalgoorlie, a distance of 4,500 miles.

SHORT RIFLE IS ADVOCATED FOR USE IN CAVALRY

There is considerable agitation in military circles for the adoption of a shorter-barreled rifle for use in the cavalry. The reason for this proposed change is that the handling of the instrument would be materially facilitated, while its weight would be decreased—always an important consideration. A sergeant of marines has been remodeling for sportsmen a number of service rifles to be used for big game. A barrel in one instance was shortened 4 in. with satisfactory results. Much interest has been evinced by the short-rifle advocates in the experiments, and it is believed possible that through them some modification of the cavalry gun may result.

GREAT GLASS DOME COVERS EXPOSITION BUILDING

Crowning the Palace of Horticulture and giving it almost the atmosphere of a Saracenic mosque, a hemispherical glass dome, which is considered to be the largest in existence, will glow with a maze of light diffused by colored searchlights beneath it, when the Panama-Pacific Exposition is opened. Exhibits of plants, trees, and various rare forms of vegetation from different tropical and semitropical countries will be housed in the sun-filled building. It is 600 ft. in length, 300 ft. wide, and is intended to resemble in some particulars many of the architectural characteristics of the mosque of Ahmed I, a famous structure in Turkey. In the middle, rising to a height of 186 ft., is the dome of glass, which is 152 ft. in diameter. Its exterior is adorned with a wealth of relief decorations which give it a tone of elegance and richness. In comparison with its size, the dome on the Capitol at Washington is 135½ ft. in diameter at the base; the famous Pantheon at Rome, 142 ft.; St. Peter's, also at Rome, 139 ft.; the cathedral at Florence, 139 ft., and St. Paul's at London, 112 feet.



The Ornate Dome of the Palace of Horticulture at the Panama-Pacific Exposition, Where Rare Plants and Trees from the World Over will be Housed: This Sun-Flooded Place will be a Garden of Tropical and Semitropical Vegetation Which could not be Seen by the Ordinary Traveler Except by Years of Journeying

MONUMENT TO MEMORY OF AVIATION PIONEER

The memory of Otto Lilienthal, the German experimenter who was the first of the long list of airmen of modern times to lose his life in the effort to fly with wings, is preserved in a monument recently unveiled in Lichterfelde, near Berlin. The memorial is a massive block of stone, surmounted by the figure in bronze of a winged man, his pinions outstretched for



Monument Erected to the Memory of Otto Lilienthal, Pioneer of Modern Aviation

flight. A portrait bust of the pioneer airman occupies a niche in the pedestal.

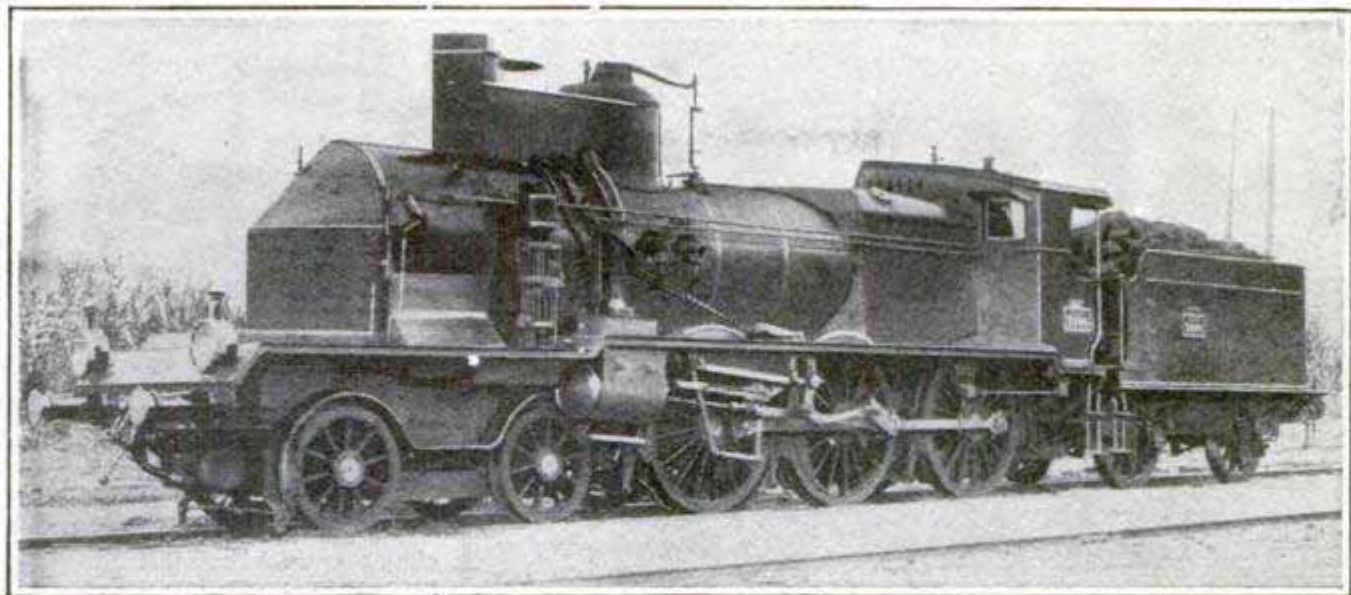
Lilienthal, whose original research and experiments with gliders, covering a period of 35 years, pointed the

way for the development of the airplane, lost his life on August 9, 1896, while soaring in a glider with which he had made many flights of from 12 to 15 seconds. The machine dived suddenly from a height of 50 feet.

PANAMA CANAL RULES MADE PUBLIC

Among the regulations governing ships seeking passage through the Panama Canal, recently made public in a circular issued by the canal authorities, the most important are the quarantine regulations and those relating to the measurement of the tonnage of ships and the payment of tolls. All tolls must be paid in cash, or payment must be secured in some form satisfactory to the governor of the Canal Zone. Toll charges will be at the rate of \$1.20 for each 100 cu. ft. of "earning capacity" of the ship, the term earning capacity being used to indicate the amount of space left for passengers and cargo after deducting all the space required for the crew, machinery, and ship's stores of every kind. Each ship must have been carefully measured in accordance with the rules by some officer authorized to perform the work, and must have a "Panama Canal Tonnage Certificate" before being al-

lowed to enter the canal. Special concessions are made to ships that go up into the fresh waters of Gatun Lake for sight-seeing or to get rid of barnacles, but do not go through the canal. The quarantine rules are strict.



Engine Built to Cut through Sand Storms on Sahara Desert Line

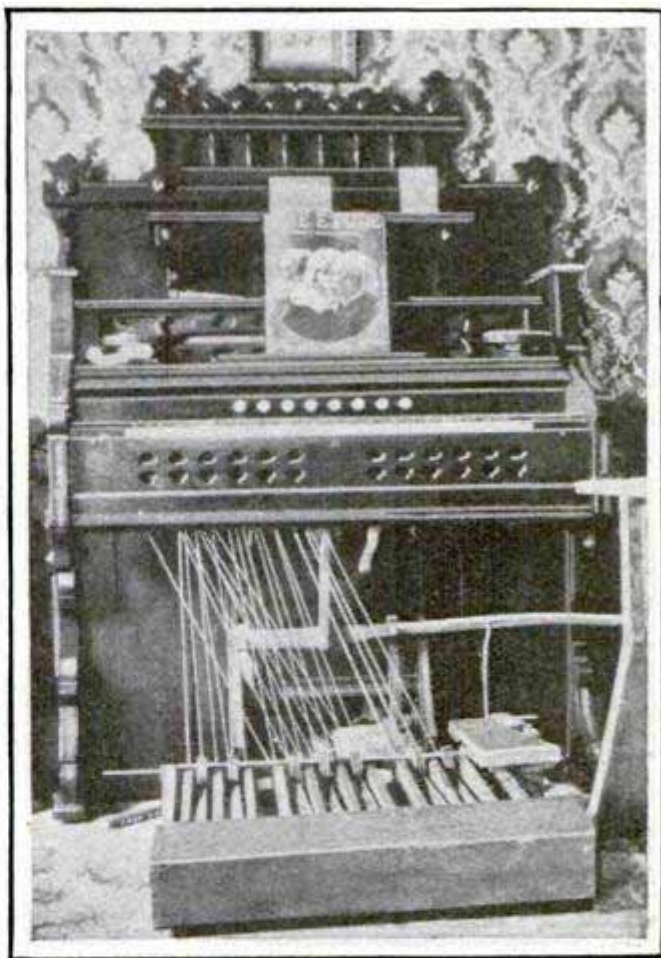
LOCOMOTIVE BUILT TO CUT THROUGH SAND STORMS

For use on the Sahara Desert line of one of the French railways, a peculiar type of engine, designed for cutting through the terrific sand and windstorms characteristic of the region, has been built. The farther railroads have been pushed into the desert the greater has been the difficulty encountered from storms, these being at times sufficiently strong to bring heavy trains to a complete standstill or even topple them over. To facilitate driving into head-on blasts a locomotive with a sharp V-shaped hood has been constructed. All its surface lines are made so as to offer the least possible resistance to the wind, while the wheels are built as nearly open as is practical, furnishing a minimum surface for the wind-driven sand to wear upon. This pattern of wheel is also to be adopted for use on the cars, as solid wheels under incessant sand blasts have been found to wear so thin within a year's time as to be unsafe for further use.

HOMEMADE PEDAL BOARD BUILT FOR ORGAN

An attachment which permits music written for the pipe organ to be played on an ordinary reed or cabinet organ, was devised by the construction of a homemade pedal board. Wires lead-

ing from the series of footboards to the lower keys, and a single-lever apparatus for pumping both bellows with the right foot, completed the device. While it is possible to play only piano music on the usual home organ, with



Foot Keys Which Increase the Scope of a Reed Organ
this attachment the operator is able to play the notes written for the foot pedals of a pipe organ. /

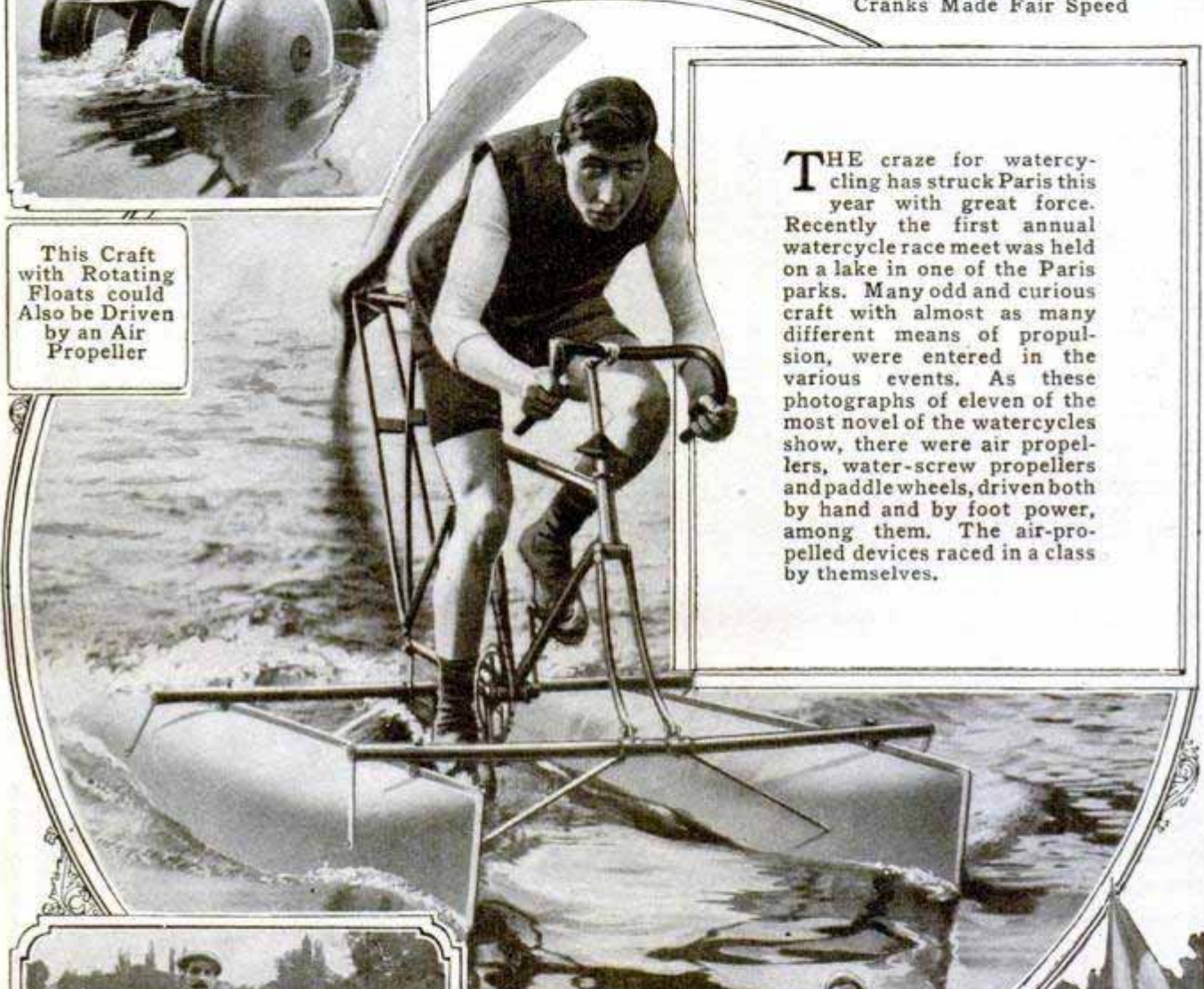
THE LATEST PARISIAN CRAZE IS WATERCYCLING



This Craft with Rotating Floats could Also be Driven by an Air Propeller



A Canoe Propelled by Hand-Operated Cranks Made Fair Speed



THE craze for watercycling has struck Paris this year with great force. Recently the first annual watercycle race meet was held on a lake in one of the Paris parks. Many odd and curious craft with almost as many different means of propulsion, were entered in the various events. As these photographs of eleven of the most novel of the watercycles show, there were air propellers, water-screw propellers and paddle wheels, driven both by hand and by foot power, among them. The air-propelled devices raced in a class by themselves.



A Machine with Cylindrical Floats That Made Good Speed



The Winner of the Race for Air-Propelled Watercycles was This Simple Machine

Like Many Other Contestants, This One Has a Bicycle Frame as the Basis of Its Mechanism

SOME OF THE CONTESTANTS IN RECENT RACES



Odd-Shaped Floats, Like the Pontoons of a Flying Boat



A Comfortable Two-Passenger Craft with the Propelling Machinery Less Conspicuous than Most



This Machine Won Second Prize in the Air-Propelled Class



Winner of the Race for Cycles Driven by Water Propellers



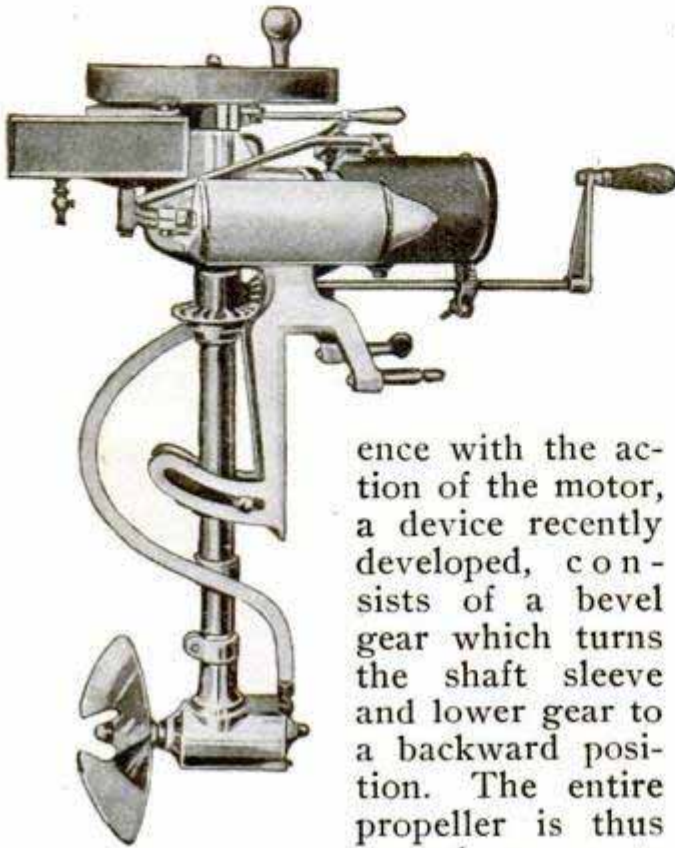
The Only Woman Contestant Caused a Sensation But did Not Win a Prize



This Watercycle, with a Stern Paddle Wheel Like a Mississippi Steamboat, Showed Great Tractive Power

PORTABLE MARINE ENGINE MADE REVERSIBLE

An attachment to a portable marine engine which enables the reversal of the propeller blades without interfer-



ence with the action of the motor, a device recently developed, consists of a bevel gear which turns the shaft sleeve and lower gear to a backward position. The entire propeller is thus turned so as to

act in the opposite direction. The arrangement is simple in its operation, requiring only a turn of the hand to accomplish. Besides furnishing a boat, fitted with a detachable motor, a reverse which may be controlled without touching the throttle of the engine, the craft is given an instantaneous brake. While the motor is running at top speed, the propeller blades may be reversed quickly so as to pull the boat in a direction opposite to that in which it is going.

UPPER MISSISSIPPI TO HAVE SIX-FOOT CHANNEL

Extensive improvement of the upper Mississippi River, a project that is estimated to cost a total of about \$20,000,000 and is designed to assure a minimum stage of water of 6 ft. during the entire year, between St. Louis and St. Paul, is being carried on systemati-

cally by the United States government. This work consists of the removal of sand bars by dredging, the riprapping of banks to prevent wash, and the building of wing and closing dams to contract and deepen the channel. The construction of dams is perhaps the most important part of the work. In many places the waters of the river have spread out into the lowlands and cut secondary channels known as chutes, and through these there is a continual flow even at low water. By closing these chutes with dams the water is held to the main channel, with the result that the level of the water is raised and a swifter current is provided for keeping the channel clear of obstacles. Much the same purpose is served by the wing dams, which are built out from the shore to confine and direct the current. The dams are built of stone and rest on mattresses of willow. Over 300 miles of the upper river has already been improved.

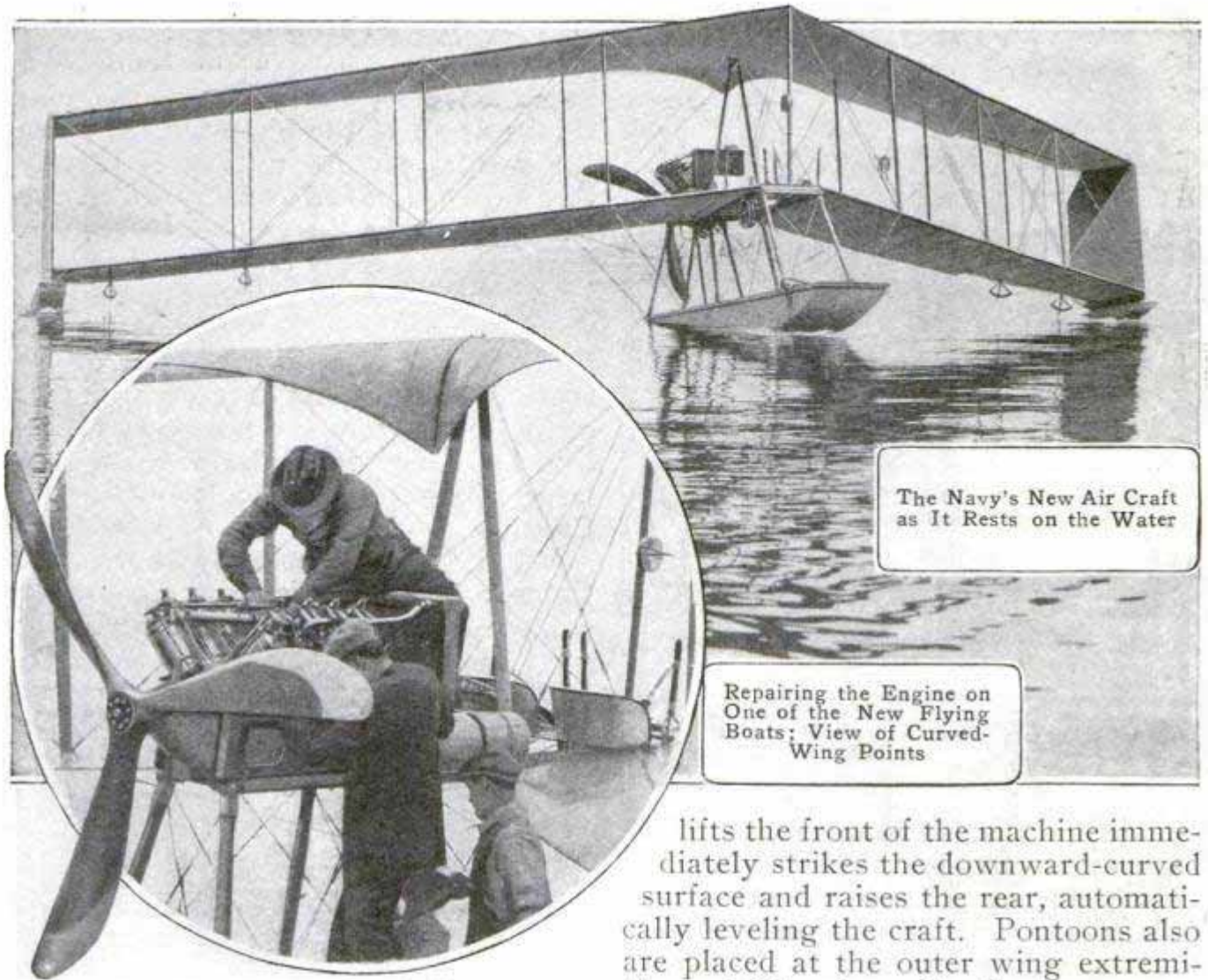
NEW STYLE OF PARASOL SHAPED LIKE A HAT

A new style of parasol now coming into vogue in London is shaped much



like a hat with an extremely narrow rim, and with contrasting colors at top and bottom. No particular reason can be discovered for this curious shape except that such a parasol is thought to give the user an air of refinement and distinction.

ⒸAn American airman flew over the summit of Mt. Whitney, in California, June 25, 1914. This peak is 14,898 ft. high, and the airman ascended to a height of nearly 16,000 feet.



The Navy's New Air Craft
as It Rests on the Water

Repairing the Engine on
One of the New Flying
Boats: View of Curved-
Wing Points

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NEW TYPE OF FLYING BOAT FOR THE U. S. NAVY

Interest has been attracted by an odd air boat which is an adaptation of the Dunne biplane, a tailless V-shaped craft with automatic stability, now being constructed in America for the United States Navy. Practically the only material change made in employing this type of machine for water use has been the substitution of pontoons for the running gear. A factory which formerly built Wright biplanes is now manufacturing this machine, which is held not to infringe on the Wright patents. The new flying boat when in the air maintains an almost even keel. This is due largely to the manner in which the wings are constructed. At the vertex of the angle formed by the upper planes, the points of the wings are turned down. Because of this, when a gust of wind strikes the fore part of the wings the same force which

lifts the front of the machine immediately strikes the downward-curved surface and raises the rear, automatically leveling the craft. Pontoons also are placed at the outer wing extremities, which gives the boat an even balance when on the surface of the water. The rudders are placed over these pontoons, occupying the space between the two planes.

HUMAN NATURE UNCHANGED SINCE PHARAOH'S DAY

Writings of the ancient Egyptians, inscribed on papyrus, a primitive kind of paper made from the inner bark of reeds, recently discovered and exhibited in London, reveal the people of Pharaoh's day as having tastes and characteristics which still mark human nature the world around. One of the documents relates to the death of a man who fell from a roof to which he had climbed in order to get a closer view of some dancing girls. Announcements of horse races and athletic sports were found, as well as the record of the complaint of a wife against her husband based on his refusal to give her the keys to their house.

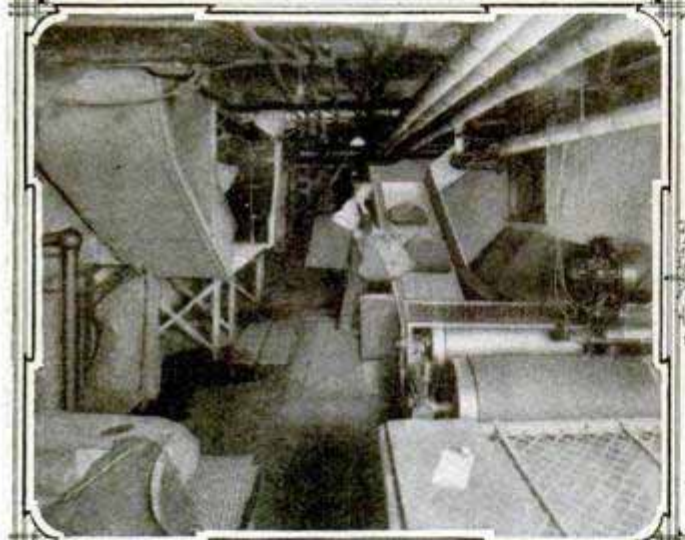
TRAVELS OF A LETTER THROUGH THE WORLD'S FASTEST POST OFFICE



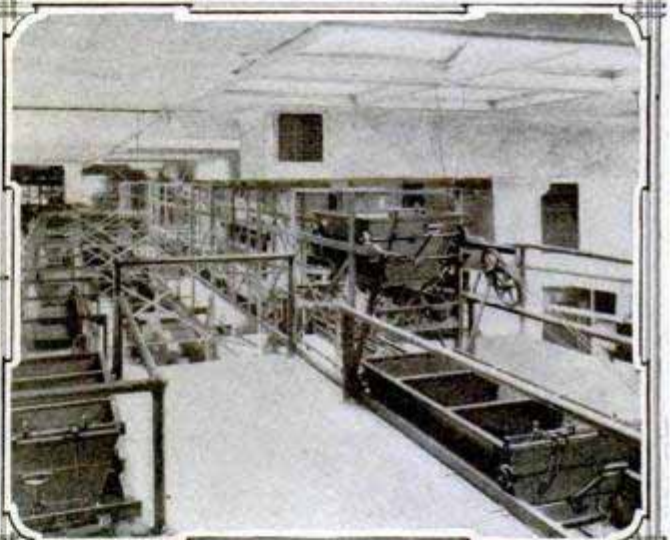
Transferring Mail into Wagons Which Take It to the Post Office

thinks at all of the big-city post office the mental picture usually is merely that of a magnified country office. If he were to take the trouble to inquire, however, and could find some one who knew the ropes and had the time to show him around, he would see something to marvel at in every one of the score or more of stages in the progress of his letter from the post box to delivery. This would be true in any large city—it is particularly true in Chicago.

While it is not generally known, the Chicago post office is more completely equipped with mechanical devices for



Under the Sidewalk the Pouches are Tossed from Chutes onto Belt Conveyors



On the Platform above the Facing Tables: Each Car Holds Three Pouches of Mail

A LETTER is dropped into a post box at the street corner. A few minutes later it is collected by a uniformed government employe. On the following morning it is delivered at its destination, whether that be 50 or 500 miles away.

The purchaser of a postage stamp knows that his letter will reach the person to whom it is addressed. But how it travels, through what machinery of sorting, classifying, handling, and transportation it passes, the average person knows little and, for the moment at least, cares less. If he

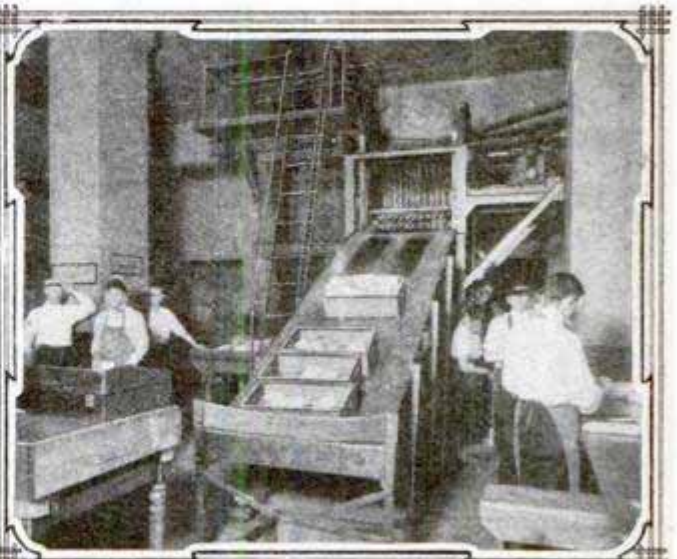


Facing Tables Where 600 Letters are Fed to a Canceling Machine Each Minute

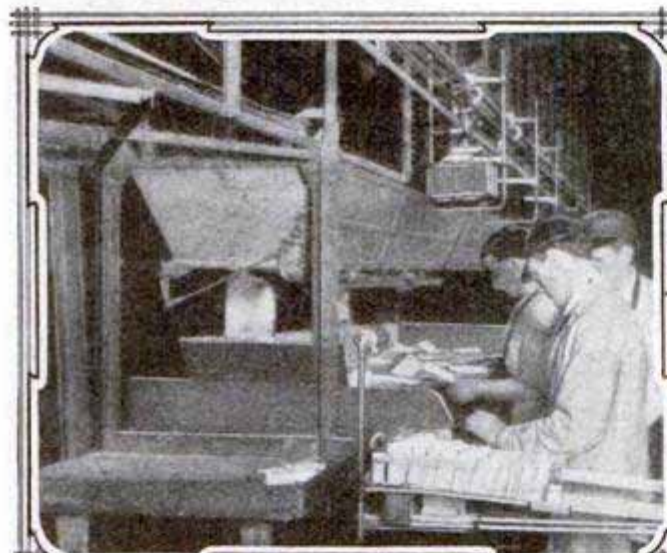
the rapid handling of the mails than any other institution of its kind in the world. The greater part of the machinery now in use in the postal service, much of which has lately been adopted by large department stores and business houses throughout the United States, was first conceived and put into operation there, and made in the post-office machine shop.

Let us follow the course taken by one of the 3,500,000 letters which pass through the Chicago post office daily. It is addressed, say, to J. M. Maxwell, Bowling Green, Mo., Route 6, R. F. D., and is dropped into one of the many post boxes scattered over the city and its suburbs. When the mail in this box is collected it is hauled to a point where, at a scheduled time, a street-

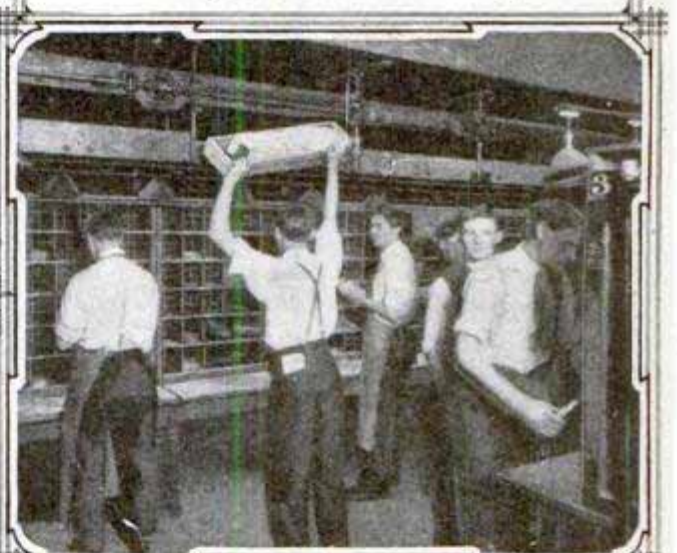
railway postal car bound for the business district picks it up. Down town the mail pouch is transferred to a



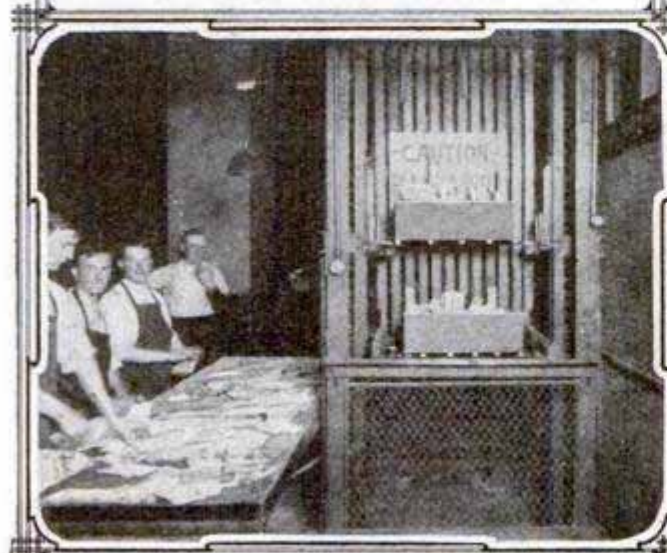
As the Boxes of Letters Reach the Top of the Elevator They are Shot to the Facing Tables



Showing Hoppers Filled by Cars, Special Delivery Basket, and Canceling Machine



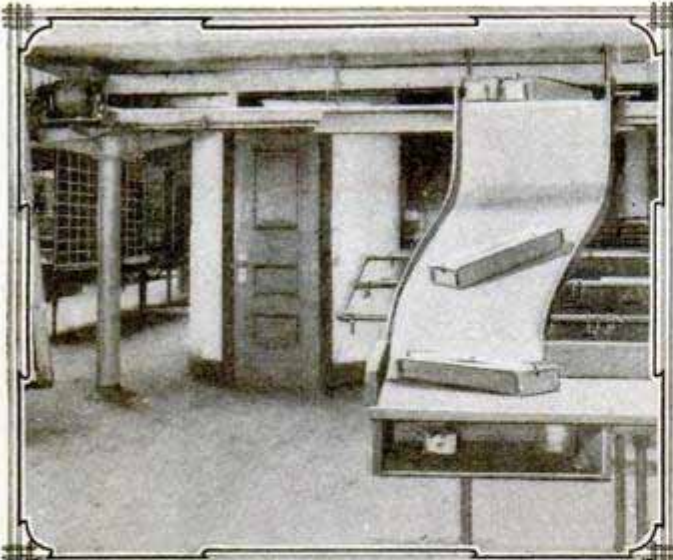
After Primary Separation the Letters are Carried by Conveyors to Distribution Sections



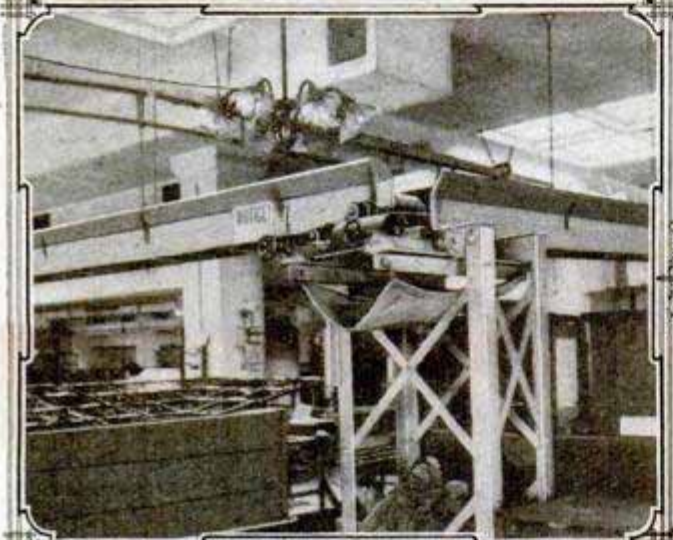
Letters Placed in the Drops at the Office are Carried to the Mailing Division by Elevator

wagon and taken to the post office where it is thrown into a steel chute extending through the sidewalk into the basement. There it is tossed upon a rapidly moving belt and carried into a vertical bucket conveyor which lifts it to a platform in the mailing division, above one of the many rows of "facing tables" which feed the canceling machine.

A heavy steel framework extends out horizontally over these tables supporting tracks upon which small electric cars are operated. When the mail sack holding the letter addressed to



Trays of Letters are Guided by Conveyors to the Distribution Section



"Tied Out" Letters are Tossed on Bundle Conveyors and Sent to the "Round Table"

ute a basket-shaped car passes above on a suspended track, a brush whisking the letter into the carrier in which it is conveyed to the special-delivery section for disposition.

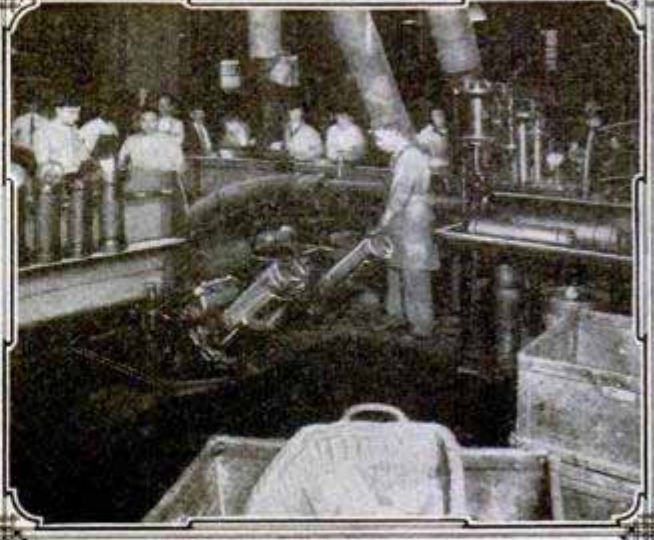
As the postal clerk reaches the letter for Bowling Green he "faces" it, that is, turns it upside down with its addressed side toward him, and places it in a grooved channel at the outer edge of the table. A rapidly moving belt passes through this and carries the letter to the feeder rack of the canceling machine, where it is stamped and slipped on into the stacker.

The letter now goes with an arm



The Mail is Directed to Specific Railway Terminals and Shot to the Tube Room

Bowling Green, Mo., is thrown from the bucket conveyor to the platform, its contents are discharged into one of these cars, which drops its load automatically into the proper mail bin above the tables, indicator fingers being set to trip when a certain hopper is reached. A supply of mail is in this way constantly available to each clerk at the facing tables. As a letter falls on one of these tables, it is sorted in relation to its class. Long envelopes, "lumber" in the vernacular of the postal clerk, are separated from those of smaller size, while unstamped, overweight and unaddressed letters are cast into drops provided for them. When a special-delivery letter is found it is laid on an overhead shelf. Once a min-



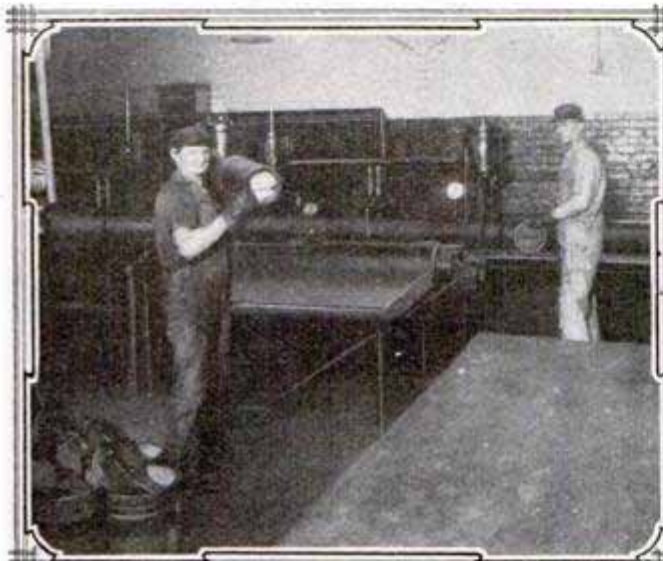
Sending Letters through Pneumatic Tubes to the Various Railroad Stations

load of others to the primary separation cases, where the mail is sorted into the states or districts for which it is

destined. This particular letter is placed in a pigeon hole marked "Missouri" and becomes one of the hundreds of epistles directed in the same general course of travel. It is then necessary to transfer it to its proper distribution section, which may be as far as 900 ft. away—according to which one of the scores of separation cases it was placed in at the beginning. It is packed with about 700 other letters in an oblong metal tray, placed on a conveyor belt and directed to its section. Each one of these places, where the mail for a certain state or group of states is handled, is represented by a



A Section of the Terminal Railway Post Office, a Recently Established Department



It Is a Matter of Seconds Before the Mail Reaches the Proper Terminal



Placing Pouches aboard Train a Few Minutes Before Its Departure



Filling Empty Containers with Incoming Mail Bound for Central Post Office

number. An indicator finger on one end of the tray works over a dial bearing the numerals of the various dis-

tributing sections. The tray full of letters is carried through a long trough until the section for which the indicator is set is reached. Here the tray, striking a guidepiece which turns it into its proper channel, is thrown into a chute which deposits it at a point where Missouri matter is worked. At this juncture the mail is handled by experts who separate it in relation to the various railroad lines and cities. In this way the letter for Bowling Green is "tied out," or wrapped in a small bundle containing mail directed either to the same point or in the same general course. As soon as this is done the package is thrown onto an overhead belt which carries it to the "round table." There the bundle of letters is

directed to a specific railroad station and train, and dropped through a chute



Interior of a Mail Car Where the Final Separation of the Letters is Made

to the tube room in the basement of the building.

Once in the tube room the bundle is placed with several others in an airtight steel carrier. This is chalk-marked on the exterior so that the character of its contents and the terminal for which it is intended are shown. It is then placed in the transmitter of one of the large pneumatic tubes and shot like a bullet by means of compressed air to the railroad station. At that point it is opened and the contents pouched, the bundle containing the letter for Bowling Green, for instance, being placed in a sack which will be put aboard the first train departing for, or connecting with, that point. In the event that there is still

sufficient time before the departure of the train, the pouch is taken to the terminal railway post office, a department of the service only recently established, and there is begun the work of separating for specific stations. This is later carried to its completion in the mail car. The letter is then pouched only with others bound for that same point, and when the town is reached the bag is dropped at the station and transferred to the post office, where it is given to the R. F. D. carrier for route No. 6, who delivers it at the mail box in front of the farm house of J. M. Maxwell. And all of this handling, rehandling, sorting, and transportation has cost the sender of the letter only two cents!

Six hundred tons of mail is handled in this way daily in the Chicago post office, but if a special-delivery letter is placed in the drop 10 minutes before the departure of a train, it will make its connection. The remarkable speed attained in this one instance is characteristic of the handling of all first-class mail. Letters bearing the post mark of 12 o'clock noon will be safely deposited aboard trains departing at 12:30 o'clock. In one hour from the time mail arrives at the office through ordinary channels, 500,000 letters can be worked out.

¶As a protection against the ravages of white ants, which will attack poles but not trees, living trees are used to support the telegraph line in portions of East Africa.



Delivering a Letter in the Country a Few Hours After It was Mailed Miles Away



A Heavy Piece of Work on the Wagon Road Built by the Government in Arizona for Hauling Supplies During the Construction of the Salt River Irrigation Dam

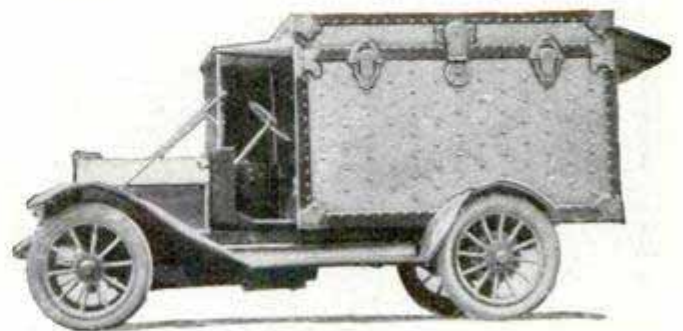
GOVERNMENT BUILDS WAGON ROAD IN ARIZONA

During the construction of the Salt River irrigation dam in Arizona, the government engineers found it necessary to build a wagon road through the mountains for the delivery of supplies and material. The construction of this road, known as the "high-line wagon road," involved a great deal of heavy work. Its location and construction were so well planned and carried out that the government now uses the road as an object lesson in mountain-road building.

BODY OF DELIVERY WAGON IS LARGE TRUNK

In converting an old touring car into a delivery wagon an eastern leather-goods manufacturer built a big trunk for the body of the machine. The

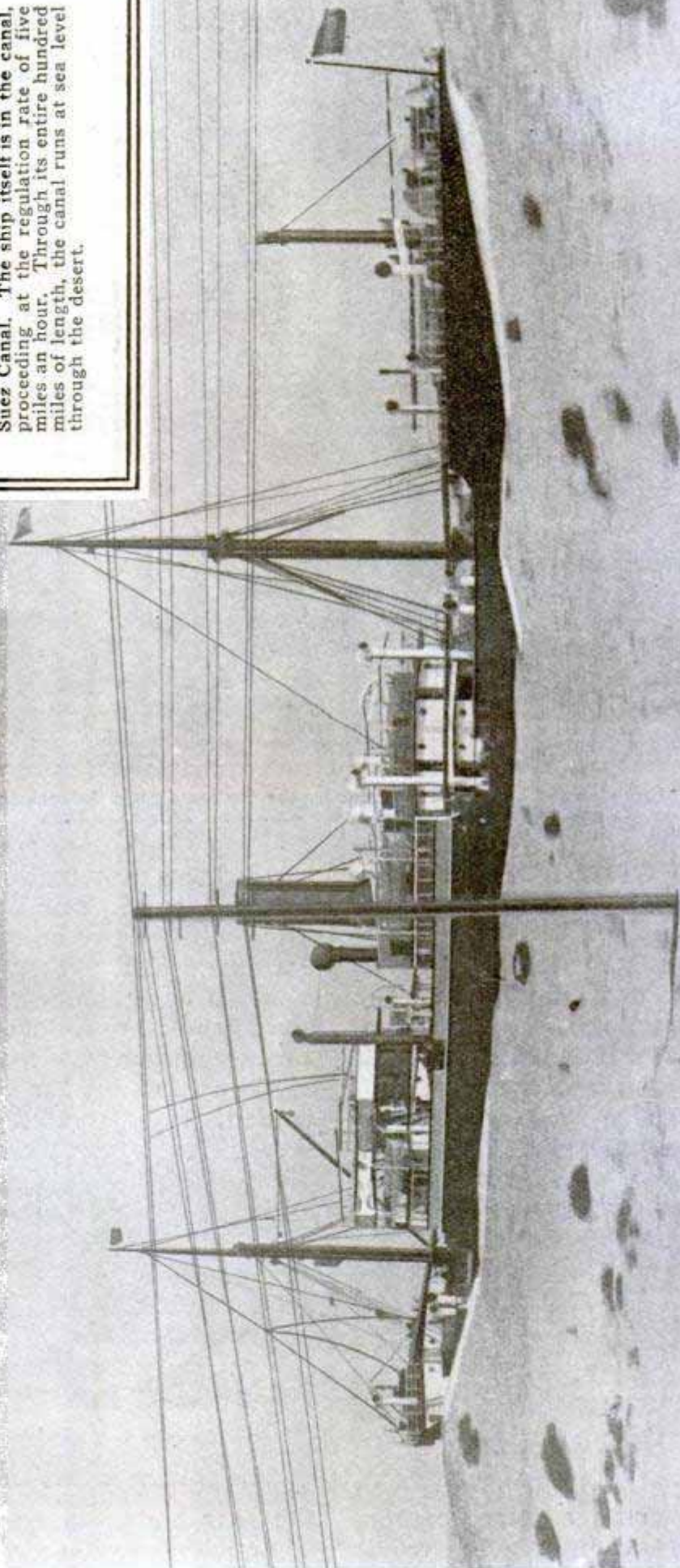
carrier was not made merely to represent a trunk, but literally was one, fitted with heavy hinges, corner plates and metal lock. Its capacity was sufficient to accommodate eight ordinary-sized trunks, or a dozen of lesser bulk. Besides being serviceable in performing the function for which it was intended, it attracted attention and served for advertising purposes. At



Large Trunk as Body for Delivery Truck

the rear end, folding end gates were made which gave access to the interior of the box.

THIS unusual view of an ocean steamship, apparently aground on a sandy shore, was photographed from a train on the railroad which parallels part of the Suez Canal. The ship itself is in the canal, proceeding at the regulation rate of five miles an hour. Through its entire hundred miles of length, the canal runs at sea level through the desert.



EXPERIMENT WITH DIAMONDS UNDER INTENSE HEAT

From tests conducted by a mineralogist at Columbia University it has been shown that diamonds are capable of withstanding heat equal to that of a crematory without losing their brilliance or suffering measurable injury. A stone used in the experiments was placed on a piece of beef, containing bone, and then put into a retort for one hour at a temperature of approximately 2,000° Fahrenheit. Examination showed that the diamond was apparently uninjured. It was then placed back into the ashes, however, and thrust into the furnace again, this time remaining for two hours at 2,100°, and for another two hours at 1,600°. During this period, or after five hours in the retort, the diamond lost about 18 per cent of its weight, but when re-polished it was as brilliant as before the test. The conclusion reached was that in the first operation the action was not oxidizing, and for that reason the stone did not show deterioration. In the second case, however, after the gases had ceased to be given off by the flesh, the action was oxidizing and the diamond for that reason was slowly consumed.

AMERICAN AIRMAN WINNER OF HENDON-PARIS RACE

An American airman, Walter L. Brock, won the aeroplane race from Hendon, England, to Paris and return on July 11, 1914, beating his nearest rival by more than an hour. The American covered the distance of 502 miles in 7 hr. 3 min. 6 sec., at an average speed of 71.1 miles an hour. Raoul Garros, the French airman who was the first to fly across the Mediterranean, finished second in 8 hr. 28 min. 47 seconds.

ⒸA six-story ice palace, with seating capacity for 3,000 persons and estimated to cost \$300,000, is being planned for New York City.

USE SMALL FLASHLIGHTS FOR ARMY SIGNALS

Satisfactory results have been attained in experiments made by the signal corps of the German army with



Electric Optical Apparatus Used at Night by German Army for Signaling

an optical night-communicating device consisting of a small electric searchlight mounted with field glasses. The current for the light is supplied by dry batteries strapped to the belt of the operator. The light rays converge slightly so that they are invisible excepting in a certain plane. By the use of code, messages may be transmitted quickly and silently to a distance of between five and six miles. The arrangement also may be used at shorter range during the daytime. Another apparatus, especially designed for the transmission of messages between aerial scouts and land forces stationed at specific points, is composed of a reflector and an electric lamp with a telescope mounted on its upper rim. A push button on the handle provides for the flashing.

BIG HOOK MADE FOR CRANE OF GIANT SIZE

Approximately three times the height of a man of ordinary stature, a hook built for handling tremendous weights has been made to be used with a huge crane which will be mounted in a German factory. The lifting apparatus will be one of the most powerful in the world, capable of swinging 231 tons to a height of about 26 ft. This weight corresponds to about that of a medium-sized coast steamer. In order that the action of the hook upon its vertical axis might be as easy as possible, bearings the size of a man's fist were used.



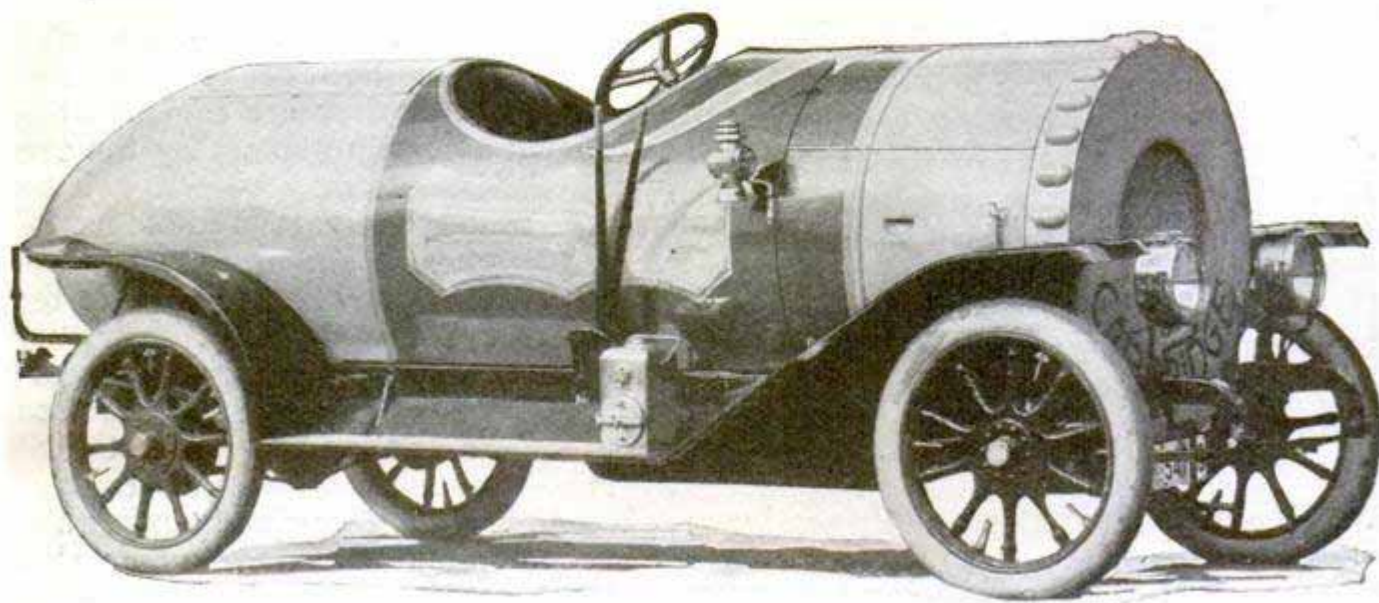
prepared in a solid and is in the form of a cartridge. The body of the car was built to resemble this in as many particulars as possible, even to the general color. The machine is of such an uncommon appearance that crowds of persons gather about it whenever it is stopped on the streets.

RANGE FINDERS USED ON NAVAL VESSELS

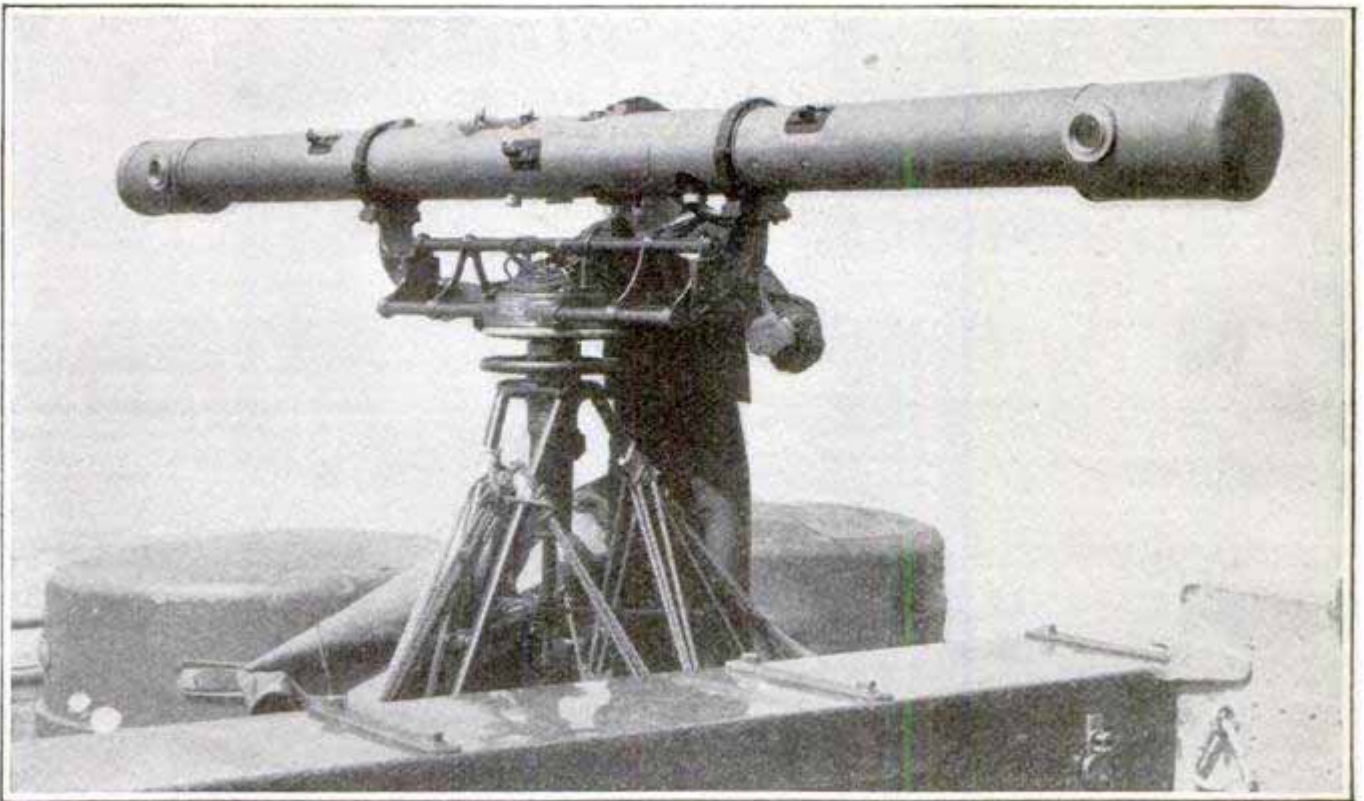
One of the most important instruments on a naval vessel is the range finder, for without this instrument it is practically impossible to aim the guns accurately without first incurring a serious delay in getting the range by trial shots. The range finder carried on the battleship "Delaware," and shown in the illustration, is typical of the up-to-date instruments that are now being installed on American warships. Range finders all work on much the same principle, images of the ship or other object sighted on being received through the two object glasses, one located near each end and on the side of the tube, and then reflected and refracted by a system of mirrors and prisms so that both are brought to the eye of the observer, who looks through the eyepiece located at the middle of the tube and on the opposite side from the object glasses. The right-hand object glass transmits only the upper half of the object sighted on, and the left-

ADVERTISING MOTOR BUILT LIKE CARTRIDGE

Intended to be used for advertising purposes by a perfumery establishment, for which it was built, a motor car shaped like a cartridge has attracted attention at Detroit, Mich. The especial perfumery manufactured by the concern is not a liquid, but is



Odd-Shaped Motor Car Used for Advertising Perfumery



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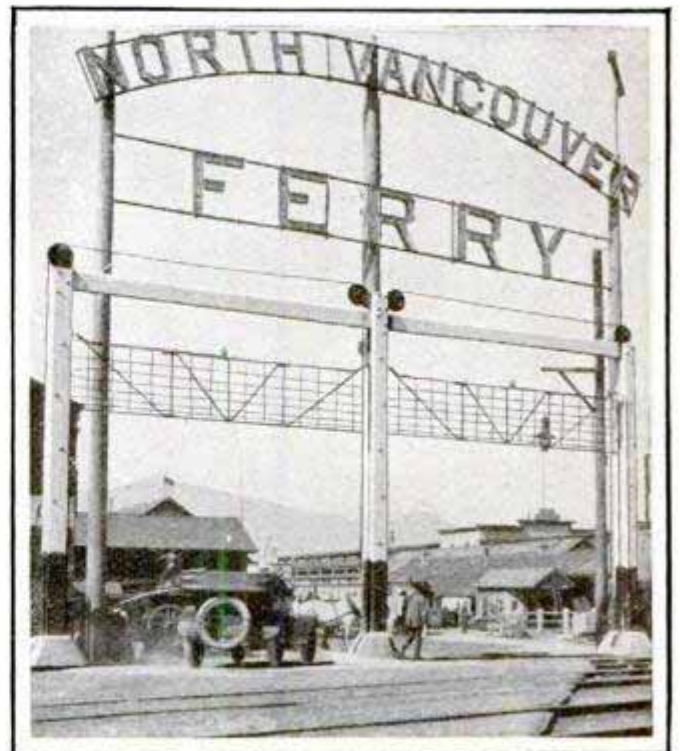
Range Finder on the Battleship "Delaware:" With This Instrument the Distance to Another Ship is Found Accurately in a Few Seconds

hand object glass, the lower half. When sighting at a ship, for example, the rigging and funnels will appear to be offset horizontally from the lower part of the ship so long as the instrument is not set for the correct range. The images are then brought together by a thumbscrew that moves one of the prisms, and this sets a scale that shows the distance in yards to the ship.

RAILWAY TRACKS GUARDED BY ELECTRIC GATES

Automatically operated electric portcullis gates have been installed by the Canadian Pacific Railway as crossing protections along its water-front trackage at Vancouver, B. C. The guards are literally lifting fences, which may be raised or lowered, either separately or in unison, to pass or stop traffic. They are controlled from a switchboard which is placed in a tower where the operator has a clear vision of the tracks. Pressure on one of the keys causes a gong to ring at the gate governed by that particular switch, and in a few seconds the barrier begins to descend. Should it be necessary to stop the gate before it reaches the

ground, it is possible to do so by using an emergency switch. The guards are raised in a similar manner. At night, white and green lights show the watchman the positions of the different gates. By a few quick taps on the electric buttons, all the gates may be set in motion simultaneously.



Electric Portcullis Gates Guarding Water-Front Tracks at Vancouver

TAKING MOVIES HUNDREDS OF FEET UNDER THE EARTH

Recent Development of Powerful Lighting Devices Makes
Possible Conquest of Darkness with Motion-Picture Camera

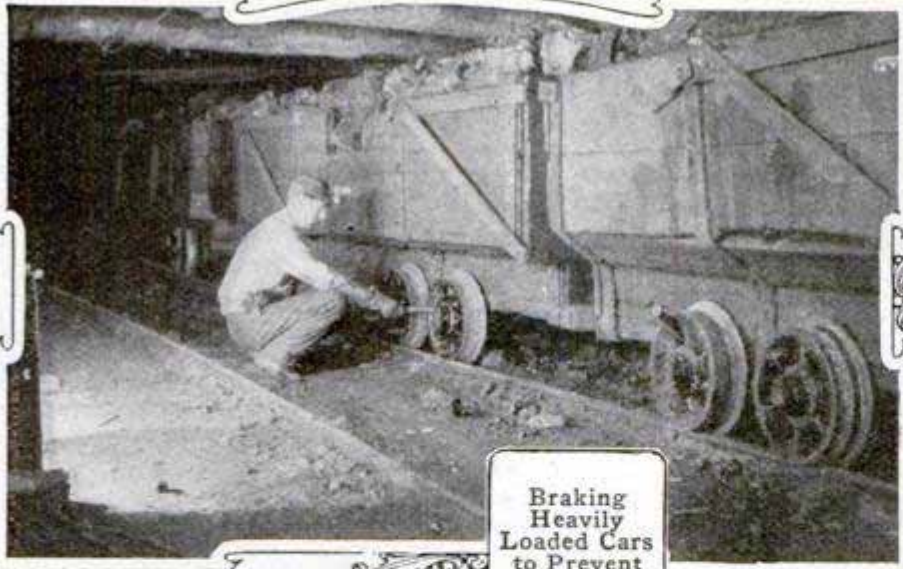
MOTION pictures of "natural" scenes, as distinguished from those specially staged in the studios, can now be made in the middle of the darkest night, in the depths of the blackest coal mine—anywhere, in short. This advancement in motion-picture photography has been attained by the employment of two distinct methods of producing intense light, one of which, in this application, is entirely new. It was because of the efficiency of these agencies that pictures, hitherto almost impossible for the split-second camera to catch, have been made. The manifold activities constantly going on beneath the surface of the earth, the toil of the miner, the beauties of caverns, the traffic under the streets of cities, and the underground phases of engineering, which in the past have been described only with type and still pictures, now constitute a new field open to the motion-picture camera.

Without the aid of electricity, arc lamps or flashlight powders, clear negatives were recently made during the night by a motion-picture camera using a $\frac{1}{40}$ -second exposure. The light was furnished by two candles made of a composition of metallic magnesium and aluminum, which gave an intense white light with a constant actinic violet ray. While a good arc will develop between 4,000 and 5,000 cp., the portable candle reaches a degree of luminosity as high as 50,000 cp. Its contended superiority over other artificial light lies in its penetrative qualities. Outside of a range of approximately 30 ft. the light of an arc is not sufficient for movie-photographic purposes, while the magnesium-aluminum candle has illuminated objects 1,000 ft. from the camera allowing impressions with considerable detail. In making the metallic candles the two metals, powdered, are mixed with a paste, used in pyrotechnics, into a solid bar. This,

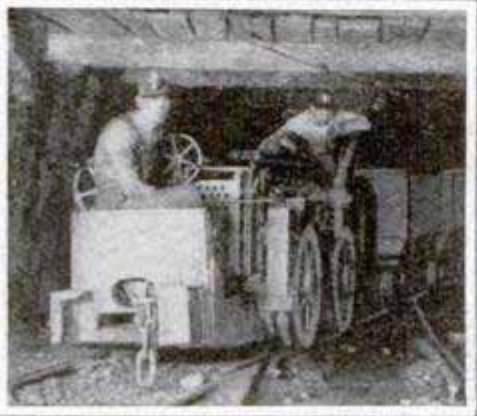
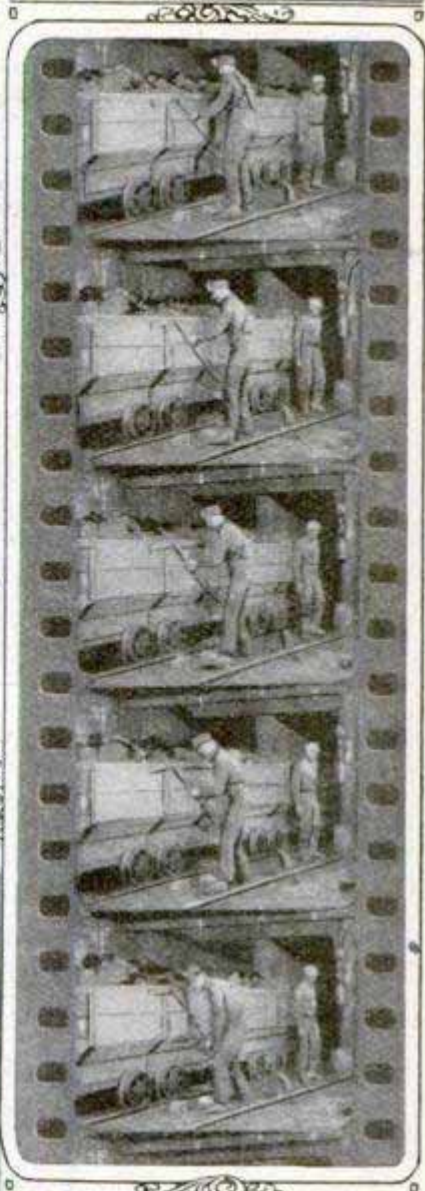
when ignited by a priming flame, produces not only a wonderful light but great heat. In composition it is greatly like thermite, a heat-producing compound used in welding. Both employ ground aluminum as one of the principal ingredients, but in the case of the latter, an oxide of iron or some other metal is used instead of magnesium. The use of the camera after nightfall is not confined to photoplays, but is valuable in the manufacture of educational and current-event reels.

Many still pictures have been taken underground by the use of time exposures. But for the movie camera this has been practically impossible because of the inadequacy of lighting facilities. The inventor of the metal candle recently overcame this obstacle by constructing a special arc-light equipment which develops 180,000 cp., enabling motion pictures to be taken showing every movement in the process of mining coal under the earth. The outfit weighs 1,800 lb. and consists of 12 arcs, each with a candle-power of 15,000. The lamps are placed in three groups of four lights each and are connected with a rheostat, furnishing a constant light of great intensity. By using a soft-carbon core threaded with a small brass wire a light rich in the violet or photographic rays is produced. In taking motion pictures in coal mines, each exposure of the film was timed for $\frac{1}{8}$ second, and 16 such exposures were made every second, recording every motion in the process of mining coal.

The photographs reproduced on the opposite page show how successful are these latest efforts of the camera to record occurrences in the dark. With under-water motion photography an accomplished fact, and coal-mine movies now obtainable, the last limitations to the scope of this newest of the graphic arts seem to have been removed.



Braking
Heavily
Loaded Cars
to Prevent
Their
Rolling



Motor Hauling Train of Coal Cars
through the Tunnel



The Movie
Man Operat-
ing His
Machine
under the
Earth

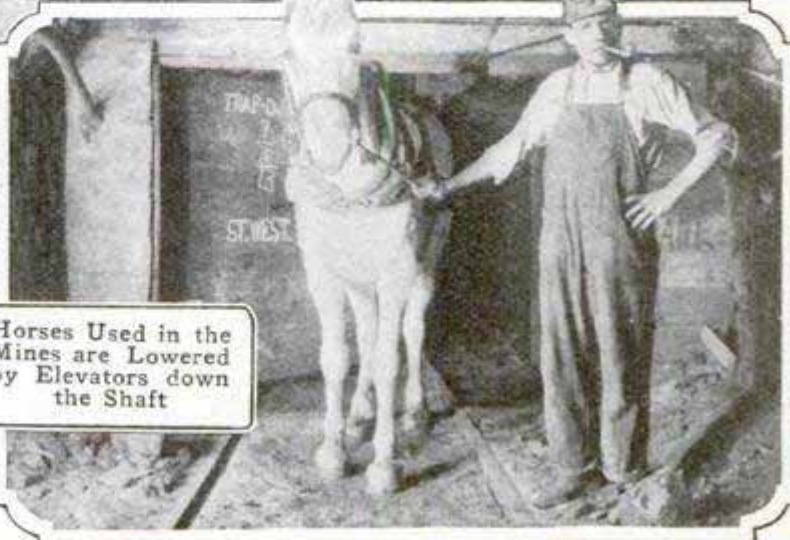


A Strip of Film
Exposed in the
Coal Mines
Hundreds of
Feet Under-
ground

Enlargement of
Motion Picture
Taken at
Night, Showing
Buildings One
Block Distant

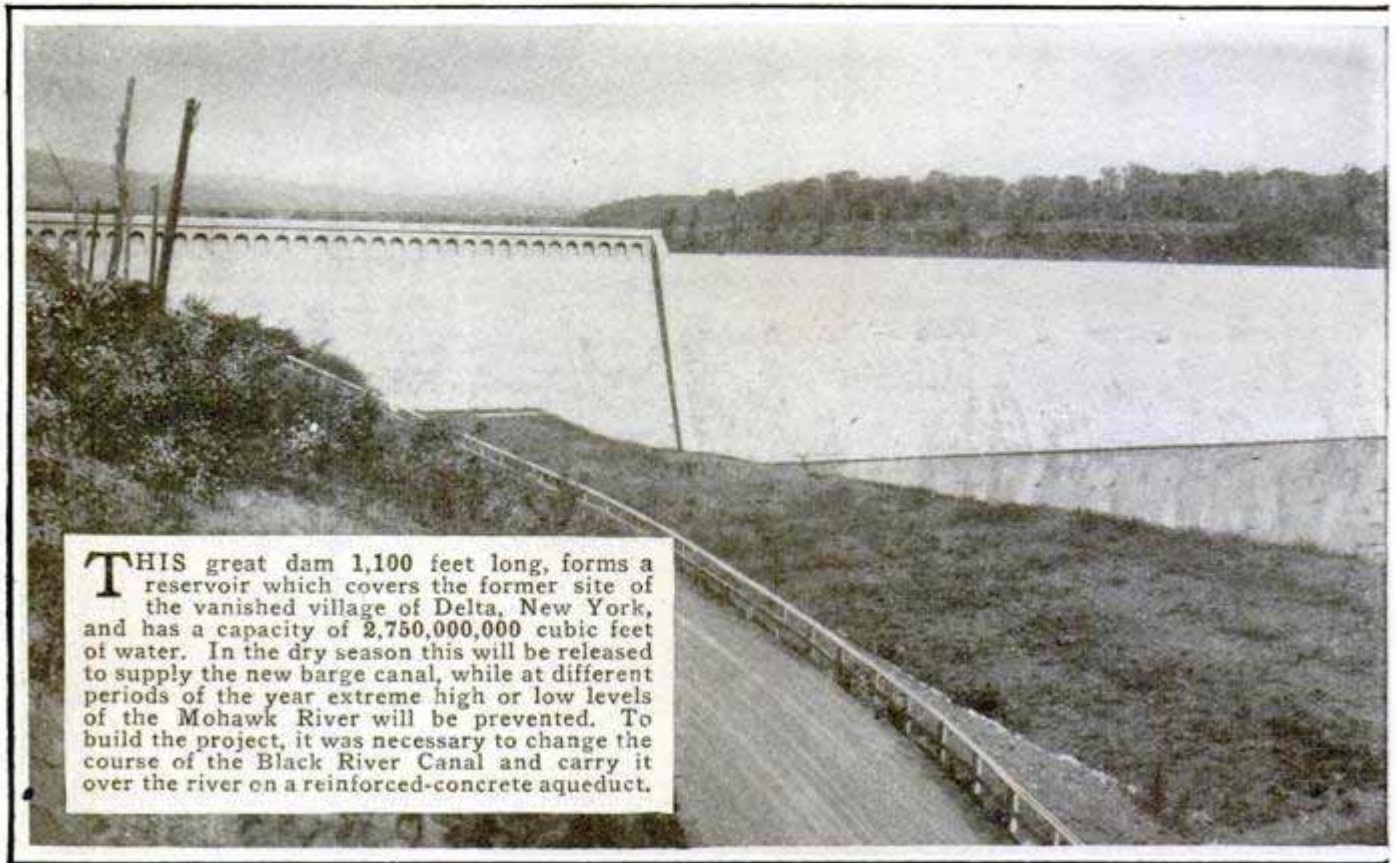


The Examiner Caught by the Camera on
His Tour of Inspection



Horses Used in the
Mines are Lowered
by Elevators down
the Shaft

GREAT DAM THROWN ACROSS MOHAWK RIVER



THIS great dam 1,100 feet long, forms a reservoir which covers the former site of the vanished village of Delta, New York, and has a capacity of 2,750,000,000 cubic feet of water. In the dry season this will be released to supply the new barge canal, while at different periods of the year extreme high or low levels of the Mohawk River will be prevented. To build the project, it was necessary to change the course of the Black River Canal and carry it over the river on a reinforced-concrete aqueduct.

A CURIOUS SIGN IN TEXAS PROHIBITION TERRITORY

As the result of local-option laws much of the state of Texas is prohibi-



Sign Erected in Prohibition Section of Texas:
Fifty-Five Miles to the Nearest Drink

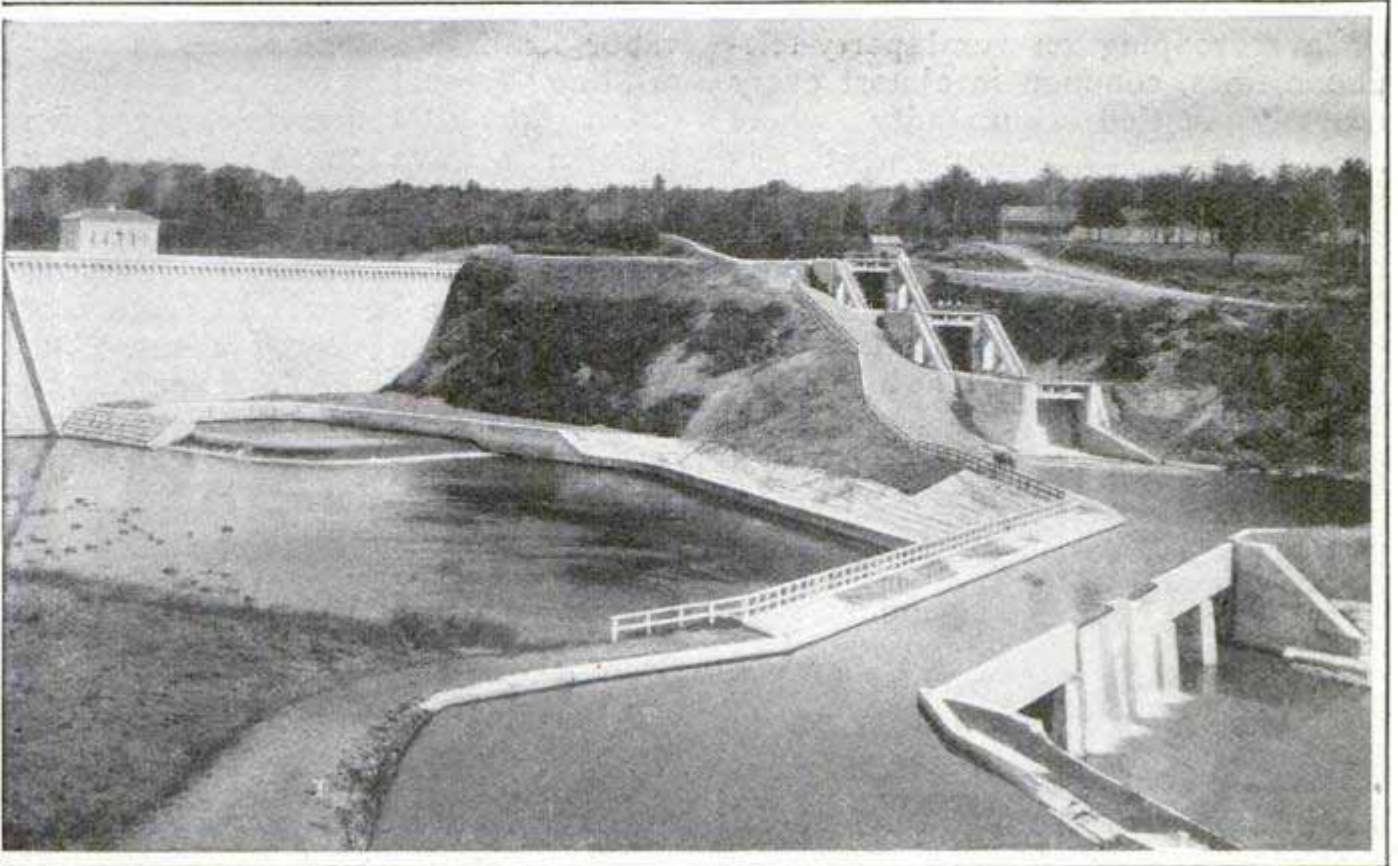
tion territory, and some idea as to the large areas over which the temperance movement has become effective is

given by the curious sign shown in the illustration. This sign not only shows the distance to Wichita Falls, but gives a hint by means of the crudely painted bottle that that city is the nearest point at which an alcoholic drink can be obtained.

INSTALLING FENDER CHAINS FOR PANAMA CANAL LOCKS

The last of the big mechanical devices of the Panama Canal locks are the chain fenders, and these are being installed as fast as the manufacturers are able to deliver them. Of the 15 chains made in the United States four have been delivered on the Isthmus and are being installed at the Miraflores and Pedro Miguel locks, while the remainder are being subjected to the severe tests required by the government. Twenty-four chains in all will be needed to complete the protection of the locks. They range from 418 to 434 ft. in length and weigh about 85 lb. to the foot.

TO IMPOUND FLOODS AND FEED BARGE CANAL



CURIOUS MEXICAN WATER-CARRYING VEHICLE

In certain semiarid sections of Mexico the natives are frequently compelled to go long distances for their supply of water. This is especially true in dry seasons when occasionally the nearest spring or stream is miles away. In these districts the inhabitants usually are poor and their implements crude, although interesting in certain instances. One of the novel methods used for hauling water consists of hitching an animal to a barrel and then pulling this across country. On the barrel heads are cleats holding knobs to which chains are attached so that the cask revolves

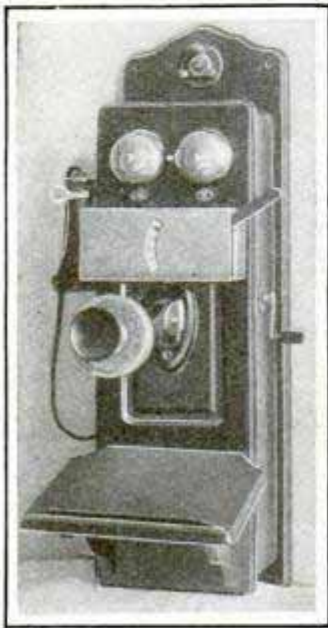
easily. The water is poured through a bunghole which is stoppered securely, so as to prevent leakage.



Carrying Water in Mexico in Animal-Drawn Casks

TELEPHONE IS MADE PROOF AGAINST EAVESDROPPING

Eavesdropping on rural party-telephone lines, common in almost every sparsely settled community where



amusement is limited, has been made practically impossible by the invention of an attachment which heralds the fact immediately in case a third person "listens in" on a conversation. The announcer is composed of a toothed disk which is set in motion by the removal of the

receiver from its hook. This device then breaks in with a series of musical notes which informs the persons using the line exactly whose instrument has plugged in. In case the offending telephone's call is one long and two short rings, for instance, a bass and two high-pitched notes will be chimed. The indicator also gauges the length of a conversation and breaks the connection after the line has been open four minutes. A person wishing to talk longer than that may make a new connection by pressing down the indicator lever. A record also is kept of the number of hours the instrument is used during a year.

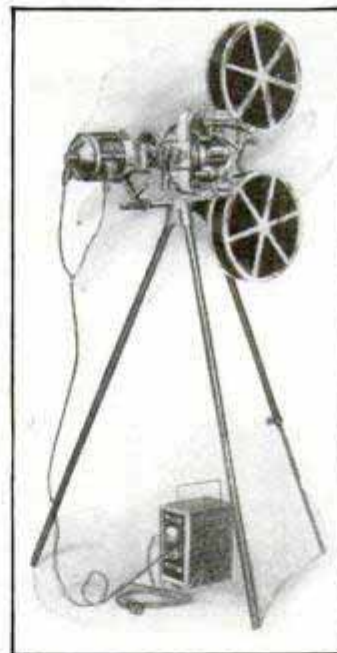
ULTRAVIOLET RAYS FOR WATER STERILIZATION

The first plant for sterilizing water on a large scale for municipal uses by means of ultraviolet rays is now being constructed at Niagara Falls. The channels in which the water will be sterilized will be of concrete, 2 ft. wide, 3 ft. deep, and 26 ft. long, affording 30 seconds of exposure to the ultraviolet rays. There will be five of these canals and in each canal seven lamps

capable of producing the ultraviolet rays will be installed. These lamps are simply a modification of the mercury-vapor lamp in common use in blue-printing establishments and photograph galleries. Ultraviolet rays have too short a wave length to be seen by the human eye, and some scientists have concluded that because of this shortness and rapidity of vibration they shake the bacteria to death just as a rat terrier shakes a rat. The lamps that are being installed at Niagara Falls will easily handle the full capacity of the waterworks plant, 16,000,000 gal. a day.

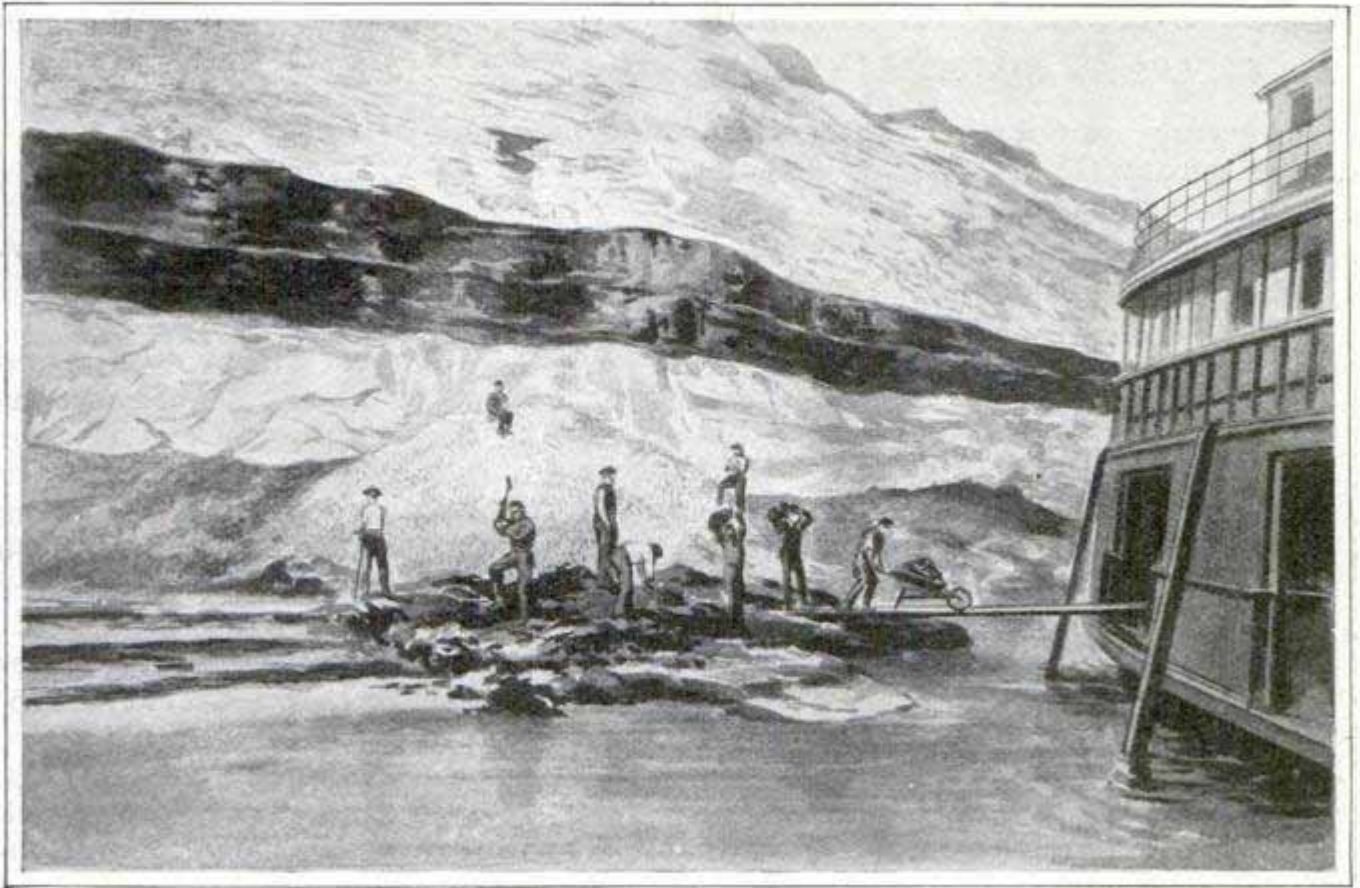
MOTION-PICTURE PROJECTOR IN COMPACT FORM

A portable motion-picture projection machine which may be taken apart or assembled in five minutes' time, and



which also may be carried easily in two compact cases, has been produced. It is especially designed for the use of traveling entertainment companies and lecturers using films or slides for illustrations. The instrument uses standard 1,000-ft. reels and is operated essentially the same as ordinary machines.

One of the advantages claimed for the invention is that the construction of its arc makes it possible to use any incandescent-lighting current, a greater flow of energy than 5 amperes being unnecessary for ordinary work. One of the reasons this is possible, it is said, is that the system is designed to illuminate only the film aperture instead of the standard lantern-slide opening, which is considerably larger.



Mining and Breaking Coal for a Missouri River Steamboat at a Point in North Dakota Where Nature has Provided a Permanent Coaling Station

STEAMERS TAKE COAL FROM VEINS IN RIVER BANK

Some of the steamboats plying the upper Missouri River obtain much of their fuel supply from outcropping coal veins along the banks of the river in the vicinity of Manhaven, N. D. The coal is free to all comers, and all the captain of a boat has to do is to bring his boat to the shore, throw out the gangplank and then dig and load all the coal he needs. The mining is a simple process, as the vein, which is about 10 ft. in thickness, is easily accessible in the vertical face of the river bank.

GUARDS AGAINST INFECTION IN USE OF TOWELS

A new towel holder, recently brought out, is designed to provide for the best sanitary conditions in the care both of used and of unused towels. All the unused towels are kept in a closed reservoir, and as soon as used each is stored in a closed receptacle at the bottom of the case, so that there is no danger of

the clean towels becoming contaminated by the air or of the soiled towels infecting the air. The towels are all strung on a wire, which is locked to the case. Each is drawn out of the reservoir and over the loop as needed

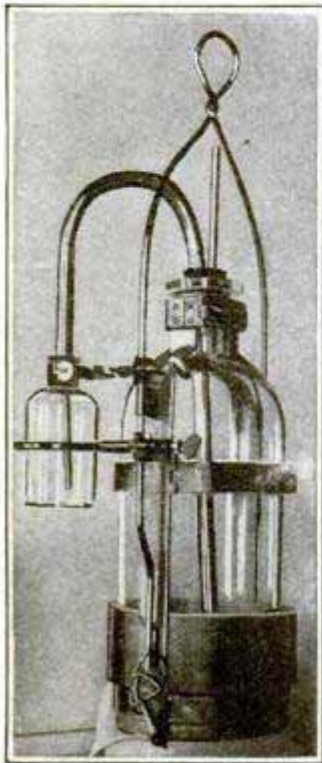


The Towels are Simply Lifted Out of the Reservoir at the Top of the Case and around the Wire Loop, and after being Used are Dropped into the Closed Receptacle Below

and, after being used, is simply dropped into the receptacle below. The towels are removed by unlocking the wire and lifting it out of the case, when the towels are easily shaken off over the top end of the wire.

PROCURING OF DEEP WATER SAMPLES SIMPLIFIED

In getting samples of water from depths greater than 10 or 15 ft., for bacterial analysis, with ordinary apparatus, it is difficult to avoid mixture with a certain amount of surface water.



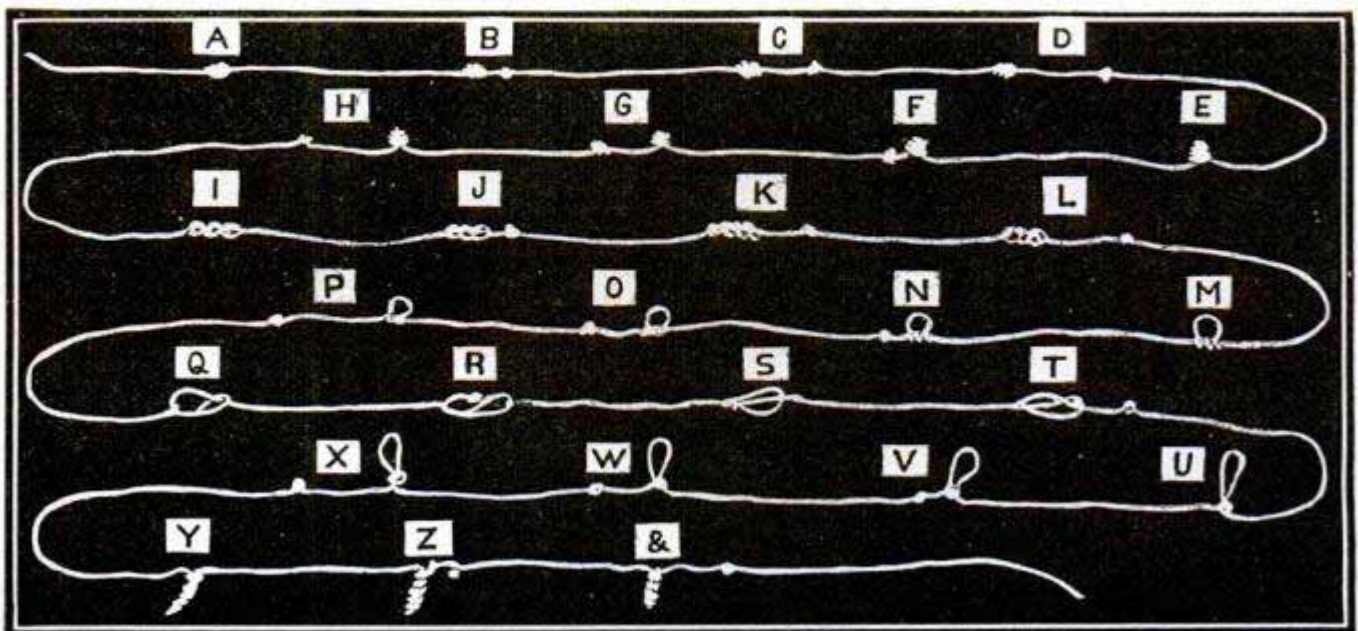
To eliminate this a device has been made which consists of a heavy framework carrying two bottles; one large, the other small. A straight hollow tube, open at both ends, extends through the cork in the large flask, while a second pipe connects the two containers.

There is an aperture in this, above the mouth of the small bottle. As the outfit is lowered into the water, air escapes through the straight tube while water enters through the orifice of the other, passing through the lesser container into the big flask. When both bottles have been filled the small one

contains the desired sample, the surface water having passed out of it into the other container during the siphoning process.

WRITING IN OLD PERU WAS A KNOTTY SUBJECT

An adaptation of the knotted string which served the ancient Peruvians as a means of communication, is suggested for the use of the blind, each knot representing, either alone or in combination, a letter of the English alphabet. In its original form, the Peruvians, before the advent of the Spanish "conquistadores," sent cords or thongs, suspended from a central top-band or cross bar, from one village to another as a warning or a call for help. Later, colored cords were introduced, and, as life grew more complex, an elaborate system of knots was devised, by which laws, edicts and historical events could be communicated. Each village had its official, whose duty it was to interpret the message, or "quipu," as it was termed, and to prepare and send such answers or other messages as were necessary. When the quipu came from a distant province, an oral explanation was required, to enable the interpreter to correctly translate the knots. In the modern adaptation, the sightless pass the string between their fingers.



Alphabet Formed by Tying Knots in String, by Which the Blind may Receive Messages

COURTESY OF THE SKETCH

HUNGARIAN GAS WELL A BIG PRODUCER

The existence of natural gas in Hungary has been known since ancient times, but it was not until 1909 that any systematic attempt was made to develop this great natural resource, and even then development was brought about more by accident than otherwise. While borings were being made for potassium salts near Kissarmas, gas at a pressure of 32 atmospheres was encountered at a depth of about 1,000 ft. The annual yield from this well is equivalent to about 2,000,000 tons of coal. The gas is transported through a conduit nearly 50 miles long, which is the largest natural-gas conduit in Europe, and serves to light about 20 small municipalities in Hungary besides lighting portions of the Hungarian state railway.

CONCRETE PILING AT DOCK USED AS LAND ANCHORS

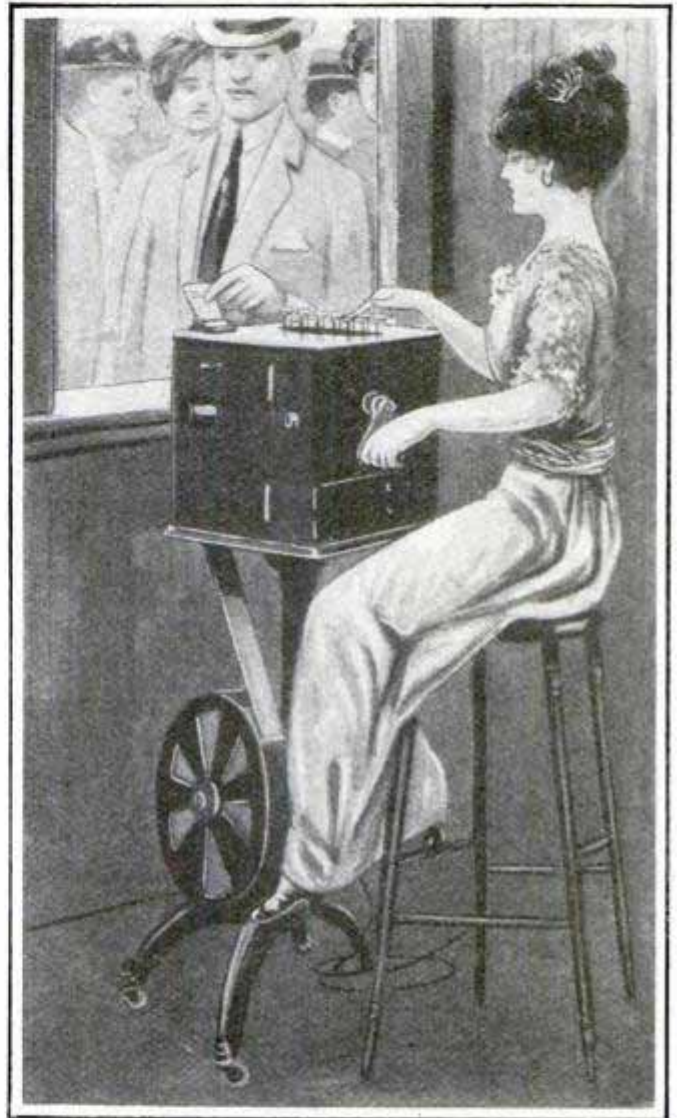
Heavy concrete posts incased in galvanized-iron cylinders and set in substantial bases, have been found superior to wood piling at an Ohio canal port where they have been used successfully as snubbing posts for docking vessels. Provided with smooth surfaces, these piles do not wear the ropes nor do they rot and wear simply from exposure, as is usually the case with wood piles along a waterway. The posts are 2 ft. in height and 1 ft. in diameter, and said to withstand the tension placed upon them fully as well as ordinary piling of similar size.



Concrete Snubbing Posts for Docking Boats

TICKETS PRINTED AND SOLD BY CASH REGISTER

For printing and issuing theater and ball-park tickets, a machine which also keeps an account of the number of



Machine Which Prints and Sells Tickets

cards made, the list of sales and the amount of money received, has been produced. The different operations all are accomplished by pressing two keys, one indicating the price of the ticket and the other the number sold at one time. The tickets are printed from a blank roll of paper which threads through the machine from a large spool. The mechanism is worked by either electricity or hand power. An advantage of the apparatus is that it shows at a glance the number of sales made and the amount of money which should be on hand, without delays either in selling or computing.

KITCHEN-SINK ATTACHMENT IS LABOR SAVING

A convenient attachment to a sink which lessens work in the kitchen consists of a cutting board with a middle



Sink Attachment Cares for Garbage

hole under which is a garbage pail for the collection of waste materials and refuse. The support is made box-shaped so that the bucket may be placed directly under the aperture. When vegetables are being prepared for a meal the paring and cutting may be done on the board and then, without difficulty, the useless parts scraped

into the bucket. The arrangement also is serviceable when dishes are being scraped preparatory to washing. Such a system often prevents the stoppage of sewage pipes, besides facilitating the routine work.

NEW SECRET EXPLOSIVE IS TESTED BY NAVY

Tests of a new explosive, the formula of which is a navy secret, indicate, so far as results have been made public, that the long-sought-for submarine mine which will sink a battleship if exploded in its immediate vicinity, even though there is no actual contact, is at last in the possession of the United States government.

A caisson constructed of plates such as are used for battleship hulls was used for the tests, which occurred at the Norfolk Navy Yard. The mine was submerged to a depth of 15 ft. and exploded at a distance of 30 ft. from the caisson, which immediately began to fill and was saved from sinking only by being towed quickly to the docks.

LAUNCH HOLDS LIFEBOATS CLEAR OF DECK

Owners of small launches which navigate the Great Lakes often find it

to provisions for live-saving equipment. Some of the craft are so compactly assembled that

there is little or no storage space where auxiliary boats might be carried without inconvenience, and for that reason it is often necessary to put them in tow. In the accompanying photograph, however, is shown the method employed on one of the government boats where the same condition was met. The boats were placed above deck on the supporting frame

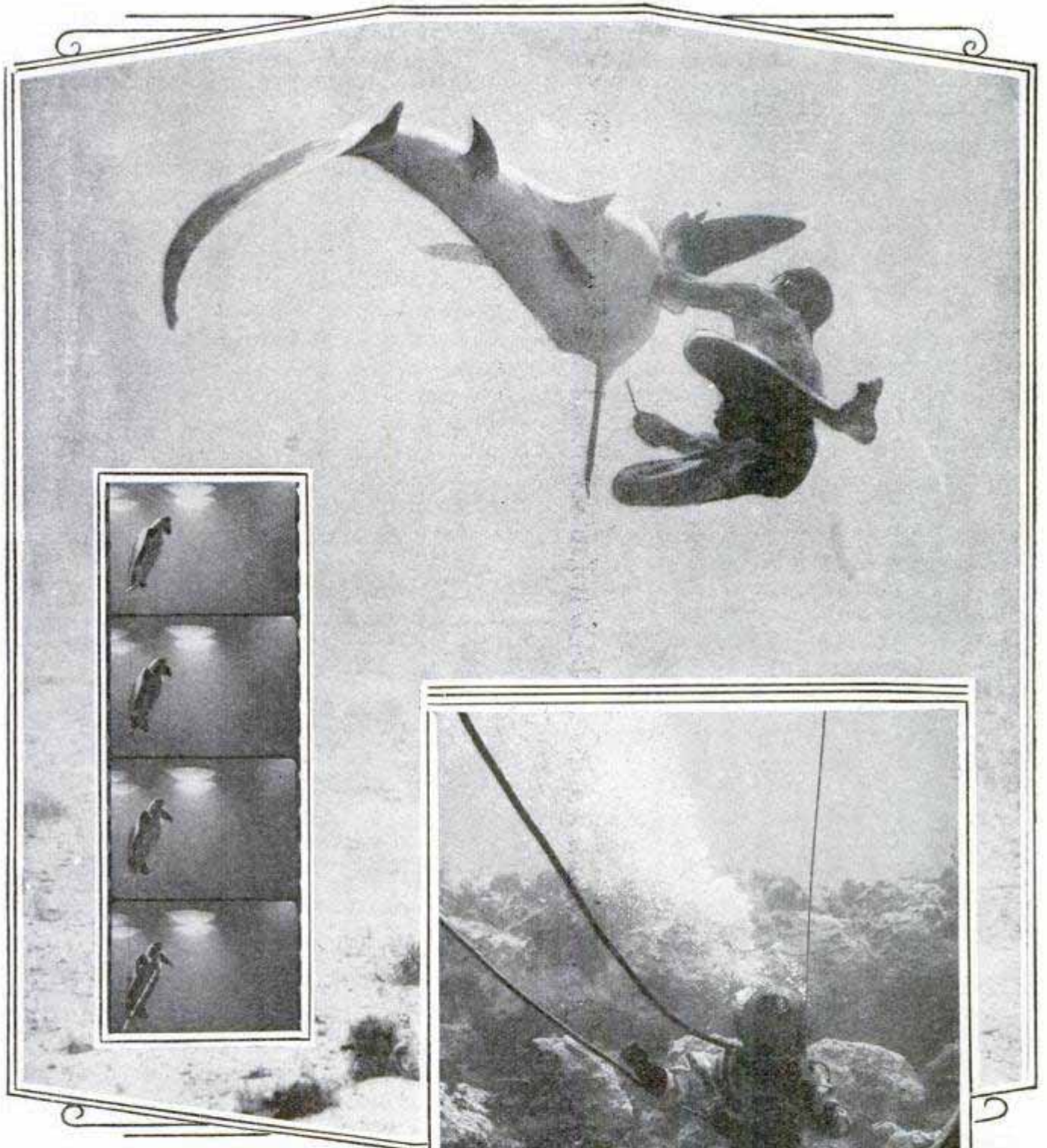


Lifeboats Carried by Launch' above Deck

a difficult problem to comply with the government's requirements pertaining

of the canvas-covered top where they were firmly lashed in position.

SHARK FIGHT UNDER WATER FILMED FOR MOVIES



A BATTLE to death between a West-Indian native, armed only with a knife, and a man-eating shark, is the first dramatic "thriller" resulting from the successful development of under-water motion-picture photography as described and illustrated in the July number of this magazine. Such combats are common in fiction, but it took weeks of search and large financial inducements to find a Bahaman who was willing to take the risk in reality. A dead horse was used for bait to attract the sharks, and one of the huge fish was killed under water by the black diver. Movies were also made of submarine exploration work in which the actors wore regulation deep-sea diving armor, and by the use of 2,400-cp. mercury-vapor lamps it was found possible to make under-water motion pictures at night with exposures of one one-hundredth of a second.



LATEST RESOURCES OF SCIENCE AND INVENTION ENLISTED TO EQUIP SHACKLETON EXPEDITION

AIR-PROPELLED motor sledges mounted on flat runners like skis form the main reliance of the antarctic expedition headed by Sir Ernest Shackleton, which is preparing to spend the next few months in exploring the great continent that surrounds the South Pole. In this and many other respects, the expedition is better equipped with modern devices than any previous body of polar explorers has ever been. Details of food supply, shelter, and provisions for the general health and comfort of the members of the party have been worked out with scientific care, tested in the snow fields of northern Norway and pronounced perfect.

Five motor sledges will be taken. One of these has a 55-hp. gasoline engine, another a 40-hp. These two have air propellers, but for use against head winds they are also equipped with positive-drive mechanism in the form of toothed drums attached at the rear to engage the ice and snow. In the extremely low temperatures of the Antarctic the snow becomes as loose as dry sand, so these sledges are mounted on flat, skilike runners to prevent them from stalling. In a seven-day test in Norway one of these air-propelled sledges, carrying six men, towed another sledge weighing 400 lb. and carrying two men, at a speed of from 15 to 20 miles an hour. Only a 30-hp. motor was used, instead of the larger ones that have since been installed, with which a speed of 22 miles an hour up a 10-per-cent grade with three men on board has been made. The engines of these aero-sledges are air-cooled, but the carburetor and intake pipes are inclosed in a sort of hot cupboard. This space has been made large to hold a number of suits of clothing, so that the explorers may dry out their underwear after each day's work—a luxury which previous expeditions have had to forego.

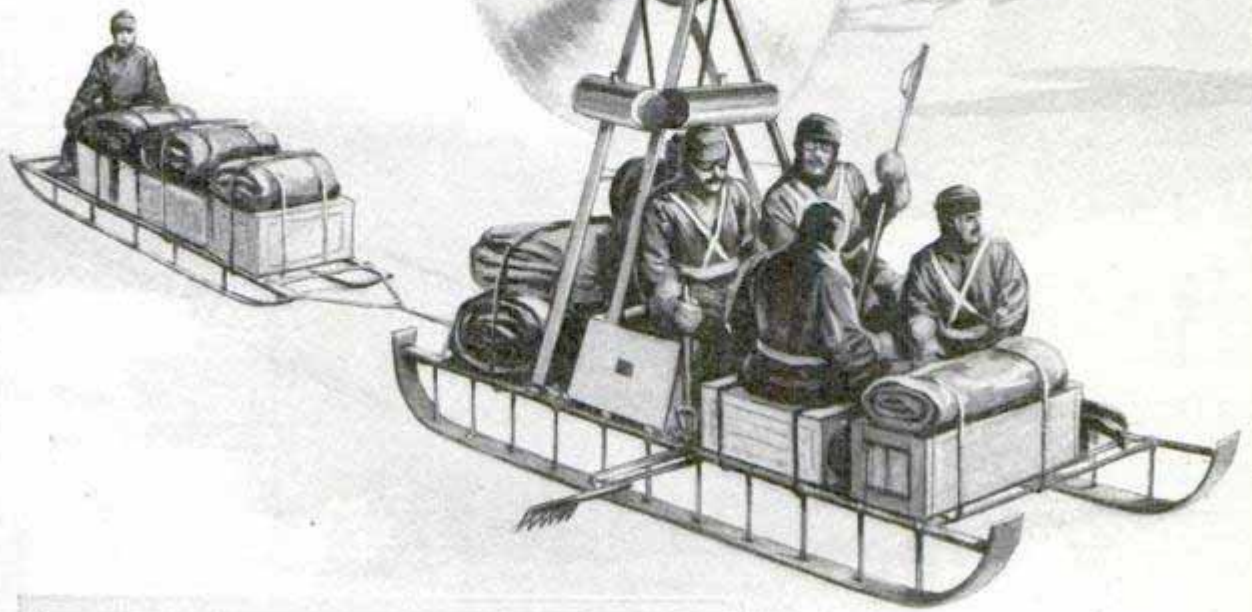
Two other sledges have the positive drive only, and are expected to cover about 50 miles a day each, as against

the 75 to 100 miles of the aero-sledges. The engines of these are water-cooled, and the water jackets are piped to steam-cooking appliances, so that food may be heated while on the march. Details of the fifth motor sledge, which is said to embody many novel features, have thus far been withheld. In addition to the sledges 100 Canadian dogs, capable of carrying 100 lb. each, will be taken along.

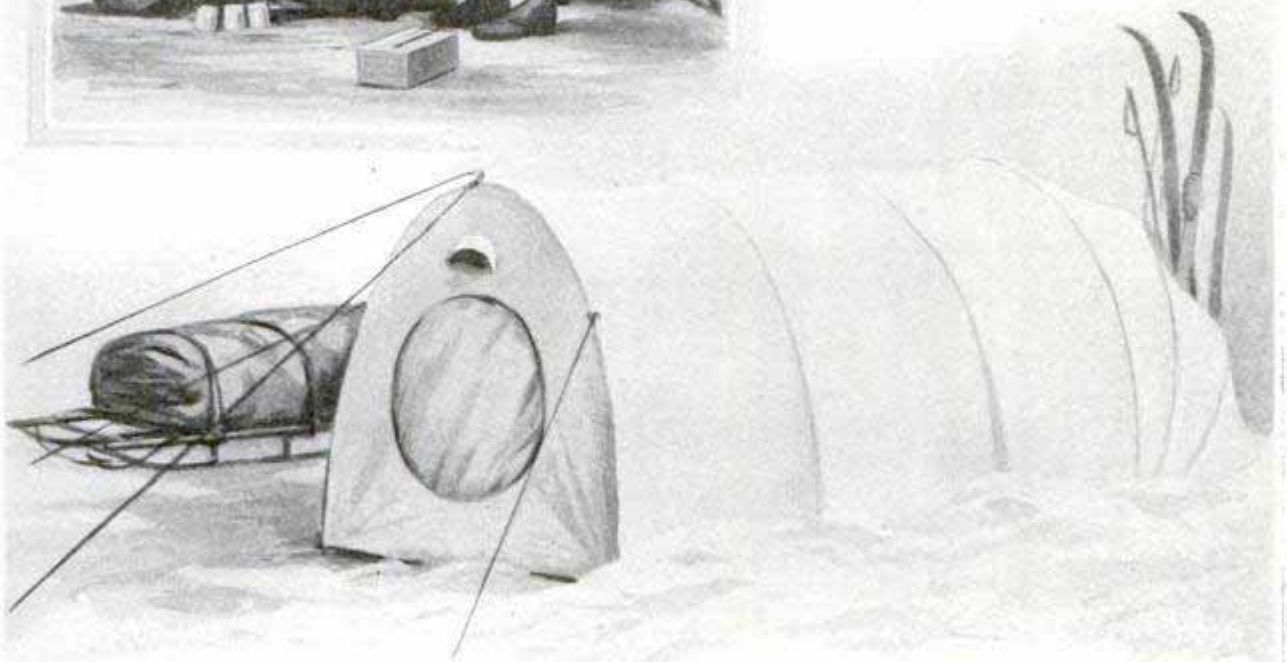
The food problem of the Shackleton expedition is a particularly difficult one. Food supplies for the entire journey of 900 miles from Weddell Sea to the pole and 800 miles from the pole to Ross Sea, must be taken along, whereas most polar explorers are able to make caches of food for use on the return journey. So a scientifically devised ration, on which the members of the party have already subsisted for days at a time, has been prepared and enough of it packed in sausage skins, for easier transportation, to last through the 1,700-mile trip. Each man will receive 36 oz. of food daily, instead of the 3 lb. which is the average consumption. In this will be 6 oz. of lard, 4 oz. of sugar, and 2 oz. of a mixture of dried milk, protein, and oats. The rest of the ration consists of Brazil nuts, almonds, and beech nuts mixed with oil and dried milk. The fat content of the ration is larger than the normal for temperate climates, since the low temperature will place a severe strain on the heat-producing elements of the body, which can only be kept up to normal by plenty of fat foods.

Since there will be continuous daylight throughout the anticipated period of the exploration, the 24-hour day can be disregarded, and the plans are based on the division of time into arbitrary days of 19 hours each. One hour will be allowed for breakfast and breaking camp, then four hours of marching, an hour for lunch, four hours more of marching, two hours for dinner and making camp, and seven hours for sleep.

Air-Propelled Motor Sledges
of the Shackleton Antarctic
Expedition are Steered
by Movable - Toothed
Sprags on Either Side,
Which Act as Drags



Interior of Folding Hood Tents
for Antarctic Exploration: They
can be Erected in the Severest
Windstorm and Shelter Six Men
Each, While They Weigh But 37
Pounds. Below is an Exterior
View of the New Tent



Instead of the 30-lb. tents, accommodating three men, which the Scott expedition carried, the Shackleton party is taking along waterproof and wind-proof "sleeping hoods," constructed on jointed frames much like the top of a touring motor car. One of these, weighing 37 lb., will shelter six men, and can be erected even in the teeth of the heaviest gale, assuring adequate shelter under all conditions.

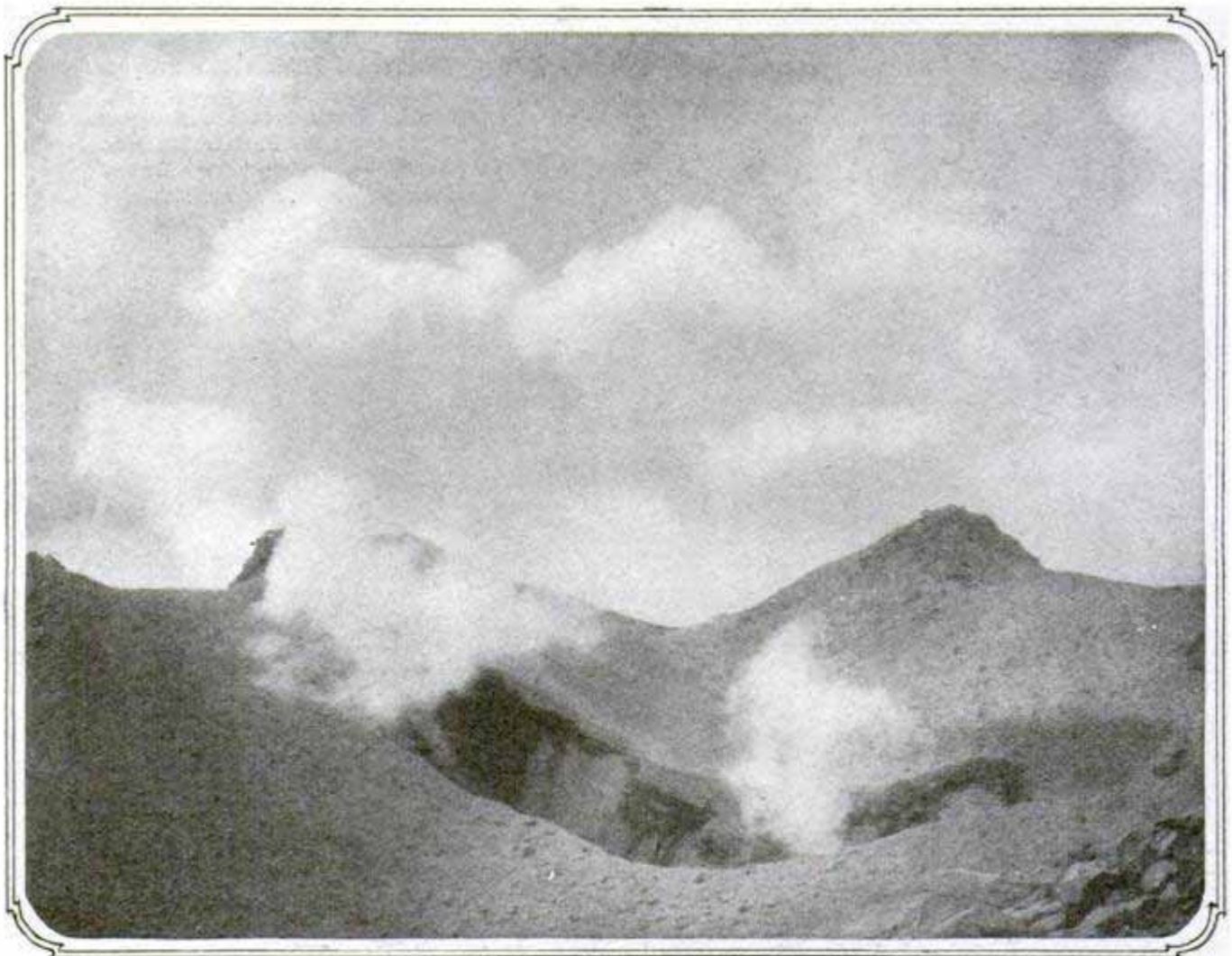
The purpose of the expedition is the

quest of geographic and scientific knowledge. The first 900 miles in from the sea will be over absolutely unexplored country, across a mountain range that is believed to be a southerly continuation of the Andes and in which coal is thought to exist. New information that will throw light on the vagaries of the magnetic compass is also sought, as well as the adventure of taking one of the few big sporting chances left for mankind to take.

A CALIFORNIA VOLCANO IN ERUPTION

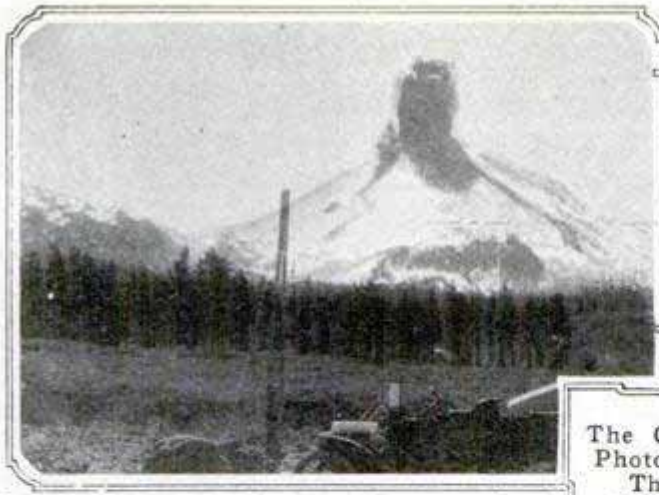
LASSEN PEAK, the volcanic mountain which stands as the northern outpost of the Sierra Nevada range in California, became violently active early in the summer of 1914, and since this first outbreak there has been an almost continuous series of eruptions. Each of these begins with

an explosion, the pent-up gases of the volcano blowing out suddenly and throwing great quantities of earth and rocks for several hundred yards in every direction. For some hours thereafter smoke pours out of the mountain in great volumes, rising until it reaches a height of 5,000 ft. The

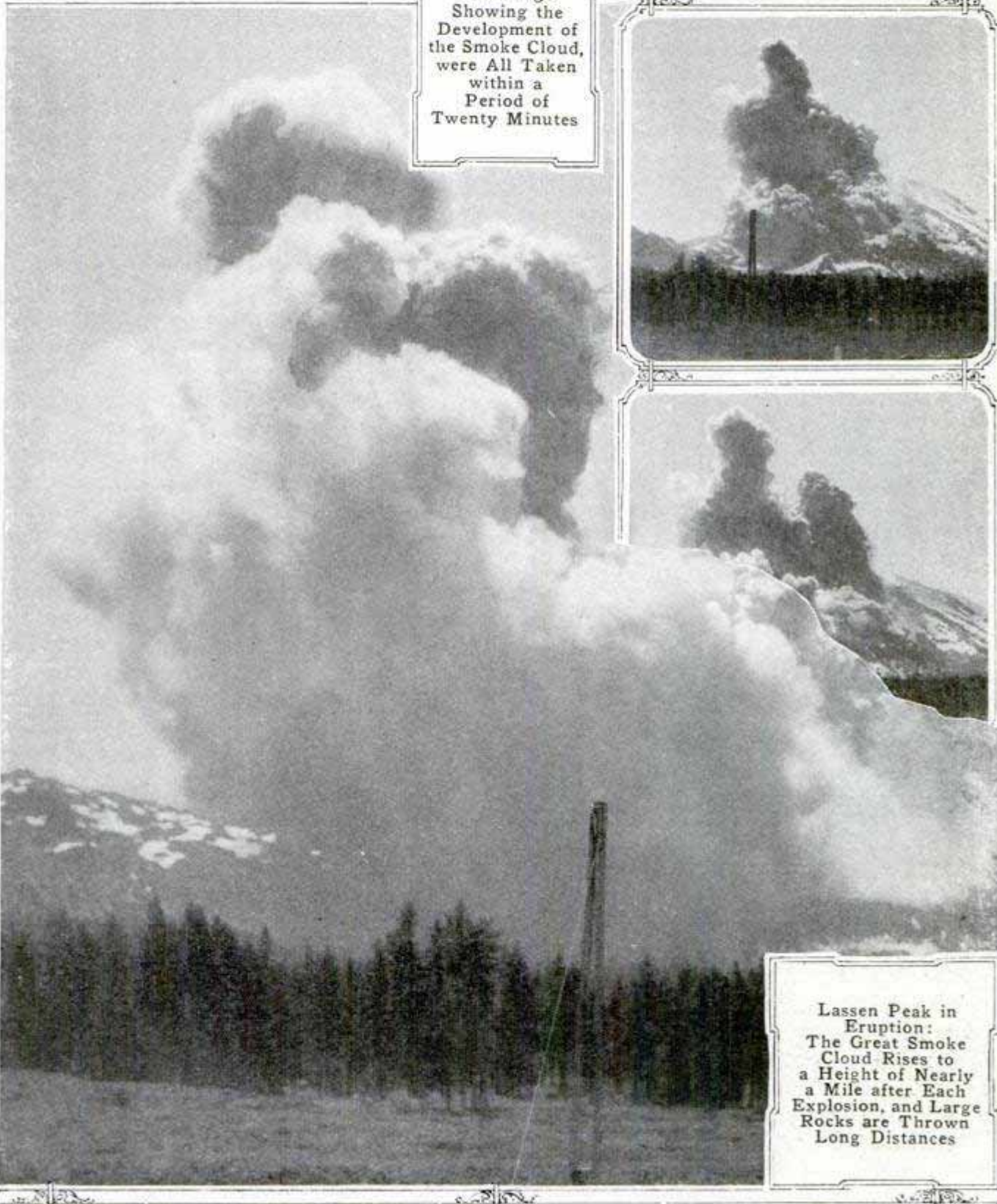


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The Crater of California's New Volcano, Lassen Peak, 600 Feet Long, 100 Feet Wide, and 125 Feet Deep



The Consecutive Photographs on This Page Showing the Development of the Smoke Cloud, were All Taken within a Period of Twenty Minutes



Lassen Peak in Eruption: The Great Smoke Cloud Rises to a Height of Nearly a Mile after Each Explosion, and Large Rocks are Thrown Long Distances

loose earth around the edges of the crater slowly caves in, until the accumulation is sufficient to stop up the opening leading down to the subterranean fires, when the volcano subsides until the internal pressure becomes high enough to cause another explosion.

These explosions occur without warning, but as the neighboring country is thinly inhabited, there is little danger to human life. One man, a mountaineer, was killed, however, by a fragment of rock blown from the volcano in one of its eruptions in June. That these rocks are merely those which have fallen into the crater from the surface is proved by the fact that they are cold. The crater itself is about 600 ft. long, 100 ft. wide, and 125 ft. deep, but is enlarged somewhat by each succeeding explosion.

It has been known for many years that Lassen Peak, like many other mountains of the Coast, Cascade and Sierra ranges, was of volcanic origin.

The conical peak is, in fact, merely a huge pile of cinders deposited by previous eruptions, most of which must have occurred in the dim past of earlier geological epochs, although in the middle of the 19th century phenomena similar to those of the present summer were noted.

While many theories have been advanced as to the cause of volcanoes geologists are not at all agreed on this point. The idea of the center of the earth as a mass of molten rock has been quite generally discarded, but it is pointed out by some scientists that any "slip" or accidental displacement of the subterranean rocks, resulting in a sudden relieving of the tremendous pressure under which they are confined, might result in generating sufficient heat to melt them and so set up volcanic activity. In the last few years many geologists have inclined to the belief that volcanic heat may be due to the presence of radium, since all volcanic rocks are radioactive.

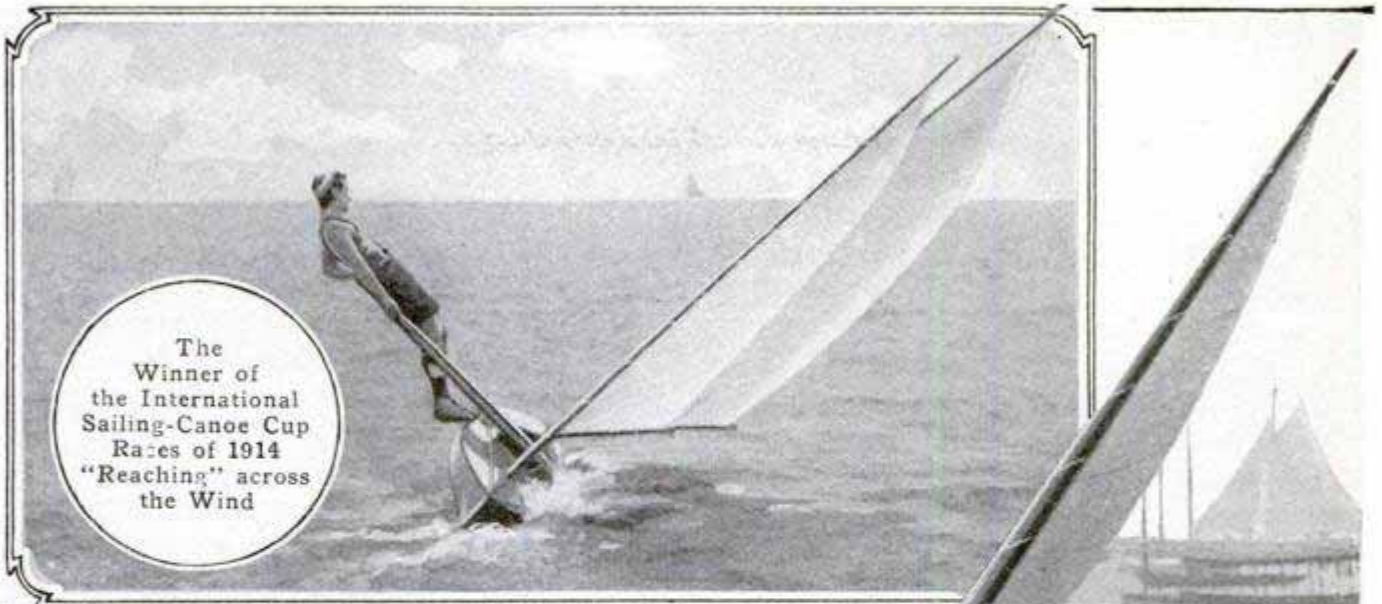
AIRMAN TAKES PASSENGER ACROSS ALPS

An Italian airman flying a monoplane took a passenger across the Alps on July 27, 1914, passing directly over Monte Rosa, a peak 15,217 ft. above sea level. The flight began at Novara, Italy, at 5 o'clock in the morning and the monoplane landed safely at Viege, Switzerland, at 7:50. This is said to establish a new record for passenger-carrying flights in the Alps. The distance in a straight line is about 100 miles.

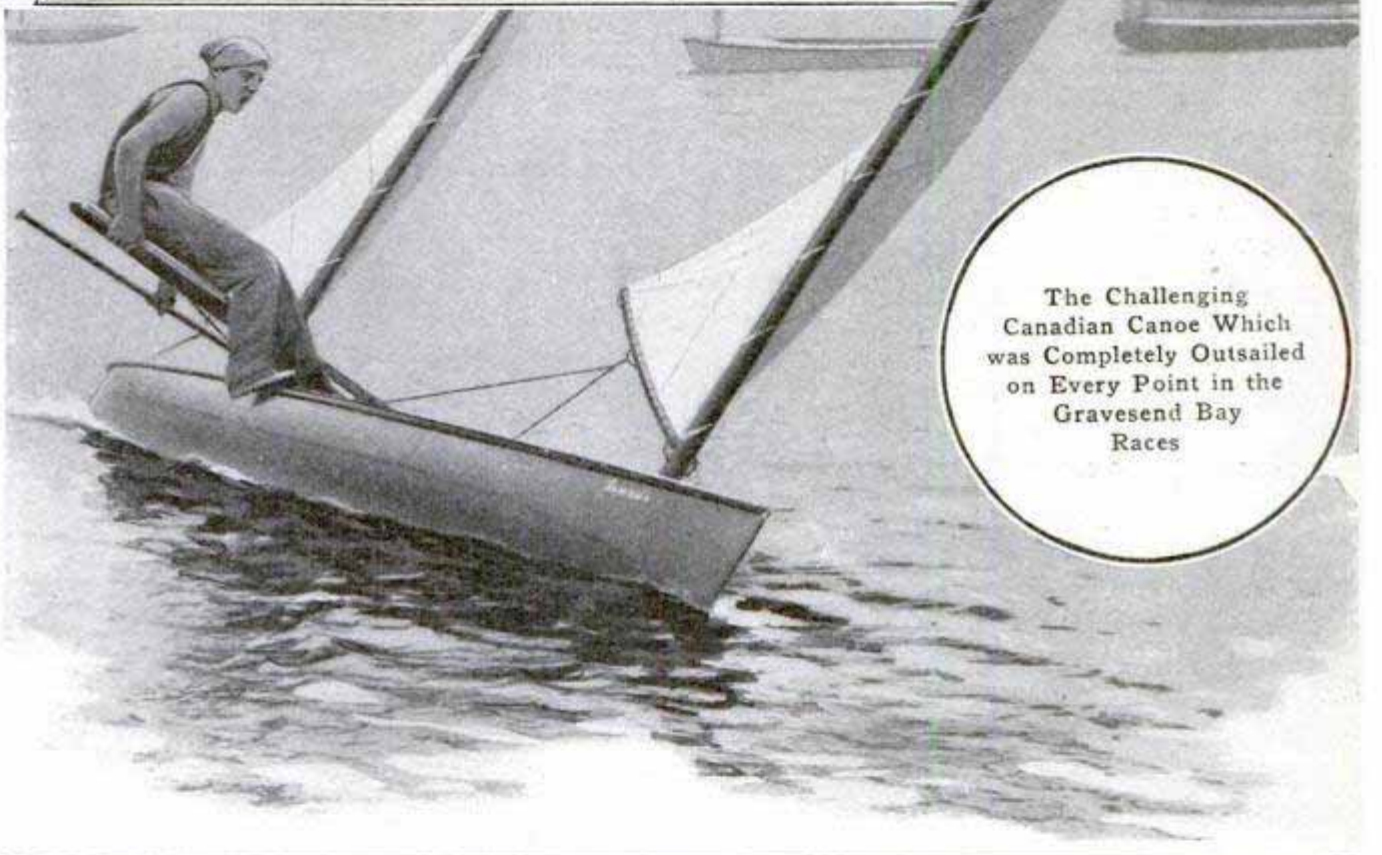
INTERNATIONAL CANOE CUP REMAINS IN AMERICA

The big yachts that race for the "America's" cup do not absorb all the interest of enthusiasts in nautical sports. Another international event which has many loyal devotees is the international sailing-canoe race, a hard-fought, thrilling contest in which true seamanship is always exhibited.

The dexterity of those who navigate these fragile barks, which in proportion to their size carry a great sail area, was demonstrated late in the summer at Gravesend Bay, New York, when the international trophy was defended against the Canadian challenger. In the two races the cup defender led by 5 min. 55 sec., and 7 min. 25 sec., over the eight-mile course. The accompanying photographs show the two canoes skimming over the water with their one-man crews stretched back on the outriggers on the windward side, to serve as ballast. These outriggers are sliding and may be shifted from one side to the other quickly when the course of a craft is changed. The tiller is controlled with one hand, while the sheets are belayed to cleats on the gunwales. The handling of such a canoe means quick work, for shifting the outrigger, hauling in and paying out the sheets, and jumping to a position on the opposite side must be done in a flash when the craft comes about.



The
Winner of
the International
Sailing-Canoe Cup
Races of 1914
"Reaching" across
the Wind



The Challenging
Canadian Canoe Which
was Completely Outsailed
on Every Point in the
Gravesend Bay
Races



Another
View of the
Canadian Challenger
in Action;
Sporty but Hardly
Comfortable
Work

PROBLEM OF LIFTING TRANSATLANTIC FLIER SOLVED BY ADDITION OF A THIRD PROPELLER

By A. F. ZAHM, Ph. D.

Secretary of the Langley Aerodynamical Laboratory of the Smithsonian Institution

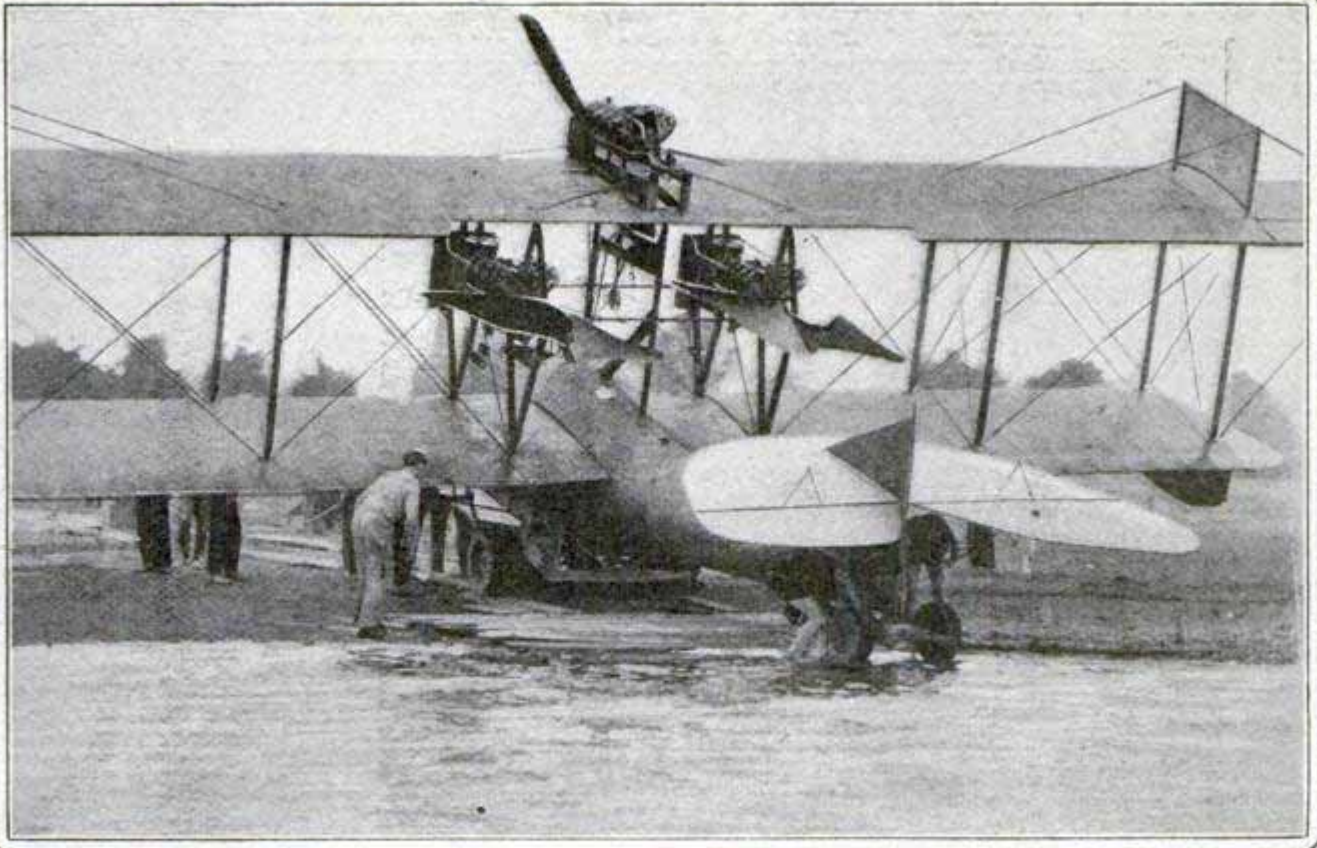
ON THE day after its launching the "America" made several successful flights with two men. Excepting for a slight tail heaviness, it seemed the stanchest, steadiest, and most efficient in flight of any air boat that either her builder or her navigators had ever handled. Next day, the process of increasing the load began, cheerfully at first, then with increasing difficulty that foreshadowed disappointment, delay, vexation of spirit, prolonged experimentation, and no little hostile criticism.

Planing fins of varying sizes and design all failed to bring the "America" into the air from the water under full load. Pontoons under the wings gave greater promise, but at last were discarded. Finally a sea-sled bottom was built and tried in two styles, first the unbuoyant, then the buoyant. The former was an inverted-V planing bottom, or raft, built under the hull from its step up to a yard beyond the prow. When run over the lake with three men aboard, it rose and planed excellently at 20 miles an hour. When completely inclosed and made water-tight, this bottom looked like a scow with up-turned bow and square stern, carrying the original "America." It had enough buoyancy and planing surface to please even Lieutenant Porte, who now thought surely the great craft must leap to the surface and skim so perfectly that the original hull need only be built to these new lines. But when tried on the lake it wallowed helplessly, its bow heaving powerfully, its tail swamped in the waves. Men placed on the prow, and a submerged blade under the stern, helped to level it, but failed to lift it to the surface or give it planing speed. It was the costliest and worst failure of all the devices yet tried; but for the information so gained perhaps many air-boat designers may be the wiser.

Mr. Curtiss now—July 18—submit-

ted to his technical associates a plan to add a third motor and attached propeller to the "America," symmetrically between the others, and, after receiving their suggestions, ordered this plant to be mounted at once on top of the upper plane, with the propeller projecting in front of the leading edge. The early bilgelike planing fins beside the bow were also fixed in place to increase the lift and planing area.

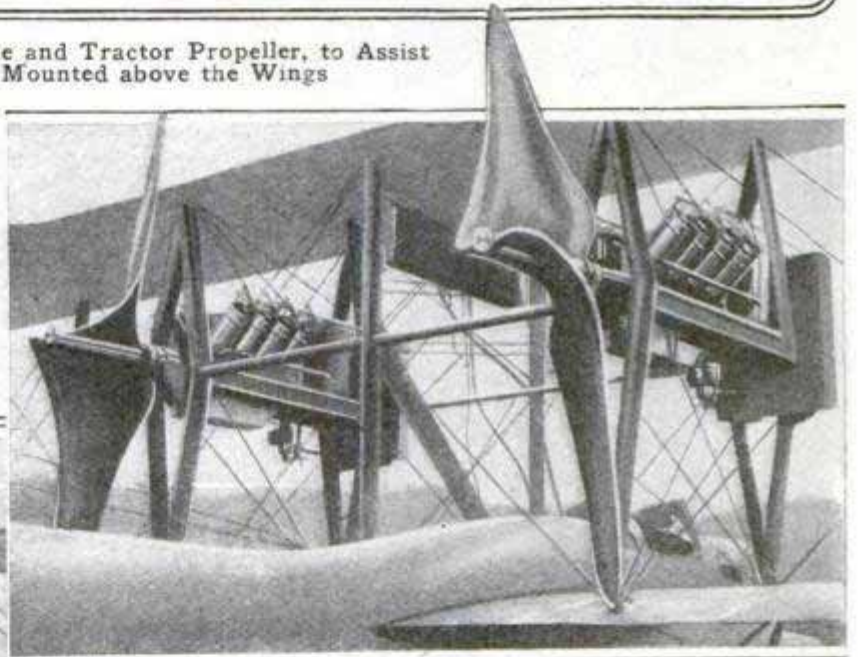
In the forenoon of July 23, with a useful load of about one ton, Mr. Curtiss ran the three-motored "America" over the lake, and flew in the most light-hearted fashion. Three other men were in the cabin with him, and two were squatting like tailors on the lower plane next the cabin. Behind the air boat, as she flew just above the lake, swept the Curtiss 40-miles-an-hour scooter bearing three naval officers. It was a rare sight, the resplendent red-winged whale chased by the swift and saucy sea dog; a sight unfortunately missed by camera and movie men. Smiling in the cabin with Curtiss were Lieutenant Porte, Hallett, his sea companion, Henry Kleckler, the strenuous superintendent of the Curtiss factory; smiling on the wings sat Robinson and Kiley, the untiring day and night workmen, in bathing suits. Others followed in motorboats or stood on shore, and all were delighted with the success of these well-deserving men. The total weight of machine and cargo was 5,500 lb. Late in the evening, after poor sparking of the top motor had been corrected, a better flight was made with a total load estimated at about 6,100 lb., or 2,600 lb. useful load. This was enough for the ocean flight, and was realized just a month from the day of the first flight. It now seemed that the hard task of lifting the "America" to the water surface and making her plane with full load, preliminary to rising in the air, had been successfully accomplished.



The "America" with a Third Engine and Tractor Propeller, to Assist It to Rise from the Water, Mounted above the Wings



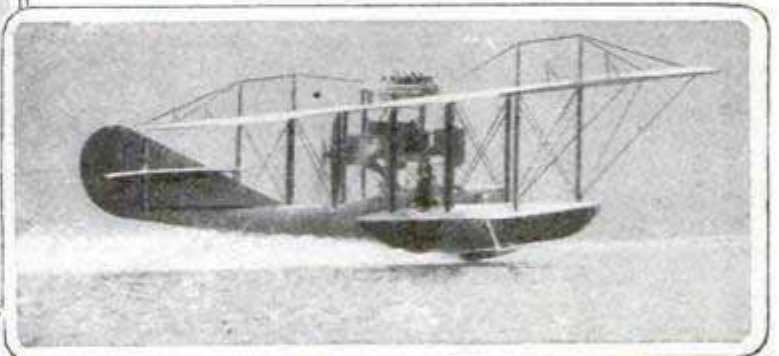
The Drift Recorder Which Indicates the Exact Direction and Rate of Travel by Revolving Telescopes



The "America's" New Propellers, Designed to Produce as Much Power at the Hub as at the Periphery

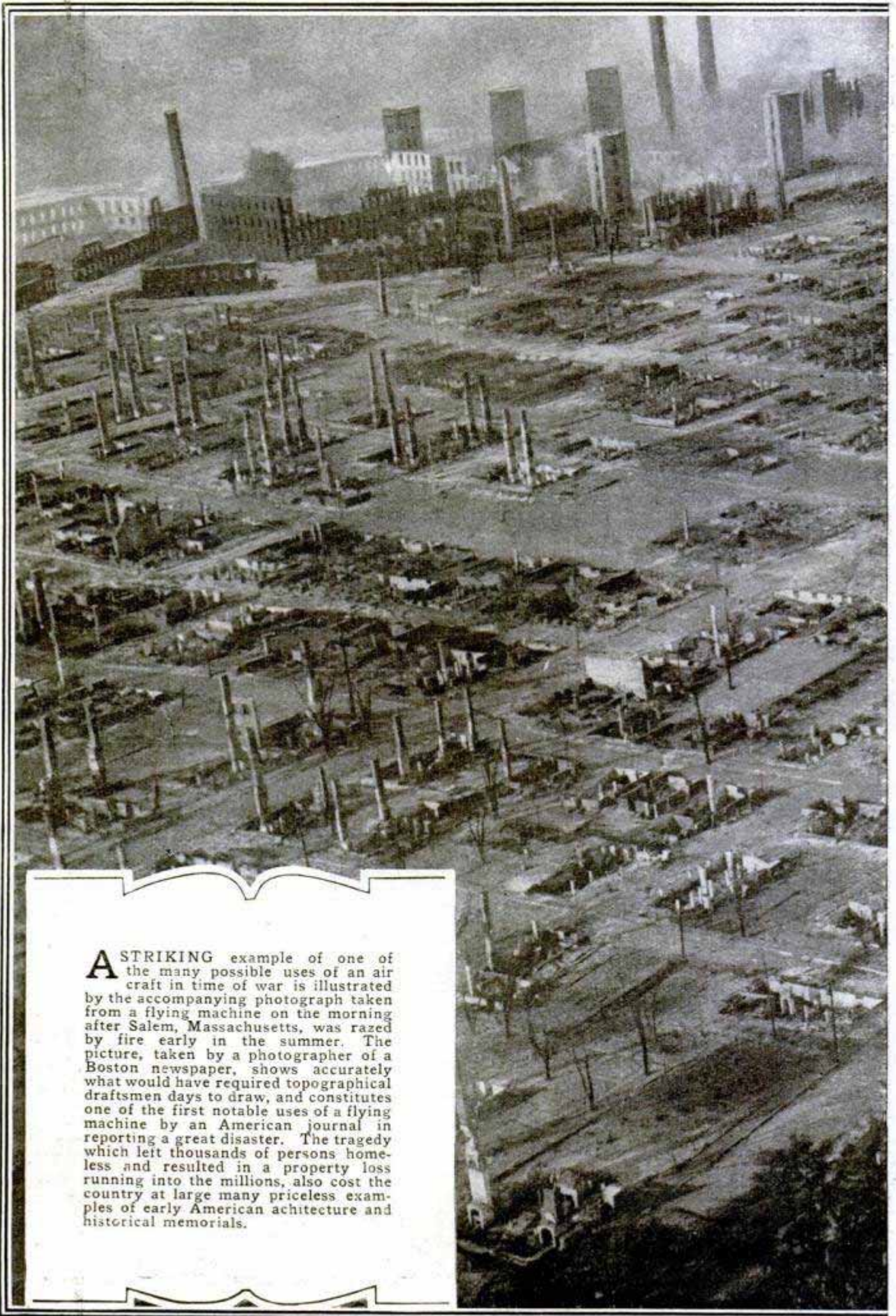


The Planing Fins, Affixed to the "America's" Hull, Which Help It Get Out of Water under Load



The "America" Planing on the Surface of Lake Keuka with Aid of Third Propeller and Fins

THE BURNED AREA OF HISTORIC SALEM, AS SEEN



A STRIKING example of one of the many possible uses of an air craft in time of war is illustrated by the accompanying photograph taken from a flying machine on the morning after Salem, Massachusetts, was razed by fire early in the summer. The picture, taken by a photographer of a Boston newspaper, shows accurately what would have required topographical draftsmen days to draw, and constitutes one of the first notable uses of a flying machine by an American journal in reporting a great disaster. The tragedy which left thousands of persons homeless and resulted in a property loss running into the millions, also cost the country at large many priceless examples of early American architecture and historical memorials.

FROM A FLYING MACHINE AFTER THE DISASTER



NEW STABILIZER MAKES AEROPLANE "FOOL-PROOF"

The \$10,000 prize offered by the French government for the best safety device for aeroplanes has been awarded to an American inventor for a gyroscopic stabilizer that is said to relieve the airman of all responsibility for maintaining the balance of his machine, the control exercised by this device being so complete that eyewitnesses to the tests have declared that it makes the aeroplane "fool-proof." In one test, with the aeroplane flying at a height of about 600 ft., the pilot stood with his hands raised free from the controls while his mechanic climbed out along one of the wings and tried to disturb the balance of the machine, but even under these extreme conditions the balance was maintained perfectly by the action of the stabilizer. The stabilizer is a small device, weighing about 40 lb. and occupying a space 18 in. wide and 12 in. high. It is made up of four gyroscopes, each $2\frac{7}{8}$ in. in diameter and arranged in pairs, one

pair controlling the fore-and-aft and the other the lateral balancing. These gyroscopes rotate at the rate of 12,000 revolutions per minute. When the aeroplane tips in any direction they act through a mechanism that controls the warping of the wings or the position of the ailerons to bring it back instantly to the proper position. In case the engine stalls, the stabilizer turns the aeroplane downward at a safe angle for volplaning, the gyroscopes being connected with a compressed-air tank so that they continue to revolve and control the machine for a period of two hours after the engine stops. When banking on a turn the stabilizer causes the aeroplane to tip at just the right angle. Under any conditions, apparently, this device gives the airman the advantages possessed by the driver of a land vehicle, since all his attention can be devoted to running and steering his machine without the necessity for giving any thought to its stability.

WATER PRESSURE RESTORES COLLAPSED SIPHON

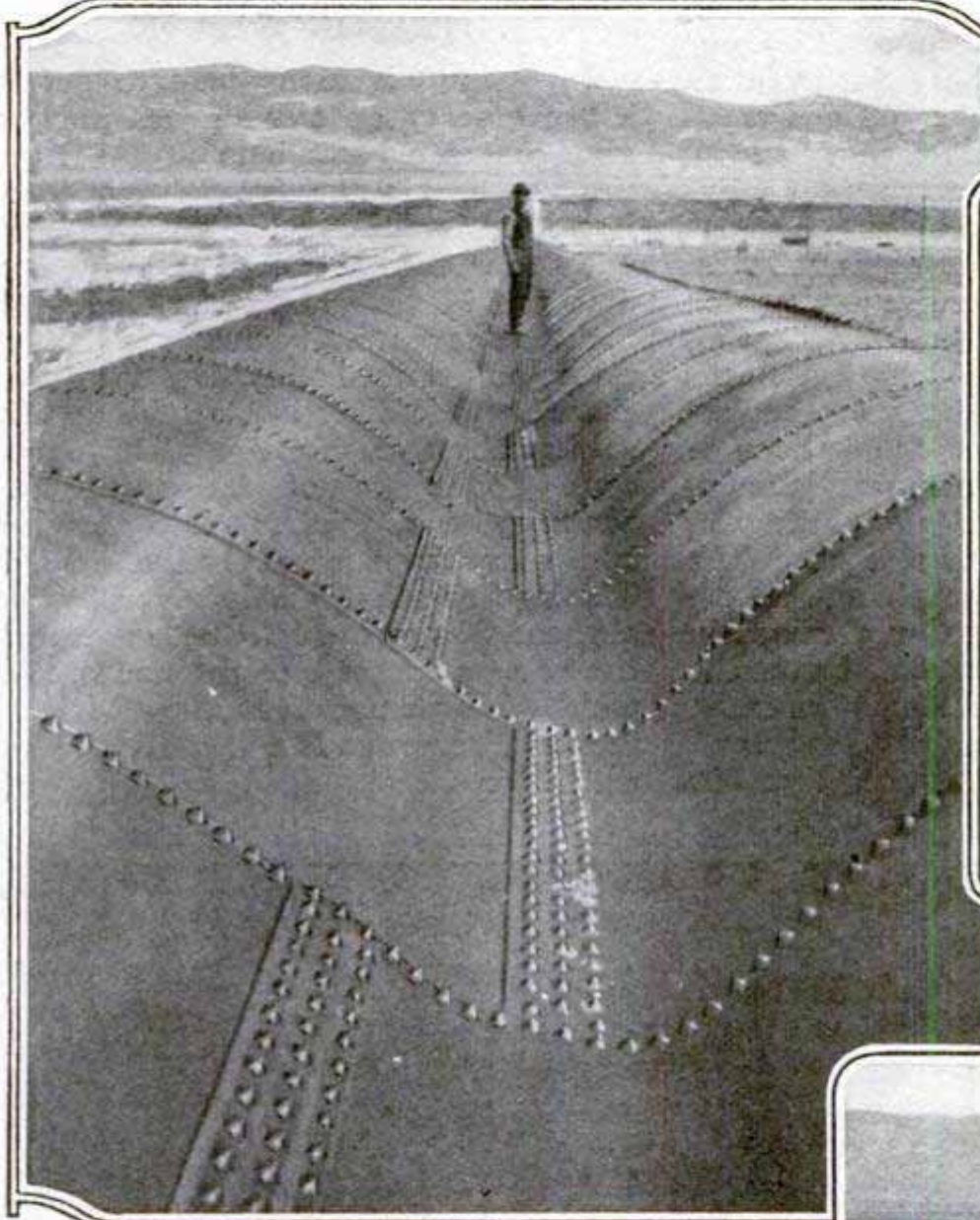
Using water pressure to restore to its original shape a collapsed inverted siphon, consisting of a steel pipe 10 ft. in diameter and nearly two miles long, is the remarkable feat performed by the engineers of the Los Angeles aqueduct. This pipe forms the link of the aqueduct that crosses the Antelope Valley. It is 15,596 ft. long, is composed of riveted plates about $\frac{1}{4}$ in. thick, and was built at a cost of \$249,200. Over much of its length the pipe is wholly or partly buried in the ground, but is carried on concrete supports across a wash near the center of the valley. The foundations of this section were washed out and the pipe burst when it fell into the wash. As the water rushed out through the break, a vacuum was formed in the pipe and the pressure of the air caused about 10,000 ft. of the pipe to collapse, the top being bent downward to within a few inches of the bottom, so that the

whole had the shape of the letter "U." In restoring the pipe to its original shape, such plates as were sheared or torn were replaced, the concrete supports were rebuilt, and the pipe was replaced in its proper position. Then, with the pipe in a water-tight condition, the water was again let in, the flow being started at 405,000 gal. per hour and gradually increased to 1,080,000 gal. Under this pressure the pipe began slowly to resume its original form, the cross section showing first as an oval and finally as a true circle. The work of repairing was remarkably slight, the total cost being about \$2,200.

☞ Wireless messages were exchanged between President Wilson and the Emperor of Germany on June 19, 1914. The distance spanned by the wireless waves is estimated at $4,062\frac{1}{2}$ miles.

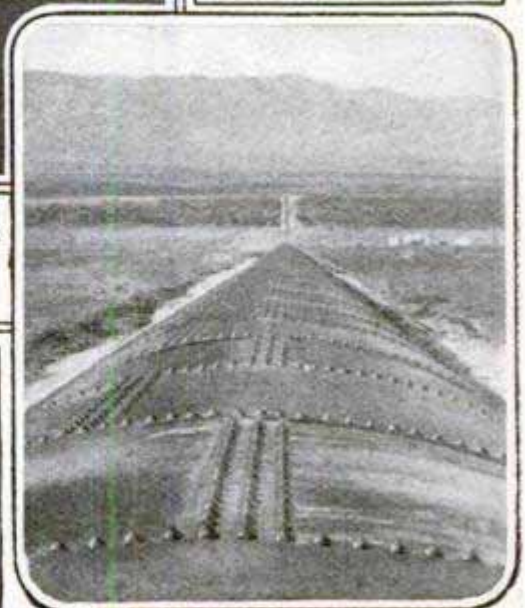


The Concrete Supports Carrying the Siphon were Destroyed by Flood, Permitting the Pipe to Fall into Stream

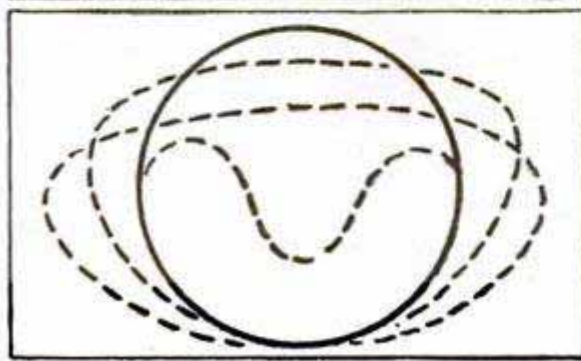


The Siphon Partly Restored to Its Original Shape by Hydraulic Pressure

How the Los Angeles Siphon Looked after the Top had been Bent Downward by the Pressure of the Air. Nearly Two Miles of the Ten-Foot Steel Pipe was Buckled Like This



Siphon Completely Restored to a Cylindrical Form by Intense Water Pressure



Full Line Shows the Original Shape of the Pipe; Dotted Lines Show the Shape of the Collapsed Pipe and the Successive Shapes as the Water Pressure was Increased

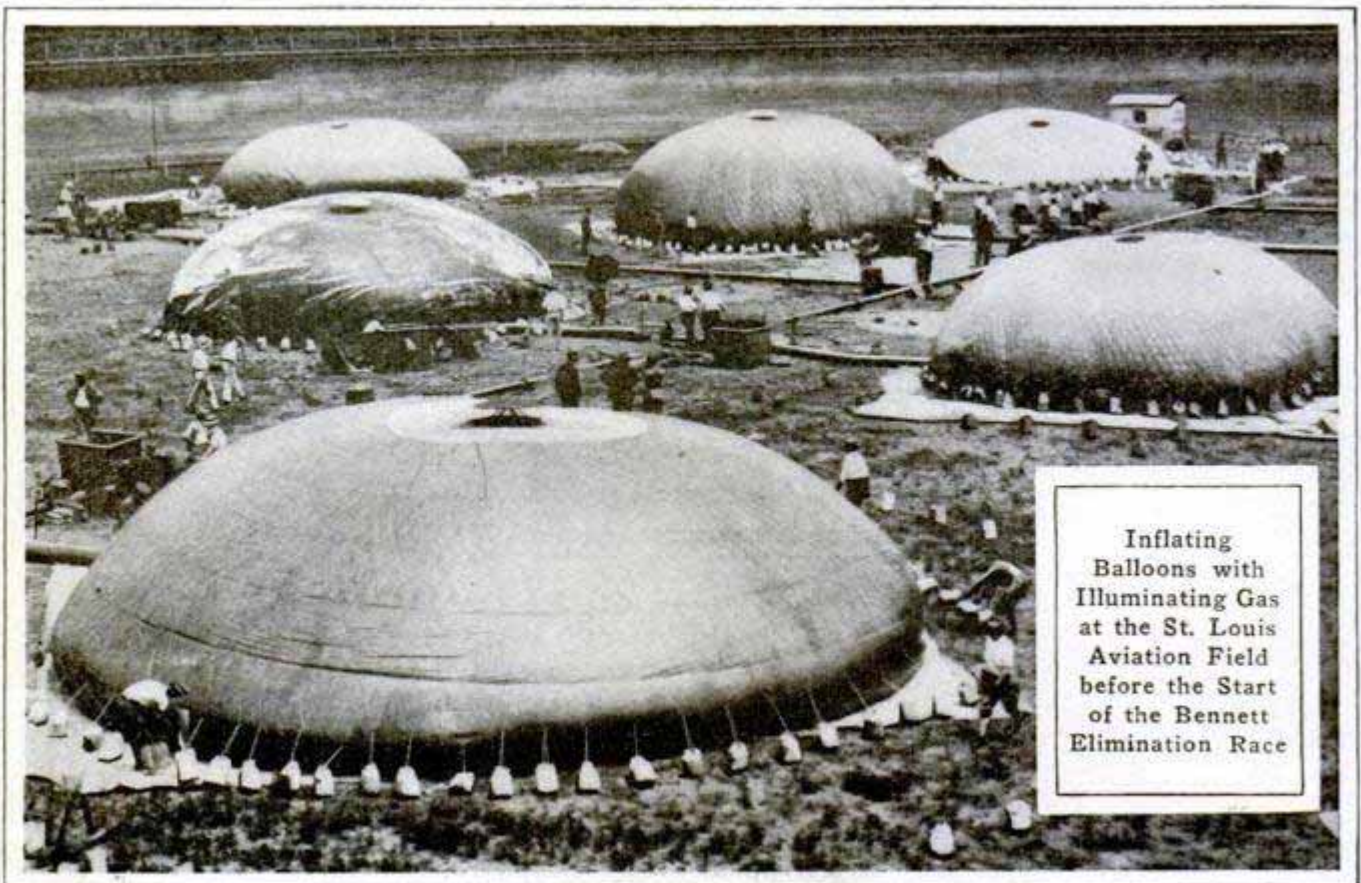
INFLATION OF BALLOONS ATTENDED WITH CARE

The inflation of large balloons, prior to casting off in an important aerial race, is attended with the utmost care and painstaking attention to details. The big silk bags, which require most delicate handling, are filled with illuminating gas which is supplied by pipe lines stretched to the field from an adjacent gas tank. As the gas is allowed to escape slowly into a balloon, precautions are taken to prevent wrinkles forming in the thin skinlike covering, which if unnoticed might bring an otherwise promising cruise to a sudden and possibly tragic end, by causing cracks which would develop into leaks and tears. Bags of ballast are hooked about the net, and as the balloon is gradually inflated, the positions of these are changed to allow the bag to fill out to its natural form. The accompanying photograph shows the entries in the Bennett Cup elimination race being filled a short time before the start made from St. Louis recently. The trial was won by the "Goodyear," which landed at Constance, Ky., 300

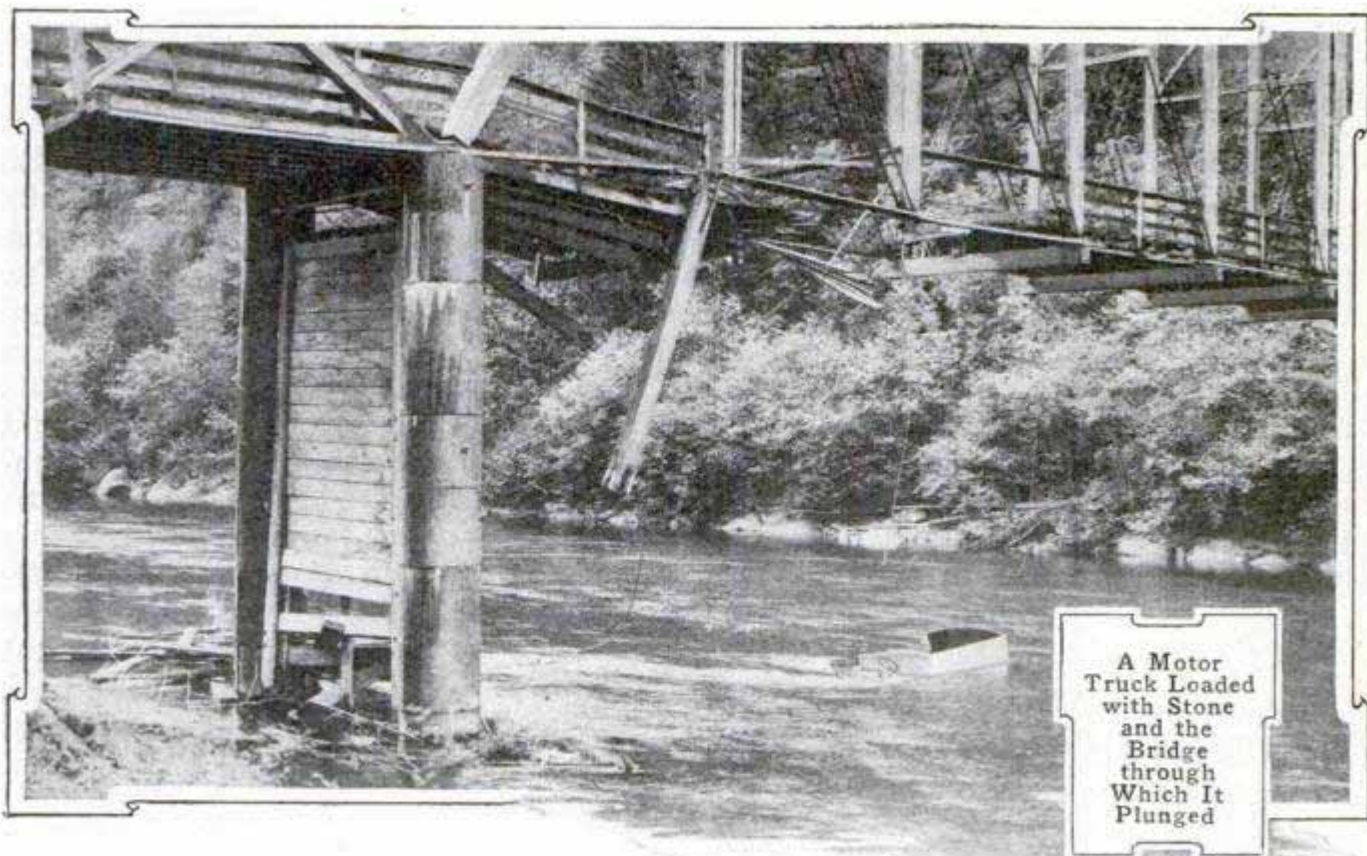
miles from its starting place. Nearly all the craft encountered fickle air conditions which kept them near St. Louis, in some cases, for several hours. Only two of the eight balloons succeeded in going more than 150 miles.

AIRMAN GOES TO FIRE IN HIS MONOPLANE

By using his monoplane to get to a fire quickly an airman was able to give just the right help at the right time to enable the fire-fighting force in a New Jersey town to get a dangerous fire under control. While the airman was in the midst of an exhibition flight he saw the fire five or six miles away, and immediately drove his machine in that direction, alighting several blocks from the fire. The entire male population of the town had already been pressed into service, and more men were badly needed. Through the timely help given by the airman, who proved to be an expert, the fire was soon brought under control. The airman then flew back to the aviation grounds and continued his exhibition flight.



Inflating
Balloons with
Illuminating Gas
at the St. Louis
Aviation Field
before the Start
of the Bennett
Elimination Race



A Motor Truck Loaded with Stone and the Bridge through Which It Plunged

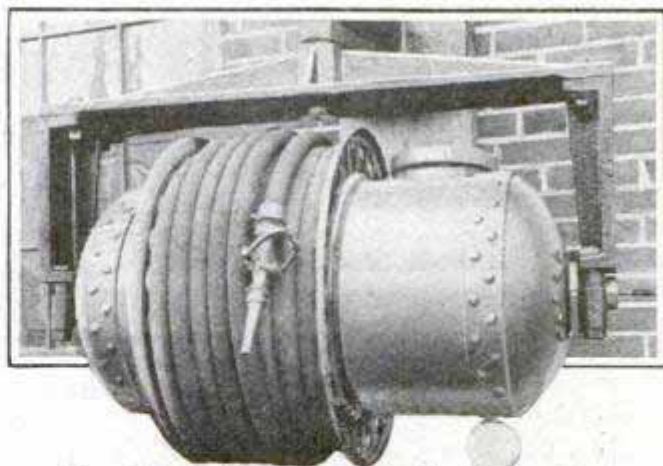
TRUCK WITH LOAD OF ROCK BREAKS BRIDGE

In carrying crushed rock to be used in the construction of the Columbia Highway, which is being built along the bluffs overlooking the Columbia River, a heavy auto truck crashed through the flooring of a bridge and plunged headlong into the river beneath, carrying five men down with it. The load was so great that the planking gave away in a large block, despite the fact that the machine was moving. While falling, the driver of the machine was able to clutch a broken piece of the railing, saving himself from the tumble. The other men were severely shaken, but none was killed.

FIRE EXTINGUISHER THROWS STREAM LONG DISTANCE

A chemical-tank fire extinguisher designed for installation in large buildings, and capable of throwing a stream 75 ft. from the end of a hose, has been invented by a New Jersey fireman. The chemical container is barrel-shaped and is mounted in a frame so as to revolve on its axis. A spool around this holds

several yards of hose in readiness to be run off in case of an emergency. In the event of a fire, the hose is unwound, which turns the tank rapidly and in so doing churns the various chemicals. This causes gases to be generated, which quickly reach a sufficient pressure to project the extinguishing ele-



Fire Extinguisher Generates Gas When Hose is Unwound

ments through the hose with great force. The nozzle is fitted with a stopcock so that the flow may be shut off when the blaze is drowned.

☐ In the United States the telephone conversations of a single day average more than 6,300,000.

FLAGS OF NATIONS PIECED INTO GIRL'S COSTUME

In Philadelphia recently a young woman attracted attention at a church fair by appearing in a costume made from the flags of the various nations of the world. The insignia of every power of consequence formed a part of a varicolored coat which was designed and made by the girl herself. To complete the attire, she wore a skirt cut from a large American flag, the stripes of which were made to run circularly.

ALLOY OF ALUMINUM FITS MANY USAGES

Claimed to be suited for almost limitless uses, an alloy of aluminum and nickel which does not tarnish and which couples the elements of lightness and strength has been developed in England. The metal has practically the same specific gravity as aluminum, its principal base, is white and takes a high polish. While extremely malleable it does not become brittle by pounding, but instead increases in hardness. A sheet of the alloy was towed for nearly six months in the ocean by a steamer operating between England and New Zealand, and at the end of that time the metal was found to be as bright as when first put in the water, it is asserted. Promoters of the alloy contend that it is particularly adapted for internal-combustion engines, marine fittings, medical apparatus, and similar uses. It has a tensile strength of 13 tons to the square inch.

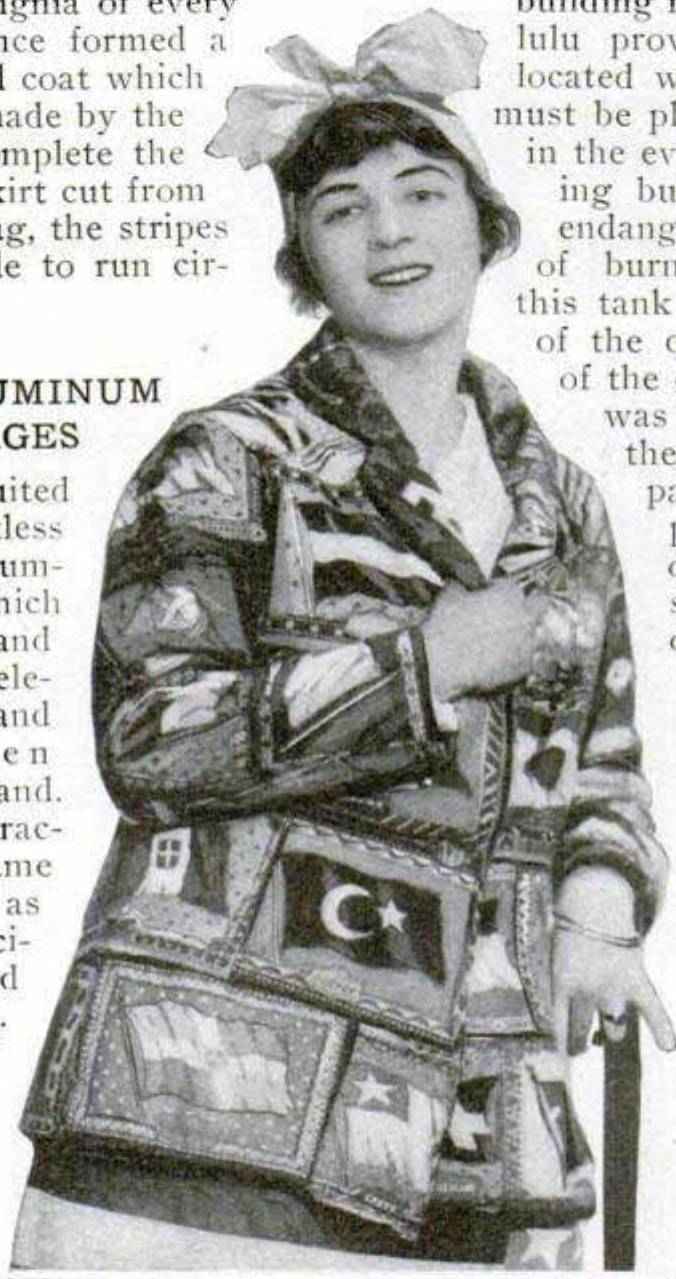
FOUNDATION OF ICE USED IN LOWERING TANK

Simple but novel methods were used both in moving and in placing on its foundations an 80,000-gal. steel storage tank at Honolulu, Hawaii. The building regulations of Honolulu provide that oil tanks located within the fire limits must be placed in pits so that in the event of a fire, adjoining buildings will not be endangered by an overflow of burning oil. Building this tank in the pit was out of the question on account of the expense, so the tank was built in the shops of the construction com-

pany and then transported to the site on a specially constructed truck drawn by a motor truck. When all preparations were completed for lowering the tank into the pit, a false foundation consisting of blocks of ice was laid over the real foundation. Then the tank was lowered into place and centered, and left to settle as the ice melted. In order to make sure that the tank would settle evenly into place, the blocks

of ice were melted uniformly by jets of live steam. The tank is 24 ft. in diameter and 25 ft. high, and weighs 14 tons.

CA starchy fluid which is made from potatoes has been found to decrease the porousness of iron submitted to hydraulic pressure. When the metal is treated with this, it is claimed it becomes water-tight.



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Coat Made from the Flags of the Nations

SIX-STORY BUILDING HUNG FROM STEEL GIRDERS



COURTESY OF ENGINEERING NEWS

Six-Story Building Suspended between Sections of New Skyscraper

Hanging six stories of a modern office building from steel girders that are 250 ft. in the air and are supported on the steel work of adjacent buildings is a novel feature in building construction recently carried out in New York City. On the site of this work it was planned to erect a 19-story building occupying the whole block, incorporating in the structure a modern 12-story building located near the

middle of the block. The foundations of the existing building had been designed for 12 stories and were not strong enough to carry the additional seven stories. The steel frame of the new building was run up to its full height of 250 ft. on each side of the old. Supported on this frame are eight steel girders, and from these is hung the steel work for six of the additional seven stories.

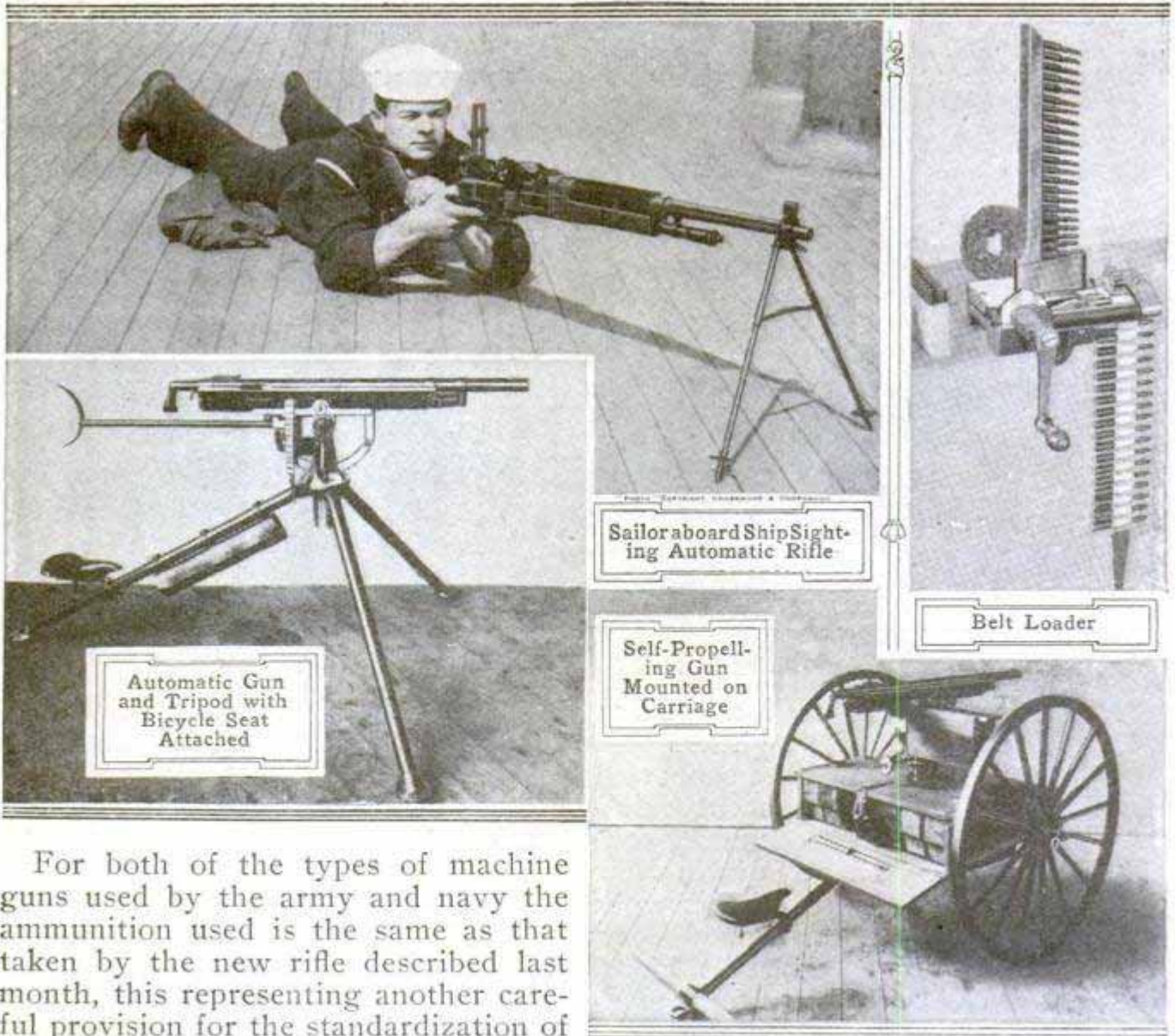
UNCLE SAM'S FIGHTING TOOLS

The Heavier Machinery of War with Which Our Soldiers, Sailors, and Marines Do Their Day's Work

[In the August number of Popular Mechanics Magazine the equipment of the individual fighting man was described and illustrated in detail. This article deals with what might be called the "machine tools" of modern warfare.—Editor.]

WHEN a corps of marines or a party of sailors is ordered ashore for land duty, such as the seizure and temporary occupation of a port, or the garrisoning of a legation, high-power automatic machine guns constitute one of the chief items of equipment supplied the forces. The recent development of these instruments of destruction has been so little less than marvelous that today a single machine, in theory at least, spits death faster and more certainly than the rifles of an entire company could in the past.

fighting equipment. Between 300 and 600 shots a minute can be fired, each with an initial velocity of 2,500 ft. a second, and a maximum range of about 2,000 yd., with one model of these guns. In this, the ammunition is fed by means of canvas belts, in which a large number of shells are held. Just as rapidly as one of these is emptied another is run through after it. The pressure resulting from the expansion of gases following an explosion in the firing chamber effects the automatic feature of the instrument.



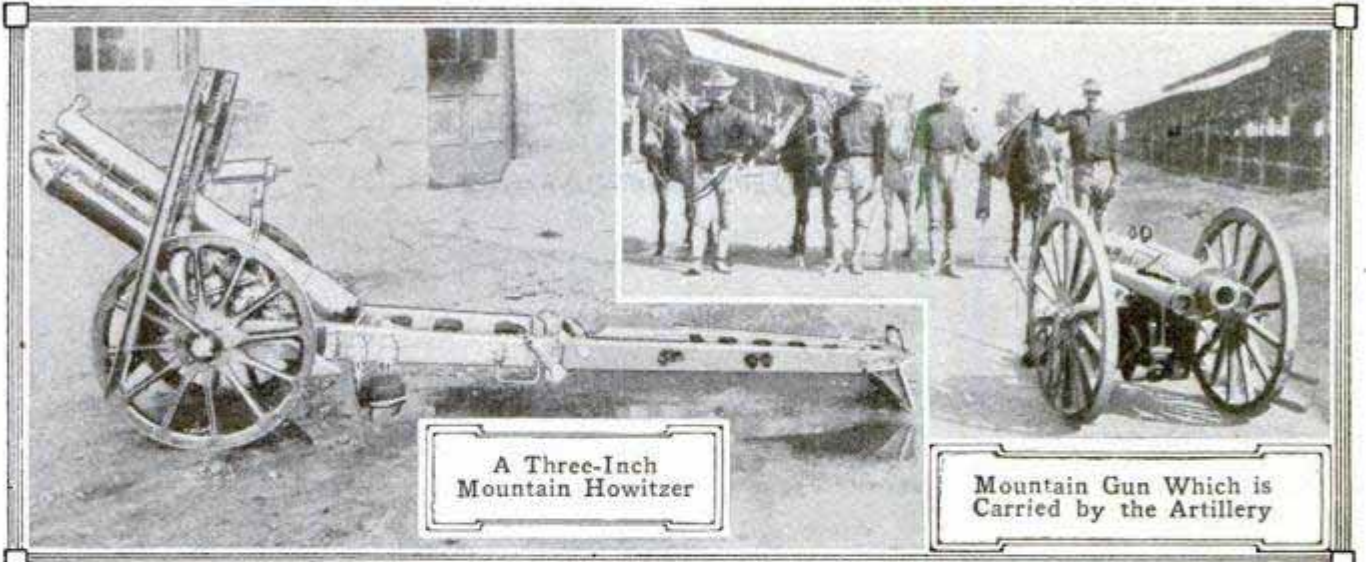
Sailor aboard Ship Sighting Automatic Rifle

Belt Loader

Automatic Gun and Tripod with Bicycle Seat Attached

Self-Propelling Gun Mounted on Carriage

For both of the types of machine guns used by the army and navy the ammunition used is the same as that taken by the new rifle described last month, this representing another careful provision for the standardization of



A Three-Inch Mountain Howitzer

Mountain Gun Which is Carried by the Artillery

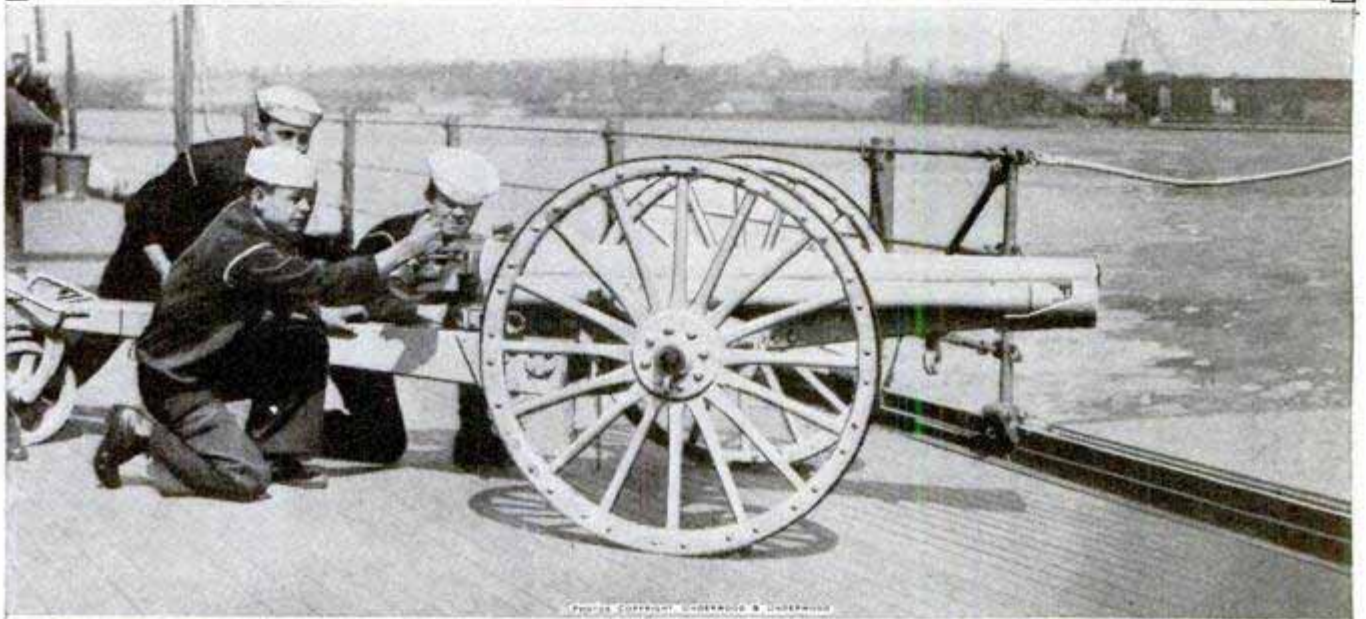
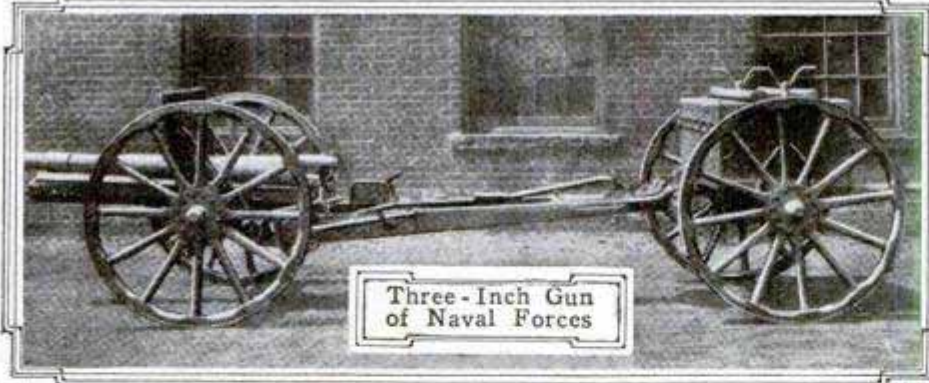
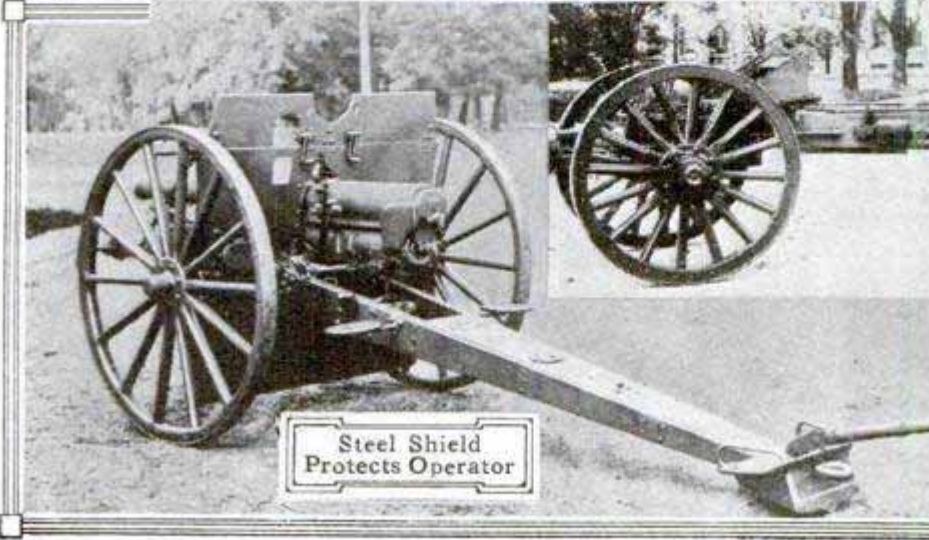


PHOTO COURTESY, USARPAC & USARPAC

Sailors at Rapid-Fire Gun Used by Landing Forces When Ordered to Seize a Port or Garrison a Legation



Three-Inch Gun of Naval Forces



Steel Shield Protects Operator

The Six-Inch Howitzer Which is Used for Heavy Siege Purposes

A 3-in. rifle which closely resembles the fieldpieces of the same size used by the artillery, is taken ashore by the landing parties from battleships. It fires a 13-lb. projectile at a muzzle velocity of 1,650 ft. a second. It is effective up to about 6,000 yd. and uses either a steel shell, which is exploded by impact, or shrapnel, which bursts either by impact or time-fuse ignition. It is fitted with a heavy shield which protects its operator from the fire of the enemy.

Greatly outnumbering all other sizes of guns in the service, the 3-in. field gun has become the mainstay of the artillery. Because of the fact that the modern gun of this type has been developed to a high degree of effectiveness, the so-called heavy artillery is rapidly disappearing. All the artillery guns are made for rapid firing, the others in use besides the 3-in. piece being the light howitzers of the mountain type and 4.7 and 6-in. howitzers, the latter two of which constitute the heavy artillery.

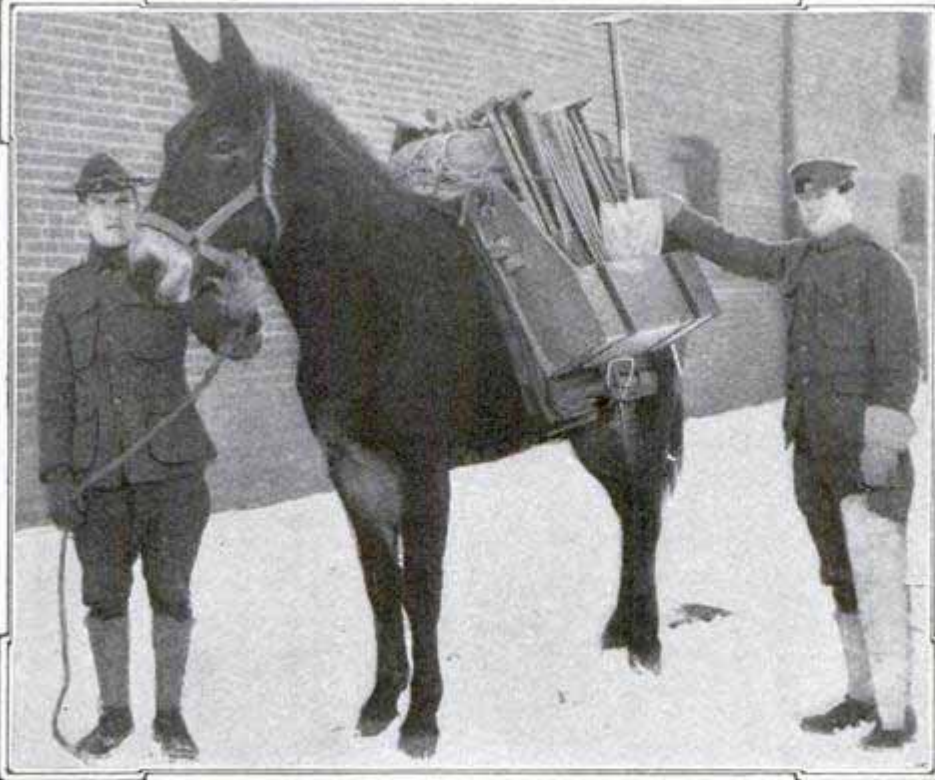
The 3-in. fieldpiece fires a shrapnel containing 252 hexagonal bullets of lead and antimony composition. A steel diaphragm near the base separates the balls from the bursting charge, about 1½ lb. of black powder. At the opposite end are the time-fuse and percussion mechanism. The fuse consists of a trail of powder which is ignited by the explosion of a fulminate-of-mercury cap. This is touched off when the explosion of the propelling charge in the cartridge case forces a metal plunger against it. Through the use of a clockwork mechanism it is possible to set the time for the fuse to burn from $\frac{1}{16}$ second to 21 seconds. When the fuse has burned its allotted time the operating mechanism diverts the flame of the powder train into a larger charge of powder. When this explodes it sends a flame through the center tube of the shrapnel to the bursting charge. If in the course of its flight, however, the shrapnel encounters an object before the fuse timing has expired, a pin in the head of the projectile knocks against a cap by the impact, resulting in an

explosion. In using the time fuse, distance estimates are made so that the bomb will explode about 75 yd. in front of the enemy. The hexagonal bullets are hurled in a cone-shaped rain, scattering over a space approximately 20 by 250 yd.

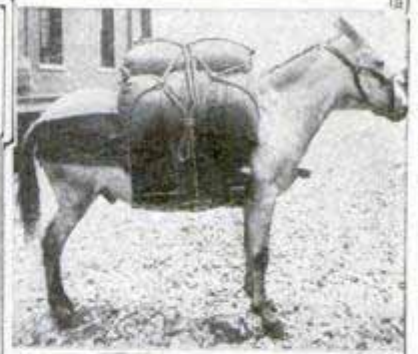
For transportation purposes the army wagon and pack mule still are considered the most efficient mediums, although the motor truck is rapidly coming into more general use. Motors are considered less dependable because of the character of the majority of roads which would be encountered by an army during actual service, especially if it were invading a country like Mexico where there is a general absence of good roads excepting in the immediate vicinity of large cities. The "aparejo," which is a heavy saddlelike harness, is used as a pack carrier for the mules. The various pieces of cumbersome equipment, some of which are exceedingly heavy, are lashed to this. In this manner, army paraphernalia and commissary supplies are transported satisfactorily in regions where it sometimes is impossible for a wagon to penetrate.

Although several types of motor trucks have been experimented with by the government, only two have been adopted officially. According to the specifications for military motor vehicles the chassis of a machine must be of a shape and size to accommodate the standard army-wagon body. The light truck, particularly that of 1½-ton capacity, has met with greatest favor in the service. These have been used successfully as tractors and regular carriers.

The construction of pontoon bridges to allow the passage of troops and rolling stock over streams impossible to ford, is one of the several functions of the engineering corps. The facilities for accomplishing this are so complete that it requires only a matter of an hour to unpack the equipage, build a floating bridge 100 or 200 ft. in length, haul the transport trucks across it, then knock it down, reload the wagons and resume the march.



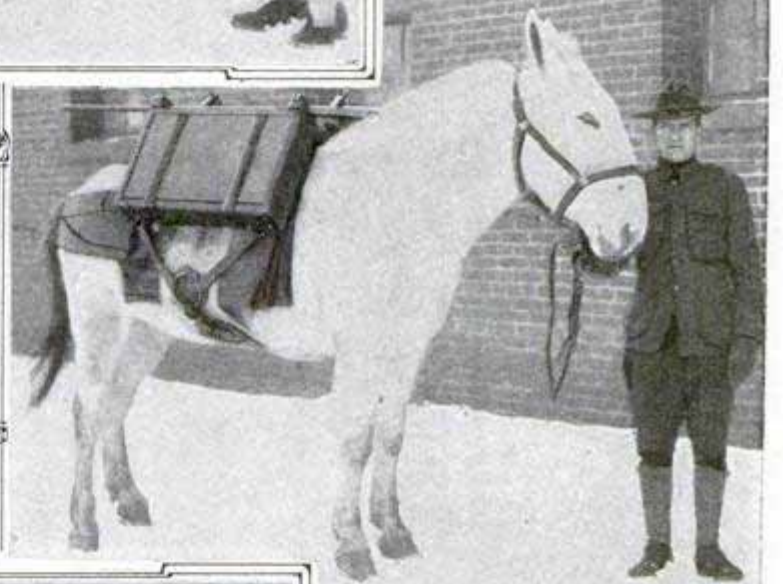
Mule Loaded with Pioneer Equipage Ready for March



"Double-Diamond" Hitch Used in Lashing Commissary Supplies onto Backs of Pack Mules



Small Army Truck Employed as a Tractor



Pack Mule Loaded with Carpenter Outfit



Demolition Equipment of Engineer Corps Packed for Transportation



Army Wagons are Built Strong for Hard Usage

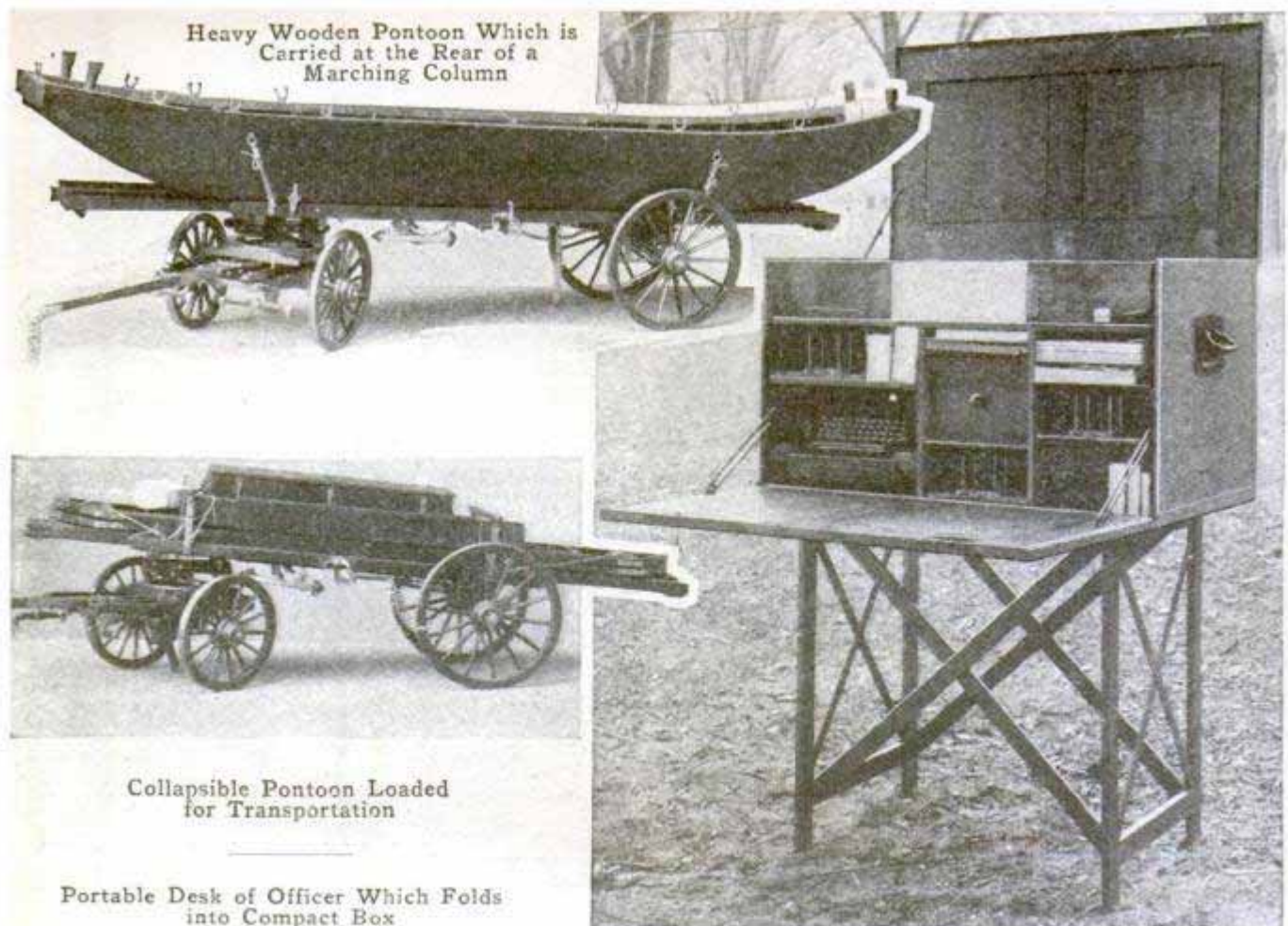
Wireless telegraphy fills an important place in the signal-corps activities. The devices are undergoing constant improvements. Apparatus packed in carriers no larger than suitcases, outfits built for transportation on mules, known as the mountain type, and wagon equipment drawn by horses or mules, have been described in this magazine as rapidly as they have been developed. The outfits carried on pack mules have been unloaded, set up and put in operation in the expiration of 2 min. 10 sec. The latest development in this line is a wireless station mounted on a motor truck, completed and satisfactorily tested early in the present summer.

Useful as the wireless is, it is not yet by any means the sole reliance of the army and navy as a means of communication. The telegraph and telephone are still essential parts of the equipment of a force in the field. The field telephone and telegraph apparatus weighs only five pounds.

The heliograph, which operates by reflecting the sun's rays with a 4½-in. mirror, has been in use in the United States Army since 1878, when it was first used successfully by the British in India. The reflectors at one station are set so as to cast the flashes on the planes of the other. A screen is mounted to intercept the flash so that by opening and closing its leaves, long and short waves are made, enabling the transmission of a message by ordinary telegraphic code.

Written communications between commanding officers, reports, requisitions and various documents involving clerical work in their preparation, are necessary to the smooth operation of even the best-organized fighting force. To house the equipment for this service each important detachment of troops carries with it a field desk, manufactured by the Ordnance Department, which is a model of ingenious utility.

When the day's work of the force in the field—whether marching or fight-



Heavy Wooden Pontoon Which is Carried at the Rear of a Marching Column

Collapsible Pontoon Loaded for Transportation

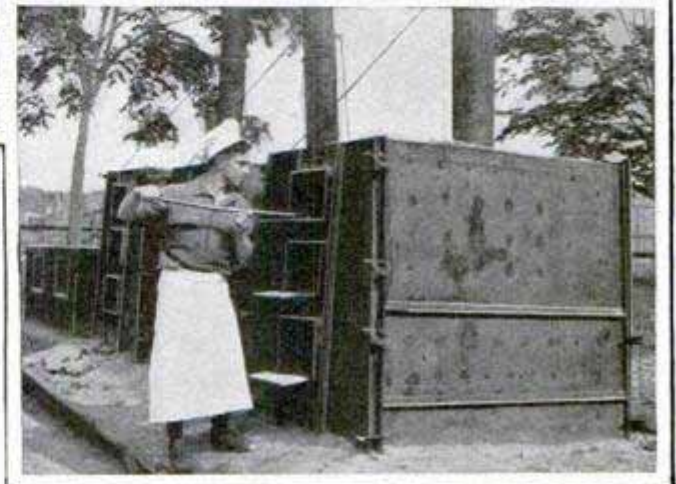
Portable Desk of Officer Which Folds into Compact Box



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Food for Sixty-Five Men may be Prepared on One of the Small Field Ranges

Marines at Sacrifice Island, Showing the Dog Tents in Which They Live While Ashore



The Ovens Carried by the Army are Collapsible and may be Loaded Quickly

ing—is done, the camp equipment becomes the most important part of the military machinery. For shelter, the army on the march relies upon the "dog tent." Each soldier, sailor and marine carries half of one of these on his haversack. Even in stormy weather a pair of "bunkies" can make themselves comfortable under the roof provided by joining their respective halves of the canvas. But before they turn in they must eat, and unless the exigencies

of transportation have delayed the cook outfit, forcing them back on their emergency rations, hot food and freshly baked bread will be awaiting them at the end of the march.

ELECTRIC TUNNEL CRANE IS SELF-PROPELLED

The use of electricity as motive power by steam railroads at eastern terminals has developed an electric wrecker which derives its power from both storage batteries and third-rail contact. The equipment is assembled over a single set of trucks, which virtually makes the 100-ton tunnel crane its own locomotive, eliminating in many in-

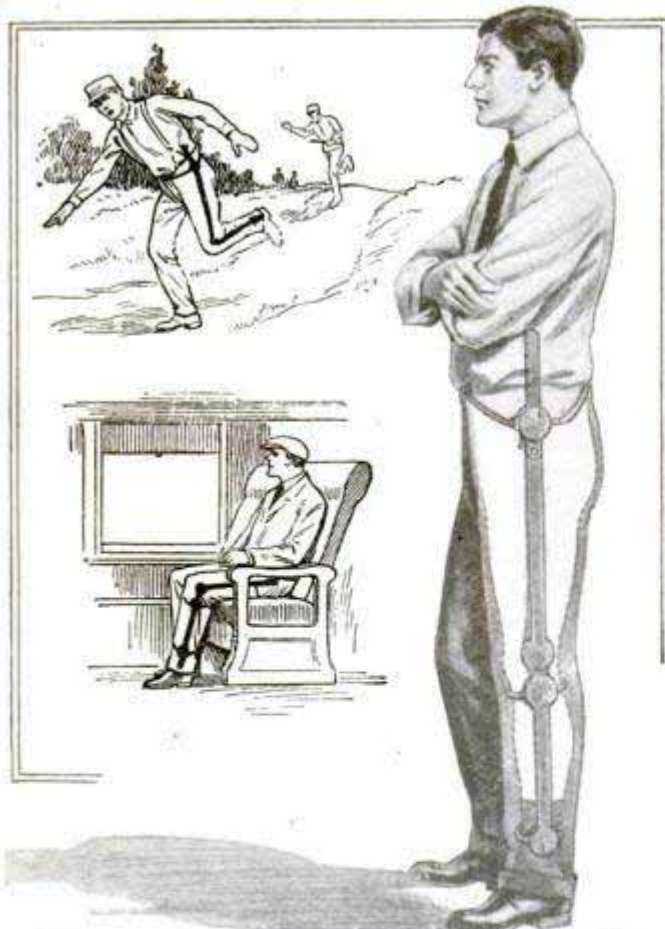
stances the necessity of carrying an entire train load of machinery to a point of blockade. The huge cranes are mounted at both ends of the steel car and may be operated independently or together. During the time that the cranes are working with heavy loads, outriggers placed at the car ends give stability. Power for the cranes is furnished by two 150-hp. motors, while four 200-hp. motors propel the car.



An Electric Tunnel Crane with a Speed of 25 Miles an Hour

SHACKLED PRISONER FREE UNTIL HE RUNS

Allowing freedom to a prisoner in walking and performing ordinary work, a new shackle for use in penal institutions where convicts are sent out to work on roads or farms will lock a man's leg, throw him and make it practically impossible for him to escape when he attempts to run. The device consists of a bar which extends from the waist to the ankle and is jointed at the hip and knee in order to allow use of the limb. At the knee, however, is a catch lock which will snap whenever the limb is swung to a 17° angle, as in running. When a prisoner is placed in a chair the lock catches at 45° , eliminating the danger of his jumping from a moving train or escaping through a court-room window. The bar is made of hardened steel which resists filing. Notches at the waist line and ankle allow the shackles to be fitted to a man of any size. By its

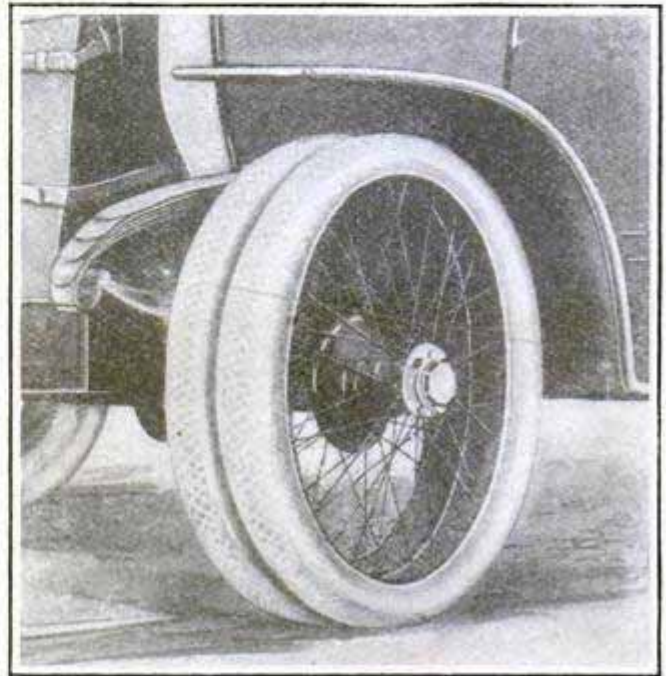


When a Prisoner Attempts to Run This Shackle Locks His Leg

use one officer can guard a number of prisoners without fear of escapes.

THE USE OF TWIN TIRES GAIN- ING GROUND

Although the notion that twin tires slow down an automobile held sway for a long time, the obvious advantages of



Twin Tires Cut the Load in Half, and Prolong the Life of the Tire

the double tire for touring are gaining recognition, and more cars are being equipped each year. A special wheel is required, with support for two regular pneumatic tires. They are inflated and used in exactly the same way the single tires are used, and their saving in wear comes from lessening the burden borne. An added advantage comes from the fact that if one of the tires is punctured, the remaining twin is able to carry the car to its destination without cutting the deflated tire.

AMERICAN FLAGS IN THE NATIONAL MUSEUM

A collection that includes 20 or more examples of the American flag and shows its development during different historical periods is one of the conspicuous exhibits in the National Museum at Washington, D. C. In this collection is a flag said to have been flown on the "Bonhomme Richard" under command of John Paul Jones,

while another flag of the greatest historical value is the one that waved over Fort McHenry during the bombardment in 1814 and furnished the inspiration for Key's anthem "The Star-Spangled Banner." This flag, which is 32 ft. long and 28 ft. wide, has 15 stars and stripes in accordance with the standard established in 1785 and in effect until 1818, when Congress returned to the original 13 stripes and made provision for the addition of a star for each new state. Many interesting flags of the Civil War and later dates are also included in the collection. Among these is the flag carried in the three-day battle at Salem Heights, Va., in 1863, when three flag bearers were killed, though the standard itself never fell to the ground. Although it was used by

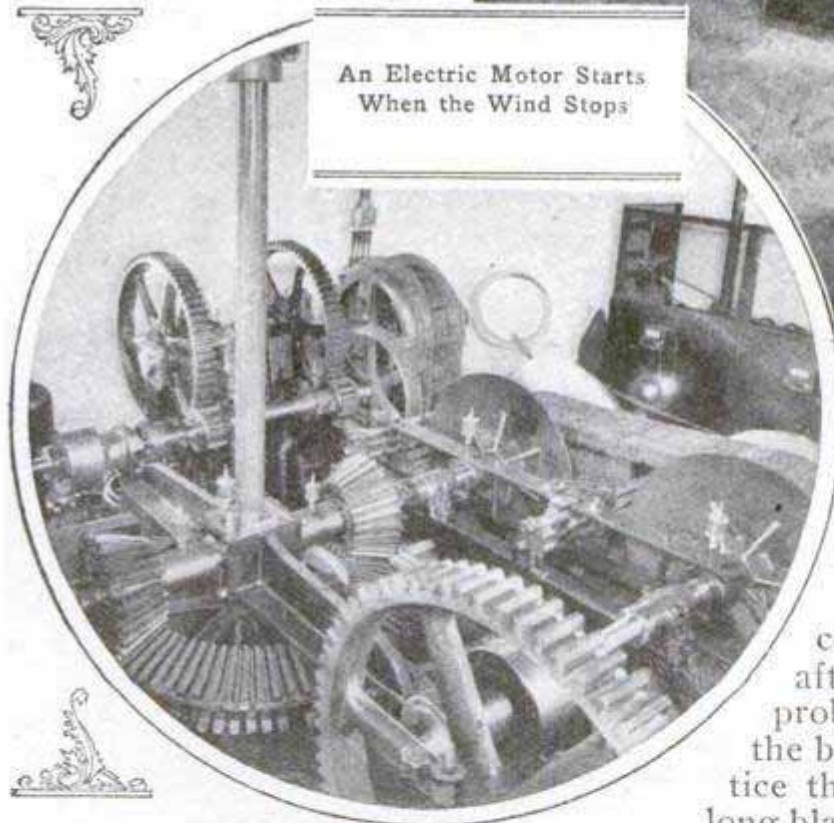
VANES OF WINDMILL TURN AFTER WIND CEASES

Whether the wind blows or not, the huge vanes of the picturesque old Dutch wind mill in Golden Gate Park at San Francisco,



An Electric Motor Starts When the Wind Stops

Dutch Windmill Which Works When There Is No Wind

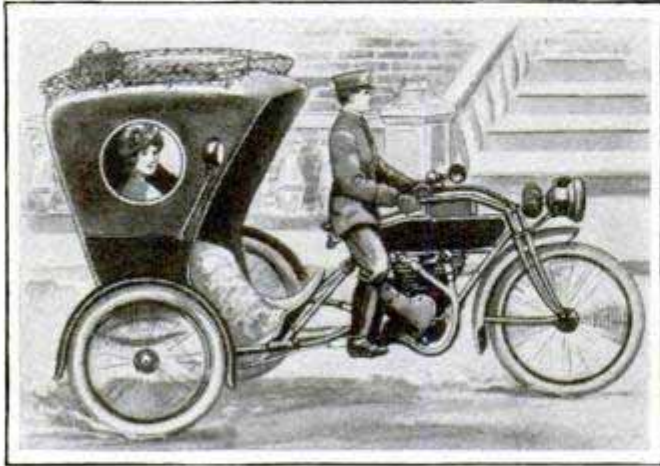


the army as a garrison flag and was flown from all warships, the stars and stripes was not carried by troops in battle until the time of the Mexican War. Before this time the regimental colors and a standard bearing the coat of arms of the United States were carried by all land forces. Many painters of historical scenes have overlooked this fact.

continue to revolve slowly, hour after hour. The casual visitor probably is too much engrossed in the beauty of the quaint scene to notice that the graceful turning of the long blades goes on despite the absence, at times, of even a balm-laden zephyr. Inside the tower lies the secret. The park authorities decided that a windmill which stopped every time the wind ceased blowing was not properly performing its duties. So they installed an inconspicuous electric motor in a corner among the other machinery, which begins its work automatically when the wind leaves off.

MOTORCYCLE AND CARRIAGE COMBINED

The combination of a motorcycle and a two-wheeled carriage, having a quaint top surmounted by a luggage-



A Curious Vehicle That is Designed to Take the Place of the Sidecar

carrying receptacle, is the latest thing in vehicles of the sidecar class. Unlike a sidecar this carriage is placed behind the motorcycle. The combination may be built as one vehicle, as shown in the illustration, or the carriage may be made separately and arranged to be attached to the rear of the motorcycle.

OPERA GLASSES ON FRAME WORN LIKE SPECTACLES

In an attempt to overcome the discomfort occasioned by holding opera or field glasses to the eyes for long periods, a device which supports the binoculars in place like spectacles has been introduced lately. The arrangement consists of a frame which grips the rims of the glasses and hooks back of the ears of the wearer. In this way the user may watch a race, or keep the glasses trained on the stage, for considerable lengths of time without inconvenience.



EMPLOY ULTRAVIOLET RAYS TO VULCANIZE RUBBER

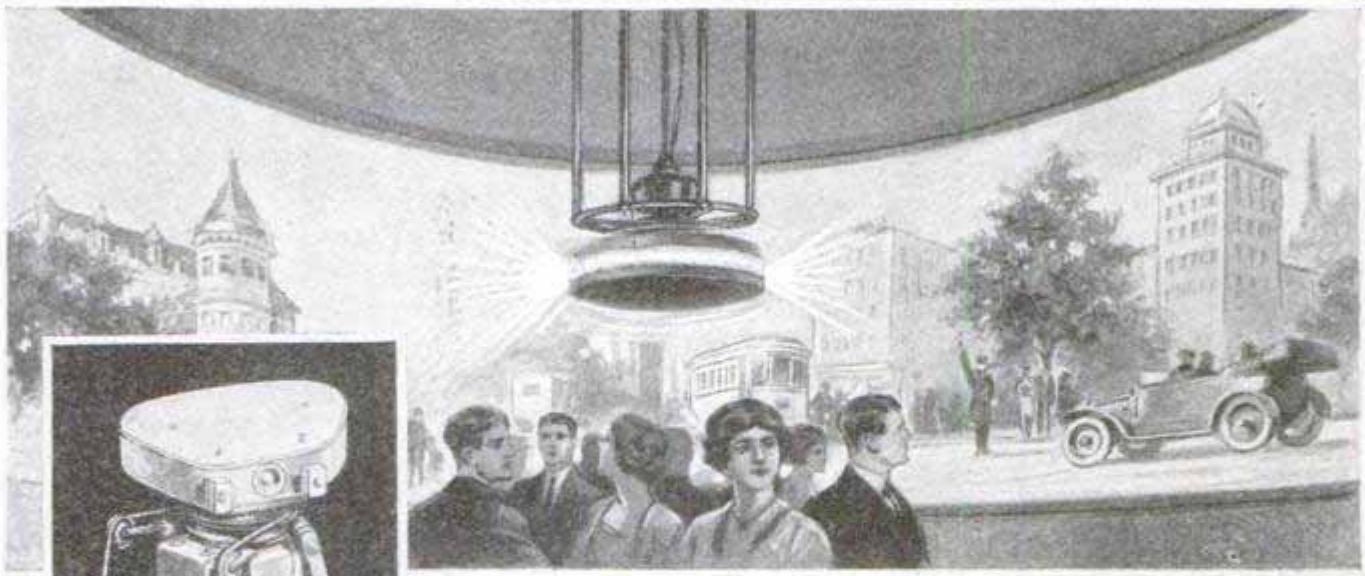
At a recent session of the French Academy of Sciences, a method of producing vulcanized rubber at ordinary temperatures by means of the ultraviolet ray, was reported. The process consists of exposing a mixture of rubber and sulphur solutions to the rays for ten seconds. After this is done the mixture is evaporated and a solid results. This has all of the properties of vulcanized rubber, it is claimed. While in usual processes the quantity of sulphur used is large, the contrary is true in the case of the new method. The fluid mixture may be kept in a closed vessel after being prepared, for it does not precipitate, as might be imagined.

NIGHT TRAP SHOOTING UNDER ARTIFICIAL LIGHT

Shooting clay pigeons at night with the aid of automobile headlights has been proved entirely practicable and is apparently to come into vogue as an after-dark sport in California. In a recent test the powerful headlights of a number of machines were turned over the traps. When the "pigeons," which had been given a coat of whitewash, were flung from the traps, they could be plainly seen in the strong glare of light, and some of the marksmen were able to make scores as high as 22 hits out of a possible 25 after they had become accustomed to the unusual conditions. As a permanent arrangement two powerful lights will be placed over the traps for night shooting.

MOVING PANORAMA GIVES EFFECT OF REAL LIFE

A machine that throws a continuous panorama completely around the inner surface of a cylindrical screen so that an observer standing at the center of the space inclosed by the screen will have the same view that he would have if standing in the midst of



When the Panorama is Thrown on a Cylindrical Screen It Produces the Same Effect as If the Observers were Standing in the Midst of the Scenes Depicted



How the Panorama Machine Looks When Mounted and Ready for Work

the actual scenes depicted, is the latest development in motion-picture apparatus.

A number of partly successful attempts to accomplish this have been made by using several synchronized machines, but it has at last been done by the use of only one machine, and that of the simplest nature. The apparatus with which the pictures are made works much after the fashion of an ordinary panorama machine except that the casing carrying the lens and film makes a series of complete revolutions around a vertical axis at such a high rate of speed that the image on any part of the screen changes so rapidly, as with an ordinary motion-picture machine, that the eye is unable to detect the break between successive pictures. The drums on which the film is wound are carried in the casing and revolve with it. They rotate in a horizontal plane so that the film is on edge vertically and travels horizontally past the lens, which is placed in the vertical face or edge of the casing. These drums are geared with the axle on which the casing revolves at such a ratio that the film moves the proper amount past the lens

at each revolution of the casing. The same machine, mounted well above the heads of the spectators and with a light placed within the casing, may be used for projecting the pictures. Owing to the position of the axle it is impossible to place the light at the center of the casing, but a light at one side of the center can be easily combined with mirrors by which it will be reflected through the film and lens.

CARRIES PUPS IN PANNIERS ON OVERLAND HIKE

Following its master on a long overland journey, a spaniel carrying its puppies in panniers swung over its back made an unusual sight. Cut from canvas and slung like saddlebags, the queer carriage harnessed to the mother dog formed a comfortable conveyance for the young pups, which made the trip with as much unconcern as if it were an everyday occurrence. Much of the travel was made through the heavy forests of Washington, where the



trails were very rough in places. Despite this, however, the little animal kept up her pace and succeeded in bearing the burden nearly 100 miles, over the uneven country, in three days.

PRESIDENT WILSON OFFERS TROPHY IN YACHT RACE

Both President Wilson and King George V of England have offered trophies in the yacht races to be held in



connection with the Panama-Pacific Exposition from April 5 to 28, 1915. The President's cup will go to the victor in the race of 12-meter yachts, which is to be held under international rules and which will be the major event in the yachting regatta. Yachts owned by members of any recognized yacht club may be entered in the

race without fee other than the nominal one of the official measurer, and entries for this race will close September 1, 1914. Among the competitors who will enter this race is Sir Thomas Lipton. Another race of scarcely less interest is that of the "Sonder Class" yachts. The requirement for yachts entering this race is that the length on the water line, plus the extreme beam, plus the extreme draft, must not exceed 9.75 meters or 32 ft., while the cost of each yacht, including two suits of sails, is limited to \$2,400 and the number of persons on board is limited to three.

☞ An automobile truck is to be used in transporting surveying parties making latitude determinations between Texas and the Pacific coast.

BOY OF SEVEN ENRAPTURES BRITISH MUSICIANS

Music lovers of England have been watching with incredulity and utter bewilderment the remarkable performances of Willy Ferrero, a seven-and-a-half-year-old boy who has been conducting one of the large symphony orchestras in London. Absolutely unconscious of his unusual ability, unable to read a single note and entirely unmindful of such things as scores, the boy, according to the critics of Britain, directs the great organization with the hand of a master. Taking London by storm, however, is not his first achievement. At the age of four years he conducted the imperial orchestra before the Russian court. While almost a prodigy of prodigies, he at the same time is 100 per cent boy, with sugar cakes, toy automobiles, blocks and tops foremost among his interests.

A PRIMITIVE MODE OF TRANSPORTATION

The native women of Surinam, or Dutch Guiana, like the women of some other primitive tribes, are expert at



carrying articles of all kinds on their heads. Anything from a pineapple to a load weighing a hundred pounds or more is carried in this way. Heavy loads are transported for miles by this primitive method without ever being touched by the hands and apparently without fatiguing the carriers, while it is not an

uncommon thing to see these women running with light loads, which they keep in perfect balance without any apparent effort.

FOR EVERY PERSON ON THIS EARTH A STAR SHINES SOMEWHERE IN THE SKY

FOR years the approximate number of stars visible to the eye, a matter of 3,000 or 4,000, according to the definition of average vision, has been known. By most persons, however, and by many scientists, the total number of stars in the heavens has been considered countless, if not limitless. The universe is now declared to be finite, yet of a magnificence of dimension and of a populousness far beyond all earlier conceptions. This assumption is a result of very recent investigations into the motions and distances of the stars.

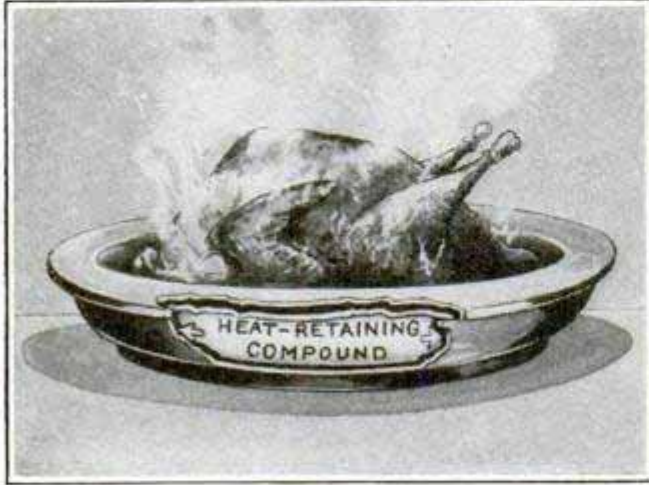
The latest studies on the subject of the number as well as the light of the stars, have been made at the Royal Observatory at Greenwich, England. The late Franklin Adams succeeded in making a set of 206 photographs covering the entire sky. After counts were made on these pictures, from which the brightness of the self-luminous bodies between practically the twelfth and seventeenth magnitudes could be inferred, it was concluded that they recorded about 55,000,000 stars. From this a formula was determined showing the change of number in passing from one magnitude to another. With these figures it was reasoned that the aggregate number of stars is not less than 1,000,000,000, probably not more than 2,000,000,000, and probably approximately 1,600,000,000, the estimated present population of the earth. In making computations it was inferred that there would be as many stars fainter than magnitude 23 or 24 as there are brighter.

The magnitude of a star relates to its brightness, not its size, for the distances of the heavenly bodies are so tremendous that there is not a single one which presents a measurable disk to the astronomer. Those stars brightest to the eye were long ago characterized as of the first magnitude, while the faintest were classed as of the sixth magnitude. The average star of the first magnitude is shown by modern photometric measures to be 100 times brighter than one of the sixth, hence the ratio between successive magnitudes is set as the fifth root of 100, or about $2\frac{1}{2}$. That is, a fifth-magnitude star is two and a half times brighter than one of the sixth magnitude, and so on. Altair and Aldebaran are standard first-magnitude stars, while the polestar is a standard of the second magnitude. The planets are not strictly included in this system of brightness. Mars is as bright as a first-magnitude star, while Venus and Jupiter are brighter.

The combined volume of light from all of the millions of stars fainter than magnitude 20—almost as dim as can be seen with the greatest telescope—is estimated to be equal to only three stars of the first magnitude, while the brightest star in the heavens, Sirius, is equivalent to 11 such stars. On the other hand the full moon is approximately 100 times brighter than would be a self-luminous body with a light equal to that of all of the stars combined. It is because of their almost incredible distances from us that the stars, every one of them a sun, do not give us more light. Many of them would be brighter to us than our own sun were it possible to view them from a point as near as 93,000,000 miles. In that event, however, the earth would be promptly melted and vaporized, for it would be totally incapable of withstanding the terrific heat which would be thrown off.

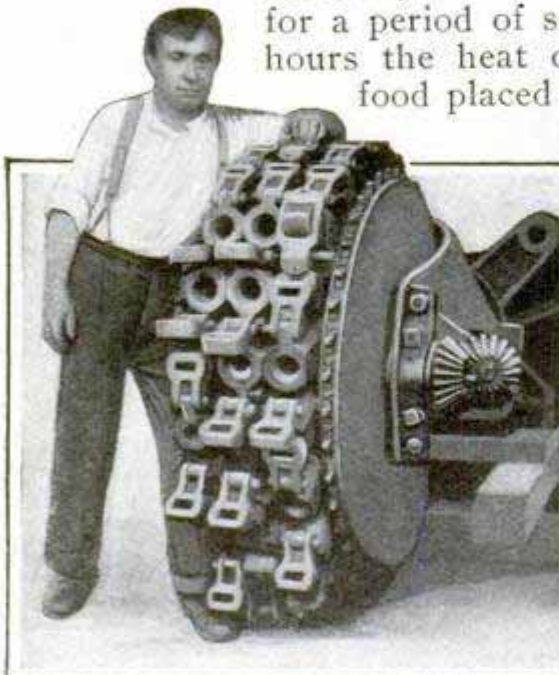
HEAT-RETAINING DISHES FOR TABLE SERVICE

By the introduction of a chemical compound, strong in heat-retaining qualities, into the hollow walls of spe-



Food is Kept Warm for Hours by These New Dishes

cially formed dishes, the manufacture of food vessels which hold a high degree of temperature for several hours has been made possible. The new tableware is made in both sterling and silverplate. Meat platters, coffee and tea pots, pancake and toast holders, and vegetable dishes which keep their contents warm for considerable lengths of time, are included in the variety manufactured. By placing one of the dishes in boiling water for a few minutes, it will retain for a period of several hours the heat of the food placed in it.

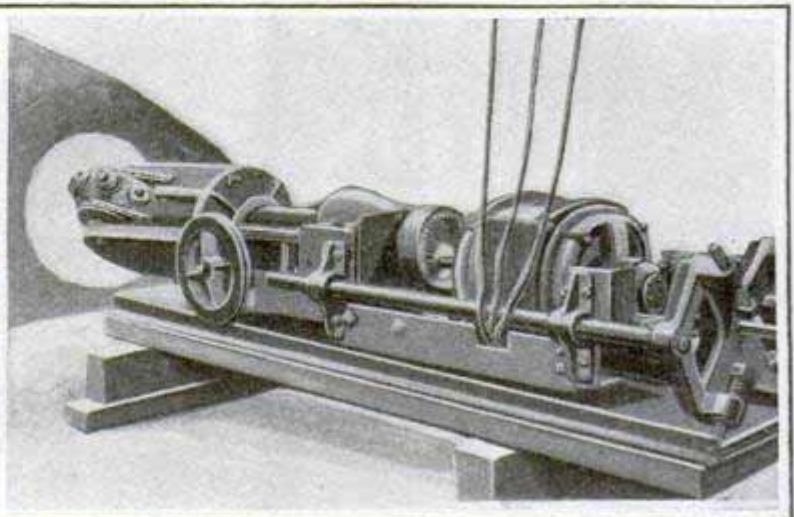


Showing Drill Head of Five-Foot Machine under Construction

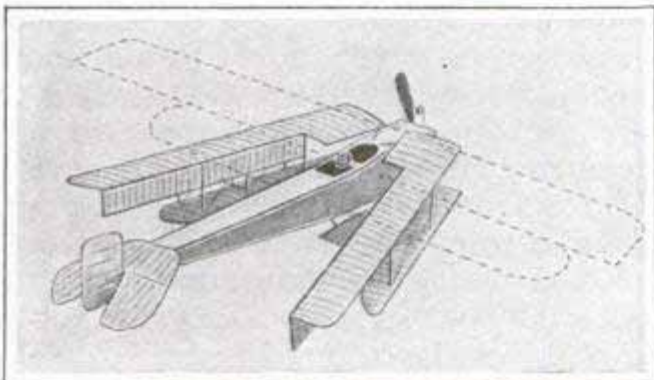
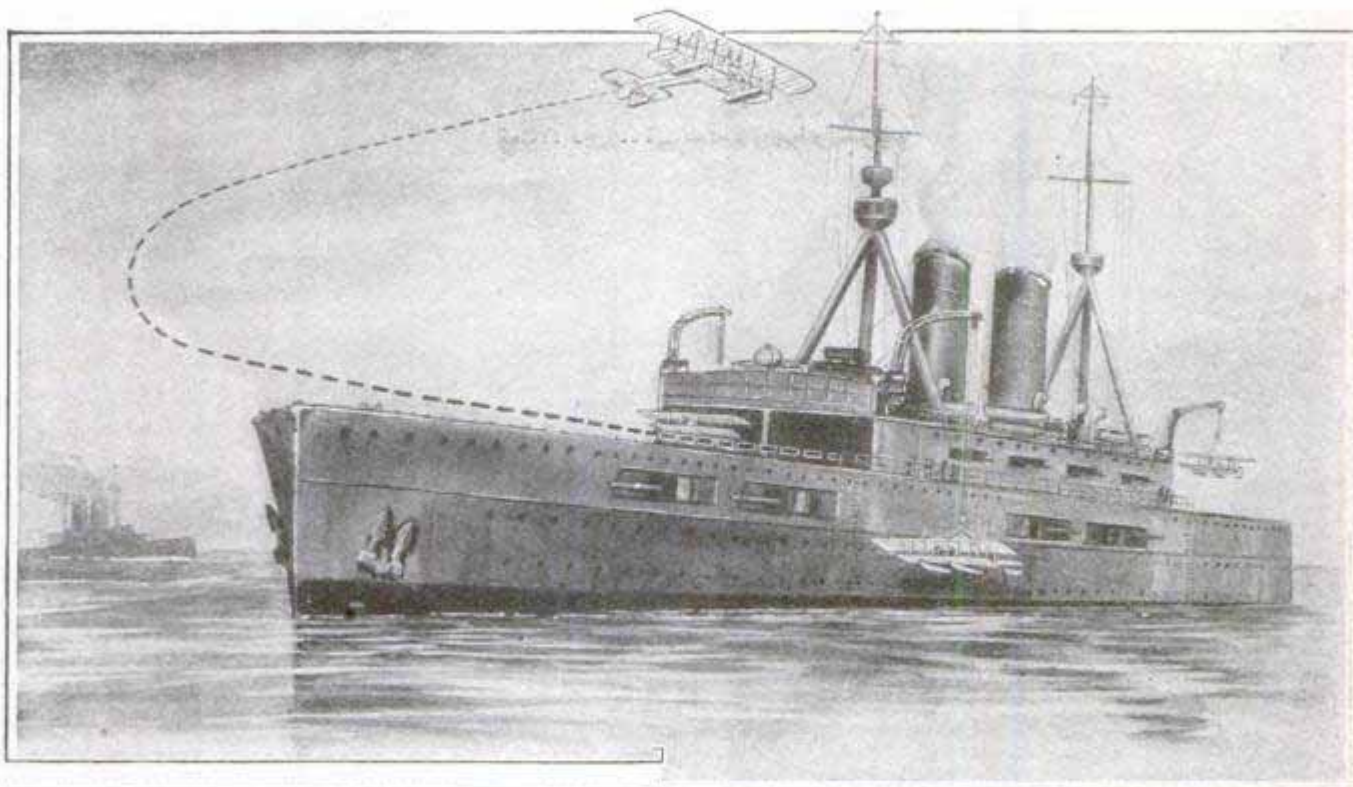
NEW-TYPE ROCK DRILL IS OPERATED BY ELECTRICITY

Centrifugal force is the basic principle of an electric rock drill, capable of cutting through the heaviest formations at a rate of 5 or 6 ft. an hour, which has received a pioneer patent. The working parts of the machine are self-contained, which allows it to feed itself automatically through the tunnel which it bores. A heavy cylinder forms the head, and arranged upon the circumference of this in rows are the chisels. Springs are so fitted to these that unless they actually are in contact with rock they are not within the range of the hammers. In operating, the drill head spins in two directions; that of a wheel revolving upon its axis, and the sidewise revolution caused by the turning of the shaft. On account of this movement the chisels work at an angle, one half of them resting while the other half are at work, which safeguards against overheating. The striking force is provided by centrifugally expanding hammers. Rotating at high speed within the drill head are radiating arms of steel, through the ends of which extend striking pins. The hammers are heavy steel slugs set in sockets in the arms, and by centrifugal force these are thrown against the striking pins, which in turn strike terrific blows upon the chisel heads.

The tunneler may be made in various



Working Model of Drill Which will Bore through an Inch of Rock a Minute



New British Naval Vessel Designed as Tender for Flying Boats

COURTESY ILLUSTRATED LONDON NEWS

View of Flying Boat with Wings Half Open, Showing How Wings are Hinged to the Body

sizes capable of drilling holes from 15 in. to 20 ft. in diameter. Its possibilities may be estimated by the results of the working model, on which each chisel receives 1,799 blows a minute, or collectively, 37,779. The model has but 21 chisels, while the larger machines will accommodate many more, in turn multiplying greatly the aggregate number of chisel strokes per minute.

CARRYING FLYING BOATS ON WARSHIPS

With the importance that aviation has assumed in connection with naval as well as military operations, the question of carrying flying boats along with a battle fleet, and even with individual ships, has become a problem of the most urgent kind, and of this

problem two interesting solutions have recently been worked out. One of these is a ship built especially for the work of carrying flying boats, and the other is a biplane flying boat with wings that can be folded back along the sides of the body. A ship is now being built at the Blyth shipyard in England for carrying the flying boats used for scout duty by the British navy, and is the first ship ever built for this purpose. This ship will have a length of 354 ft. and will be provided with flying decks both fore and aft. After much experiment a biplane with hinged wings has been developed that is not only easily folded into a compact form for storage in a hangar or on the deck of a ship, but is said to be safe and rigid when in flight. The span of the wings when extended is 70 ft. from tip to tip of the upper plane, while the span of the lower plane is somewhat less. When the wings are folded back the machine has an over-all width of only 10 ft. In folding, it is only necessary to remove four pins and detach the stay wires from the floats, when the wings are easily and quickly wound back. Each machine is equipped with slings and rings for lowering into the water and for raising aboard ship.

HAND WASHER FOR PERSON WITH ONLY ONE ARM

A faucet attachment designed to furnish a simple hand-washing device for one-armed persons, consists of an



Hand-Washing Device for One Armed Persons

arrangement which suspends an up-turned brush beneath the stream of water. A conical-shaped clamp fits over the mouth of the faucet. Attached to this is a bar which holds the brush. It requires only a moment's time to screw the attachment in place or remove it after being used. When the

FRESH-AIR SCHOOLHOUSE IS MOSTLY WINDOWS

Abundance of sunlight and fresh air has been provided in an uncommon



Schoolhouse with Constant Supply of Outdoor Air and Sunlight

type of schoolhouse built in a southern California city. The building itself

water is turned on, the brush may be lathered by passing a bar of soap across it. The apparatus is easily carried and may be attached to any ordinary faucet.

MANILA ROPE AS STRONG AS BAR OF STEEL

Weight for weight, a Manila rope used for power transmission is as strong as a solid bar of steel, according to authorities. On the other hand, the same rope is only 11½ per cent as strong when its cross section is the same as that of the metal. Leather, such as is used for belting, has only 5 per cent the strength of steel of a like cross section, and is less than 40 per cent as strong when it is of corresponding weight. The efficiency of rope and leather for the transmission of power, however, is not proportional to their respective strengths, owing to the fact that internally the two are constructed, and wear, differently. Fibers from which rope is made are usually from 8 to 10 ft. in length, and possess material longitudinal strength, but lack that quality transversely. It is this which causes the fibers to be broken into short pieces within a rope, making it sometimes dangerous, although apparently strong externally.

departs radically from the general appearance of the ordinary public-school structure, being not only attractive, but also picturesque. Its lines are mission, and are generous. On the long sides of the building the greatest part of the wall space is taken up by French windows, over which are transoms. Above the latter are open places reaching to the ceiling, and covered only by wire screens. When the glare of the sun becomes strong during the course of an afternoon, blinds are dropped, shielding the pupils from the direct rays.

BILGE OIL IN MOTORBOAT REPRESENTS DANGER

The report of the court of inquiry which officially investigated the burning of the motorship "Scout," that created a sensation in England, points out a condition common in many launches which might cause a disastrous accident. It was found that the destruction of the vessel was due to the ignition of oil in the bilges. It is believed that this was brought about by the revolving flywheel of the engine coming in contact with bilge water and throwing oil on a hot exhaust pipe. In experiments conducted to ascertain the soundness of this reasoning, fuel and lubricating oil were mixed, and this was allowed to float on the surface of water which touched the circumference of the flywheel. When the revolving wheel threw some of the oil on a hot pipe ignition was instantaneous. In the case of the "Scout," the pipe was in such a position as to be within range of oil which might have been thrown in this manner. On a part of the pipe there was no protective covering, and the metal had been seen red hot frequently. Protection of the exhaust pipe, incasement of the flywheel, and frequent pumping out of the bilges, were three of the recommendations made by the court.

STENOGRAPHIC TYPEWRITER USES COLORS FOR VOWELS

In a stenographic typewriter that has just been invented in Germany the syllabic method of writing is replaced by one in which the consonants are written in full and each vowel is indicated by the color of the following consonant. This machine uses a five-color ribbon, the middle color being used for the consonants when no vowels are indicated. In accordance with German stenographic practice the vowel "e" is not indicated, while a distinct color is used for each of the four remaining vowels. The change in color is made by a shift key arranged for convenient and speedy operation.

GARBAGE CAN AND REFUSE BURNER IN ONE

Combination garbage receivers and refuse incinerators for domestic use are being made of cast iron designed to be



A Sunken Garbage Receptacle with Incinerator Attached

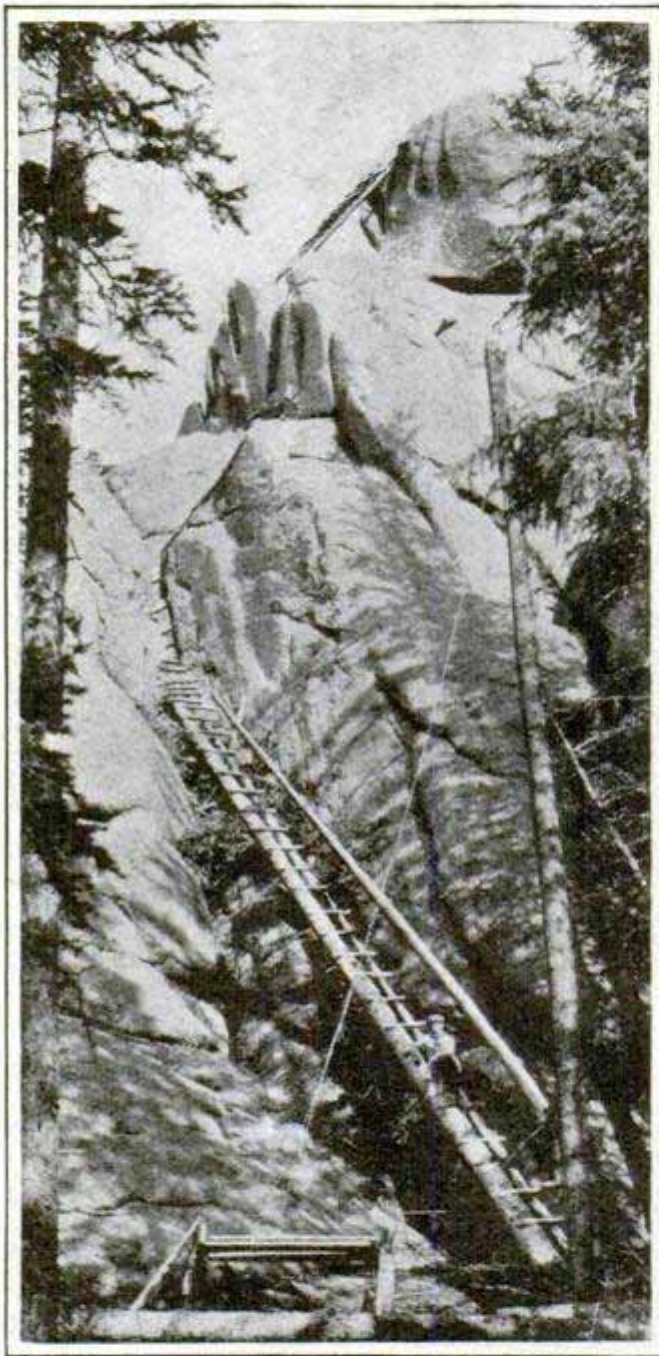
sunk in the ground to prevent the escape of odors and also to eliminate freezing during cold weather.

All that is visible at the surface is a quarter cylinder-shaped hood, the door of which may be opened by foot pressure. The inner garbage can is made of galvanized iron, and below this is a receptacle for the ashes which accumulate from burning brush and refuse. Either the ash container or the garbage holder may be removed by means of a bail. The device is 19 in. in diameter and 30 in. in depth.

Ⓒ Blast hooters have been substituted for electric signals at the Windsor colliery in South Wales.

LOOKOUT FOR FOREST FIRES ON PEAK SUMMIT

One of the many forest-fire lookout stations in the Rocky Mountain territory is maintained on Devil's Head



Scaling Ladders for the Forest-Fire Patrol

Peak, which is about 30 miles north of Pike's Peak, in Colorado. The lookout, who is on duty constantly, lives in a tent at the base of a gigantic pile of boulders which forms the summit of the mountain. In performing his duties he is compelled to climb a long series of ladders, to his position, several times daily. These were put in place by the careful felling of tall

spruces. From his lookout point the watchman can survey the hills for miles around and estimate nearly the exact location of a fire almost at its inception. A telephone line extends to the peak, enabling communication with the forest headquarters immediately upon the sighting of a column of smoke.

SEPTIC-TANK GAS USED AS ENGINE FUEL

The gas produced in the decomposition of sewage in a septic tank, which is rich in hydrocarbons, is now being successfully used in place of coal gas for running the engines at the municipal sewage-reduction plant at Paramatta, Australia. By utilizing in this manner what has heretofore been regarded as a waste and evil product, the way is apparently opened for reducing the cost of operating not only plants of this character but other municipal facilities as well. At the present time this gas is being used only for running a 16-hp. pumping engine, but it is stated that there is still enough gas available to develop about 120 hp., and the possibility of running the municipal lighting plant in this way is being seriously considered.

AEROPLANE RECORDS BROKEN BY GERMAN AIRMEN

New altitude and endurance records for aeroplanes were established in July, 1914, by German airmen. On the ninth Otto Linnekogel attained a height of 6,600 meters, or four and one-tenth miles, in a monoplane, breaking the record of 6,120 meters established on Dec. 28, 1913, by E. Legagneux, the French airman who lost his life while attempting a double "loop-the-loop" on July 6. On July 11, Reinhold Boehm, another German, made a continuous non-stop flight of 24 hr. 12 min., in a biplane. On the 14th, a still higher altitude record of 7,500 meters, or four and two-thirds miles, was made by Oelrichs in a biplane.

TENEMENT HOUSE WRECKED BY BOMB EXPLOSION



WHEN the six-story tenement at 1626 Lexington Avenue, New York, was completely demolished, several persons were killed. Accepted explanation of the catastrophe is that it was due to the premature explosion of a bomb manufactured in one of the apartments by anarchists whose bodies were found in the ruins.

DEVICE FOR RECHARGING AUTOMOBILE MAGNETOS

The recharging of the field magnets of automobile magnetos, which ordi-



New Device for Recharging
the Field Magnets
of Automobile Magnetos

narily needs to be done at intervals of from six to ten months, may now be carried out in any garage by unskilled attendants by means of a device that has just made its appearance on the market. This device is simply applied to the poles of the magnet and no drawing or rubbing of the magnet is required. It is compact and portable and can be operated by any direct current of the proper voltage. It is claimed that with a 6-volt storage battery or with six dry cells an ordinary magnet can be thoroughly charged in from 15 seconds to one minute.

BELIEVE RADIUM INCREASES SOIL'S FERTILITY

Remarkable results have attended experiments made near London with radium as a stimulant for plant growth. It is declared that what already has been accomplished indicates that the application of the mineral in intensive farming may ultimately become one of its important uses. In the process of extracting radium from different materials there is usually a small amount of the element left in the residue. When this substance is mixed in the earth,

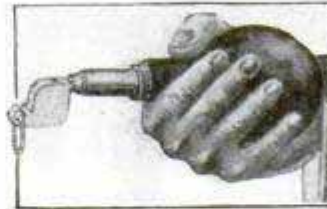
giving about one seven-hundredth part of a grain of radium to a ton of soil, wheat and barley grow with great rapidity, while the leaves become greatly darkened. Radishes and carrots treated in this manner have grown to six times the usual weight. It is stated that when radium is once incorporated in the soil its effects will remain practically constant for centuries.

WHITE HORSES LOSE PLACE IN RANKS OF ARMY

White and gray horses will no longer be purchased for use in the army. Because of their conspicuousness they are not considered desirable, despite the renown several such animals gained as the mounts of famous generals of the past. Military authorities declare that in the field the light-coated beast forms a target for sharpshooters, and for that reason the quartermaster corps has stopped their purchase entirely. This does not prohibit an officer from buying a light-colored mount for his individual use if he cares to do so, although some of the members of the general staff are now advising an order withdrawing all such animals from service.

HAND-BLOWN WHISTLE USED BY POLICEMAN

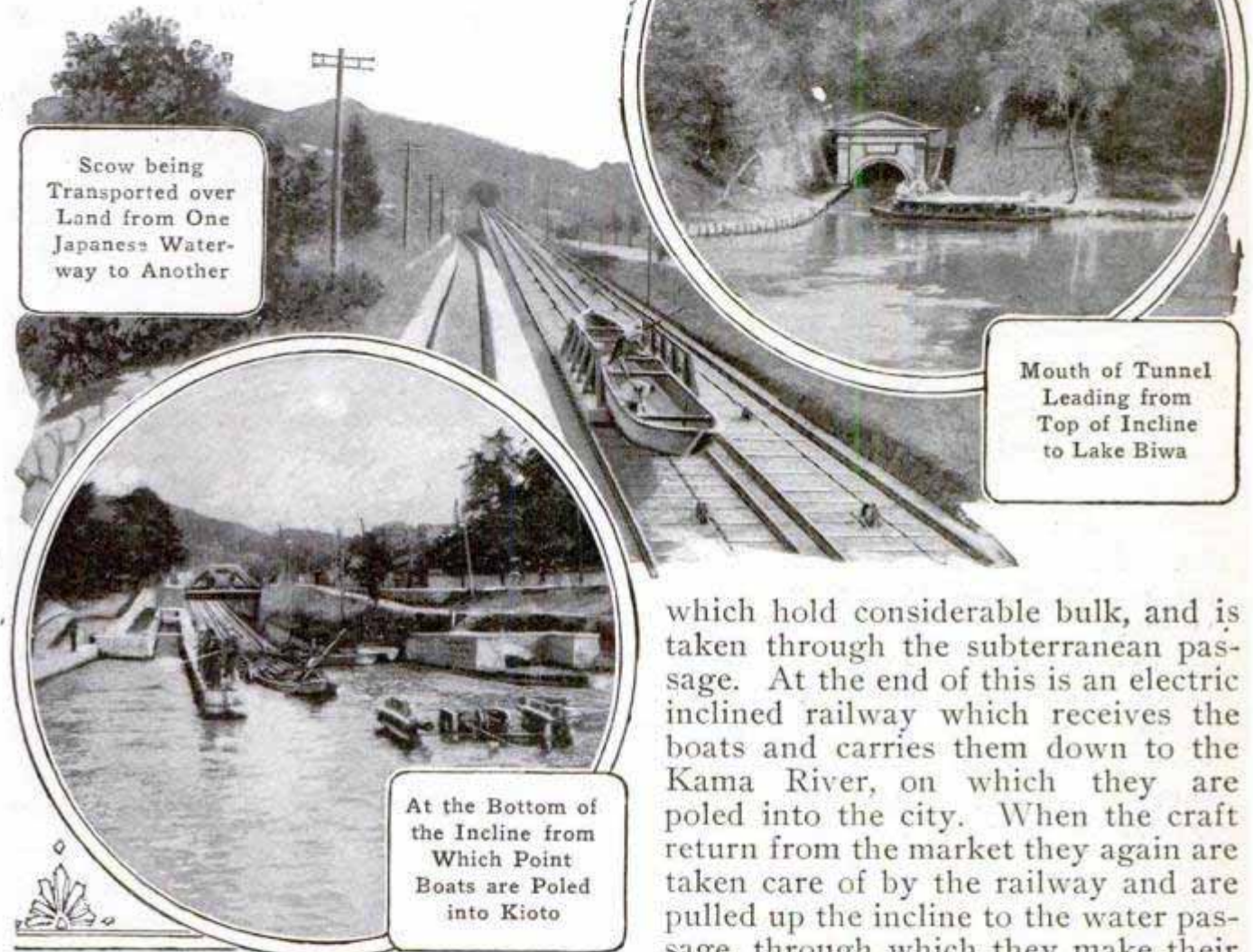
One of the discomforts experienced by the traffic policeman is caused by the necessity of blowing a whistle con-



tinually in signaling drivers and pedestrians at street corners in cities. Growing tired of using his breath for this purpose, a California patrolman attached the bulb of an automobile horn to the mouthpiece of a whistle. By a slight pressure with the fingers he was able in this manner to give his traffic directions easily and without the inconvenience of incessantly blowing the whistle. When this whistle is accidentally dropped it may be blown with the foot.

JAPANESE FARMERS USE ODD MEANS OF TRANSIT

Along the shores of Lake Biwa in Japan, the farmers who send their produce to the old city of Kioto employ a novel means of transportation which is accomplished over land and water without the necessity of chang-



ing carriers. At the lower end of the lake is a water tunnel extending three miles through a mountain. The produce is loaded into queer tublike scows

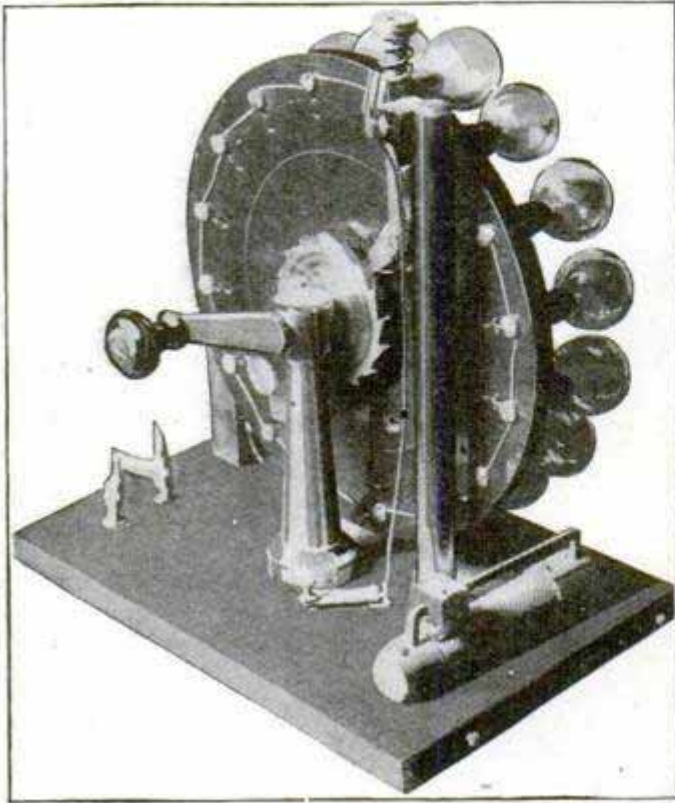
which hold considerable bulk, and is taken through the subterranean passage. At the end of this is an electric inclined railway which receives the boats and carries them down to the Kama River, on which they are poled into the city. When the craft return from the market they again are taken care of by the railway and are pulled up the incline to the water passage, through which they make their way back to the lake. Power for the electric line is generated by utilizing the water flowing through the long tunnel. Passengers also are carried over this land-and-water route.

MACHINE FOR PRODUCING "COLD LIGHT"

A simple and ingenious machine is being used in demonstrating the so-called "cold light" which was discovered by a French scientist and described in the August, 1913, issue of this magazine. Lamps are spaced around the outer edge of a disk, as

shown, and are connected by a wire running around the back of the disk. This wire is in turn connected to the pawl, while the electrical connection with the apparatus is through the ratchet. The pawl is alternately in contact, and free from contact, with the ratchet teeth, thus making and breaking the current at regular intervals, and the adjustment is such that these in-

tervals are of exactly the same length. The ratchet has 16 teeth, and 16 interruptions per second are therefore produced simply by turning the handle at



A Machine That Produces "Cold Light" by Breaking the Electric Current 16 Times at Each Revolution

the rate of one revolution per second. The flashes produced in this way follow each other so quickly that the breaks cannot be detected by the eye, while the periods of rest given the filament prevent its heating appreciably.

INDICATE TELEGRAPH CODE IN SIMPLE MANNER

With the intention of providing a picture of the telegraphic code which will fasten itself upon the mind of a novice more readily than will a series of dots and dashes placed after a letter, an inventor has devised a method of presenting the alphabet entirely in letters, small letters standing for dots and capitals for dashes. In the case of the letter "A," for instance, in the continental code, instead of writing it "—", it has been presented as "a A." In this way there is little confusion and the process of memorizing is apparently simplified. "A" in the telegraphic code immediately becomes a small and large character to the pupil rather than

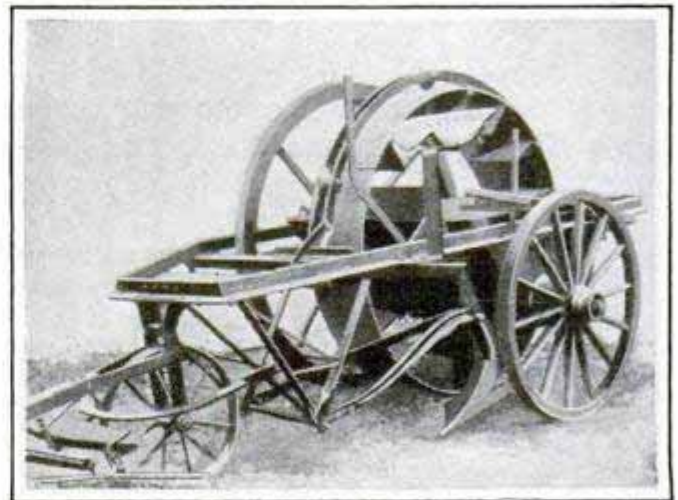
a bewildering dot and dash, or series of them, as in the case of other letters. With "B," again, the code is shown by "B b b b," instead of "— . . .". The numerals are pictured in the same way.

"TAME" RUBBER DISPLACING "WILD" PRODUCT

"Tame" rubber, as that grown in plantations is termed, is rapidly supplanting "wild" rubber in the markets of the world. A few years ago Brazil had almost a monopoly of the world's fine-rubber supply, and prices were controlled from Para, the principal shipping point. The price of rubber reached nearly \$3 a pound, with the demand steadily increasing. Men interested in rubber manufactures set out plantations of rubber trees in Sumatra, Ceylon, and other tropical lands, and now much more than half of the world's supply of rubber comes from these plantations.

HORSE-DRAWN EXCAVATOR IS SELF-LOADING

An automatic plow and earth-loading machine, which discharges its duties without necessitating a stop, has been invented by a Colorado man. The machine consists of a plow which peels the earth into a large wheel elevator. This in turn drops the dirt into a false-bottomed bed, capable of



Machine Loads Dirt As It Plows

carrying $1\frac{1}{4}$ cu. yd. The implement is drawn by a team of horses and loads itself in 20 seconds.

TO MAKE THE OCEAN FERTILIZE THE LAND

Problem: What shall we do when the earth's fertility is exhausted?

Solution: Tap the inexhaustible storehouse of the Sargasso Sea.

WILL the human race find a way to recover from the sea the vast stores of fertilizing energy which are constantly being washed away from the land?

Students of economics have repeatedly warned that some day the fertility of the earth will be exhausted and the human race perish for lack of food. Attention is being given by constructive thinkers, however, to the problem of finding somewhere an inexhaustible store of fertilizer with which to restore plant food to the soil. The latest and in some respects the most interesting suggestion, put forward by a French scientist in *Cosmos*, is that the Sargasso Sea, that strange marine meadow of interlaced sea plants covering a vast area in mid-Atlantic between the Antilles, the Azores, and Cape Verde, may be made to renew the vitality of the farm lands of all the world.

This snarl of marine vegetation, sometimes called "the pasture ground of the seas," fills a romantic place in history and literature. Columbus sailed for a fortnight over it, thinking at first that it was merely an almost endless marsh. A migratory plant forest with an estimated area of approximately 1,600,000 square miles, it holds the wrecks of hundreds of ancient ships, and trees and plants from the Amazon and Mississippi rivers. Similar tracts of floating weeds are found in the Pacific Ocean north of the Hawaiian Islands. There are others to the southeast of New Zealand and in the South Atlantic, extending from the Falkland Islands, south of Africa and southwest of Australia.

The algae and various other forms of water vegetation which abound in the Sargasso Sea are rich in nitrogen, phosphoric acid, potassium and magnesium sulphate, essential constituents of plant life. Besides this the seaweeds contain sodium, chlorine, iodine, and other materials beneficial to certain crops, and cellulose in quantities esti-

mated to be greater than that obtainable from the combined forests of Scandinavia, Russia, and Canada. All these salts and substances have been washed into the sea from the land, the volume of such waste increasing annually and rapidly.

Seaweed is not an untried fertilizer for farm lands, and even when crudely used has proved of value. Gathered along the coast as it is washed ashore, piled in heaps, allowed to rot, and then plowed into the soil, it is utilized in many lands. The recent development on a commercial scale of the kelp industry, based on the extraction of potash and iodine from sea plants, has aroused further interest in the fertilizing possibilities of the sea and its products. An insight into these possibilities is given by the yield of potassium. In the case of the Pacific Ocean seaweeds, each ton of air-dried kelp gives up a minimum of 500 lb. of pure potash salts and 3 lb. of iodine, besides other by-products.

In investigating the possibilities of the industry, the Bureau of Soils of the Department of Agriculture has shown that by exercising care in harvesting the plant it will furnish the world a never-decreasing supply of important chemicals. Providing the weeds are properly cut, the growth within 60 days will equal that removed. What is true of the plants of the Pacific also is true of those of the Sargasso Sea, where their abundance is so enormous that their possible yield of necessary products is inestimable. The plan suggested for gathering these weeds entails the establishment of floating factories for cutting and temporarily drying the vegetation before it is loaded into boats and transported ashore. In being treated for fertilizing purposes it would be macerated and reduced to a paperlike pulp. After being dried by compression it would be ready for use. During this process it is possible that certain properties not

needed for soil renewal could be extracted profitably. As a fertilizer, the nitrogen contained in the pulp would stimulate stalk and leaf growth of crops, phosphoric acid would mature the seeds and fruits, potash would go to the formation of carbohydrates, such

as sugar and starch, while the sodium chloride would tend to hold the moisture in the earth. The ocean in this manner would be made to give up practically all the chemicals required for the nourishment of the various crops, perpetuating the fertility of the soil.

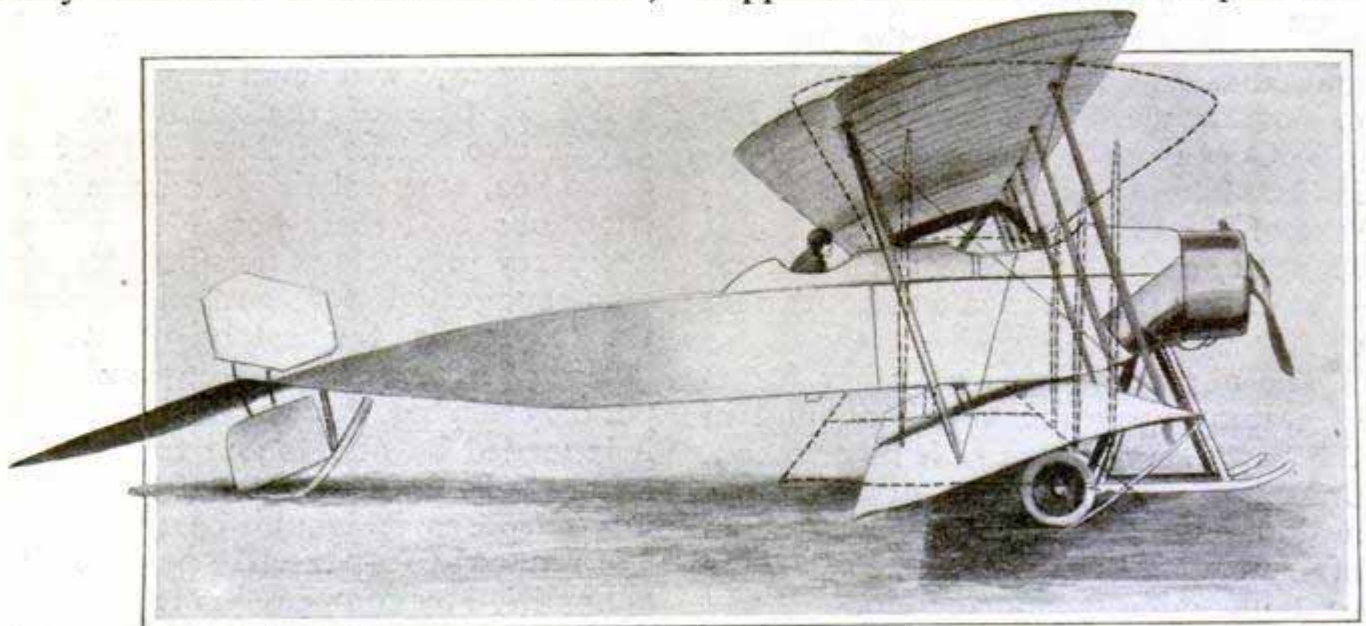
VARIABLE-ANGLE WINGS ON NEW FRENCH BIPLANE

A French biplane that has made six passenger-carrying altitude records since the beginning of the present year has adjustable wings under the control of the pilot so that while in flight he can vary the angle that the wings present to the air stream. This is accomplished by a hinged connection between the fuselage and the framework on which the wings are carried combined with a chain and sprocket which is controlled by a screw and hand lever. The maximum angle at which the wings can be presented to the air stream is 12° . At this angle, which would only be used in rising from the ground or in slackening speed to alight, the machine is said to have immense lifting power. In one flight with the pilot and five passengers on board, the machine made the ascent of the first 3,000 ft. with the wings at an angle of 4° . The angle was then gradually increased to a maximum of 9° ,

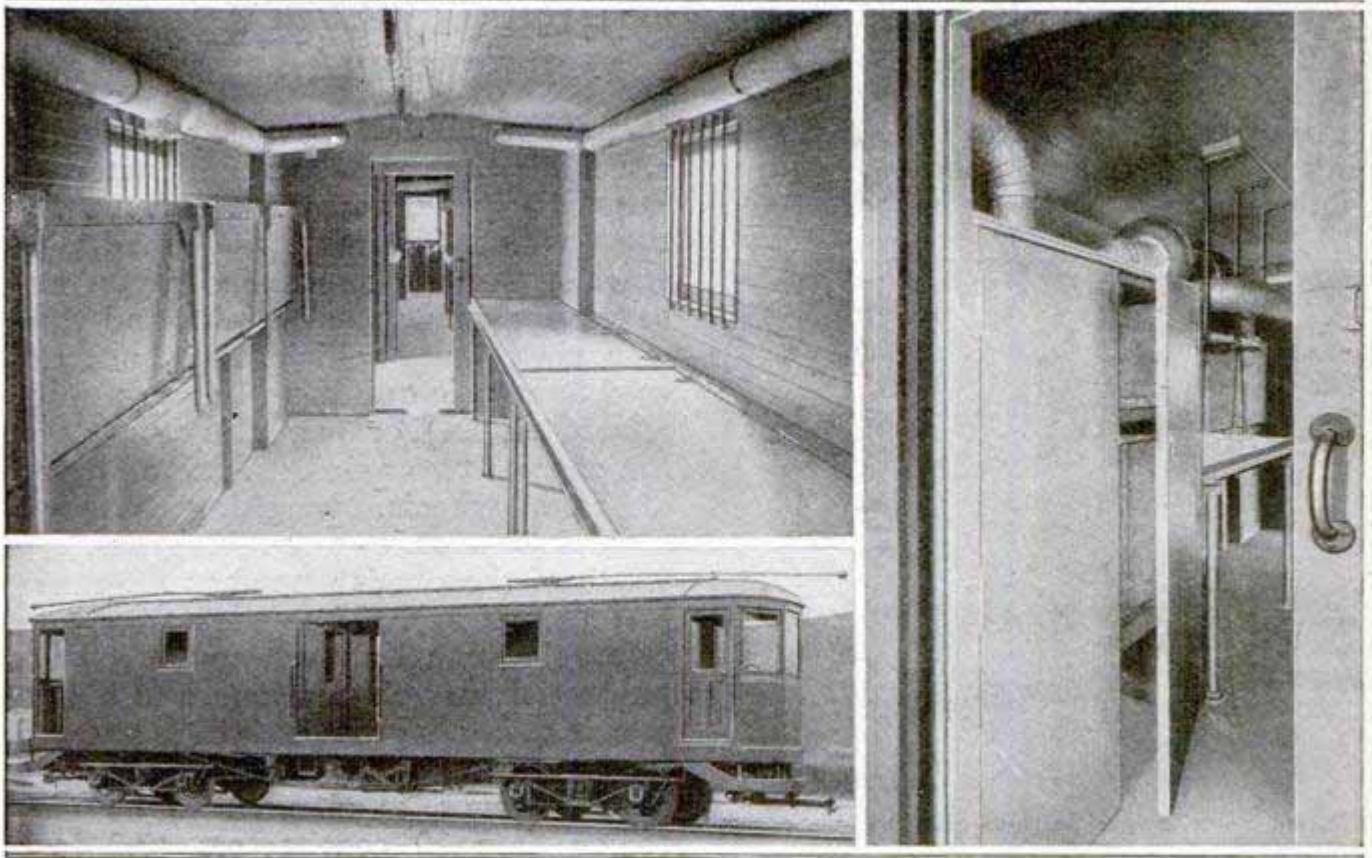
at which a record of 7,882 ft. was made. This biplane is equipped with a 160-hp. Gnome motor.

MILK CAR FOR ELECTRIC RAILWAY

A milk car of a new and interesting type has been installed on an electric railway line running into Philadelphia, and is to be used in bringing milk into that city from the dairy districts to the north. This car is equipped with a refrigerating system for keeping the milk cool and pure during transit, and the loading and unloading arrangements are such that it can be operated with equal convenience in either direction. It is 36 ft. long, with a 4-ft. vestibuled platform at each end, and is divided into two compartments by a passageway running across the middle of the car. Along the sides of the compartments are sectional tables for carrying the milk cans. These are hinged to the wall and rest on pipe supports when in the lowered position.



French Biplane with Variable-Angle Wings Ready to Start from Ground: In This View the Wings are Adjusted to Meet the Air Stream at the Maximum Angle



This New Type of Refrigerating Milk Car is Adapted for Use on Suburban Electric Lines and Transports Milk with the Maximum of Cleanliness

Along the outer edge of each table is an iron ledge which serves to support the end of shelving placed across the aisle. The car is equipped not only with brine tank and ice chest, but has a fan motor and system of piping by which cooled air is kept constantly circulating through the car.

"STORSTAD" IS BLAMED FOR ST. LAWRENCE TRAGEDY

Blame for the sinking of the "Empress of Ireland" in the St. Lawrence River on May 29, with the loss of more than 1,000 lives, was placed on the collier "Storstad," the vessel which rammed the passenger ship in a fog, by the royal commission which investigated the wreck. The third officer of the "Storstad," who was on the collier's bridge at the time, was specifically censured, both for altering the vessel's course in the fog and for failing to call the captain when he saw the fog shutting down. Charges that the steering gear of the "Empress of Ireland" was defective were held to be not well founded.

YOU CAN MAKE A WHISTLE OUT OF A PIG'S TAIL

In the effort to disprove the contention held in the time-worn saying, "You can't make a whistle out of a pig's tail," a Sodus, N. Y., man succeeded in doing that very thing. He actually made a whistle out of a pig's tail. The curved member was allowed to harden and when sufficiently tough to be whittled it was cut to the form of an ordinary



A Whistle Made from a Pig's Tail

willow whistle. When completed the instrument gave a clear, resonant note.

Ⓒ Electric light is supplied at 3 cents per kilowatt-hour in Cleveland, Ohio, since the opening of the new municipal lighting plant.

FOOT SCRAPER ON STEP OF AUTOMOBILE

An open-grating effect upon the running board of an automobile is an English invention, which serves to keep the



A Patent Foot Scraper Helps to Keep the Car Clean

interior of a car clean. After leaving the automobile for any cause, especially in wet weather, mud adhering to the shoes is easily removed before again entering the car. As the bars of the foot scraper are open, the dirt falls through on the road again. The device is made in brass or aluminum.

HEAVIEST OFFICE BUILDING IN THE WORLD

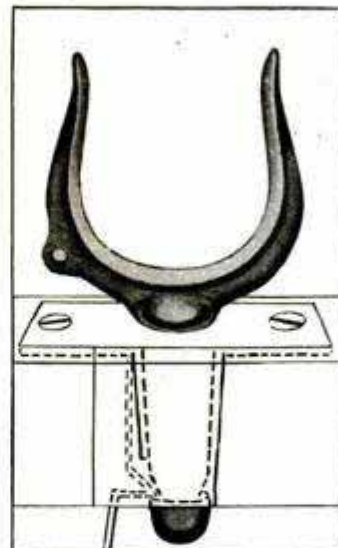
The Equitable building, now under construction in New York City, will be the heaviest office building in the world, as well as one of the highest, the weight of the steel alone being about 33,000 tons. This building covers a ground area of 160 by 312 ft. When completed it will tower 500 ft. above the street and will extend about 65 ft. below street level at its lowest point. It will contain 36 stories and in addition to these there will be two mezzanine floors. The steel erection was made particularly difficult by the network of timber bracing that it was necessary to put in to hold the basement retaining walls until steelwork could be installed to take its place. The heaviest piece of steel to be handled was a column weighing 32 tons.

WIDTH OF VEHICLE WHEELS SPECIFIED IN ITALY

Rigid regulations covering the width of vehicle-tire treads are being made by the Italian government. The computations which determine the breadth of a wheel rim on a certain wagon are based upon its gross weight, and this, in a single-axle vehicle, must not exceed 50 metric quintals (1 metric quintal=220.46 lb.), or 80 metric quintals in the case of two axles. With a wagon of four wheels, weighing between 50 and 80 metric quintals gross, the width of the rim is placed at 100 millimeters (3.9 in.). The ratio varies considerably with lighter wagons. With power-driven vehicles, one and a half metric quintals gross weight is allowed for each centimeter of rim width. No rim, however, is allowed to be narrower than 10 centimeters (3.9 in.), and all vehicles, whether animal or power-propelled, must have flat tires

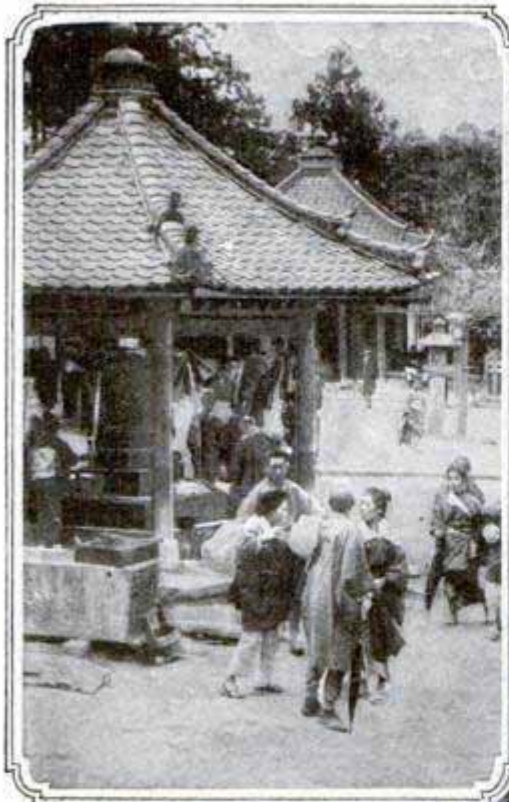
ROWLOCK HELD IN SOCKET BY SPRING LOCK

A self-locking device for holding a rowlock in place is one of the latest inventions in the way of rowboat equip-

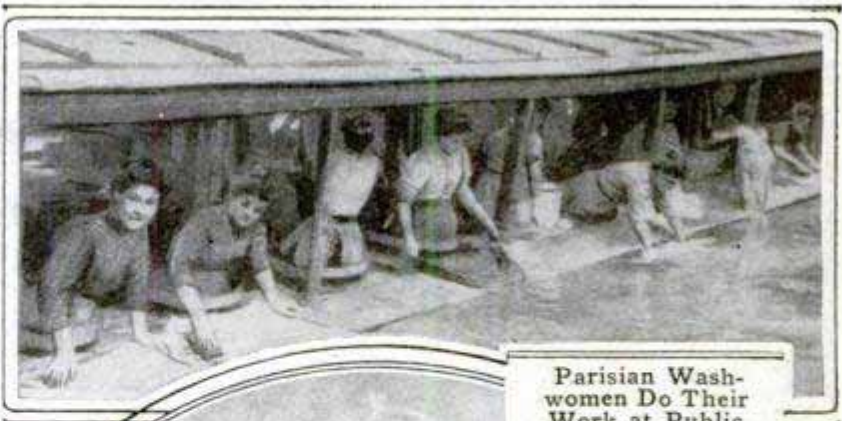


ment. The lower end of the shaft of the rowlock is encircled by a deep groove. The locking feature consists of a spring tongue bent near its lower end to form a sharp projection and secured to the socket in such a way that it exerts a strong

pressure against the shaft. When the rowlock is forced into the socket the projection on the spring snaps into the groove and holds the rowlock in place. The rowlock is easily removed by pulling the spring back by an extension that projects well below the socket.



Public Washing Fount
in the Miidera Temple
Grounds, Japan



Parisian Wash-
women Do Their
Work at Public
Tanks Like This

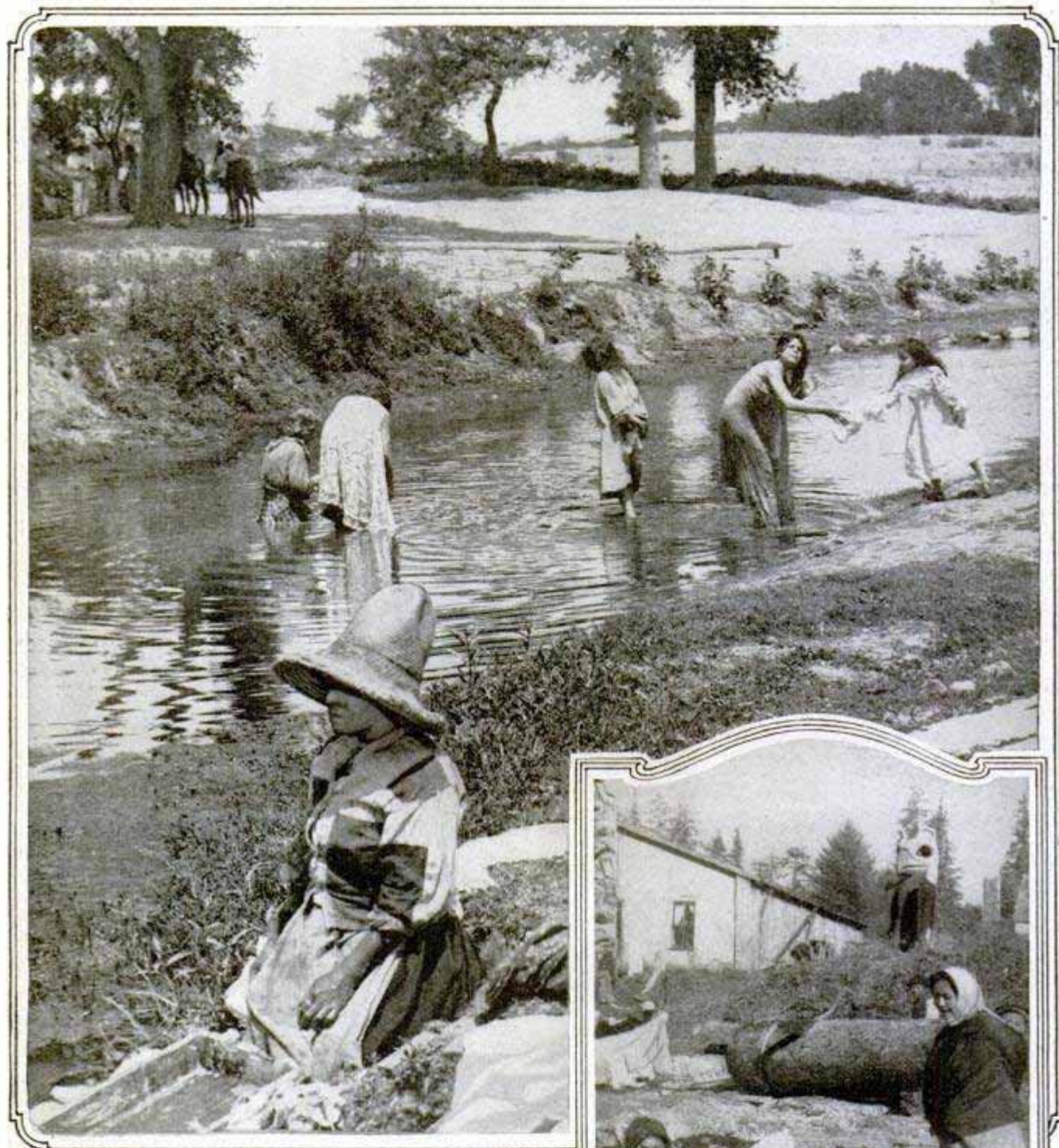


Wash Day near
the Toledo Bridge
at Madrid, Spain

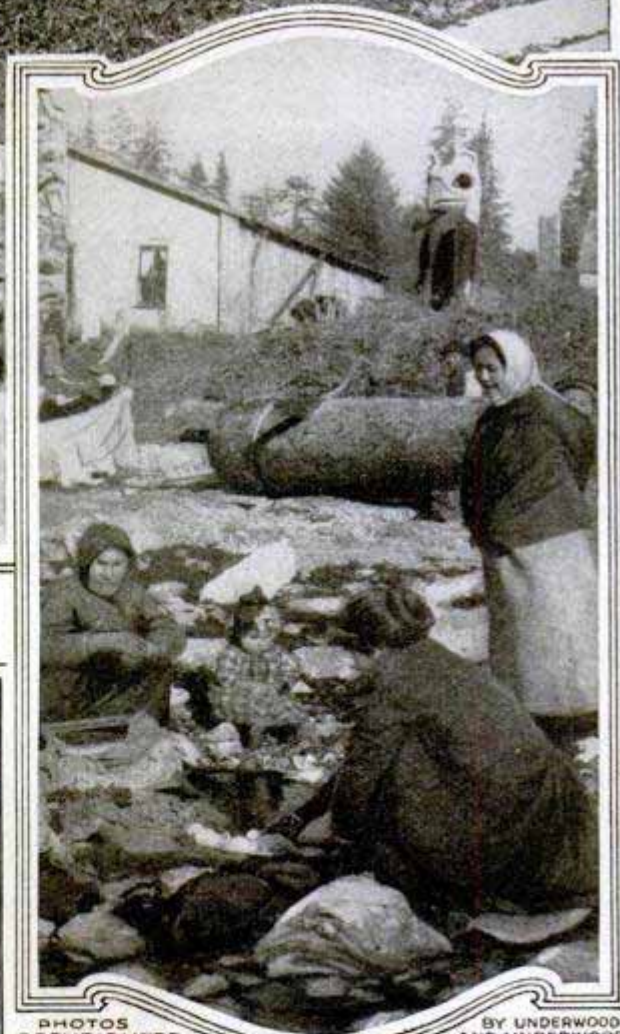


Many Little
Streams Like
This in Panama
are Pressed into
Service on
Wash Day

HOW THE WORLD DOES ITS FAMILY WASHING



A Lukewarm Stream Fed by Hot Springs at Aguas Calientes, Mexico, Furnishes the Best of Washtubs



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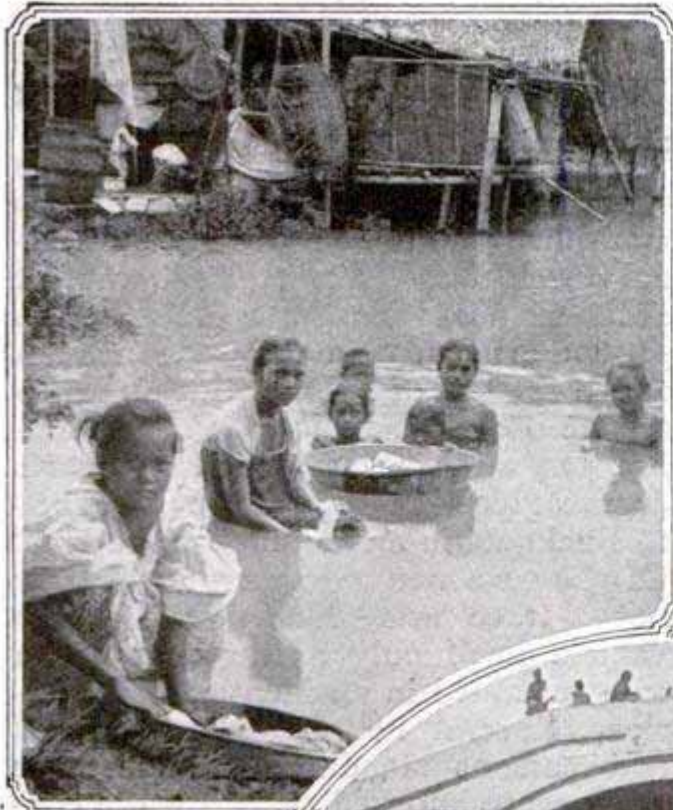
BY UNDERWOOD
AND UNDERWOOD



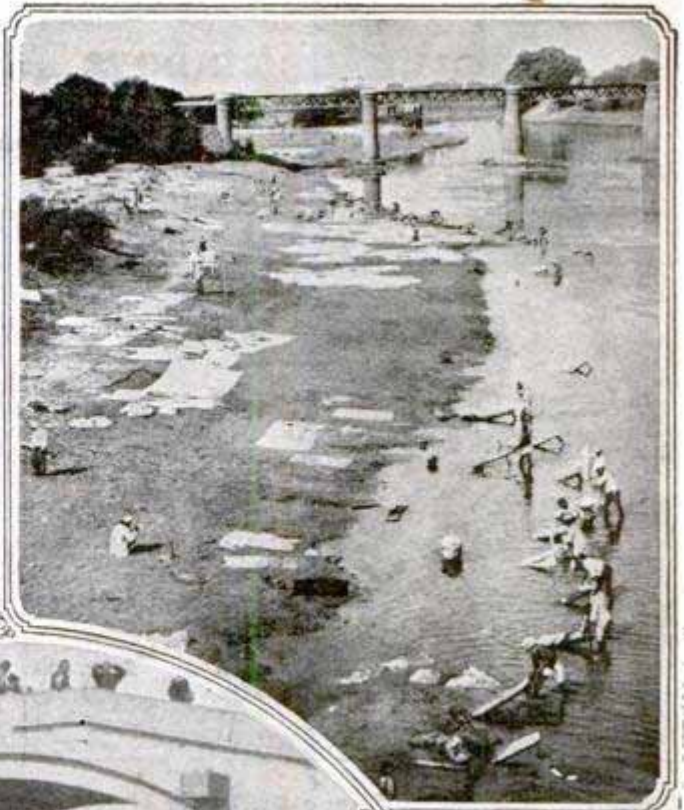
Interior of Washhouse at Jalapa, Mexico, Maintained by Municipality for Benefit of Women of the Lower Classes

Eskimo Women Washing at a Public Pool in an Alaskan Village

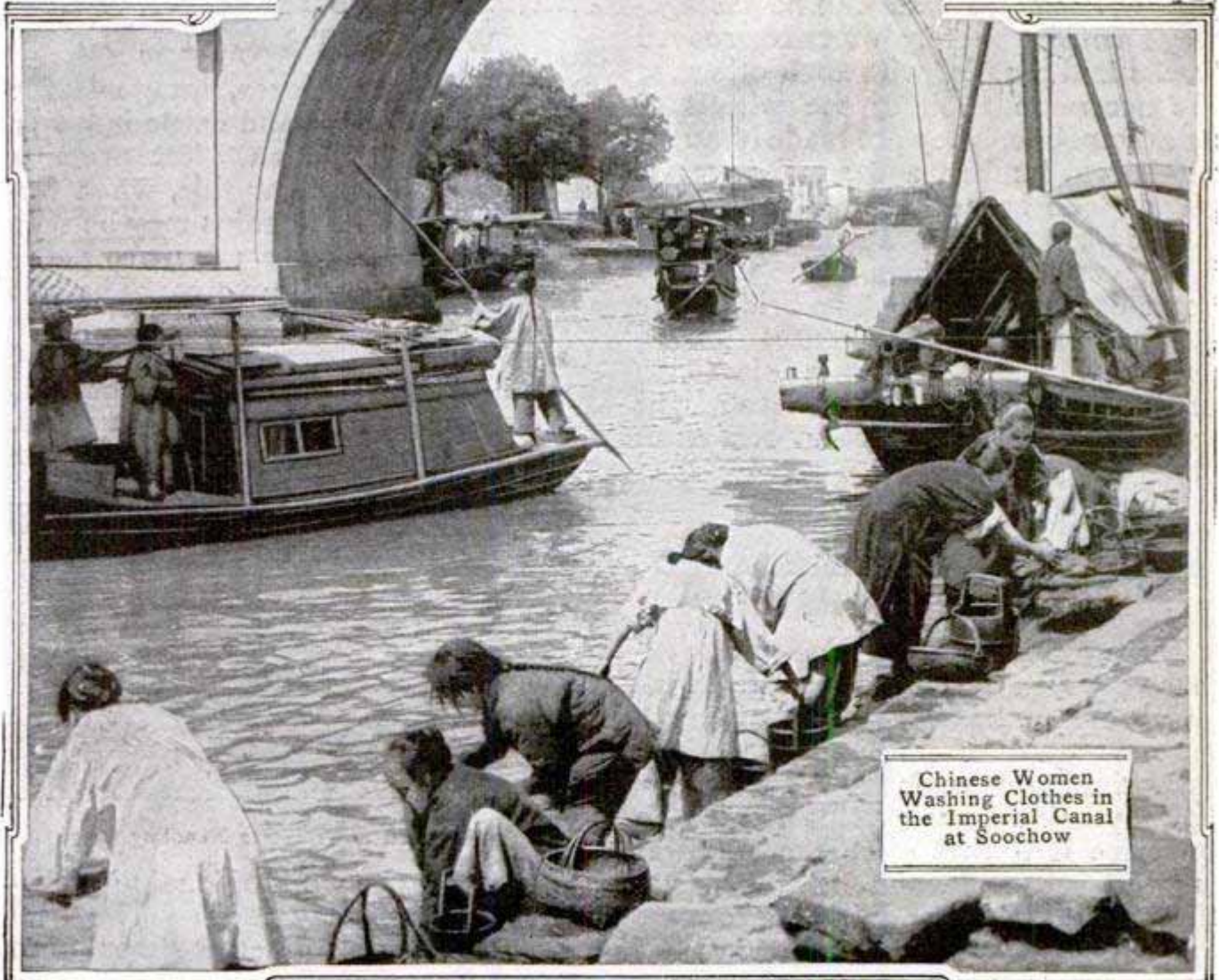
HOW THE WORLD DOES ITS FAMILY WASHING



Native Girls of Manila
Combine Bathing with
Clothes Washing



Washermen Working
in the River at
Lucknow, India



Chinese Women
Washing Clothes in
the Imperial Canal
at Soochow

GROOVED TRACKS ARE USED AS AUTOMOBILE BRIDGES

Built by an automobile club exclusively for the use of motorists, odd-looking bridges may be seen in certain



These Grooved Tracks Form a Bridge for Motorists

parts of southern California spanning washouts in the roads and filling the gaps over small streams. The passageways consist merely of two grooved tracks laid parallel with each other for the accommodation of the wheels of an automobile. They are made of structural iron, lumber, and small concrete piers. The space between the tracks is not planked, and for that reason it is impossible for them to be used by horse-drawn vehicles. The bridges are used as temporary structures during emergencies and also are placed in sections where the traffic is too light to warrant the construction of a complete bridge.

MEN AND CAR ANNIHILATED BY NITROGLYCERINE

Nitroglycerine, the powerful explosive which when incorporated with an absorbent base is known as dynamite, is used in its liquid form for "shooting" oil wells to increase the flow by opening new veins of oil. So sensitive is it that often the slightest jar will set it off, and its transportation on railroads and public conveyances is everywhere prohibited. The professional oil-well "shooter" literally

carries his life in his hands, but familiarity and long immunity often lead him to take chances that are nothing short of appalling.

Usually nothing happens, even though the cans of liquid death are transported over rough roads in ordinary vehicles. When the imminent accident does happen, a hole in the ground is usually the only evidence left to tell the tale of horror. Such a catastrophe occurred on July 8, near Findlay, O., when several hundred quarts of nitroglycerine that were being taken to Buckland in an automobile "let go." Of the two men who were in the car not a trace was found, while of the vehicle itself only a fragment of an axle remained in an identifiable condition. Several houses were damaged and persons standing some distance away were knocked down by the concussion.

BEACH SHIPS TO LOAD THEM WITHOUT LIGHTERS

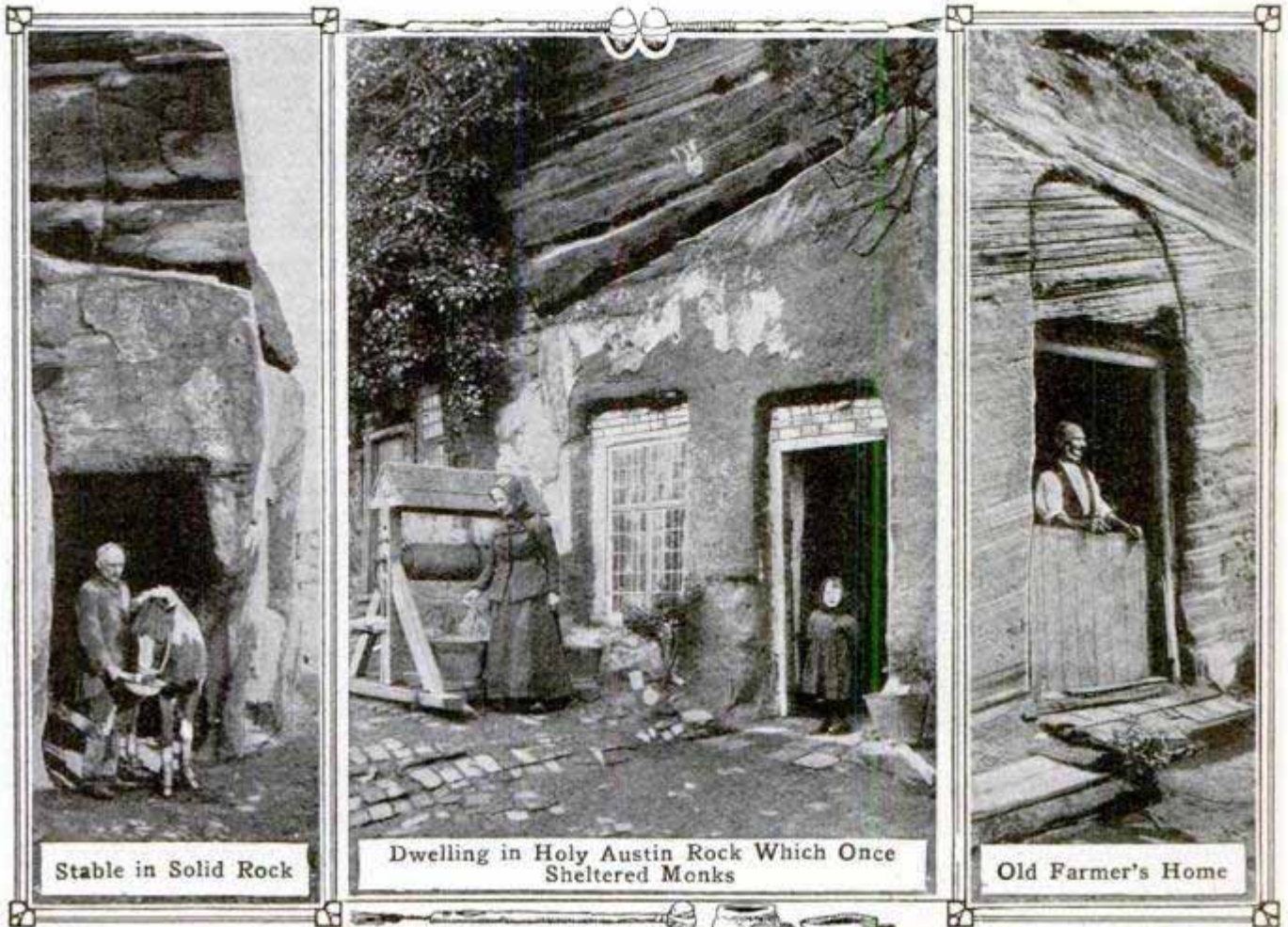
The beach at Gallegos, Patagonia, the center of the sheep and cattle industry in southern Argentina, often presents a curious sight at low tide, when frequently a number of ships may be seen stranded high on the sands many yards from the edge of the water. The tide at this point varies from 24 to 40 ft. Cargo boats to be loaded or unloaded at the port run far in when the swell is heavy, anchoring and remaining high and dry when the tide goes out. In



Ships Beached to Facilitate Handling Cargo

this manner the work of loading or discharging cargo may be carried on with dispatch without either the trouble or the expense of employing lighters.

ENGLISH DWELLINGS HEWN OUT OF SOLID ROCK

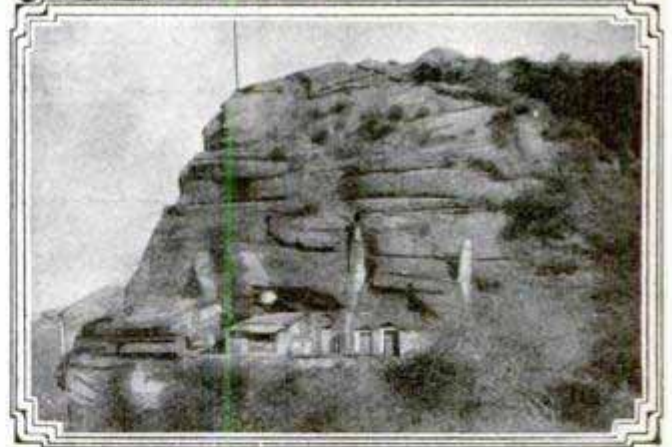


Stable in Solid Rock

Dwelling in Holy Austin Rock Which Once Sheltered Monks

Old Farmer's Home

Evidences of the antiquity of England are found by the traveler who visits that wild bit of country between Kidderminster and Stourbridge, in Worcestershire. Here is located Vail's Rock, a cone-shaped mass of stone, some 100 ft. in height, in which two rooms have been hewn, and where a family now lives in apparent comfort. It is known that this house has been inhabited for many years, centuries, perhaps. Another and similar dwelling may be found at Wolverly, in the same district. Here, in a house hollowed out of the solid rock, the ancestors of the present occupant have lived for more than a hundred years, and even then, so it is said, it was an ancient house. Not less interesting is Holy Austin Rock, near the village of Kinver, also in Worcestershire. It is an immense rectangular rock some hundreds of yards around at the base and takes its name from the fact that early in the 16th century it was used as a refuge by some Augustinian



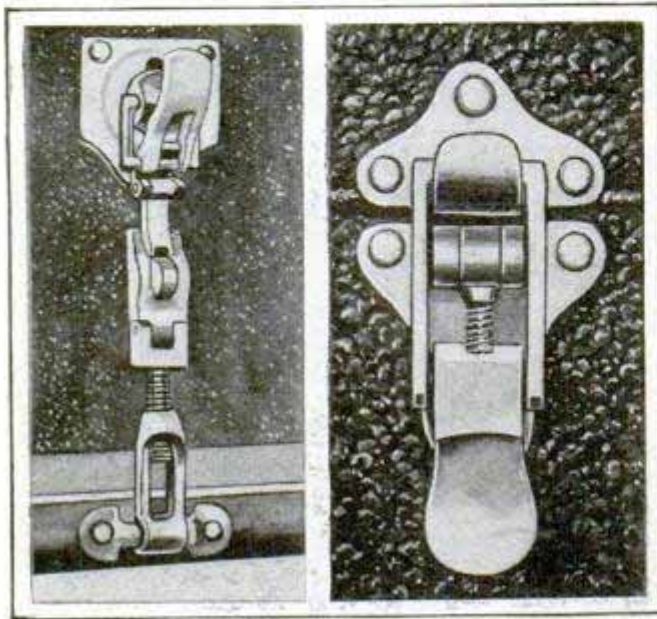
Vail's Rock, Inhabited for a Hundred Years or More

monks. It has five rooms wrought in the rock, the floors of which have been flagged, but the ceilings are rough and untrimmed, and some of the walls, also. Tradition says it has been continuously inhabited for over 900 years. A tiny stable has been constructed in the rock, adjoining the dwelling.

⌋The largest dam in Europe is across the river Bober, near Hirschberg, Germany.

CLASPS HOLD MOTOR TRUNK FIRMLY IN PLACE

For fastening automobile trunks to the footboards, top, or similar places on a machine, a metal clip holder has



Clip Which Holds Automobile Trunk in Place without Straps

been invented which eliminates the necessity of a motorist using straps or ropes to secure his baggage. The main part of the clasp is riveted to the trunk while its hook grips a small bar attached to the permanent carrying board. When the hook is in position, the thumbpiece is snapped over a spring catch which draws the trunk tightly against its carrier and holds it firmly. Another catch of similar principle enables the lid of a trunk to be drawn securely to its seat, making it dust and rain-proof. In both cases the clips are fitted with threaded shanks which provide for shortening the connecting rod in case the tension becomes relaxed.

SURVEY AMAZON TERRITORY BY USE OF WIRELESS

To assist in fixing frontier lines in the Amazon basin wireless surveying has been employed. Instead of cutting long passages through the forests, the positions for the boundary marks are being determined by telegraphy. In carrying out the work a wireless signal

is flashed from a certain station at a given hour. Its transmission is, to all purposes, instantaneous and for that reason, if it is received by a second station at one minute after the hour, for instance, the difference in time between the two points indicates their difference in longitude. The distance separating the stations can then be computed. Since the latitude is given by stellar observations, it is comparatively a simple matter to determine exact positions in this manner.

KIND WARNINGS REFORM SPEEDING MOTORISTS

Coöperation between the municipal governments and the automobile clubs, combined with a liberal placing of signs bearing courteous warnings and requests, seems to have succeeded in curing the speeding evil in southern California after the old method of traps and threats had failed, and as a result popular prejudice against the automobile is fast disappearing. In some cases the signs bear warnings that a speed "cop" is on duty, while on



Typical Signs Used in Southern California for Placing Motorists on Their Good Behavior

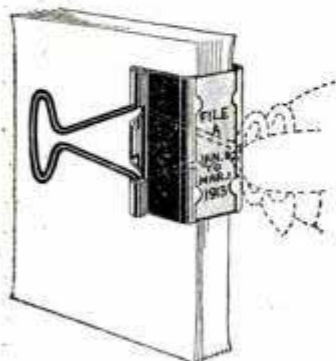
other signs there is simply a statement that a "reasonable compliance" with the speed limits indicated "will be appreciated."

HANDLING SHELLS FOR BIG GUNS WITH COALING RIG

During the rush of getting the battleship "New York" away from the navy yard at Brooklyn and off for Vera Cruz recently, several days' time was saved by using the deck capstans and coaling rig in taking the ammunition for the 14-in. guns aboard the ship. The deck capstans of the "New York" are equipped with foot pedals by which the capstans and the line shaft that runs under the deck and supplies the power are positively connected or disconnected without any chance of error, and it was this that made it safe to handle in this way such sensitive and dangerous loads as the 14-in. shells. Although each shell weighs 1,400 lb. and the coaling apparatus is designed for handling only 800-lb. loads, the shells were all taken aboard without delay or accident.

A LOOSE-LEAF BINDER CLIP FOR THE OFFICE

A loose-leaf binder clip has been designed for holding letters and other papers in the form of a book, with the title on its back. By simply raising the lever any paper can be removed or replaced.

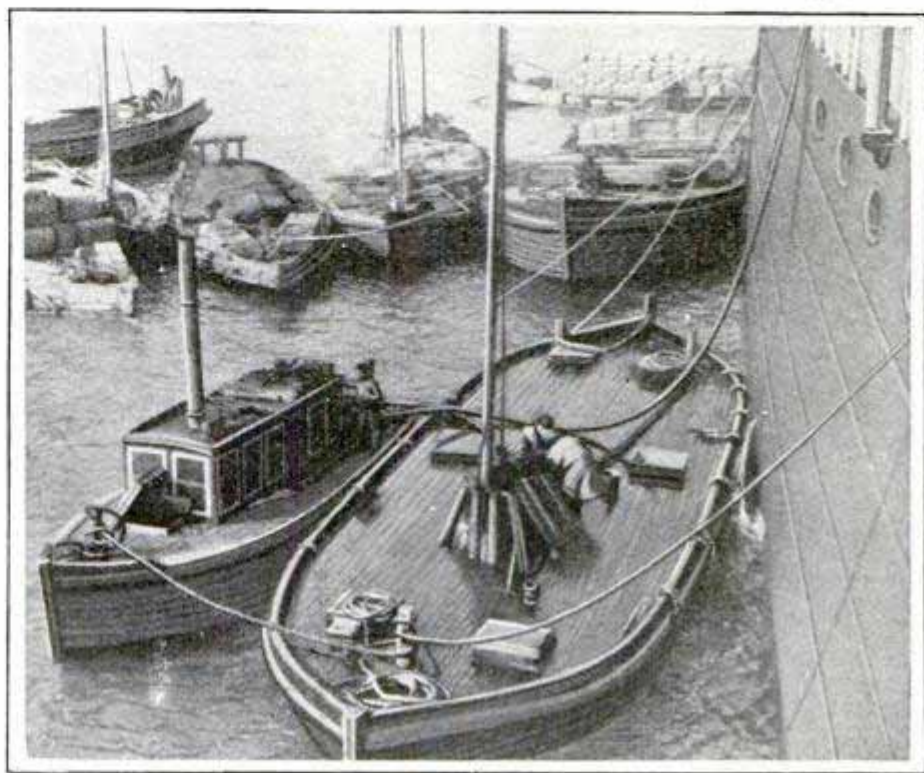


of 100,000 animals are used and 400,000 sheets of gold leaf are used for the gilt lettering.

☞ To cover the Oxford Bibles published each year, the skins

WATER FOR OCEAN LINERS PUMPED FROM BARGES

When large steamers are docked at Japanese ports the supply of drinking water is taken aboard from rough



A Liner Taking Water at a Japanese Port

barges, known as water boats. These scows are accompanied by pumping boats, and when in operation the two are warped against the side of the liner. By means of the pumps and hose the water supply is transferred to the tanks of the ship. The water is little different from bilge water, but is claimed by sanitation authorities at Japanese ports to be fit for drinking.

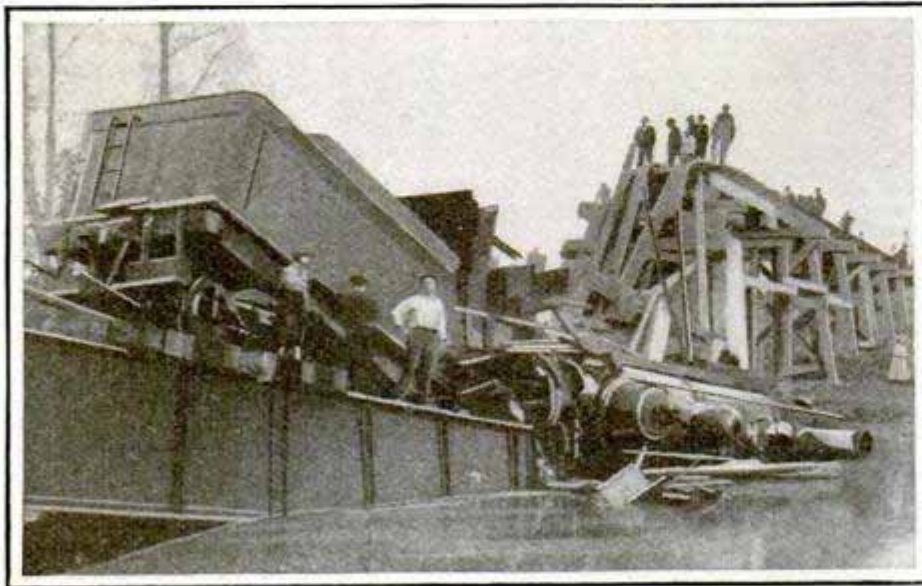
STEEL BRIDGE COLLAPSES UNDER TRAIN

An unusual railroad accident occurred at Bluffton, Ind., recently when the locomotive of a mixed freight and passenger train carried down a 53-ft. steel girder over the Wabash River and then turned on its side in the water, which was from 6 to 8 ft. deep. The engineer was pinned under the engine and was killed instantly, but the fireman, being on the upper side of the engine as it fell, escaped with

slight injuries. None of the passengers was injured. The bridge replaced one on the same location that had been washed out during the floods of the spring of 1913, and was temporarily supported on piles driven to

COTTON PLANT CROSSED WITH COTTON TREE

Cotton that compares favorably in length and texture with the American product is being produced in Panama by crossing the native cotton tree of that country with the American cotton plant. The producing life of the cotton tree is usually more than 10 years and it is expected that by means of this hybrid plant a largely increased production will be assured without the necessity for replanting each year. The size of the boll produced by the hybrid plant is much larger than that produced by the American cotton

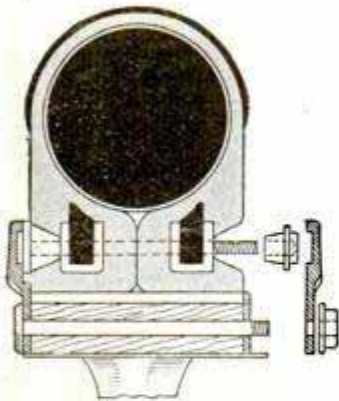


How a Steel-Girder Bridge over the Wabash River, with Its Pile Foundations Weakened by a Freshet, Collapsed under the Weight of a Locomotive

bedrock. The accident is believed to have been caused by the washing away of the earth surrounding the piles.

RIMLESS TIRE BOLTED TOGETHER

A Berlin inventor has patented a rimless tire based upon the fact that the weakest part of a pneumatic tire is adjacent to the bead. The sides of this novel tire are brought down to a square base, split in the center. In each side of the base is a ring of channel section with a filling of hard rubber. The base of the tire

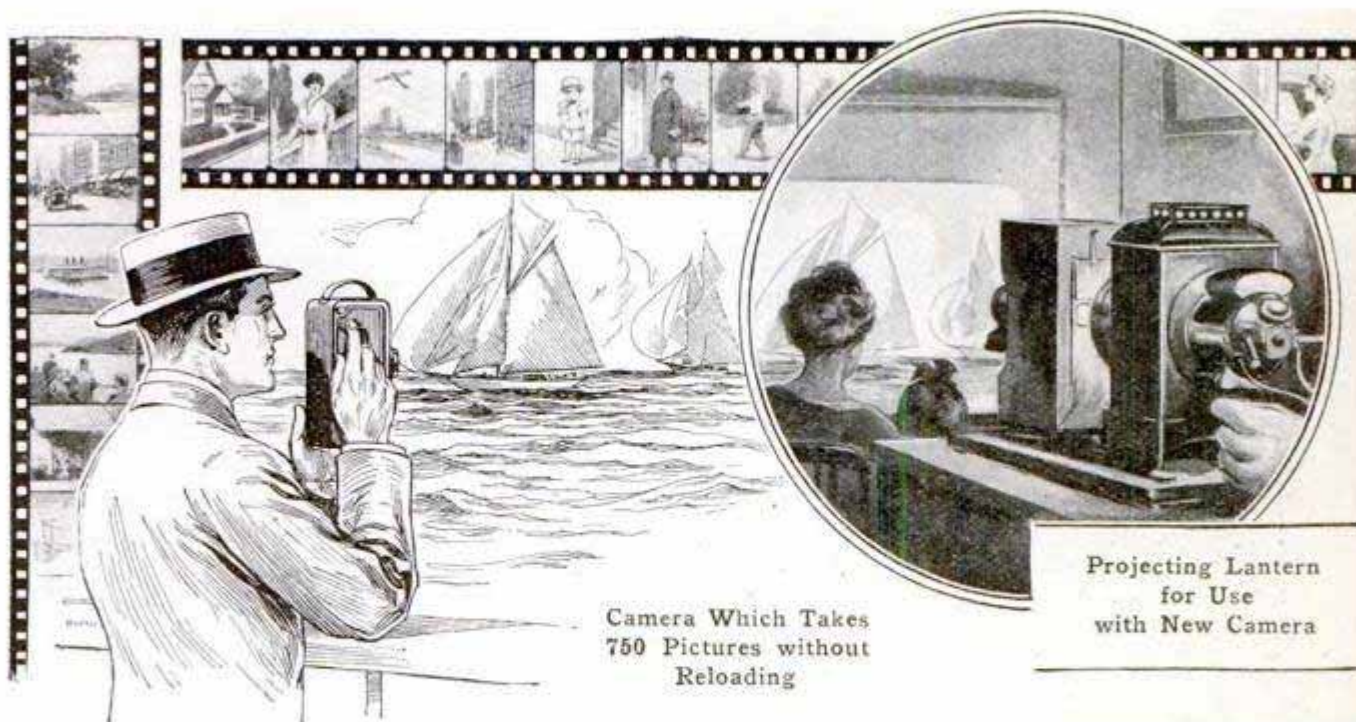


is bolted up independently, without attachment to any part of the wheel. The bronze channel rings give the bolts a bearing, and the hard-rubber filling prevents collapse. An inner tube is used with this form of rim as is usual in other tires.

plant. Actual weights show an average of 18 bolls to the pound, while ordinary cotton often runs as high as 80 bolls to the pound. Experiments are also being carried out with the idea of producing a substitute for silk by crossing certain wild fiber plants of Panama with the cotton plant, and these experiments are said to have already resulted in the production of fiber of unusual strength and fineness.

NOVEL POCKET CAMERA THAT USES MOVIE FILMS

Intended to fill the gap between the ordinary still camera and the motion-picture instrument, a new camera, designed for the use of amateur photographers and using motion-picture films, is now being made. The purpose of the invention is to furnish the tourist a magazine camera which does not require constant reloading, and which will serve the purposes of both taking ordinary pictures and producing connected strips of film for use in a projection lantern within the home. While the impression made upon the film is very small, the detail is sufficiently

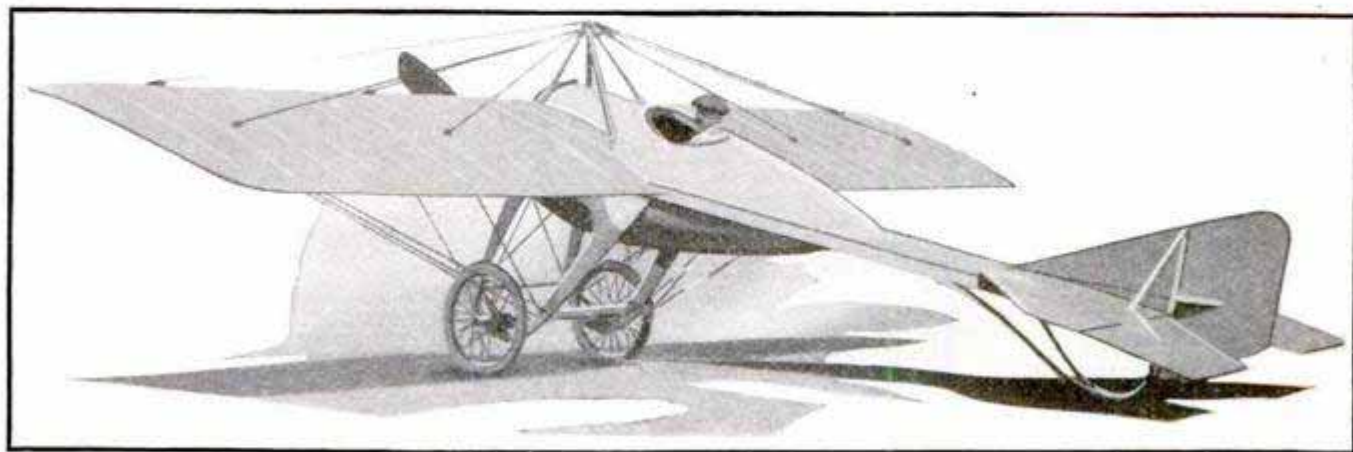


strong for enlargements. The instrument is approximately the size of the usual folding pocket camera and carries one film long enough for 750 exposures. In this manner the traveler may take pictures from the beginning to the close of a long tour, keeping them in their proper sequence, and not be obliged to reload the camera nor do developing until his return.

ARMORED MONOPLANE BUILT FOR MILITARY USE

Although carefully guarded against publicity during the experimental period, the existence of a new American military monoplane, steel-armored and fitted with an automatic machine gun, has become known. Almost abso-

lute secrecy attending the construction of the machine was maintained by its builders, a New Jersey company, in the hope of interesting the War Department in it. While this government has not looked with favor upon the single-plane type of machine for use in the army and navy, representatives of foreign countries, it is claimed, are now studying the craft. The air car is covered with $\frac{3}{8}$ -in. steel. It is capable of carrying two persons—a pilot and rifleman. While the machine is designed especially for scouting duty, it is contended by its makers that it could take an important place on the offensive side of an engagement because of its steel construction, which would serve to protect both its working parts and its occupants from the fire of the enemy.



Armored Military Scouting Machine Foreign Powers are Studying

TREES ON MOUNTAIN TOP FORM LIVING TOWER

Reaching nearly 100 ft. in the air, a living seven-story tower overlooks miles of surrounding country from the summit of a California mountain.



The queer observation structure is built with platforms, one above the other, between four sturdy redwood trees, which act as the upright supporting beams. The great trees are practically square with each other and about

10 ft. apart. Stairs connect the various platforms, providing an easy ascent to the top. From a distance the odd tower bears almost the appearance of being some old vine and moss-covered ruin.

WOMAN SWALLOWS CYLINDER OF POWERFUL MINERAL

An odd accident occurred in England recently when a woman who was being treated with mesothorium, a mineral with radioactive properties, for deafness, unconsciously swallowed a small vial of the substance. The tube had been placed in one of her nostrils by the attending physician. When it was time for it to be removed it could not be found. After a careful search, which failed to reveal the missing container, an X-ray examination was made and the cylinder discovered in the woman's stomach. It was supposed that the patient had in some manner thrown her head back and allowed the almost-minute holder to enter her mouth. A surgical operation performed in the effort to recover the tube resulted fatally.

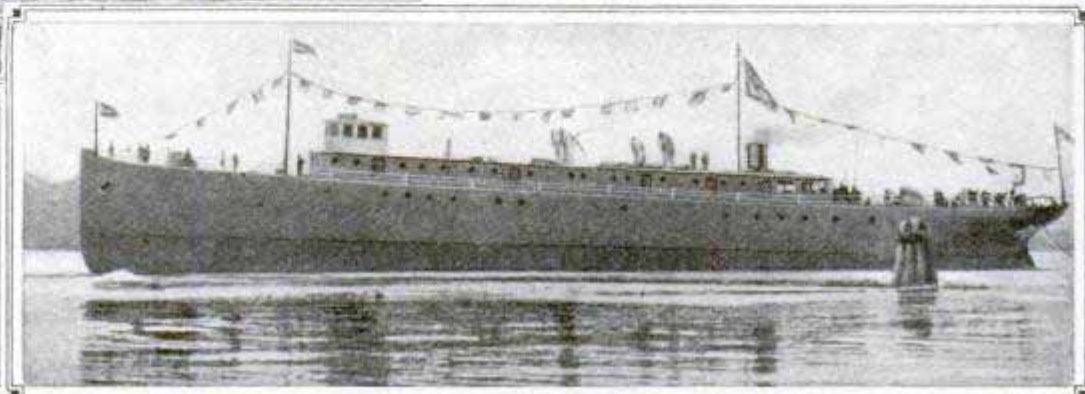
SUBMARINES AND TENDER ARE ADDED TO NAVY

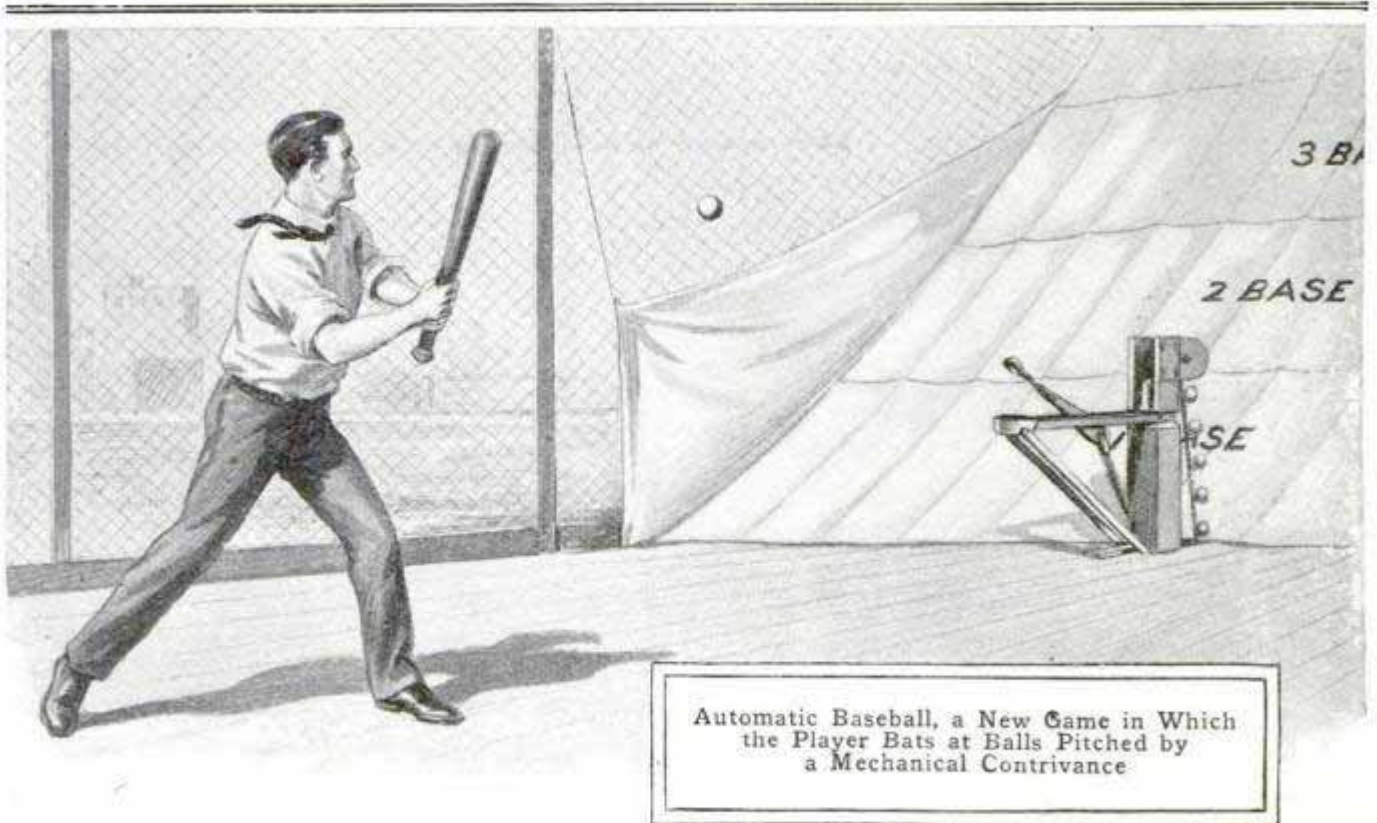
Two new submarine boats, "K 5" and "K 6," were recently delivered by their builders to the government, and christened. Each is of the same model, and of the largest type used in the United States Navy, being similar to "K 1" and "K 2." The craft display great efficiency for traveling at high speed either over the surface of the water or during long dives under it. The displacement of one of these vessels is 519 tons. The new submarine tender, "Fulton," which also has been lately added to the navy, is capable



One of the New Submarines Coming to Dock

The "Fulton," a Recently Completed Submarine Tender





Automatic Baseball, a New Game in Which the Player Bats at Balls Pitched by a Mechanical Contrivance

of developing a speed of 16 miles an hour. She acts as a mother ship to a flotilla of submarines and furnishes them with fuel, supplies and torpedoes. Both the "Fulton" and the new submarines are equipped with internal-combustion engines of the Diesel type, using heavy oil instead of gasoline. They are the first American naval craft to be so fitted.

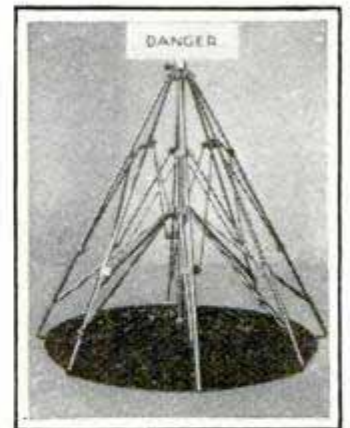
PITCHING MACHINE USED IN NEW BASEBALL GAME

Automatic baseball, played on an inclosed court, is a novel game introduced on the Pacific coast this season. It is played with the assistance of a mechanical pitcher which twirls regulation-size balls to the batter. In front of the player is an inclined canvas "field," marked into four divisions, known as first, second, third, and home base. The batter's score is the sum of the points earned by placing the batted balls in the various sections or bases. At the top of the canvas there is a spiral net catcher, which captures the balls and returns them to the machine. A bucketlike conveyor at the rear of this lifts the balls into position, so that by the operation of a lever the pitching

arm picks up a ball. By means of a trip, the arm is released and the ball thrown to the batter.

COAL-HOLE GUARD FOLDS INTO SMALL BUNDLE

Designed to inclose sidewalk coal holes, protecting pedestrians against possible accidents, a steel guard has been invented, which, when not in use, may be folded into a compact space and carried under the seat of a wagon. It consists of a substantial center rod with a slide head radiating bracing arms to each of the legs, practically the same as in the case of an umbrella. The long legs, corresponding to the ribs, are bent at the bottom so that they fit inside the inner rim of the hole, and also rest on the surface of the walk. In this position the standard is made rigid by tightening a thumbscrew. When in use, sufficient space is pro-



vided between the guards to allow the insertion of a chute. Folded, the device is 5 in. in diameter and 4 ft. long.

LINEMAN'S WAGON WITH TELESCOPING TOWER

Overhead wires vary enough in their distance from the ground to make it difficult for the line repairers



The Working Platform of This Tower Wagon is Easily Raised or Lowered, While the Driver is Provided with Two Seats, One at High and the Other at Low Level

to reach the higher wires when working from the ordinary tower wagon with a tower of fixed height, and to overcome this a motor wagon with a telescoping tower has been invented. The lower tower is a rigid steel-lattice structure resting on the body of the wagon, and inside this is a smaller tower, of like construction, that works up and down on guides and carries the working platform. This is raised or lowered by a motor-driven screw and in this way enough variation is given to provide for any conditions that are

likely to occur in ordinary line work. Another advantage in this wagon is the fact that it has two seats for the driver, one being supported near the top of the fixed tower and the other resting on the wagon body. The wagon is driven from either seat, as happens to be most convenient for the driver.

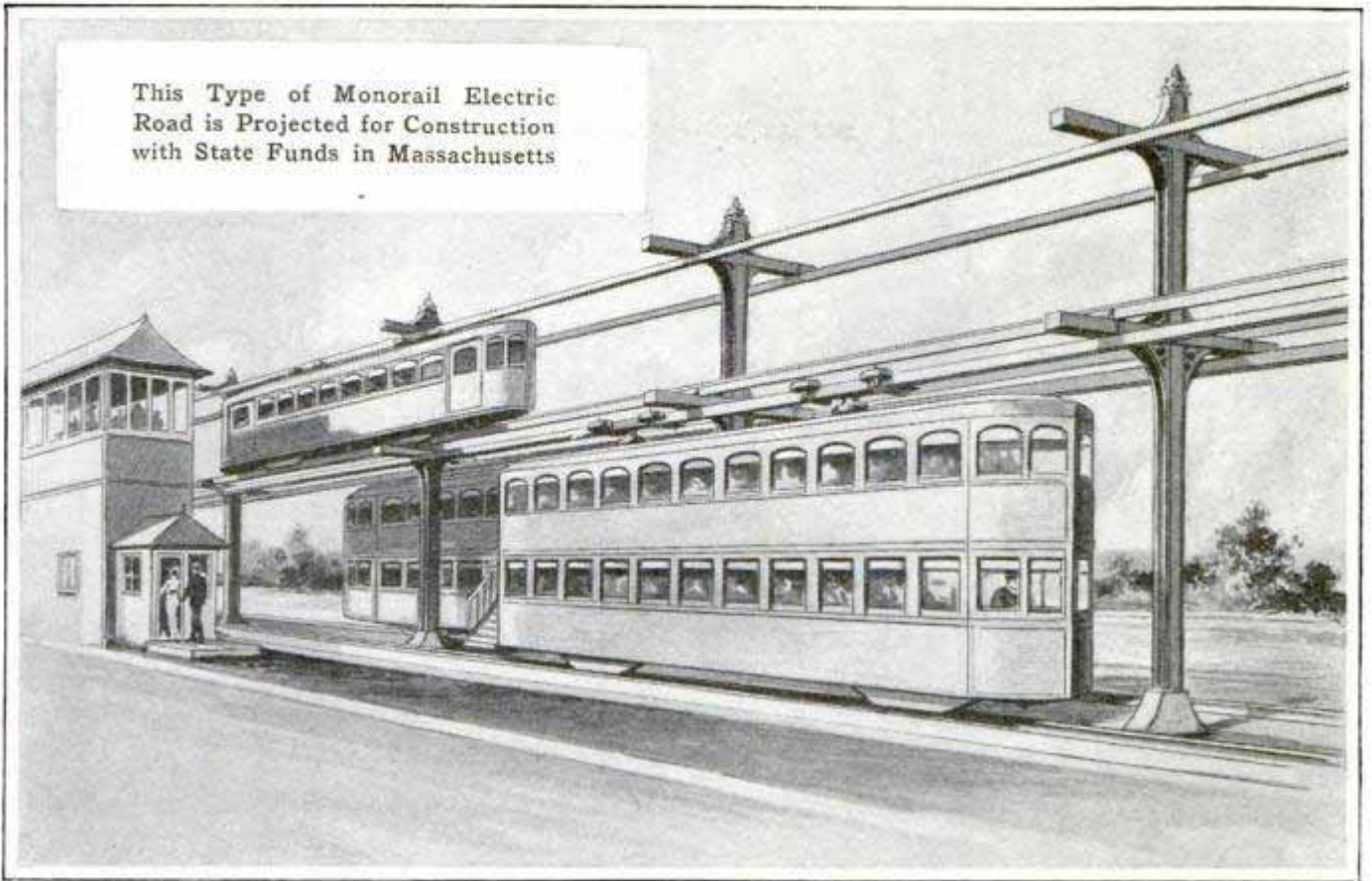
TREE STUMPS ARE REMOVED WITH STRONG ACIDS

Removal of large tree stumps during the clearing of new land, under ordinary processes is expensive, and also slow, excepting in cases where explosives are used. A simple method has been applied in Germany which eliminates much of the trouble usually encountered, and is feasible when time is not an important factor. A hole 2 in. in diameter is bored fairly deep into the middle of the stump and is then filled with equal parts of nitric and sulphuric acids, and plugged. After about five weeks' time the large stumps of the hardest woods are so eaten by the acid that they are easily crumbled with a pick.

STATE-FINANCED MONORAIL ROAD PROJECTED

The lower house of the Massachusetts legislature recently approved a bill appropriating \$5,000,000 for the construction of a high-speed monorail transportation system connecting Boston, New Bedford and Fall River. The proposed system, which is regarded seriously by many well-informed persons, is planned for a speed of 100 miles an hour. Gyroscopic principles do not form the basic ideas of the invention. The plan is for a single track with an overhead trestle guide, which supports the train as it rounds a curve or comes to a stop. When velocity is attained the individual car is righted by its own momentum, just as in the case of a bicycle, relieving the strain on the guiding line. If it is decided to build the line, two-story cars will be employed. These will

This Type of Monorail Electric Road is Projected for Construction with State Funds in Massachusetts



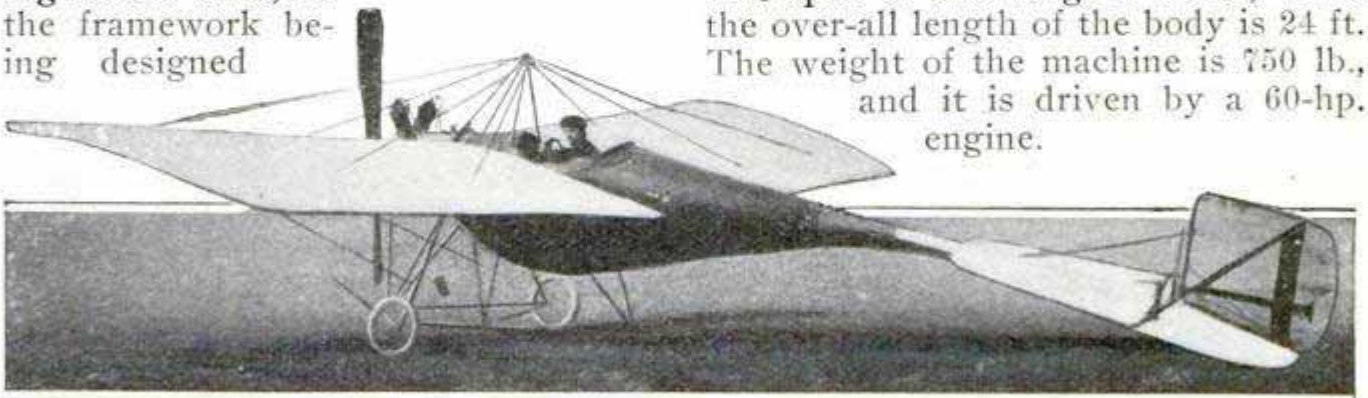
follow the lines of a ship's deck, being long, narrow, deep and pointed at the prow. They will be approximately 42 ft. in length and 14 ft. in depth, having a seating capacity of 108 persons. The cars designed for commercial use, as well as those used on the experimental road, are of the compartment type.

Plans for using the system for local transportation service in cities, eliminating the present form of elevated roads, have been conceived by the inventor. The question before the legislature, however, confines itself to the proposed line to the southeastern part of the state.

NEW MONOPLANE USES STEEL INSTEAD OF WOOD

Steel is the prime factor in the construction of a new monoplane recently built by a Chicago man. The propeller is the only piece of wood used in building the air craft, all the framework being designed

with steel. Fiber is employed as a covering for the fuselage, or body, while the wing surface has a cloth covering similar to that of ordinary machines. The span of the wings is 30 ft., while the over-all length of the body is 24 ft. The weight of the machine is 750 lb., and it is driven by a 60-hp. engine.

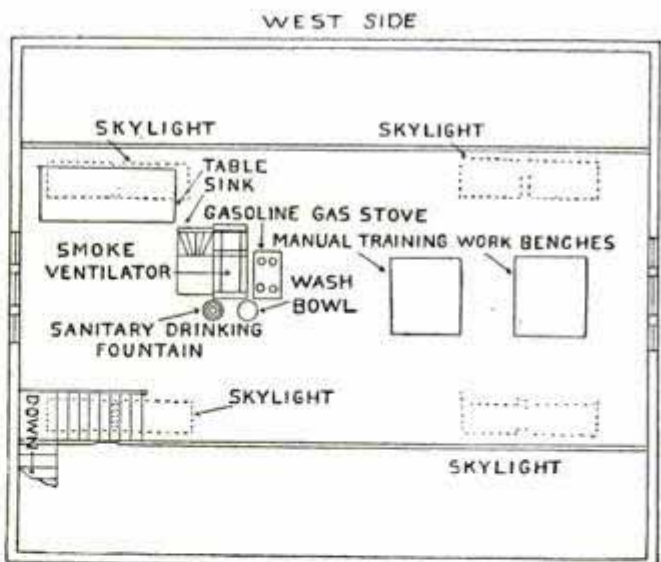
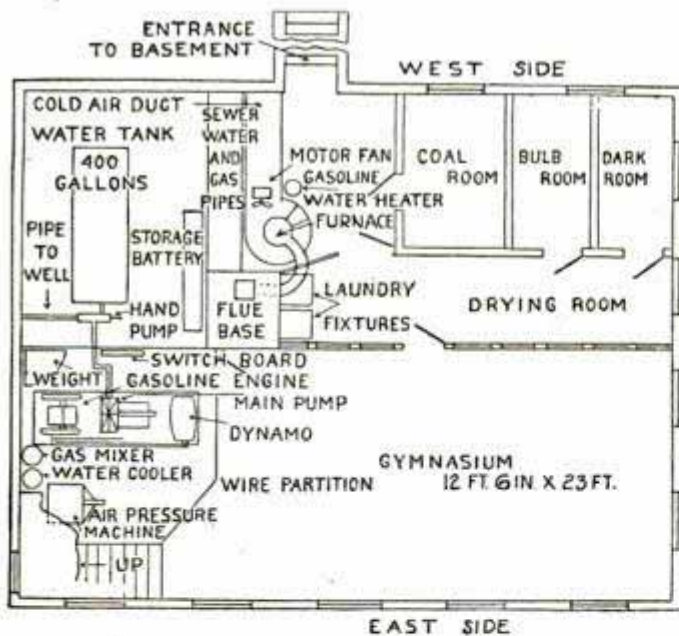
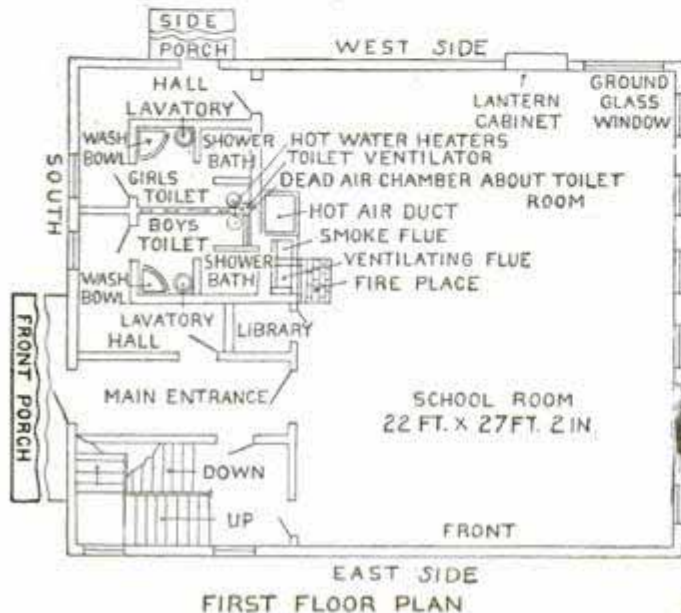


Air Craft Which Nears All-Steel Construction

MODEL RURAL SCHOOLHOUSE SOLVES PROBLEMS

Upon the grounds of the Normal School at Kirksville, Mo., a model rural-school building has been erected, by which, it is hoped, the serious problems confronting country communities may find proper solution. The building contains as effective facilities

obtained in more favored places. The model building has one main floor, a basement and an attic. In the basement, which is of concrete, well drained and lighted, are the furnace, air duct and electric fans; the coal bins; storage room for plants; a dark



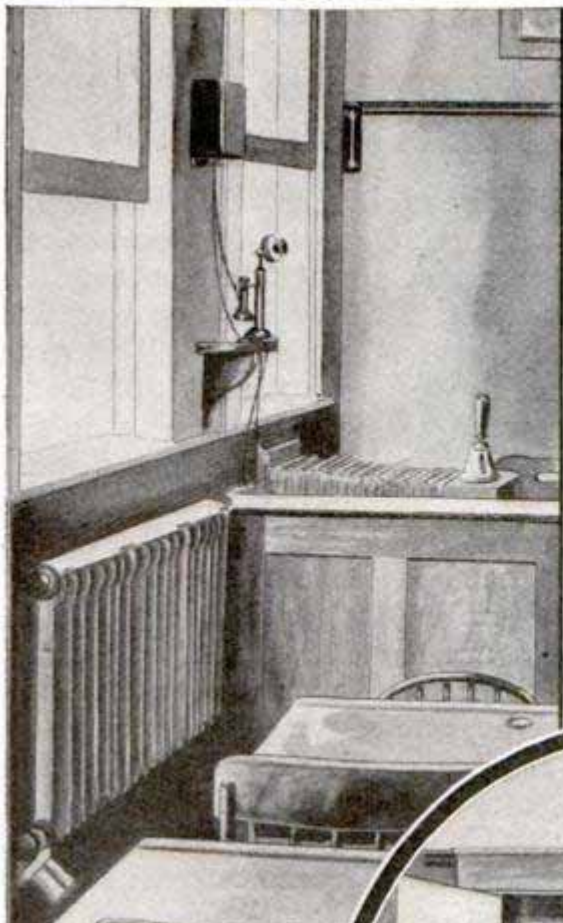
BASEMENT PLAN

ATTIC PLAN

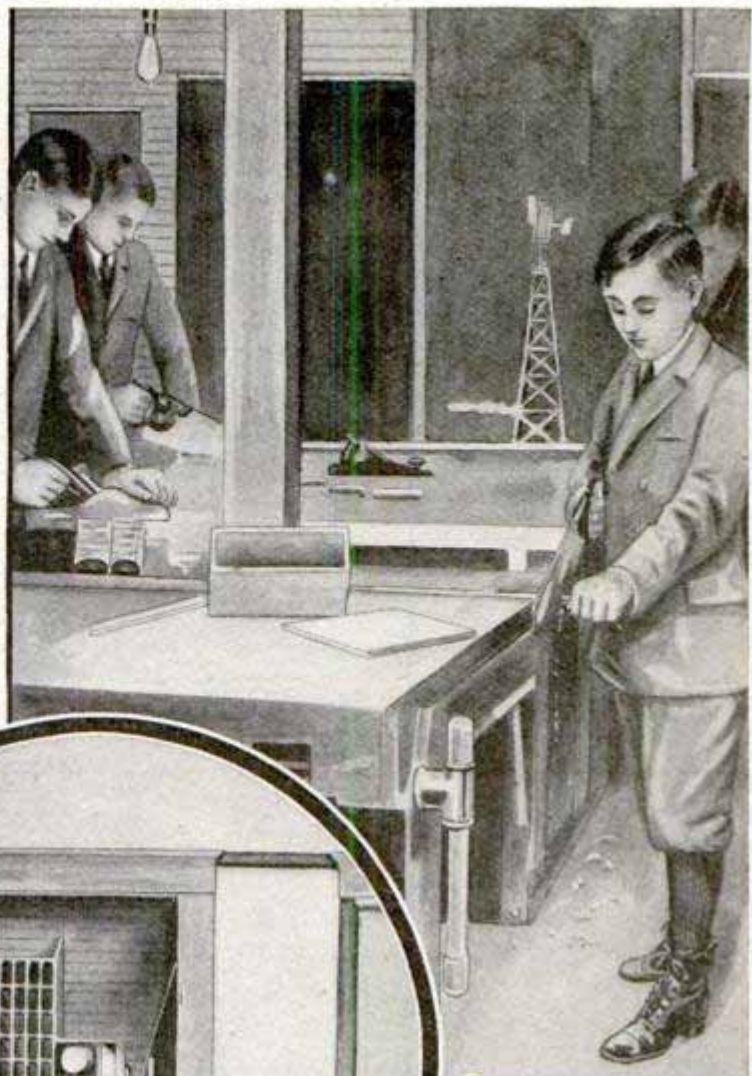
Plans of Basement, Main Floor and Attic of the Model Rural Schoolhouse at Kirksville, Mo., Which Combines Many of the Most Desirable Features of the Best Modern City Schools in a Single One-Story Structure

for instruction as the best city schools possess. Light, heat and sanitation have been studied in the attempt to give the scholars, whose time for study must be snatched from pressing duties on the farm, just as good, if indeed not better, facilities than those

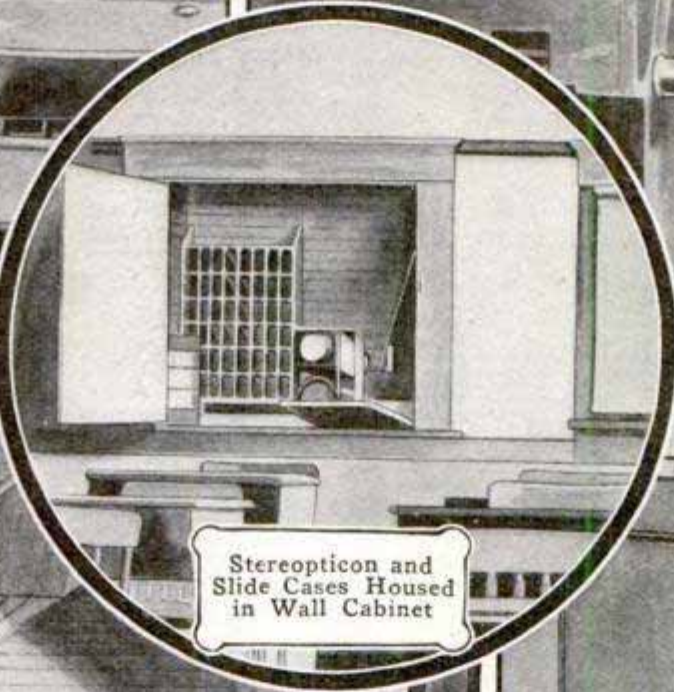
room for photography; a laundry and drying room; the engine room and tank room, where a 400-gal. pneumatic-pressure tank, storage battery for electricity, and hand pumps for emergencies are stored. On the first floor are the schoolroom, 22 by 27 ft. 2 in.;



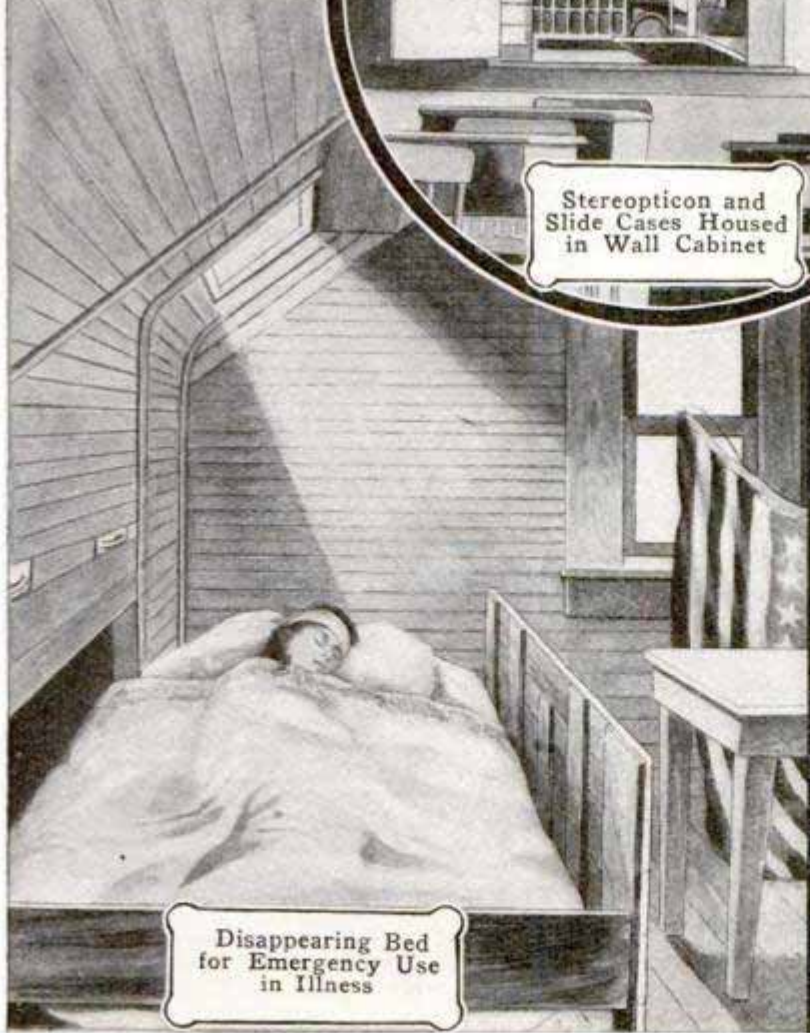
Corner of School-
room, Showing
Modern Equipment



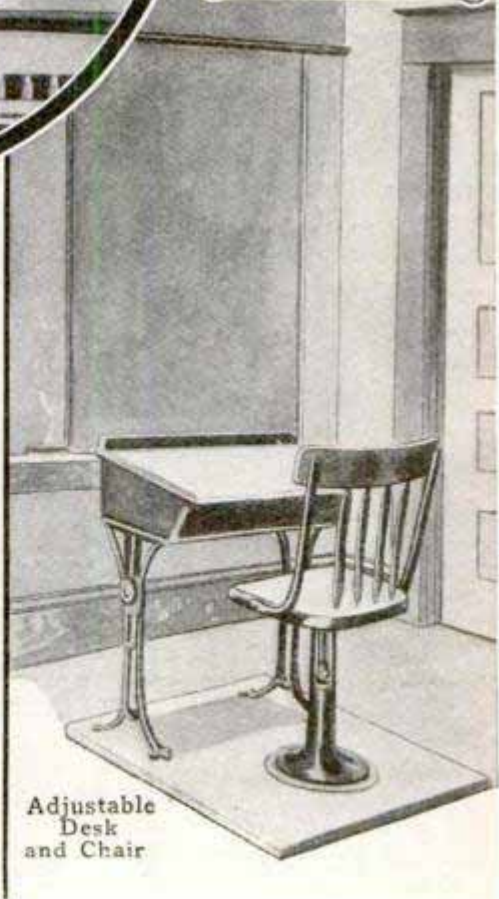
Manual-Training
Classes Work in
the Attic



Stereopticon and
Slide Cases Housed
in Wall Cabinet



Disappearing Bed
for Emergency Use
in Illness



Adjustable
Desk
and Chair

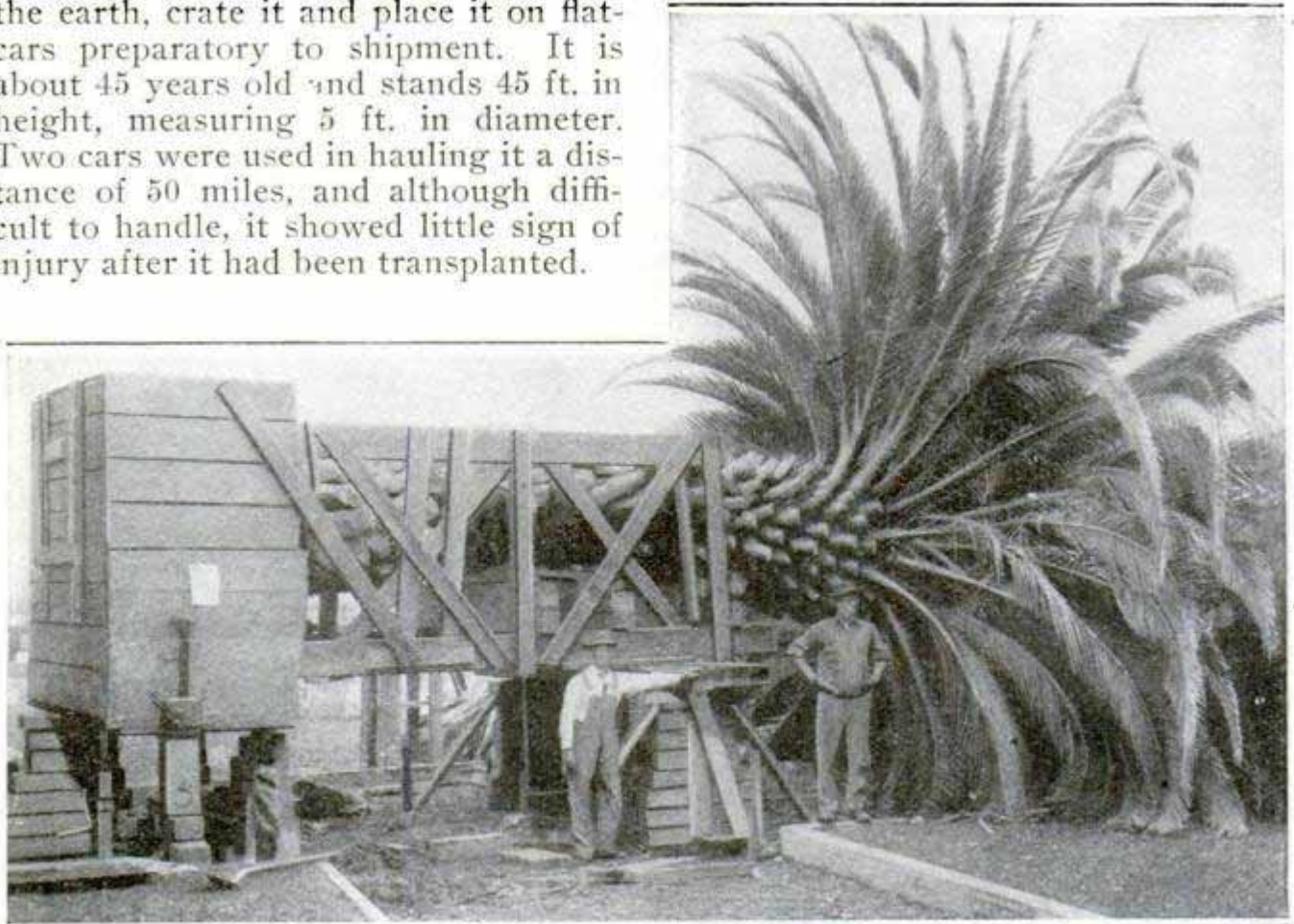
toilet rooms, hallways and stairways. The attic is utilized for manual-training benches, domestic-science apparatus and wash room. There is also provision for an emergency hospital, a bed of the disappearing type being arranged within the wall. Here, too, in close conjunction with the cooking apparatus, is a large dining table, for use of the pupils, and a drinking fountain. Cupboards, boxes and receptacles are provided, and all is neat, adequate and sanitary. The pupils are carried to school and back home in a covered wagon.

LARGE DATE PALM SHIPPED TO SAN FRANCISCO

A date-palm tree weighing 20 tons was recently dug from its growing place and transported from San Jose, Cal., to the Panama-Pacific Exposition grounds at San Francisco, where it was replanted and will appear in the state horticultural exhibit. Seven men required two weeks in which to remove the large tree from the earth, crate it and place it on flat-cars preparatory to shipment. It is about 45 years old and stands 45 ft. in height, measuring 5 ft. in diameter. Two cars were used in hauling it a distance of 50 miles, and although difficult to handle, it showed little sign of injury after it had been transplanted.

GREAT ITALIAN AQUEDUCT NEARS COMPLETION

With the finishing of the Croce di Monaco tunnel in the Apennines, the final engineering obstacle preventing the completion of the Puglien aqueduct in Italy, will be removed. The great undertaking was begun in 1899, and it is expected to be concluded this fall. Extending from Caposele, the main waterway, which runs through 60 miles of almost solid rock to Venosa on the eastern slope of the mountains, is 132½ miles long. At this point the carriers are divided, streaming out in three directions over the arid regions of Puglie, one of which extends to the very heel of Italy. These three mains have an aggregate length of 1,000 miles. The distribution among the principal towns necessitated the laying of an additional 500 miles of pipe. Two and a half million persons will be benefited by the water supply, the building of which has already cost more than \$30,000,000.



Preparing to Transport a Large Date Palm to the Exposition Grounds at San Francisco

GREEK PAPERS DELIVERED BY RELAY TEAMS

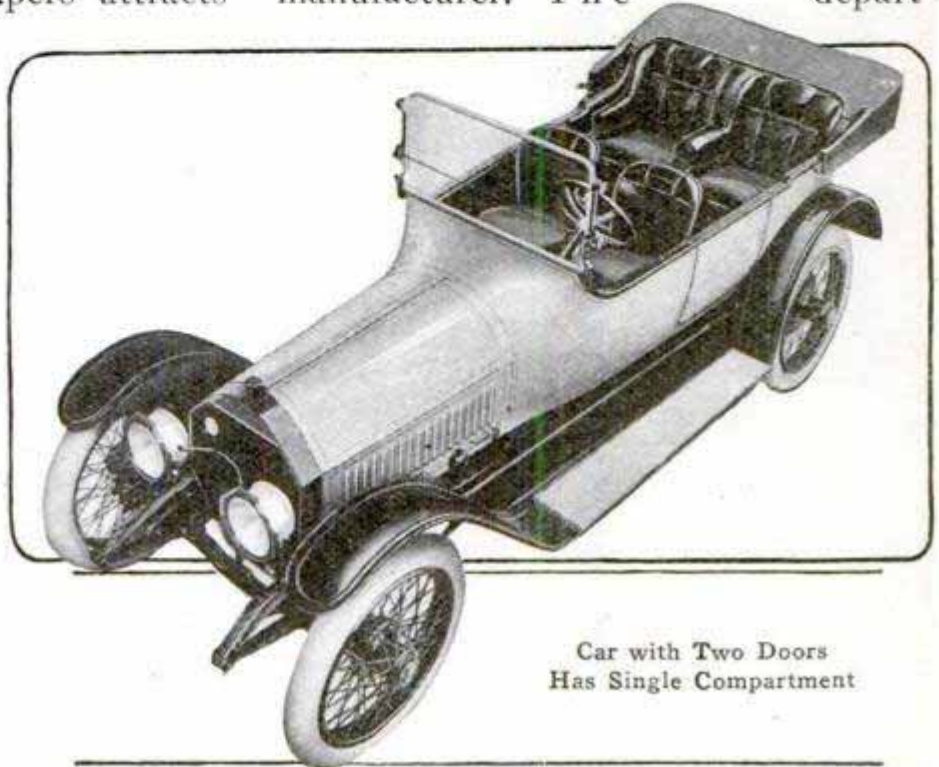
At Kalamata, in Greece, the odd method employed in the delivery of the Athens morning newspapers attracts much interest, besides showing enterprise. It also serves the younger generation of the town an opportunity to uphold its traditional reputation as runners. The main square in the place, where the papers are sold, is a half mile from the railway station. Keen rivalry exists between the carriers of the different papers, and from the moment the train arrives it is a contest to be the first to place the papers on the stands at the square. As a result, relay teams have been organized which accomplish the delivery in a little more than two minutes; each member racing with a bundle of papers a short distance and then passing it into the hands of the next runner. The race is watched with interest by the townsmen, who appear to be more interested in its outcome than in the news contained in the papers.

MINE EXPERIMENT-STATION PLANS COMPLETED

Plans for the half-million-dollar experimental station of the Bureau of Mines, to be built at Pittsburgh, have been approved by an especially appointed congressional committee. Property upon which it is intended to erect the buildings has been secured by the government. It is expected to construct on the slopes of a ravine, close to the station, an amphitheater for the accommodation of 20,000 persons. Demonstrations of mine-rescue work, first aid to the injured, and various tests will be held there.

ONLY ONE PAIR OF DOORS IN NEW CAR DESIGN

A two-door body for a stock touring car has been adopted by an American manufacturer. The department



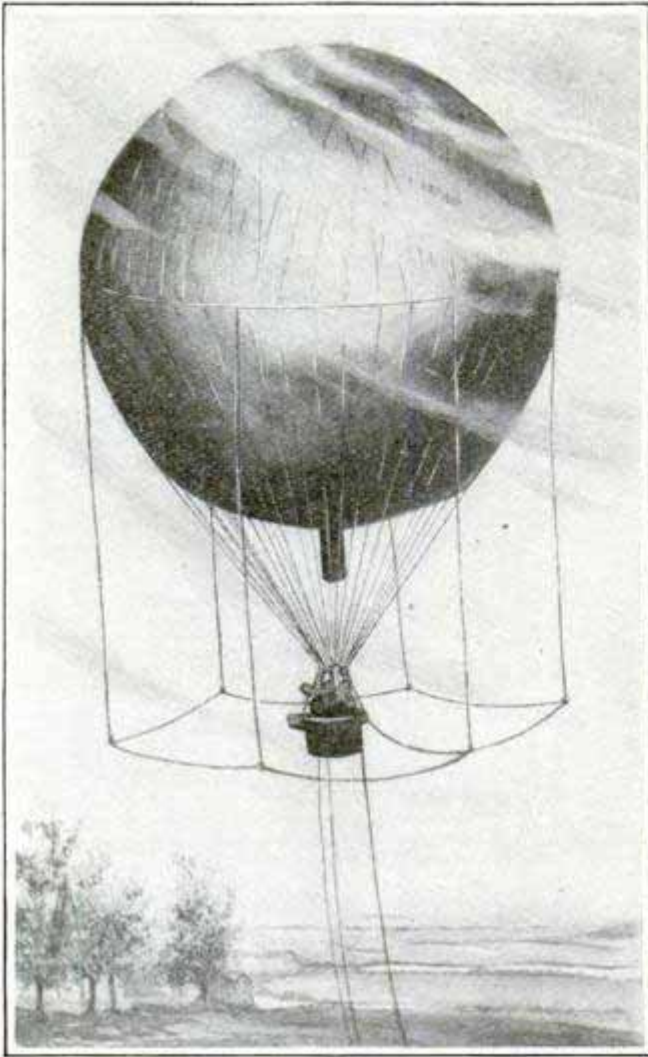
Car with Two Doors
Has Single Compartment

ure from the conventional design with four doors was accomplished by constructing a single compartment carrying both the front and the rear seats. Entrance to the car is gained through a 26-in. door midway in the tonneau. The driver's seat and the one beside it are individual, and between them is an 8-in. aisle permitting passage to the back. The effect is an appearance of furnishing additional room for the occupants. This arrangement also makes it unnecessary for the chauffeur to crawl over the person seated next him, when wishing to leave the car.

NEW WIRELESS ANTENNAE FOR BALLOONS

A new form of antennae for spherical balloons that is designed to take the place of the trailing wire and to serve equally well for sending and receiving wireless messages has been invented and put to practical tests in Germany. The antennae consist simply of wires suspended horizontally at the level of the cage by sup-

porting wires that are attached to an equatorial line placed around the envelope, and which form a six-sided



In This New Wireless Equipment for Balloons the Antennae are Suspended Horizontally, and a Leading-In Wire Runs from the Antennae to the Wireless Apparatus in the Basket

figure encircling the basket. The antennae are attached to the supporting wires by porcelain insulators, while a leading-in wire runs from the antennae to the wireless apparatus in the basket.

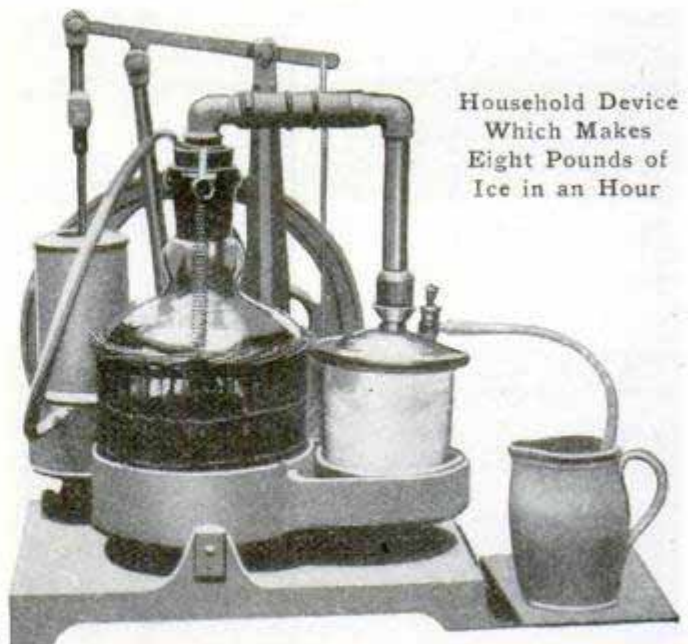
LAUNCHING THE "BISMARCK," BIGGEST SHIP AFLOAT

The "Bismarck," the 60,000-ton sister ship of the "Vaterland" and "Imperator," was launched at Hamburg, Germany, June 20, 1914, and it is planned to have the ship entirely equipped and ready for transatlantic service in 1915. This ship is about 5,000 tons heavier than the "Vaterland," heretofore the biggest ship afloat, and 5 ft. longer, being 955 ft. in

length. Both vessels have the same beam, 100 ft. The "Bismarck" will be equipped with four turbines that are expected to develop 61,000 hp. It will be luxuriously furnished and will be equipped with wireless-telephone as well as wireless-telegraph apparatus.

SMALL ICE MACHINE MADE FOR FAMILY SERVICE

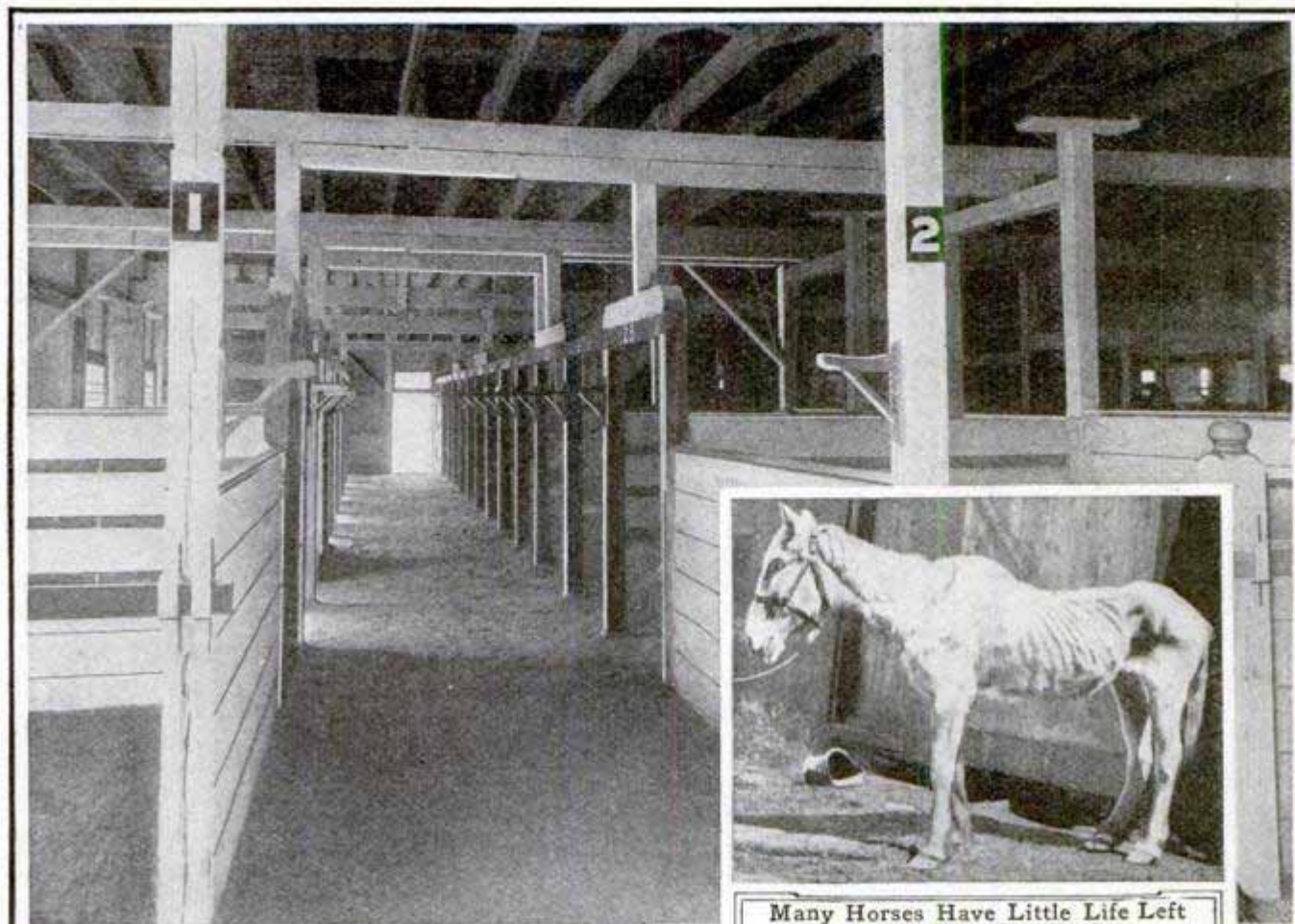
Designed especially for use in out-of-the-way places where ordinary household refrigeration facilities are denied, a small ice-making machine is being manufactured which is operated by hand power. Its principle is that water freezes when rapidly evaporated in a vacuum with sulphuric acid to absorb the vapor. Success of the process depends upon the perfection of the vacuum and upon the thorough agitation of the absorbing fluid. Small quantities of ice may be frozen in 3 minutes with the device, while from 6 to 8 lb. may be made within the course of an hour. Fruit, beverages and foods generally, may also be cooled quickly. The acid used in the process does not come in contact with the water nor with the articles being frozen or chilled. The cost of operation is declared to be slight, one charge of acid, amounting to 10 lb., being



Household Device
Which Makes
Eight Pounds of
Ice in an Hour

sufficient for from 50 to 100 ordinary freezings. A somewhat larger machine makes from 20 to 30 lb. of ice an hour.

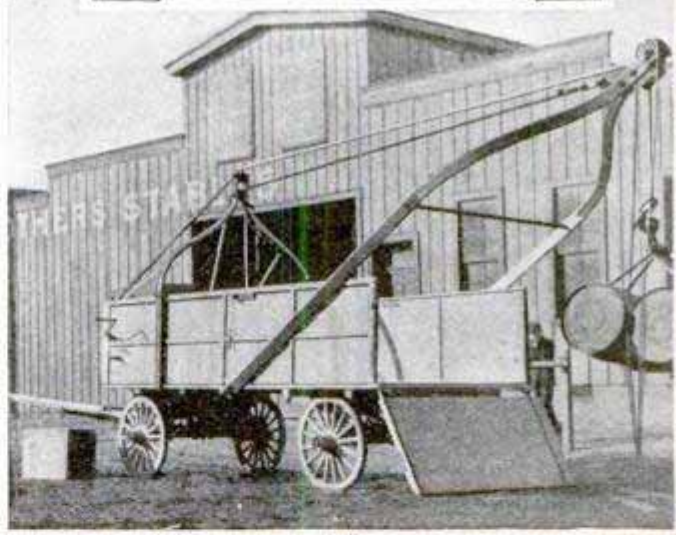
HOME FOR MISTREATED HORSES IN INDIANA



Interior of the "Inn," Where Many Horses are Shown Kindness for the First Time

Many Horses Have Little Life Left When First Received

At Evansville, Ind., a wealthy horse fancier promotes an establishment known there as the "Friendly Inn," at which mistreated and worn-out horses are cared for and nursed back to health. Animals of the "pauper" class, which have been unfamiliar with kindness and never enjoyed a real meal, often are literally kidnaped and taken to the institution by its supporter. By authority of a special-police badge the man occasionally drives the owner from the beast he has abused, and sometimes takes his fight into the courts. When horses become regular boarders at the "inn," their care is expected to be paid for at cost, the price varying in relation to the cost of feed. The doors of the place always are open to unprosperous-looking animals, which are cared for until they develop into respectable-looking horses. Recently the man made a gift of \$1,000



Ambulance Used for Transportation When Animals are Disabled

to the city, with a stipulation that the money should be placed at interest in a bank for 250 years and at the expiration of that time it should be spent for the betterment of the condition of dumb animals. A like donation was made in June by him at East Aurora, New York.

WARNING SIGNS FOR THE MOTORIST

In many cities associations are providing a system of warning signs upon the highways and boulevards, designed



Signs Warn Drivers That Automobiles must be Driven Carefully

to advise automobilists of the proximity of schools, hospitals, fire stations and other institutions, where careful driving is necessary. These signs are always placed on the right side of the roadway upon which the cars approach, and about a block distant from the various buildings. If, for example, a hospital is located upon a corner, the "Hospital—Quiet" signs are placed about a block distant on each of the four streets leading to that institution. The sign proper may be square, round or oval, but usually they are conspicuous by reason of their white ground and clear lettering. Sometimes the posts are of wood, painted white, and in other localities the posts are of iron piping, covered with asphaltum or other rust-resisting paint. It is safe to say that the warning given is rarely disregarded.

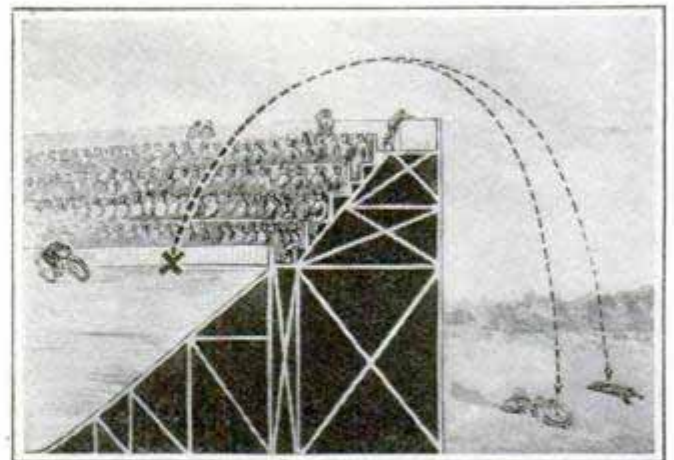
ⒸExperiments with a rubber tennis court are about to be made in London.

TIDAL CHANGE NECESSITATES UNUSUAL PRECAUTIONS

Extensive railway-tunnel construction work in London recently necessitated the building of a considerable length of tube under the bed of the Thames. In putting the bore beneath the river, the clay stratum between the top of the tunnel excavation and the floor of the water was very thin, while the tide movement caused a marked variation in the depth of the water above it, which necessitated automatically increasing and lowering the air pressure between 9 and 18 lb. per square inch daily. Had this not been done it is probable that excessive air pressure at low tide would have lifted the bed of the river, while added weight of the water at high tide, and too little air pressure in the subway, might have had the opposite effect, that of the river breaking through.

HUMAN SKYROCKET THROWN 170 FEET AND LIVES

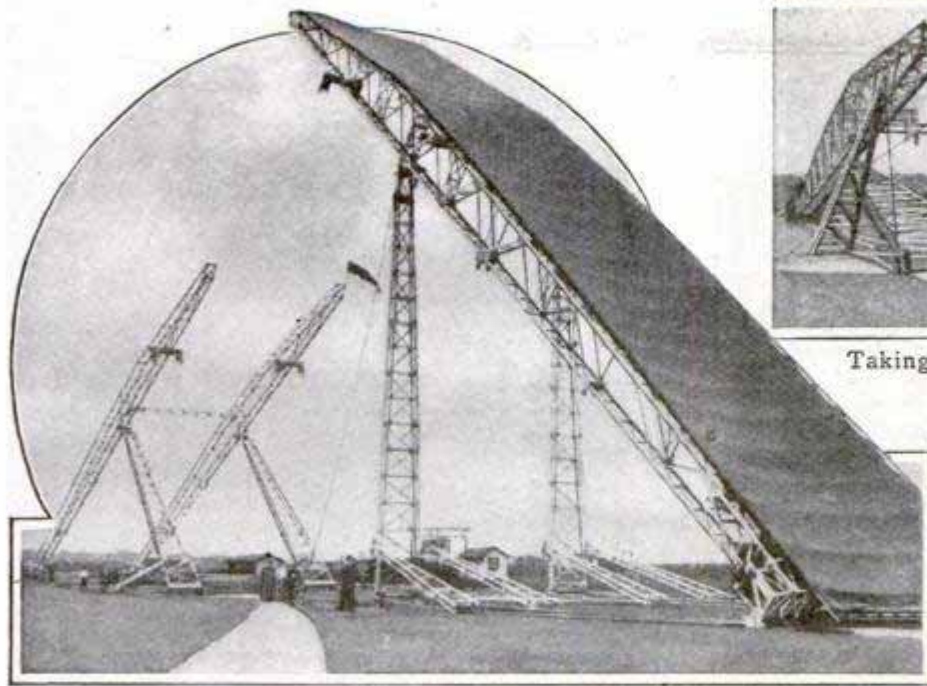
While riding a racing motorcycle at Houston, Texas, recently, a rider ran into a wire guard at the top of the track and was thrown with his machine completely over the grandstand of the motordrome, a total distance of 170 ft., and although bruised and shaken, was not seriously injured. He was riding



Motorcyclist Has Narrow Escape from Death in Accident on Motordrome

at full speed when he struck the wire netting, and described an arc 50 ft. in height, falling to the ground outside the inclosure.

PORTABLE SHEDS FOR GERMAN AIR FLEETS



One Pair of Trusses with Tarpaulin in Place and Ready to be Drawn over Structure, Erected in 15 Minutes



Taking Down the Shed for Transport to Another Location

Portable airship sheds that can be erected or taken down quickly have been developed to the stage of practical use by the German government and are expected, in case of war, to add enormously to the effectiveness of the air-craft fleet that now forms so important a part in the military and naval armament of that country. The new sheds, which may do away entirely with the revolving stationary sheds now in use, are in the form of an inverted V-shaped structure and are

made of light steel trusses and supporting bents covered with heavy tarpaulin. By an ingenious arrangement of pulleys the tarpaulin is easily and quickly drawn over the structure as soon as

the steel is erected. The structure is 140 ft. high at the center and the sloping steel trusses are placed about 26 ft. apart. The length required in any case is obtained simply by using the proper number of trusses, 25 being necessary for housing a Zeppelin dirigible safely. The sheds are erected to conform to the direction of the wind, and in addition to their portability, have the advantage of costing considerably less than the stationary sheds formerly used.

CAPE-TO-CAIRO AUTO TOUR ENDED BY TRAGEDY

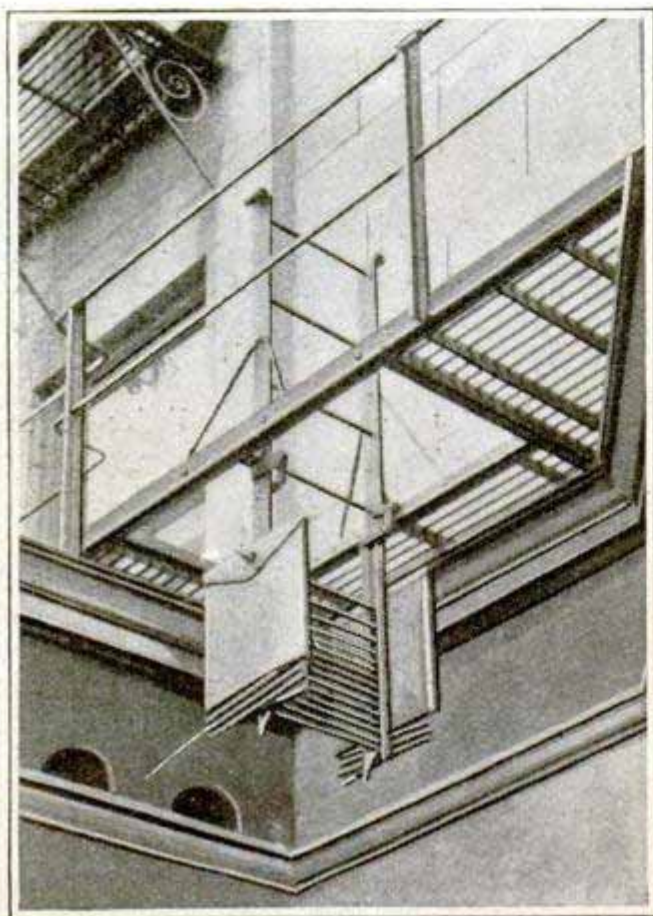
After fighting the way for miles through a roadless, dangerous and almost impenetrable territory, the English motor-car expedition from the Cape to Cairo, the length of the African continent, recently came to an abrupt end. The party suffered a series of mishaps, ending finally in the tragic death of the leader, Captain R. A. Kelsey. While hunting leopards in advance of the rest of the party, he was attacked and mortally wounded by an animal he thought dead. This caused the end of the expedition. The car

used by the party, which was described in a previous issue of this magazine, was fitted with collapsible pontoons upon which it could be floated across streams.

FIRE-ESCAPE LADDER THAT OPENS AUTOMATICALLY

An extension fire-escape ladder that automatically opens downward into position for immediate use when pressure is brought to bear on one of the rungs, has been installed on a Chicago building where there is not space sufficient for a stairway of the usual type. This ladder is used for giving access from

the second floor to the ground, and forms the lower link in the fire-escape system, the upper stories being



To Extend This Fire-Escape Ladder to the Ground It Is Only Necessary to Step on the Rung at the Level of the Landing

equipped with fire-escape stairways. The sides, or uprights, of the ladder are built like lazy tongs, and a rung is pivoted at each intersection of the bars forming the uprights. When the ladder is pushed up into closed position, the lower rung is caught and held by a trigger at each end. Each trigger is connected by a rod to a pivoted arm, which supports one end of the rung at the level of the upper landing. When the weight of the user is brought to bear on this rung, the triggers are pulled out of engagement with the lower rung, and the ladder runs out of its own weight.

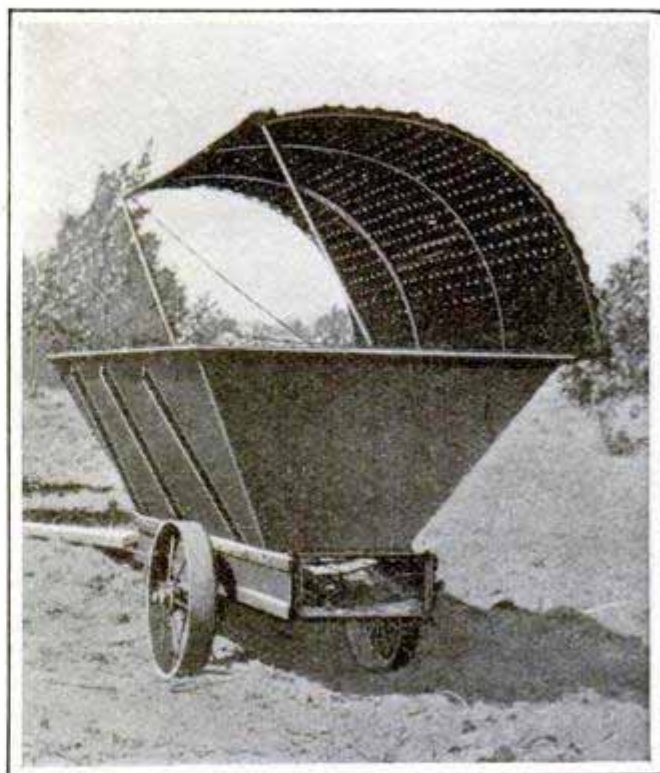
STATION TESTS INTERRUPT WIRELESS TRAFFIC

Considerable interference with radio transmission has been caused in the vicinity of New York and San Francisco by operators of wireless stations con-

ducting tests without regard to traffic being carried on simultaneously. The disturbances have become so pronounced that the Department of Commerce has taken the problem in hand. Letters have been sent to the owners, and also the operators, of stations, warning them that when tests are to be held communication with the radio inspector must be made. When a station is conducting a temporary experiment, the operator should "listen in" frequently, it is maintained, in order to determine certainly whether any interference is being caused. It is held that such interruptions are in violation of the provisions of the act under which the licenses are granted.

SCREEN ON BRUSH BURNER LESSENS FIRE DANGER

Safeguarding against injury to surrounding trees by uncontrolled flames, and also lessening the danger of starting forest fires, a portable brush incinerator is in use in one of the California forest reserves which is under the care of the Los Angeles park commissioners. The apparatus consists of a mounted firebox and hopper over which is hinged an adjustable curved



Screen on Incinerator Is Safeguard against Fires

shield of perforated sheet iron. This may be swung from one side to the other when required by a change of the wind. It not only acts as a spark screen, but also keeps the flames from reaching out to the tender branches and leaves of the near-by trees.

MIGRATION OF RATS FEARED IN BRITISH CITY

While in the interior districts of most civilized countries rats are comparatively scarce, the contrary is true in nearly all seaport towns. In England, where no city is far distant from the water, the problem of exterminating the rodents is a source of constant difficulty. Because of this, the profession of rat catcher is well known. Many of the men engaged in this business capture as many as 100 or more rodents in a single night while relieving some building of the vermin infesting it. The business is stimulated by the demand of sportsmen for rats with which to train their dogs. At the present time while plans are being laid to raze the abattoirs and fish and meat market at Sheffield, recognized as the home for millions of rats, there is public agitation for provisions to prevent the migration of the animals.

CONCRETE-BLOCK LINING IN CIRCULAR SHAFT

Concrete blocks were recently used for the lining of a circular shaft 130 ft. in depth at a Belgium coal mine. The blocks, shaped to fit the curved surface, had a minimum thickness of $3\frac{1}{8}$ in., while their length was a fourteenth of the circumference of the shaft. Wire netting imbedded in the blocks served as reinforcement, while small rods, a foot in length, fitted into the blocks, furnished a mutual support. Rings and vertical rods on the back side, massed in concrete, retained the wall of blocks permanently in position. From tests which were made, it was estimated that the strength of the lining was equal to a $31\frac{1}{2}$ -in. brick form.

CULTIVATOR MAY BE USED FOR VARIED PURPOSES

An adjustable garden cultivator, capable of being converted into various shapes for different uses, consti-



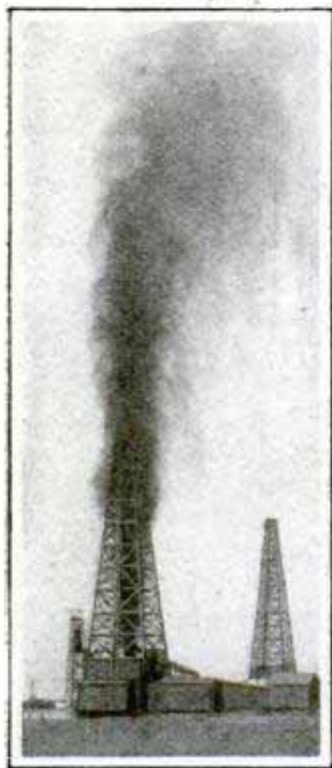
Cultivator may be Converted into Rake

tutes an original implement for the suburbanite or small-produce farmer. Drop-forged teeth are set in a substantial plate. By a grooved slide secured by thumbscrews, the working width of the tool may be adjusted to different angles to suit the particular function desired. By the removal of the center tooth, for instance, a line of young plants may be straddled and two rows worked at one time. The cultivator, which is a hand implement, also may be converted into a heavy rake by straightening the groove bars.

☞ Daily weather forecasts for shipmasters on the Great Lakes are being sent out by wireless from the naval station at Radio, Va.

LARGEST "GUSHER" IS STRUCK IN CALIFORNIA

Uncontrolled and shooting petroleum into the air at an estimated rate of 40,000 bbl. a day, a new oil well struck



near Maricopa, Cal., has the greatest flow of any bore in the United States at this time, according to the U. S. Geological Survey. In Mexico there are larger wells, and in the past this country has produced bigger ones, although the latest one is considered very large. The high pressure of the gusher tore the top and upper rigging out of

the derrick and then commenced to fill the air and cover the flat with a fine spray of oil. Pumps and other ma-

chinery were rushed to the place, and now most of the product is being saved, the principal loss being in the mist of oil which is blown far away.

FREEZE BIG WATER MAINS TO AID REPAIR WORK

Although the freezing of water pipes is ordinarily avoided, pipe-extension work has been simplified somewhat by intentional freezing. When it is wished to tap a main in order to branch a lead from it, the usual method is to turn off the water. This often deprives temporarily a large number of consumers of water and causes general inconvenience. To overcome this a new system has been employed which consists of freezing the main on both sides of the point at which the tapping is to be made. This forms two ice stoppers in the main, allowing the work to go ahead and at the same time not causing the water supply to be cut off. While the work is in progress the frozen points are maintained at low temperatures. The apparatus used in the process is similar in design and principle to that employed in freezing sand in tunneling.

RIGID BAR AN EFFECTIVE SHOCK ABSORBER

For preventing the rebound in an automobile, which is always annoying and sometimes results in broken springs when driving over rough

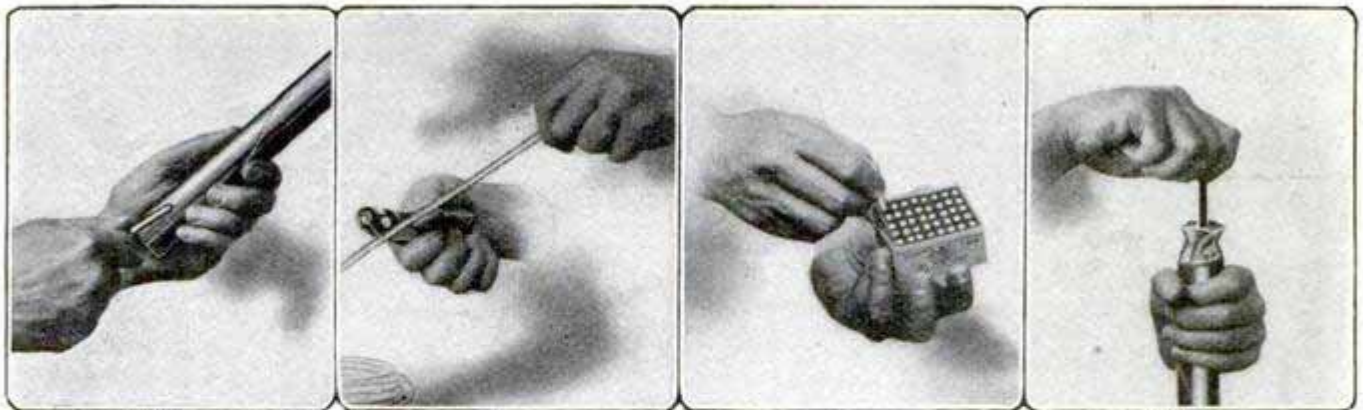


Curved Rigid Bar Clamped to Concave Side of Spring Prevents Rebound beyond Normal Position

roads, a shock-absorbing device that is exceedingly simple in its action has recently been brought out. This device consists of a practically rigid bar shaped to conform to the long leaf of the spring when in its normal posi-

tion under load and securely clamped to the concave side of the spring by two clamps near the center. When the car passes over an uneven place in the road, this bar does not interfere with the resulting flattening of the spring, as the outer portions of the spring simply draw away from the bar, leaving a gradually increasing opening from the center outward. When the rebound begins, the spring comes back to a bearing against the bar in a progressive fashion from the center outward, thus preventing any jolt, while any further movement is taken up by a slight bending of the spring beyond the ends of the bar. In this way, the rebound is damped and the spring is prevented from bending materially farther than is necessary to bring it back to its normal position under the load.

THE RIGHT WAY TO PRIME A DYNAMITE CARTRIDGE

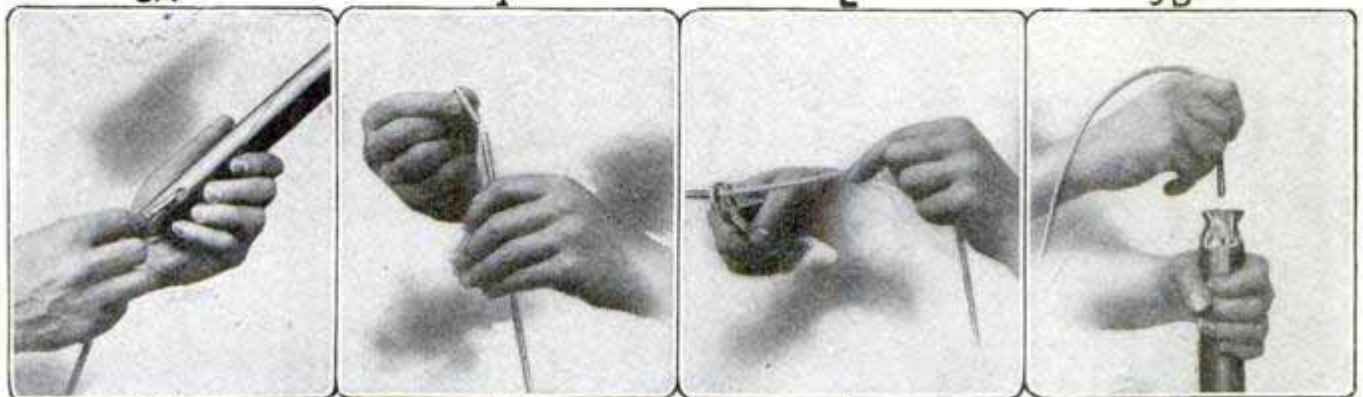


5A

1

2

5B

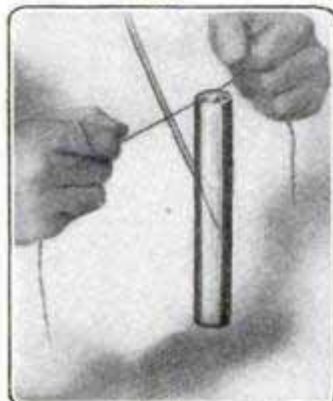


6A

3

4

6B



7A

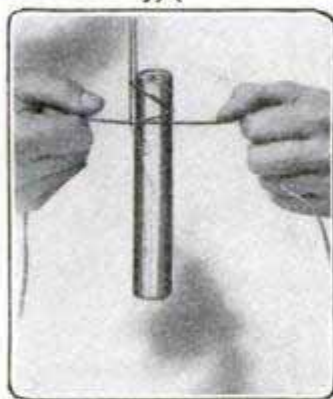
1, Cutting the Fuse; 2, Taking Out the Cap;
3, Putting the Cap on the Fuse; 4, Crimping

Those who handle dynamite cartridges day after day come to look upon them with no more caution than the ordinary man looks upon matches. They take the "short cuts" despite danger, and in so doing, lessen the efficiency of the explosive and increase the percentage of missed shots. It is a frequent sight to see a miner bite a cap with his teeth, and fasten it on a fuse with his jackknife instead of using a crimper. Outwardly the result may appear the same, but one way is the right way and the other is proved wrong by countless accidents. When the crimper is used, one can see just where to crimp the cap, and exactly how hard; but when the cap is put in the mouth it is hard to judge the distance from the end of the cap to the point of crimping.

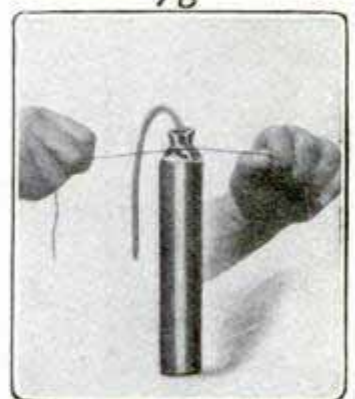
The accompanying illustrations show the proper way to affix the fuse.



7B



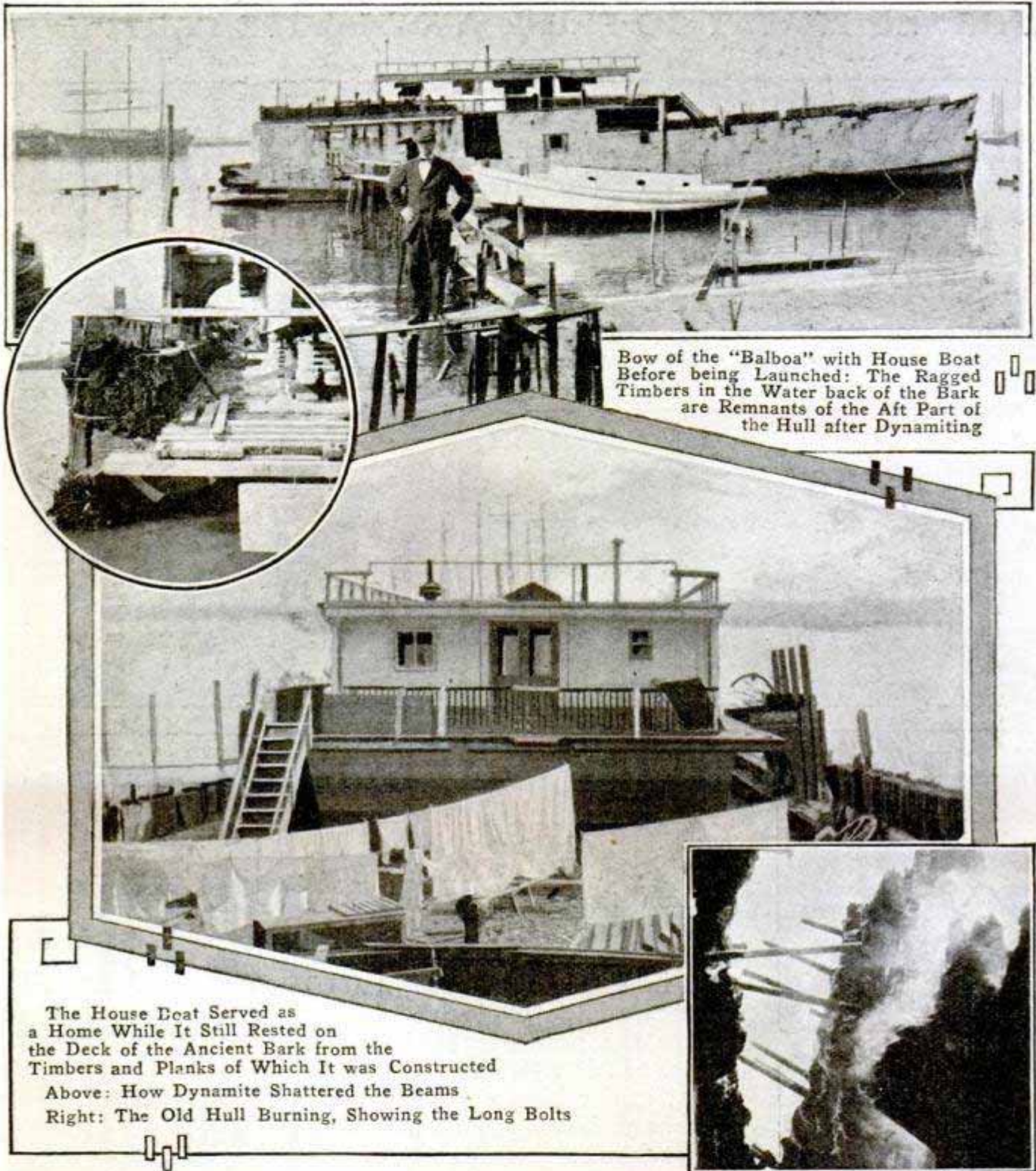
8A



8B

5A, Making a Hole in the Side of the Cartridge; 6A, Inserting the Fuse and Cap in the Side of the Cartridge; 7A, Tying the String to the Fuse; 8A, Tying the Fuse to the Cartridge

5B, Making a Hole in the Top of the Cartridge; 6B, Inserting the Cap and Fuse in the Top of the Cartridge; 7B, Folding the Cartridge Paper around the Fuse; 8B, Tying the Cartridge Paper around the Fuse

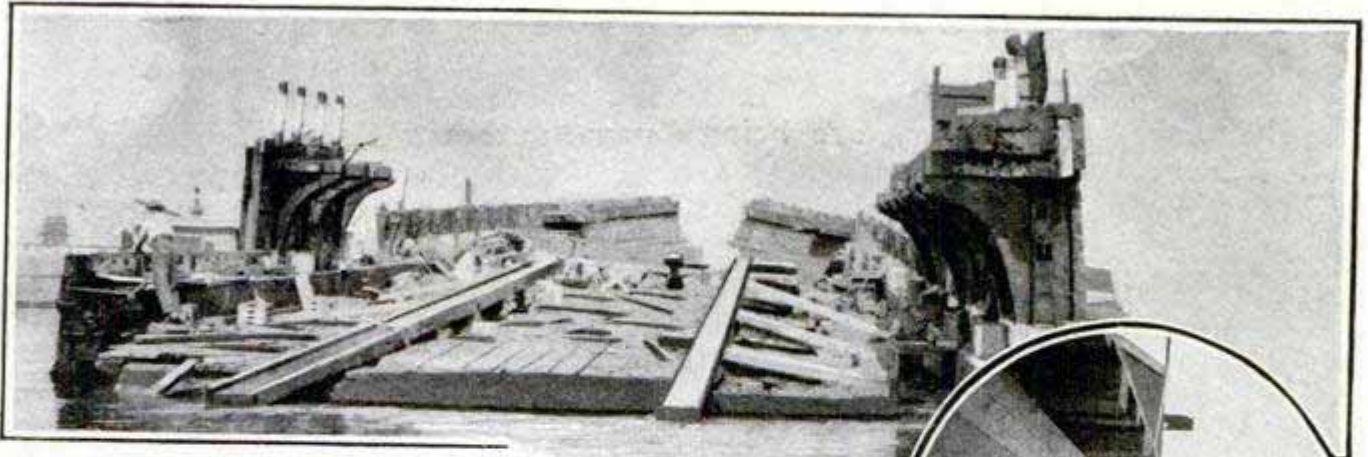


BUILDING A HOUSE BOAT FROM AND ON A DERELICT

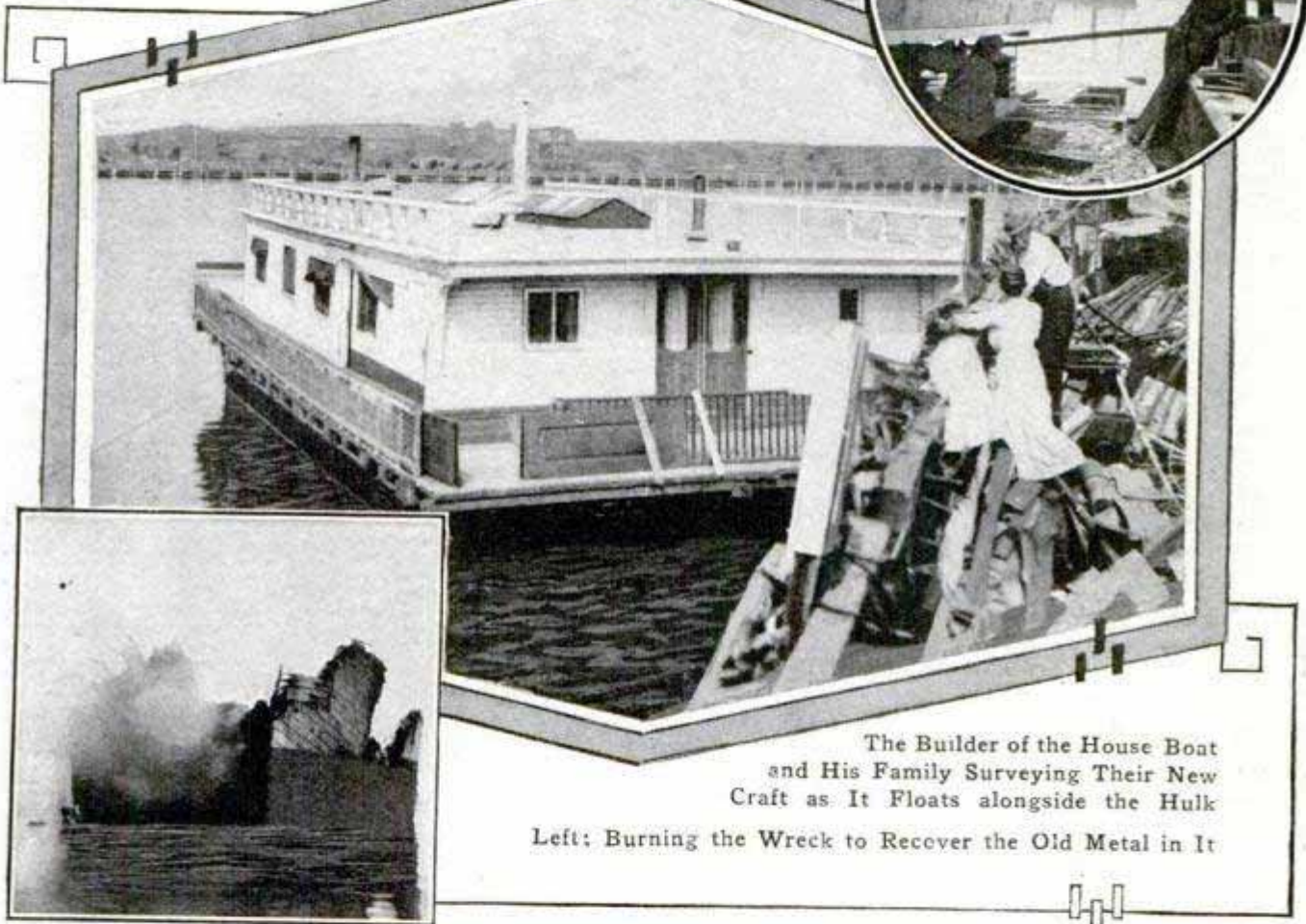
FROM the timbered hull of an abandoned merchantman, a derelict wrecker on the Pacific coast recently launched into the tidewaters at Oakland, Cal., a commodious house boat built from the decking and superstructure finishings of the old "three-master."

The passing of the bark, once the

"Balboa," in most respects was the same as the end of nearly all obsolete and worn-out craft which tie up for the last time in the mud flats. It differed, however, in that it gave up a new boat trimmed with rich mahogany and teakwood, and also acted as a dry dock while the construction work proceeded. And with a bottom made from



After the Launching, Showing
the Sliding Ways
Right: An Impression of the
House Boat's Size



The Builder of the House Boat
and His Family Surveying Their New
Craft as It Floats alongside the Hulk

Left: Burning the Wreck to Recover the Old Metal in It

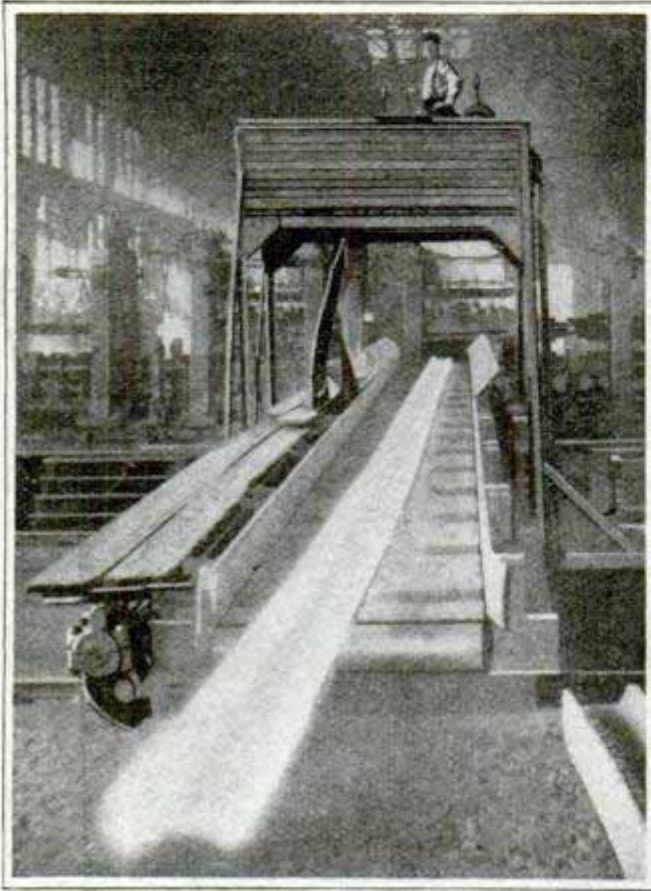
the second deck of the parent clipper, the house boat slid into the water upon ways made from the larger vessel's ribs.

For a few hundred dollars the wrecker purchased the large wooden ship from its owners, dismantled its rigging, from which alone he got 20 tons of scrap iron, marketing the stripings and everything of value. Within a short time, with the use of axes and dynamite, the after part had been cut to the water line and all of the mate-

rials of worth sold for junk. During most of this time, the house boat, which had been built on the forepart of the deck, served as rentless quarters for its owner. After it was finally launched, the ripping of timbers for things convertible into money was completed. Then the shattered hull of the "Balboa," resting among the arctic whalers and salmon vessels wintering in the harbor, was set afire, yielding still another harvest in the metal bolts recovered from the ashes.

DRAWING OUT A WHITE-HOT STEEL BEAM

When large steel beams are being rolled into shape, they are brought to a high degree of temperature which



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A Huge Bar of Steel Rolled into a Long White-Hot Beam

gives off an intense white glare. In the accompanying photograph one of these beams, 90 ft. in length, is shown after having been drawn through the heavy shaping rollers at a Pittsburgh steelworks. In the manufacture of structural steel of this nature, every step of the process is accomplished by the aid of heavy machinery which handles the great pieces of metal as easily as if they were merely medium-sized strips of lumber.

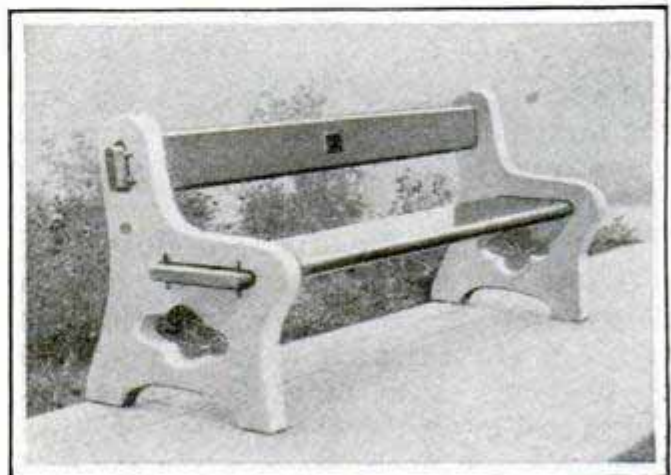
NAVY PROTECTS SAILORS AGAINST MALARIA

The port of Tampico, like other Mexican cities on the coast, is infested by great swarms of mosquitoes, and the officers and men on board ships lying at anchor are not infrequently

disabled by a severe type of malaria traced to the bites of these insects. To prevent this, the United States naval authorities are giving very careful attention to safeguarding the health of the men on our warships, both by impressing them with their individual responsibility in the matter of destroying the mosquitoes and in protecting themselves from their bites. Screens are placed on all openings on the ships, the men are kept below after dark, except those required by duty to be on the decks, and these are obliged to wear gloves and a netting over the head and neck. These precautions have resulted in an almost complete absence of malaria on American vessels, although the ships of other nations had numerous cases.

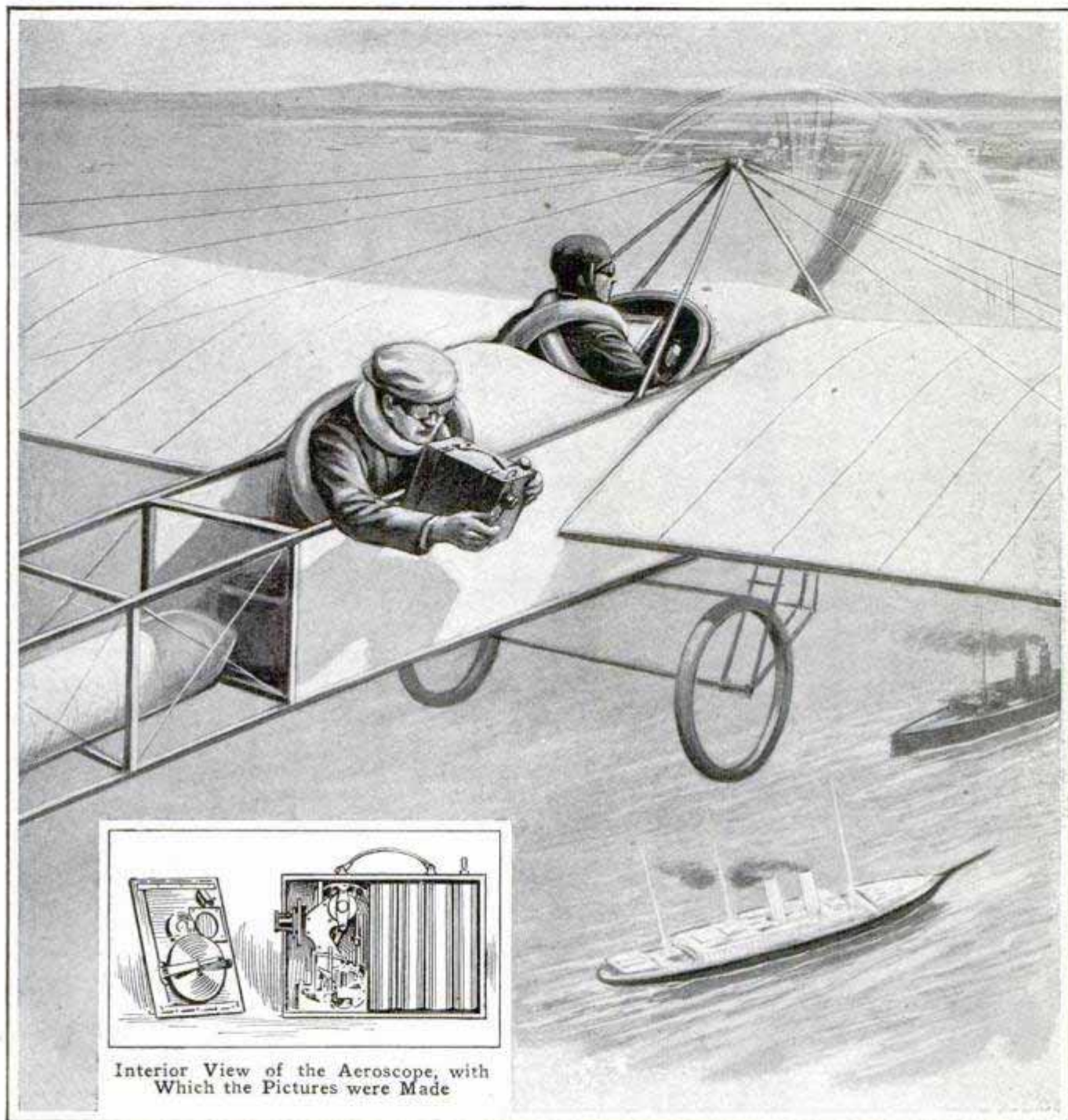
SIGHTLY BENCHES PLACED AT TROLLEY STOPS

At Coronado, Cal., artistic benches have been placed at different points along the local transportation lines for the use of patrons of the system. Instead of being of the ordinary steel form, they are made with concrete end pieces which not only make them substantial but also pleasing in appearance. Fitted through these are inch and a half planks, painted green, and held in place firmly by large wooden pegs. The benches are placed along the edge of the sidewalks, while back of them in the parkings are arranged beds of golden poppies.



Artistic Seats Provided Traction-Company Patrons in California Town

PICTURES OF ROYAL YACHT MADE FROM AEROPLANE



Interior View of the Aeroscope, with
Which the Pictures were Made

Motion-Picture Operator, with Aeroscope, and Pilot of Aeroplane, Who Flew above the Royal Yacht Carrying the King and Queen of England and Made a Series of Pictures Showing the Yacht Crossing the English Channel

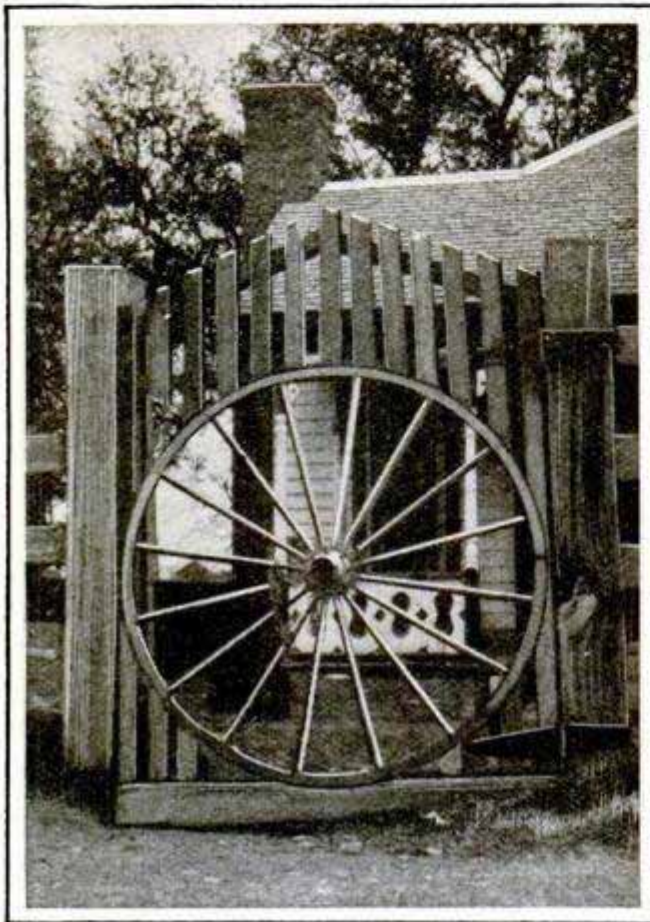
A remarkable and daring feat occurred in connection with the recent visit of the king and queen of England to Paris, France, when a motion-picture operator seated in an aeroplane made a complete series of overhead views of the royal yacht as it made its way across the English Channel. As soon as the yacht reached Calais on the French coast, the aeroplane, carrying the films which had been made for a

London publication, turned and flew back to Hendon, a suburb of London, making the 125-mile trip in 110 minutes. The camera used was the aeroscope, which makes motion pictures without the necessity of turning a handle.

ⒸThe use of electricity and automatic-igniting devices has materially reduced the consumption of matches.

CURIOUS GATE MADE FROM AN OLD WHEEL

Visitors to San Saba, Texas, usually pause before one house in a quiet street, where there is a most unusual



Ingenious Disposition of a Spare Wheel

gate. A carriage wheel, which just fits between the rough posts on either side, comprises the major part of the framework, while, above and below, pickets are nailed to complete the gate. The structure is strong and is adapted to its use, while at the same time it is quite the most distinctive among ornamental gates in the city.

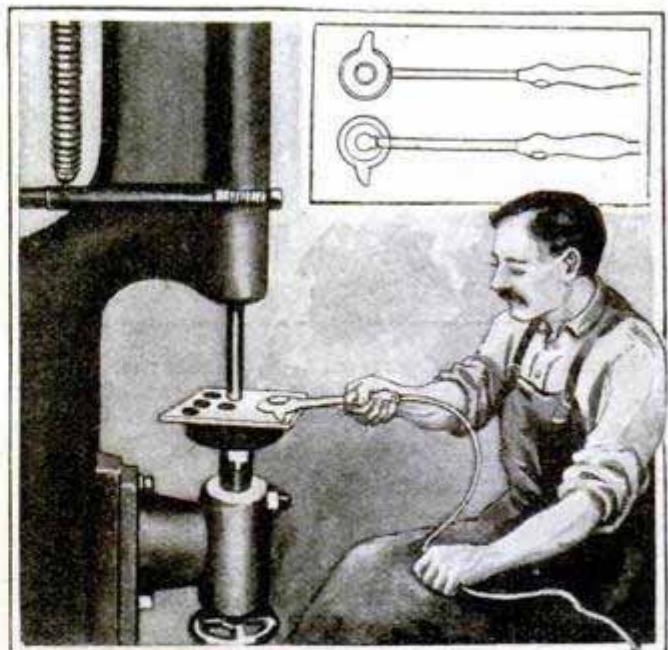
WATER IS FREED FROM OIL WITH ELECTRICITY

Water condensed from steam thrown off by an engine is often fed back into the boiler, because it is soft and non-scale producing. This is done, however, only after the water first has been passed through a separator which frees it to a certain degree from the oil it has taken up while in the engine. The

separators in use at the present time have been unable totally to disunite the two products, for a kind of emulsion is formed which prevents the oil from rising to the surface. In Germany this union has been broken up by the use of electricity, and the oil particles allowed to mass together and float to the top. The apparatus which is used in the process is simple and the cost of its operation is said to be small.

SAFETY SUCTION DISKS TO LIFT SHEET METAL

The "safety-first" campaign has stimulated activity in all lines of manufacturing looking toward guarding employes against injury. One device arousing much interest at a recent exhibition of safety appliances was a safety suction disk for handling sheet metal on punch presses. A hollow steel rod is equipped at the end with a flat rubber disk, which derives its suction from a vacuum pump, to which it is attached through the handle. The pressure by the thumb of the operator on a button located on the handle opens or closes the valves, and the sheet of



By the Use of This Contrivance Punch Presses are Made Safe

metal may be lifted or released without bringing the hands into dangerous proximity to the press.

GUN THAT FIRES WITHOUT RECOIL



A gun that fires a 6-lb. projectile without recoil, and is therefore particularly adapted for service on a military aeroplane or dirigible, has been invented by an officer of the United States Navy and successfully tested on board a small yacht. Both the gun and its projectile are of peculiar construction. The gun is open at both ends and is made as light as possible. The shell has

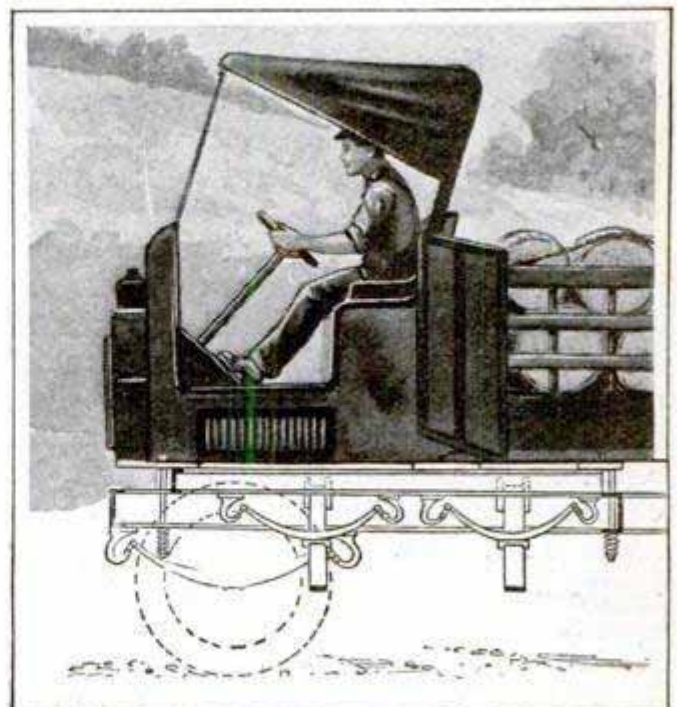
This Nonrecoil Gun is Open at Both Ends, the Reaction against the Discharge of the Six-Pound Projectile being Supplied by a Heavy Mass of Bird Shot Placed in the Back of the Shell

the projectile in one end, while in the other end is a mass of bird shot of sufficient weight to furnish the necessary reaction when the projectile is discharged. When the gun is fired the projectile is thrown from the muzzle at a high

velocity, while the bird shot is forced out at the breech end at such a low velocity that it is practically harmless. The gun is fired by electricity.

FALSE CHASSIS ON HEAVY TRUCK ABSORBS SHOCKS

An interesting solution of the problem of safeguarding the engine and driver's seat of a heavy truck against shocks is offered by a French concern, which provides a false chassis supported on springs resting on crosspieces on the main chassis or frame of the truck. This false chassis is so attached to the main chassis as to prevent any longitudinal movement, but it can oscillate from side to side within certain limits. Spiral springs form an elastic connection between the two frames, acting as a shock absorber. The advantages gained by this form of construction lie in the facts that iron tires may be used, and light metals may form a considerable part of the construction of the engine, thus affording a saving in weight and in fuel.



French Truck Built to Protect Engine from Shocks

QUEER TRICKS ARE WORKED BY IOWA TORNADO

A severe tornado not only caused material property damage but also displayed phenomenal caprices at Sanborn, Ia., recently. The eccentricities



A Tree with Wide Root Spread Tossed through a Window without Injuring Casing

of the twister were exemplified when the entire front of a building was taken off, the first floor, occupied by the post office, completely swept of every vestige of fittings and mail, while furniture in a second-story room was not even disarranged. Although letters from the Federal office were blown in some cases for distances of two miles, pictures on the walls above were scarcely thrown out of line. An adjoining building suffered the loss of its roof and front. Another "freak" occurred when a large tree was lifted from the ground and tossed through a window of a residence. Although the diameter of the root spread was about four feet, the casing was barely marred.

☐Benzine is being extracted from coal by a new electrical process invented by a Swedish inventor.

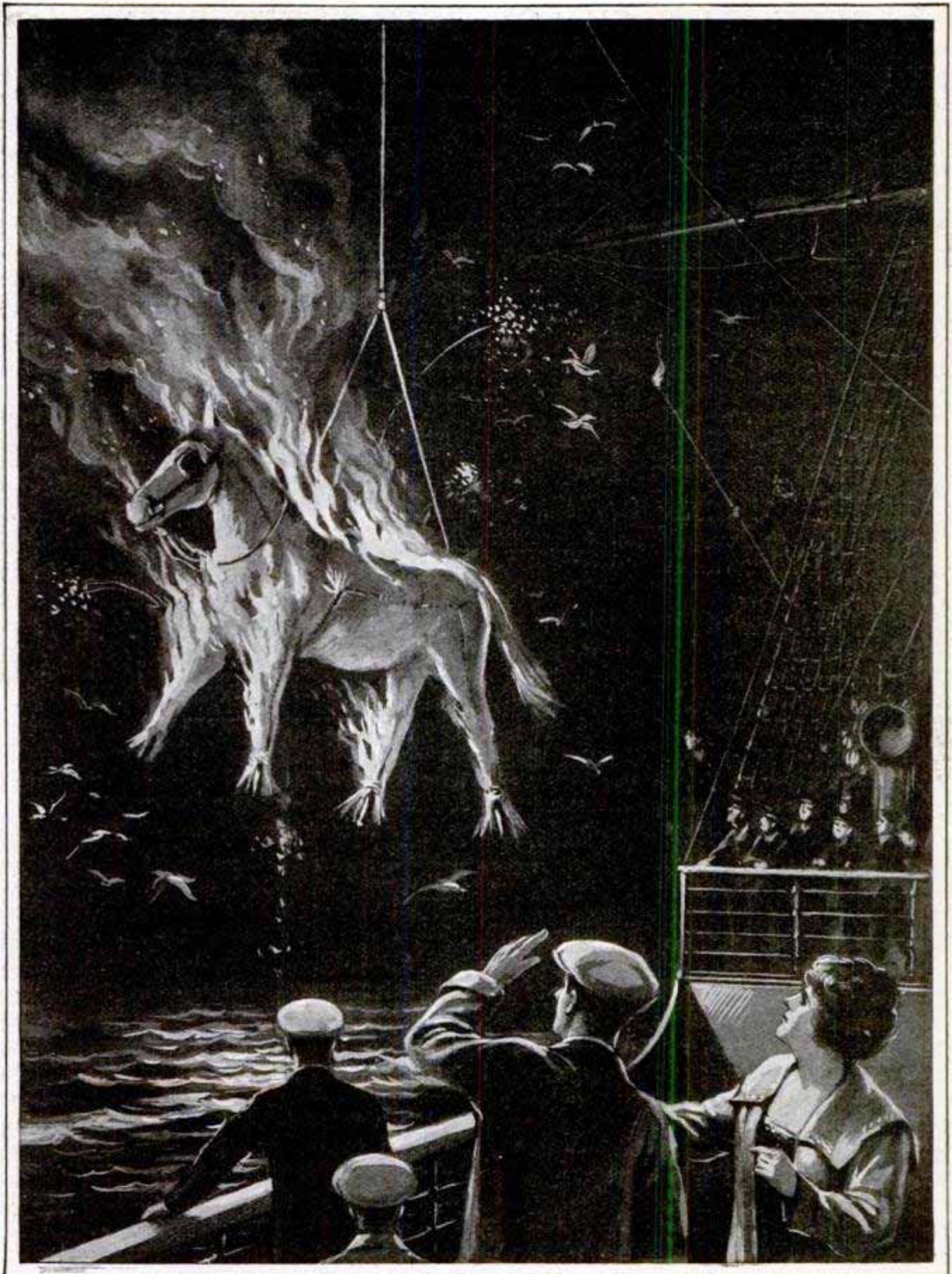
MACHINE NOW SCORES LAPS IN AUTOMOBILE RACES

Scoring of track laps made by automobiles in a large race is often a difficult task. Especially is this true when the number of entries is large and the cars are closely bunched, which usually is the case at the beginning of a race. In order to eliminate confusion to as great a degree as possible and provide an instrument with greater efficiency than the ordinary hand method of scoring, a machine was recently invented and tried with success at the Indianapolis races. It consists of a block of automatic counters; one for each entry. The operating levers of these are numbered to correspond with the car numbers. As a machine dashes across the tape the lever controlling the counter which is keeping account of the turns of a specific car, is pressed. This keeps an accurate check on the number of laps a machine has made and shows at a glance exactly what position a racer occupies.

CURIOUS NAUTICAL CUSTOM NOW SELDOM SEEN

Recently there was seen a celebration by fire on the high seas, which once was of common occurrence. It is called "Burning the Dead Horse," and marked the completion of the first five weeks of a long voyage, a time-honored custom of seamen, which the officers suffered them to indulge to break the monotony of ship life.

The custom had its origin in the practice of paying seamen one week's pay as soon as they had signed the ship's articles. The wives of these seamen were permitted to draw four weeks' pay on the sailing of the ship. These five weeks represented so much "lost time" to Jack Tar, as no further advances could be made until this time had elapsed, when the "fo'c's'le" celebrated the occasion with festivities. A horse fashioned out of canvas and stuffed with tow, was hauled along the deck and, if permission was given,



COURTESY OF ILLUSTRATED LONDON NEWS

Sailors Celebrating the Completion of the First Five Weeks of Long Voyage

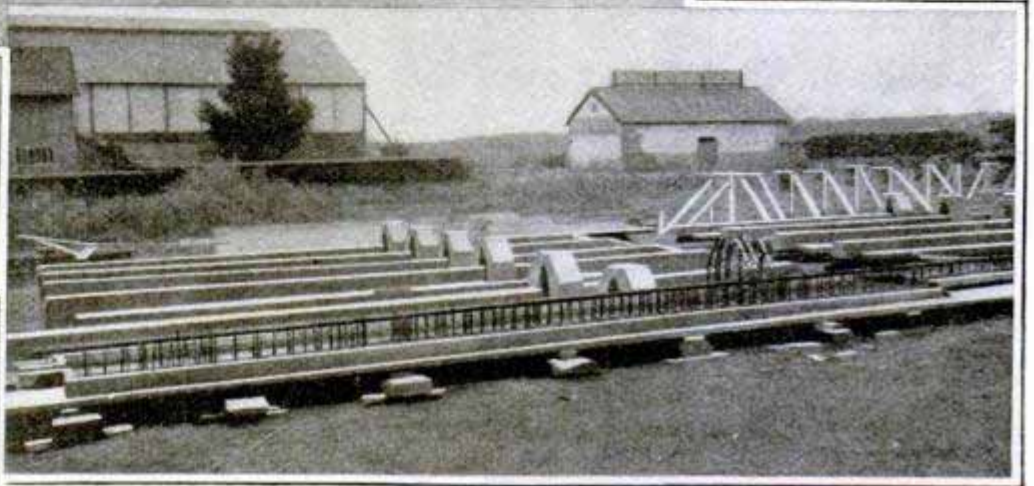
swung aloft at the yardarm. Fireworks were attached and the whole set on fire at night, the sailors skipping about the deck and running up the

shrouds while the effigy flared and the fireworks exploded. The custom is still maintained in vessels following the Cape route to Australia.

NEW TYPE OF CONCRETE SHEET PILING

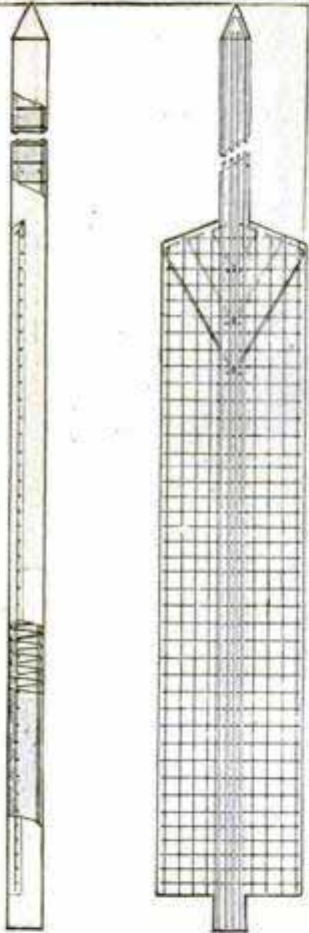


forcing rods exposed. These are then attached to longitudinal reinforcing running along the top, and around this reinforcing a concrete coping that binds



Upper View: Dock Made of Reinforced-Concrete Sheet Piling at Dives-sur-Mer, France

Lower View: Making the Piles in Forms Laid Flat on the Ground



Shape of the Piles and Method of Reinforcing

type of piling is the wing that projects from each side of the pile proper and acts as a curtain wall for filling the space between adjacent piles. The central or pile portion projects above and below the wings, providing a point, which is steel-shod, at the bottom, and a head at the top for driving. The reinforcing consists of a mesh of round bars. When the piles have been driven to the proper depth, with the heads in a level line, the concrete in the heads is broken off, leaving the rein-

the tops of the piles together into one continuous wall is built.

The piles are made in widths of from 32 in. to 5 ft. and in thicknesses varying from 3 to 6 in. They may be driven close together with a tight joint, but are usually driven with an open space between adjacent piles and this space is filled later by a small winged pile or reinforced-concrete slab placed to bear against the wings of the main piles. With the tops of the piles tied by steel rods to anchorages on the shore to prevent overturning, it is estimated that permanent walls as much as 50 ft. in height may be built by this method.

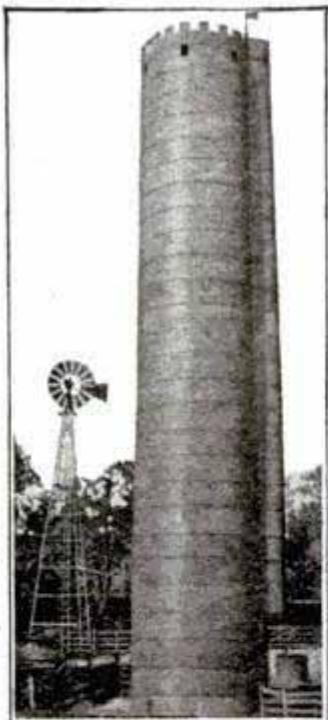
NATIONAL FOREST LANDS PUT TO MANY USES

Permits are issued for the use of land within the national forest reserves by the Forest Service, and some 15,000 such permits are in force today. They cover almost every conceivable project,

comprising the use of the land for farming, grazing and ranches, the use of water power, and the installation of reservoirs, and the cutting, sale and use of timber. Among the projects a few may be taken alphabetically, showing apiary, brickyard, cannery, cemetery, cranberry marsh, fox ranch, marine railway, rifle range, turpentine still, wharf and whaling station. The largest single class of permits was for special pastures or corrals, with water power and irrigation a close second. More than a thousand permits for telephone lines were issued, under which 6,500 miles of wire have been strung, mostly farmers' lines, for which use of the land the government makes no charge.

NINETY-FOOT SILO HOLDS THREE HUNDRED TONS

Ninety feet in height and having a capacity for more than 300 tons of ensilage, a giant silo constructed of concrete has been



built by an Ohio farmer. The diameter of the stack is 14 ft. Its contended advantage over the employment of several smaller silos is that there is but one surface of the contents to spoil, and on account of the height the pressure is so great that a large quantity of fodder may be crowded into a compact space.

A powerful silage cutter is used, which carries the shredded materials to the top of the tower. Looming up higher than any of the structures in the surrounding country, the apex of the tank makes a sudden departure in its architectural design and is finished like the turret of a medieval castle.

HUMAN TELEPHONE STATION AT A FANCY BALL

By means of cleverly concealed circuits and contact points one of the participants in the "Ball of All Nations," recently held at the exposition grounds at San Francisco, was able to converse by telephone with her friends from various parts of the dance floor. Because the instrument was simply operated and its wearer had perfect freedom in dancing, it startled many by its ability to make connections with outside telephones and those at different parts of the room. The dancer wore slippers, the soles of which were fitted with thin copper plates. Small invisible wires made a connection between these and the telephone set. Round-headed bolts, wired to regular telephone lines, were set in pairs in the floor at different points. By standing on two of these, a circuit was formed, and conversation could be carried on without difficulty.



CRACKSMEN ENTER SAFES WITHOUT EXPLOSIVES

Safe cracking without the aid of explosives has been accomplished a number of times recently by a band of burglars operating at Memphis. Each new job has duplicated the methods used in previous lootings. Instead of attacking the safe from the front and working on the bolts or hinges, entrance has been made through the side paneling. With the assistance of a cold chisel, a brace and bit, and a long

crowbar, the cracksmen, with seeming ease, have ripped their way through steel plate and lining, making an opening large enough to allow the entrance



Safe Cracked without the Use of Explosives

of an arm. The strong box then has been reached and broken open. The work is started by boring a small hole in the side of the safe and then enlarging it with a chisel. When the aperture is large enough to accommodate a crowbar, the ripping is commenced.

FIFTY TONS OF GOLD IN GERMAN WAR CHESTS

In a report recently submitted to the German government, the imperial war treasure, guarded in the Julius tower at Spandau, was announced as amounting to 120,000,000 marks, or \$28,560,000. All of this sum is in gold, which is kept in readiness for hostile demonstrations, at which time it would be used for mobilization of troops and

preparation for war. It is reserved from the indemnity paid by France at the end of the conflict of 1870, and is made up of 10 and 20-mark pieces sealed in 1,200 cases, which have an aggregate weight of 105,000 lb. In accordance with the recommendations made in the report presented by the commission investigating the treasure, the fund will be increased to three times its present amount, bringing it to 360,000,000 marks, or \$85,680,000. The additional amount of 240,000,000 marks will be withdrawn from circulation and placed in provincial bonds.

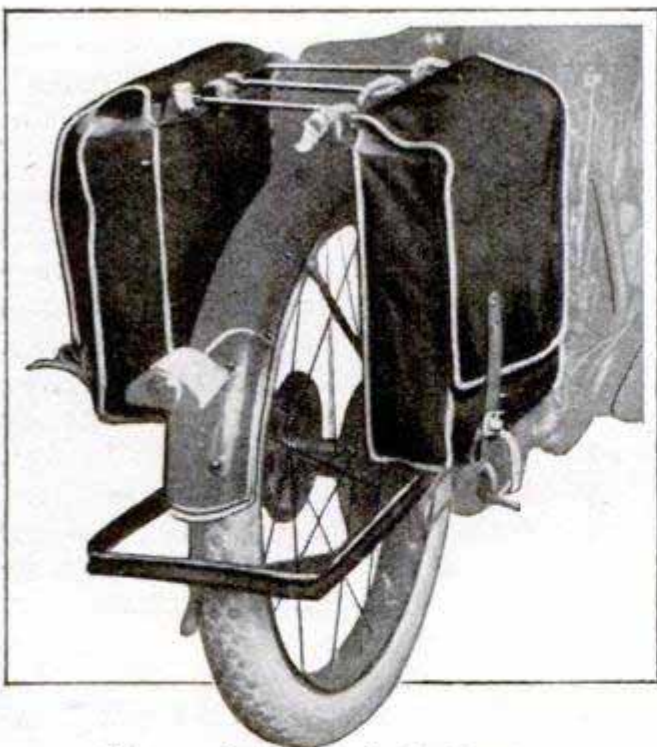
NEW FLYWHEEL AND POWER-STEERING APPARATUS

A new double flywheel for internal-combustion engines that permits the engine to be reversed while the wheels continue in uninterrupted revolution is designed to do away with the necessity for reversing gears and reversible propellers. The essential feature about this apparatus is that the wheels, mounted on a single shaft, revolve in opposite directions through the action of beveled friction pinions, while either wheel, by the movement of a controlling lever that actuates a toggle-clutch mechanism, may be made to revolve with the shaft while the other wheel runs idle. When the engine is to be reversed, all that is necessary is to throw the controlling lever from one extreme position to the other. As the lever passes the middle position the wheel that has been rotating with the engine shaft is released and the engine stops. As the lever reaches the other extreme position it causes the other wheel, which has been running idle, to engage the shaft, and the momentum of the rotating mass starts the engine in the reverse direction. The wheels are mounted on roller bearings and will run idle for a considerable time, so that when the engine has been stopped for a short time it can be started simply by clutching one of the wheels to the shaft. These wheels may also be used to operate the steering gear of a vessel. Friction wheels

mounted on an oscillating shaft so that each may be made to bear against the edge of one of the flywheels are connected to the drum on which the tiller rope is wound. In steering, a controlling lever is moved to the proper position, causing one of the friction wheels to bear against the corresponding flywheel and to actuate the steering gear until the rudder has swung to the required position.

PANNIERS FOR MOTORCYCLES MAKE PORTAGE EASY

For motorcycle tourists, who have often found it difficult to carry conveniently camping equipments, or similarly bulky loads, panniers have been made which may be strapped on both sides of the rear wheel. These, instead of tending to lessen the stability of the machine, lower its center of gravity, when heavily packed, and make the equilibrium even more easily maintained. The bags, which are made of canvas, are fastened to supporting braces and to the ordinary steel carrier which extends back of the seat. In this way the top of the carrier is left

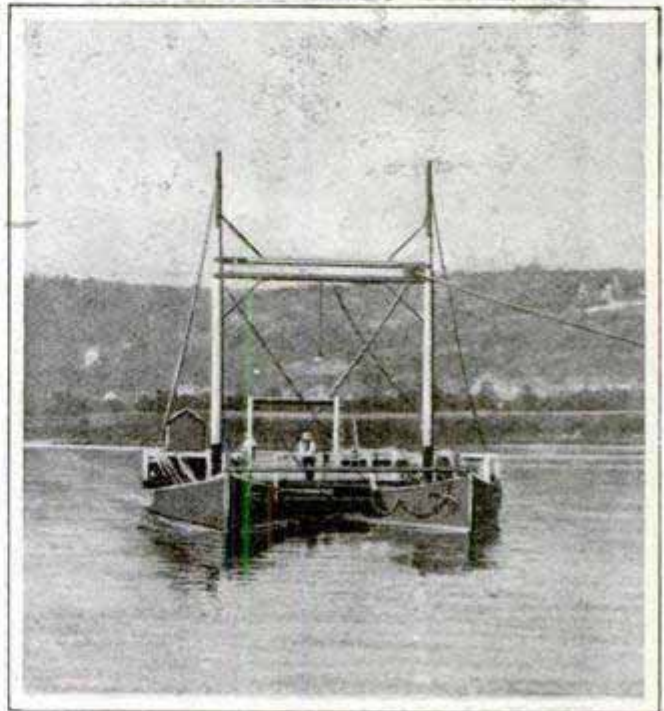


Motorcycle Equipped with Panniers

free for an additional load. The straps are adjustable, which enables the panniers to be used on any motorcycle.

QUEER FERRY ON ELBE IS WITHOUT VISIBLE POWER

On the river Elbe, near Dresden, is an oddly shaped ferryboat which plies between the opposite banks without



Current of River Ferry's Only Power

any visible means of power. It is unequipped with engines or sails. Practically the only thing noticeably connected with the operation of the boat is a man amidship on a bridge working the rudder. Under water, about 100 ft. upstream, paralleling the course of the ferry, is a steel cable. The boat is connected to this by means of another cable which passes along the parallel line on a pulley. By heading the nose of the boat upstream the current propels it to the opposite shore, the cables holding it in its course. This is repeated on the return trip.

MOTORMAN'S MIRROR GUARDS AGAINST ACCIDENTS

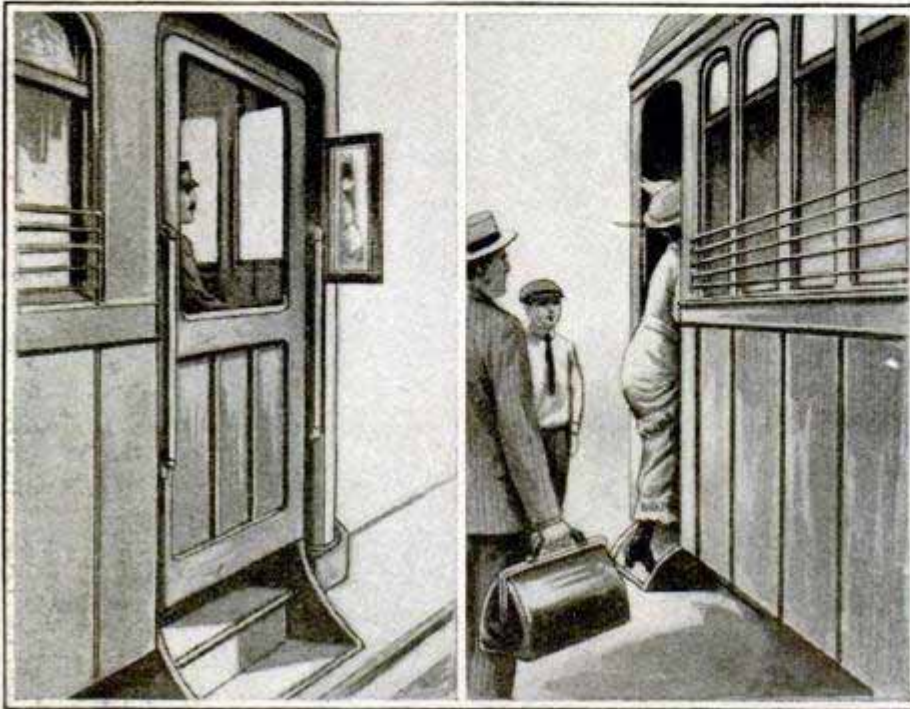
In an attempt to minimize the number of personal-injury claims annually charged to the accounts of surface traction companies, a mirror arrangement has been devised which affords the motorman a clear view of the rear step of his car. Without this the driver is dependent entirely upon the signals

from the conductor, which sometimes are given prematurely. The mirror, which is of heavy plate glass, 6 by 12 in. in size, is mounted in an iron frame attached to the corner post of the car. It is adjustable to any desired angle

CHINESE FLOOD PREVENTION LEFT FOR AMERICANS

For hundreds, even thousands, of years, floods and famine have recurred annually in certain regions of China.

Recently an American engineer impressed upon the Chinese government the possibility of preventing such catastrophes by engineering works, and now a commission of three engineers from this country is about to take in hand the carrying out of the project. Surveys for some of the work have been made by Chinese students, but there is much which will require the services of a well-organized corps for some time to complete. One of the most important branches of the undertaking, it is stated, will be the organization of a weather bureau.



Position of Mirror When Attached to Car, and View the Motorman Obtains by Its Use

and has a projection over the edge of only 4 inches.

taking, it is stated, will be the organization of a weather bureau.

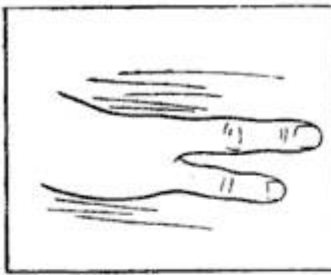
BRITISH SUBSIDIZE MOTOR TRUCKS OF KINGDOM

In order that the War Department may be prepared against contingencies arising from a possible delay in acquiring motor vehicles at the time of a crisis, the British government has adopted a system of subsidizing privately owned motor trucks which meet its specifications. The payment amounts to \$530 for each machine, of which \$30 is paid upon enrollment and the rest in six semiannual installments. Before an owner can receive the subsidy, his truck must be of a make which passes the department's tests. Two classes are acceptable, those of one and a half and of three-ton capacity. In the event of an emergency the government has the right to purchase all subsidized machines at a fixed cash price.

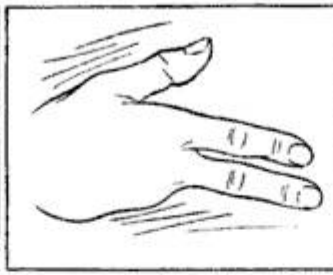
FIRST TOLL IS COLLECTED AT PANAMA CANAL

After putting millions of dollars annually, for years, into the construction of Panama Canal, the first cash revenue from the gigantic project was recorded recently from barge traffic. Because of congestion on the Panama Railroad, cargoes were allowed to be transported over the water bridge. Most of the loads were composed of sugar shipments from Hawaii. For the business done during approximately two weeks' time, the return was \$7,356.12.

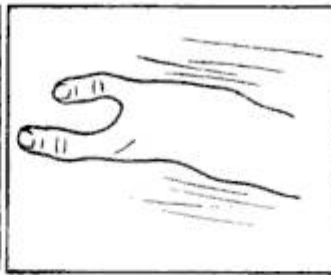
Plans for crossing the Sahara Desert by aeroplane are being made by French airmen. The route will probably be that from Algiers to Touggourt, and thence across the Sahara to Banmako, a distance of 1,675 miles.



This man earned \$9.50 a week operating a drop hammer before his accident. He now gets \$2 a day in a garage as an attendant.



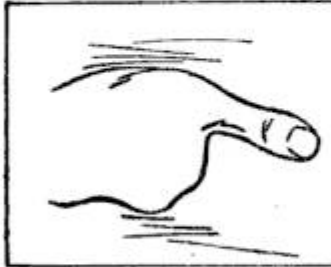
A drill-press hand, at 15 cents an hour, lost two fingers and part of his right hand. Now earns 39½ cents an hour in the same plant.



Polish girl, injured in a mangle while earning 10 cents an hour in a laundry, is now forewoman in a bakery at the same wages.



Railway brakeman earning \$45 a month was badly injured. Recovered and became fireman on the same line at \$90 a month.



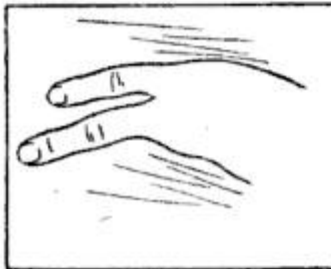
Was a farm hand before losing fingers in feed chopper; earned \$6 a month and board. Today earns 22½ cents an hour in a sawmill.

MAIMED HANDS NO BAR TO SUCCESS

An investigation by the Industrial Commission of the State of Wisconsin into the influence of permanent partial disability on earning power reveals a remarkable power of recuperation. There are, of course, those who lose courage in the face of misfortune, but most workmen examined by the commission have taken a fresh grip on life, and instead of being more liable to accident because of the injury, have proved to be more careful, steadier and, because of this, able to earn more despite their partial disability, than before the injury.



Rip saw disabled a \$1-a-day man. Company built a special machine, enabling him to earn \$2.55 a day, filing saws.

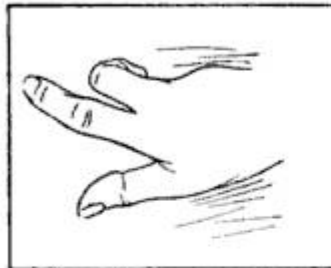


Buzz planer took off two fingers and thumb; earned 22½ cents before and 25 cents an hour after accident, in same line of work.

Of the 154 cases cited, 100 are earning higher wages than before their accident, 29 have the same earning power, and only 25 report a decrease.



Cutting machine took four fingers off of operator earning \$4 a week. He now paints automobile bodies and earns \$3 a day.

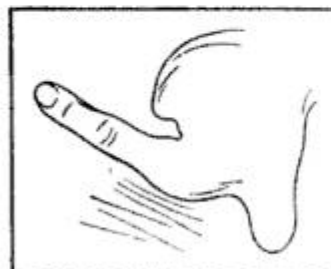


Unguarded gears crushed an apprentice's hand while earning 50 cents a day. He now receives \$4 a day as a full-fledged machinist.

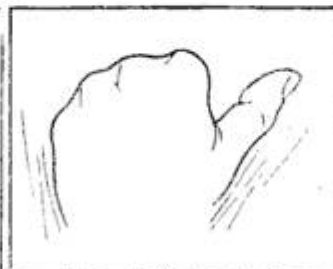
Of these, 122 suffered the loss of fingers or hands, 17 lost one or both legs, while 15 were deprived of the use of an eye. Nor does partial disability necessarily deprive men of their participation in outdoor sports. One typical case reported that although he had lost four fingers from his right hand, he was the star catcher of the ball team, and another, whose leg was removed at the knee,



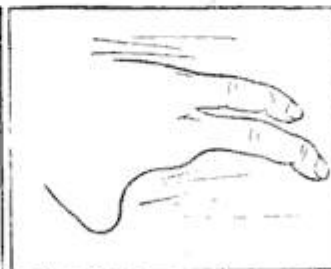
Woodworking machinery injured this man while earning \$2.75 a day. This did not prevent his rise as foreman at \$3.50 a day.



While earning \$1.25 a day the owner of this hand slipped and gearing crushed the hand. He is now a milk dealer, earning \$85 a month.



Stamping press took off four fingers of \$6-a-week man. Now he is the best workman in the shop; earns \$2.50 a day and is catcher on a ball team.



Buzz saw took two fingers and thumb from operative earning \$1.85 a day. Same employer pays him \$2 in galvanizing department.



Norwegian farm hand making \$20 a month and board was hurt by a meat cutter. Now foreman in assembly room at \$75 a month.

continues to skate both on ice and roller skates, and rides a bicycle.

One feature was brought out in the investigation very clearly: that, when an employe suffering from partial although permanent disability kept up his courage and ambition he invariably made good, receiving in most cases larger wages after his accident than be-

fore, while those who brooded over their disabilities and lost confidence because of the loss, even of a finger, always reported a diminution in their capacity to earn wages. Evidently it is not so much the loss of a finger, or of an arm, leg or eye, as it is the loss of confidence which destroys or impairs earning power.

CIGARETTE HOLDER RELIEVES AUTO DRIVER OF BURDEN

A device recently has been patented which relieves the driver of an auto-

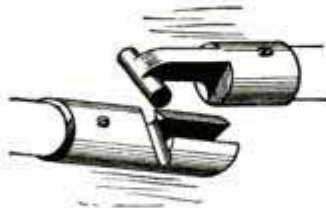


mobile of the burden of holding his cigarette while driving. A metal frame with U-shaped clasps at either end grips the cigarette with one clasp, while the other end is fastened tightly around the finger. This leaves the hand entirely free for manip-

ulation of levers, etc., while maintaining the cigarette in convenient position for smoking.

NEW CONDUIT-ROD COUPLER

The difficulty so often experienced in "threading" a conduit, where rods pull apart or separate when stress is exerted to pull them through a long conduit, has been overcome in a novel coupler recently invented. By means of a crosshead, countersunk, a good grip is secured, while at the same time the parts may be separated quickly when desired. The joint is a snug fit, there is no lost motion, and the diameter of the rod is uniform throughout.



PROVE PARCEL POST'S POWER TO CUT FOOD COST

Although the service was introduced only a short time ago, the attempt of the postmaster-general to bring the producer and consumer of agricultural products closer together through the medium of parcel post has already shown encouraging results. It has been found necessary at the Washington post office to employ automobile delivery wagons in order to move the perishable produce as fast as it arrives. The consignee in a large per cent of the cases now receives his order of food-stuffs within a few hours after it is mailed by the farmer. Customers in the city were given access to lists, prepared by the postal authorities, which showed at a glance where produce could be procured. A flourishing interchange started almost immediately. Eggs, butter, poultry, vegetables and similar commodities now are pouring into the Washington office in great quantities. While the same plan has been tried in several of the large cities to a certain degree, the campaign has been carried on aggressively at the capital, resulting in the development of a large business.

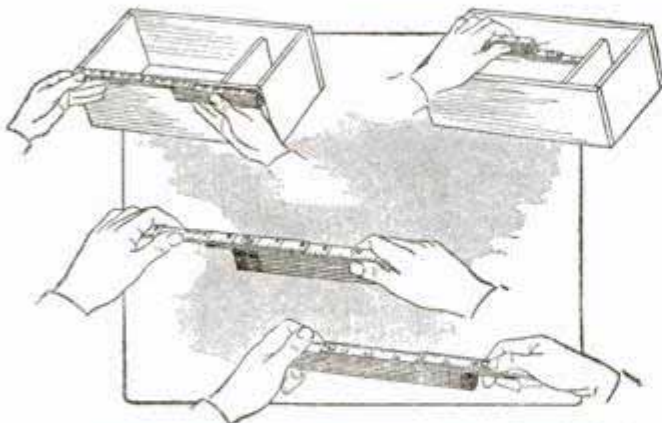
HELP OF HUNTERS SOUGHT TO END FOREST FIRES

The aid of the sportsmen of the United States in preventing forest fires is being sought by the Forest Service of the Department of Agriculture. Since it has been shown that a large percentage of the conflagrations is started annually through the carelessness of hunters and campers, the bu-

reau has determined to decrease the danger of recurrences by educating the sportsman. One of the methods which it is planned to employ is the enlistment of gun and powder manufacturers in the movement. On account of their desire for the perpetuation of game, it is believed they will be willing to print warnings on ammunition boxes and hunting supplies.

SLIDE RULE WITH NEW FEATURES

New features designed to add to the usefulness of that common tool of the mechanic, the measuring rule, are embodied in a new interlocking slide rule that has just made its appearance on the market. When the rule is closed all the slides except the first are locked together by spring-locking devices, and as this is pulled out, the slides are released in consecutive order until the rule is fully extended. The same locking devices then hold the rule in the extended position, and it is closed in the reverse order to that followed in extending it, the first slide being released by pressure on a spring. With this arrangement there is no danger of the parts sliding on each other while the rule is being used. On the back the figures are so arranged that they show at a glance the distance spanned by the rule when partly extended. This feature is designed to



Making Inside Measurement with Locked Slide Rule

make easy the reading of inside measurements, such as the inner diameter of a barrel or the distance between the faces of door jambs, etc.

PISTOL REPORT PRODUCED BY HARMLESS TOY

A novelty in the way of a noise maker is designed to give the youngster the sensations of an explosion with-



When Held Lightly in the Hand and Snapped Downward, This Toy Produces a Report Like That of an Exploding Percussion Cap

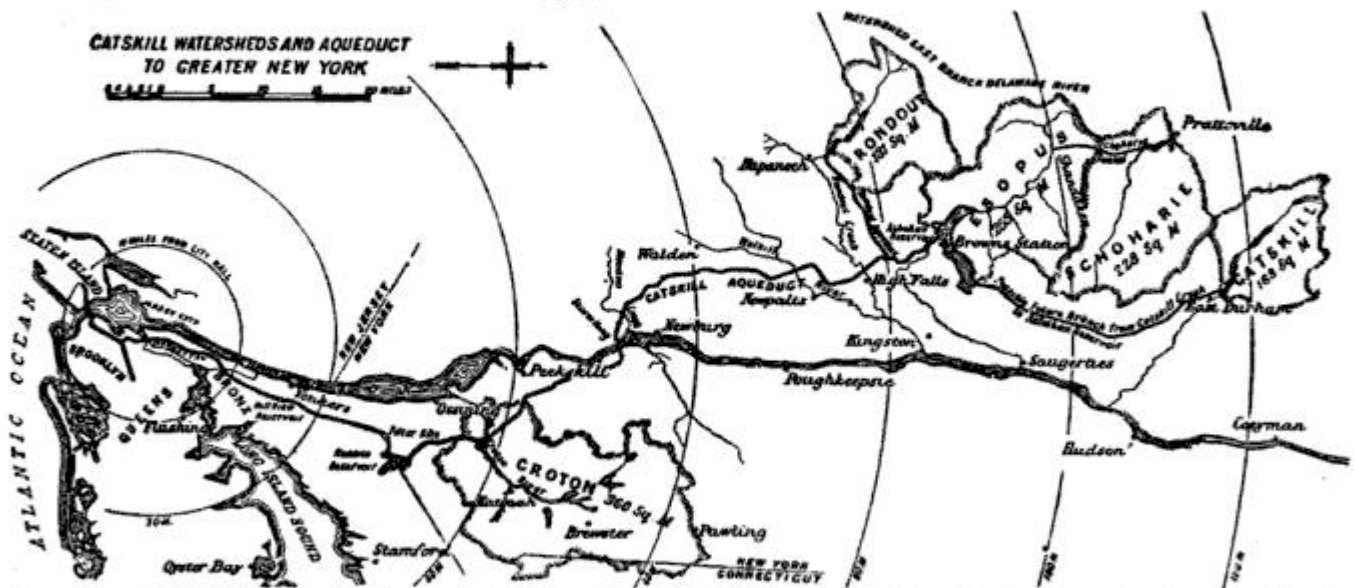
out any of the attendant dangers. This toy consists of two pieces of cardboard shaped and marked to resemble a revolver and hinged together by a cloth strip along the top. To the muzzle ends is pasted a sheet of paper that folds to a triangular shape between the cardboard sides with the free edges down and the fold at the top. When the toy is held lightly in the hand and snapped quickly downward the paper is forced out suddenly by the pressure of the air and produces a report that resembles that caused by the explosion of a percussion cap.

GROWTH OF NEW YORK CITY WATER-SUPPLY SYSTEM

With a constantly growing population that is already close to the 5,000,000 mark, the problem of water supply is one of the biggest and most urgent of any that the city of New York has to deal with. Formerly the supply was derived from the Croton River, where a high dam forms an artificial lake containing about 32,000,000,000 gal. of water and capable of delivering a daily supply of 250,000,000 gal. When this supply became inadequate, it was in-

creased to 325,000,000 gal. by the construction of additional dams across various tributaries of the Croton River. Owing to continual increase in popula-

When the city outgrows this, it is planned to tap some of the numerous lakes and rivers of the Adirondack Mountains.



Map Showing Water-Supply Sources of New York City: The Four Watersheds Recently Acquired in the Catskill Mountains Have a Total Area of 777 Square Miles

tion, the requirements have increased until, at the present time, something like 500,000,000 gal. a day are needed. The possibilities of the Croton watershed have been exhausted and a new source of supply was therefore selected in the Catskill Mountains, on the west side of the Hudson River. This led to the construction of the Ashokan reservoir and the Catskill aqueduct, both of which have been described in past issues of this magazine. Large as it is, the Ashokan reservoir is only a part of a system designed to supply all needs of the city far into the future, and which, when finally carried out, will be one of the most extensive water-supply systems in the world. The Esopus watershed, the waters of which are impounded by the Ashokan dam, contains 255 square miles. The entire scheme comprises three other watersheds adjoining the Esopus and containing a total of 522 square miles. Two of these watersheds, the Schoharie and the Catskill, will have reservoirs connected by tunnels with the Ashokan reservoir, while the Rondout reservoir will have a direct connection with the Catskill aqueduct, which has been built with a capacity sufficient for the entire system. It is estimated that this system will supply about 800,000,000 gal. daily.

HOOKE HAIRS INTO SCALP TO END BALDNESS

In order to furnish a cloak for baldness, hairs are being sewed into the human scalp successfully at a hospital in Budapest. The unusual operation is performed, it is claimed, without causing the patient to undergo pronounced pain. As many as 50,000 hairs have been planted into the head of one man. The process of anchoring the hair in the scalp is odd. Minute hooks made of extremely fine gold wire are threaded with a double strand of hair. These, with the assistance of a small instrument, are inserted into the subcutaneous tissues, where they are given a slight twist to fasten them into place. One hundred strands of hair to each square centimeter (about $\frac{1}{6}$ sq. in.) are drawn through punctures in the scalp to form a suit of hair.

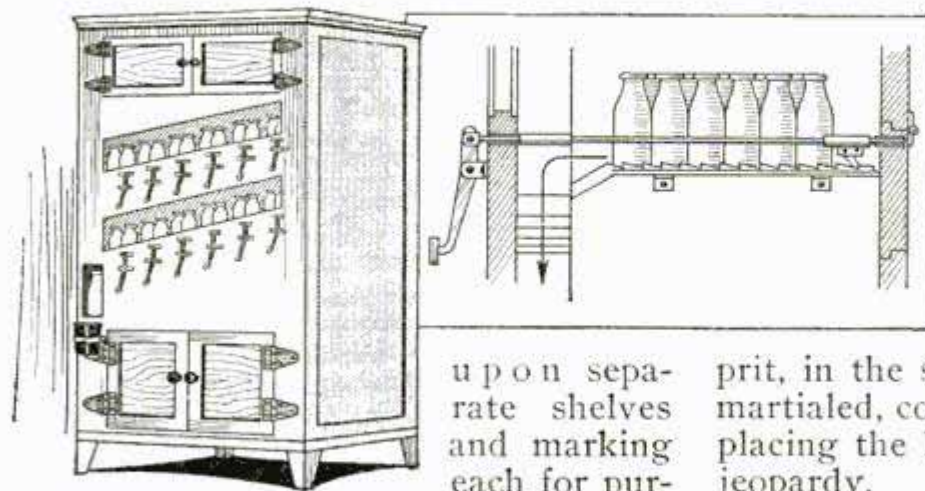
STIMULATING INVENTION OF SAFETY DEVICES

A movement of national scope has been inaugurated for stimulating the invention of practical machinery and devices designed to minimize the loss of life and limb among the 34,000,000 persons engaged in industrial pursuits

in the United States, and a committee headed by the vice president of the United States and composed of other government officers and men of national prominence has been formed for carrying this movement into effect. In addition to this, three prizes, one of \$1,000, one of \$300, and one of \$200, have been offered by a prominent philanthropist for inventions designed to prevent industrial accidents. This prize contest closes June 1, 1915, and is open to inventors of any nationality. Competing inventions must be protected by United States patent, and only the patent papers will be considered.

NOVEL BOTTLE-DELIVERING REFRIGERATOR

An ingenious device has been patented which enables one to select a bottle in a refrigerator and remove it without exposing the ice, or admitting an appreciable amount of warm air to the interior. It consists of any form of icebox, within which a series of shelves is provided upon which may be ranged bottles of milk, cream, or any flavored beverages. A lever controlled from the outside operates a mechanism for forcing the bottles on any shelf onto a roller track conveying a bottle at a time to a chute from which it is projected through a trap-door upon a receptacle on the outside of the icebox. By keeping the flavors

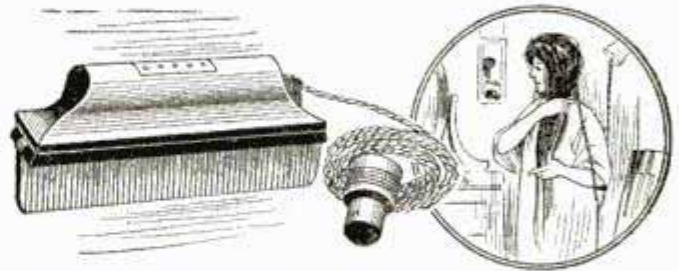


A Refrigerator Which Delivers Bottles without being Opened

may press the appropriate lever and obtain any bottle desired.

ELECTRIC COMB AND HAIR DRIER

An English concern is introducing an electric comb and hair drier which may be attached to any lighting socket



Electric Device Dries the Hair While Combing It

in hotel or residence, having a flexible cord of sufficient length to permit free use within reasonable limits from any fixture. The power consumption of this device is 40 watts.

THE THING ONE SHOULD NOT DO AROUND A DIRIGIBLE

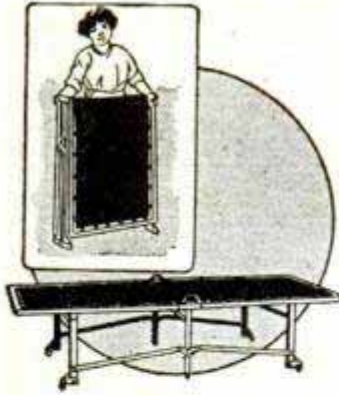
The bringing of a flame, or anything capable of causing a flame, to the vicinity of a dirigible is one of the things most guarded against. Recently a dirigible landed outside of Milan, Italy, and was soon surrounded by a crowd. Despite repeated warnings of the officers aboard, some one lighted a cigar. Immediately there was a tremendous explosion, and 50 persons were severely burned, and the dirigible entirely destroyed.

The seriousness of the danger of an explosion on a dirigible was emphasized in a recent work of fiction, in which an officer of a German dirigible discovered a single match in the clothing of one of the crew. The cul-

prit, in the story, was instantly court-martialed, condemned and executed for placing the lives of his companions in jeopardy.

Two new volcanic craters recently became active on Mount Lassen at the foot of the Cascade Range.

NOVEL AND PRACTICAL THINGS FOR DAILY USE



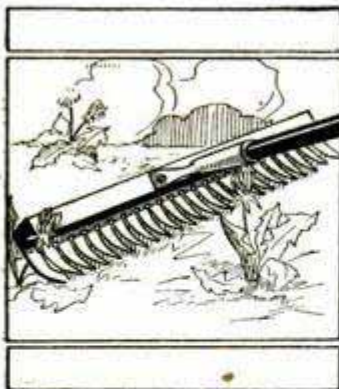
Cot Automatically Folds
upon being Lifted

DESIGNED for summer cottages, camps and sun parlors, a folding cot which closes, knifelike, into a space 29 by 40 in., forms a convenient bed for emergency use. It is made of steel framework and is hinged at the middle so that it automatically doubles itself when lifted. When not in use it may be concealed easily.



Shield Protects Wall Paper
during Painting

For the purpose of preventing wall paper and window panes from being daubed while interior casings and moldings are being painted or varnished, a metal guard has been invented. When in use, this is guided parallel with the brush along the edge of the surface which it is wished to protect. It also may be used to preserve the paper when woodwork is being washed.



Rake Removes Dandelions
from Lawn

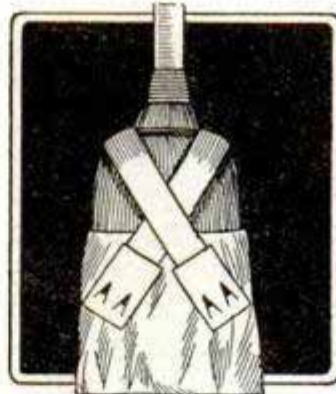
A rake especially designed to remove dandelions and similar plants and weeds from lawns has been introduced. While it is of customary size, the prongs, instead of being of the ordinary kind, are similar to curved knives. When dandelions are encountered, the stems and leaves are slipped into a circular hole, between the teeth, and cut.

An adjustable bracelet which may be worn either as an ornament or a glove supporter, is supplied in attractive patterns. It is made self-fitting so that it will clasp the arm at any point tightly enough to prevent a long glove from falling about the wrist.



Bracelet Used as a Glove
Supporter

It is often troublesome and tedious to fasten a cloth securely about a broom so that it may be used in cleaning ceilings or dusting polished floors. A device which accomplishes this quickly and well consists of a suspenderlike arrangement which fits over the shoulders of the broom. At the ends of the straps are sharp claws which grab tightly into the cloth and hold it firmly in place.



Suspenderlike Straps
Hold Cloth over a
Broom

Among the late styles in footwear is a women's novelty pump which, although built on a conservative last, introduces an odd ornament. This is an upright rhinestone circlet from the center of which is suspended a small metal bell. When walking or dancing this gives a clear little tinkle.



Ornament on Pump
Dangles Bell

For household use, a combination cleaver and meat tenderer has been patented, which may be employed for various purposes. The blade of the French pattern is 3 by 6 in. in size. At the top of this on the left side, the tenderer, which consists of a dull-toothed plate, is riveted in place. The instrument is made of crucible steel and is ground sharp.

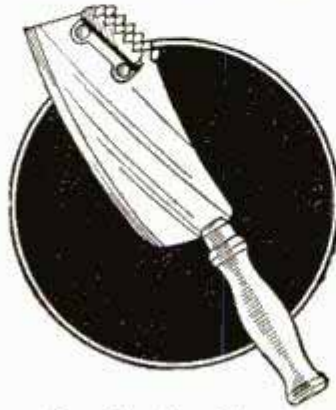
A convenient holder for a ball or spool of yarn consists of a device which suspends it from a wrist bracelet. A blunt pin which passes through the spool is held by a connecting chain fastened to the ornament. In this manner the ball always is at hand, and at the same time not in the way.

Easily adjusted and supplied with a firm standard, a convenient nozzle holder for garden and lawn uses has been invented. The hose passes under a bridge on the base and is



A Garden-Hose Holder Which is Easily Adjusted

a revolving spray to be attached to it. A clothesline holder made to clamp



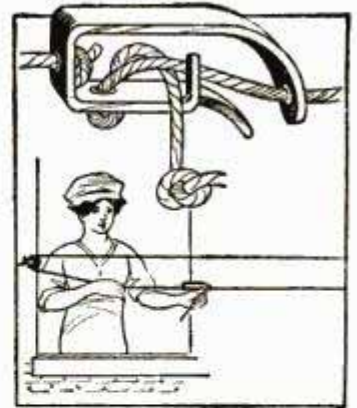
Combination Cleaver and Tenderer for Domestic Use



A Spool of Yarn Held by a Bracelet

held firmly. A notched lever is attached to the nozzle, and by changing the position of this, moving it forward or backward, the stream of water may be directed at any angle. The hose also may be held upright, allowing

the end of a pulley rope firmly, consists of an instrument eliminating the need of tying the ends together. One end of the line is fastened to the holder while the other is passed through two holes in it. By drawing the rope and pulling the loose end, it is kept taut. It may be loosened by reversing the operation.



A Clothesline Clamp That Keeps the Rope Taut

Designed to accommodate material of any thickness, an adjustable embroidery hoop is being made which is claimed to overcome objections to other forms. The rings are made of metal and at the top of the outer one is a double screw which may be turned so as to either tighten or loosen the frame. By changing this the hoop may be made to hold gauze or heavy cloth without its wrinkling while being worked.



Adjustable Embroidery Hoops Which Hold Any Material

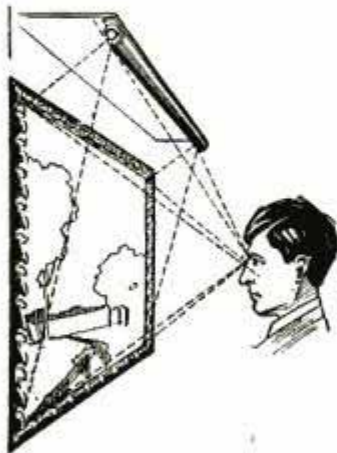
A small ice-making machine for household use, which may be operated easily and quickly either by hand or with an electric motor, also serves as a general freezing device. It is cylindrical in shape and is supplied with a number of molds which, when filled with water, produce briquettes of ice within from 10 to 25 minutes. The machines are made in different sizes for manufacturing between 4½ and 44 lb. of ice at once.



A Small Machine for Making Ice

PAINTINGS ILLUMINATED BY NOVEL METHOD

A novel system of artificial lighting that proved strikingly successful in bringing out the true color tones of the



paintings was used at a recent art exhibition. A trough in which the lamps were mounted was placed above and in front of the paintings and was so shaped that while the paintings were fully illuminated,

no direct light could reach the eye of the observer. The inner surface of the trough was painted a dead black, and electric lamps were placed at intervals of 1 ft. Each alternate socket was equipped with a 40-watt, 105-volt, half-shade lamp, while the remaining sockets were equipped with colored lamps, individually selected to correspond to the predominating tone of the paintings before which they were placed. Annoying reflections of the lights from glass-covered paintings were prevented by so locating the trough that the reflections would fall below the eye of the observer when the paintings were viewed from a proper distance.

COOKING AND IRONING WITH THE SAME HEAT

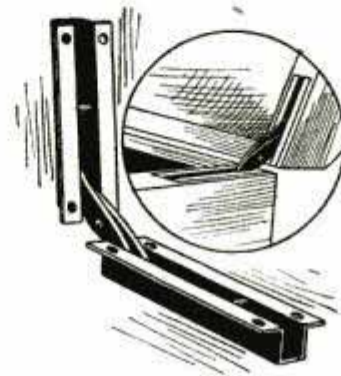
Housewives can keep down their gas bills by the use of a combination kitchen heater which was recently patented by a Chicago woman. By its use, one burner or stove hole can be used to heat a flatiron, toast bread, and cook a kettle of food at the same time. Inside the metal cover which rests on



the stove is space for a flatiron on a holder that slides through an opening in one side. Above the flatiron is an opening for a kettle, and the inclined sides, all the way around, are perforated for toasting. A removable asbestos lining confines the heat and cuts down the amount of fuel needed.

INVISIBLE HINGE MAKES NEAT JOB

A novel hinge which is invisible when the lid is closed has been patented by a Minnesota inventor and

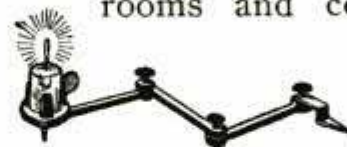


is now being placed on the market. The hinge is to be mortised in the side of such articles of furniture as desks, piano benches, window seats, trunks, and the

like, where neatness and absence of joints, screw heads and bolts is desirable. When opened, the hinge holds the lid open, doing away with side straps for support.

AN ADJUSTABLE CANDLE BRACKET

A recent device enables plumbers and repair men of all trades whose work carries them into dark halls, rooms and cellars, to place a light where they want it. It is a hinged bracket with four joints



so arranged that the candle at one end of the bracket may be adjusted to any angle, up or down or from one side to another. The opposite end of the bracket is equipped with a sharp spike which can be driven into brick joints, beams or any rough woodwork.

Three new subterranean railways, to cost \$60,000,000, are to be built in Berlin.



A Small Portable Oxyacetylene-Welding Outfit

By ALBERT H. WAYCHOFF

The small welding outfit shown is especially adapted for light and portable work where the larger outfits would be cumbersome and almost useless. Both gas generators are alike in construction. The size can be changed if desired, but the dimensions given are for an outfit suitable for all-around work.

To make the gas generators, procure two pieces of seamless steel tubing, 6 in. in diameter and 8 in. long, having $\frac{1}{8}$ -in. walls, and cut a fine thread on each end. The flanges A are made of thick boiler plate and threaded internally to fit on the threads of the tubes. When they are in place on the ends of the tubes they are soldered, or, better still, brazed; then, if possible, turned up on a lathe. The latter operation is not essential, however, providing a good thick gasket is used in the joint between the head and the flange. Plates for heads are then fitted to both ends and fastened with cap screws.

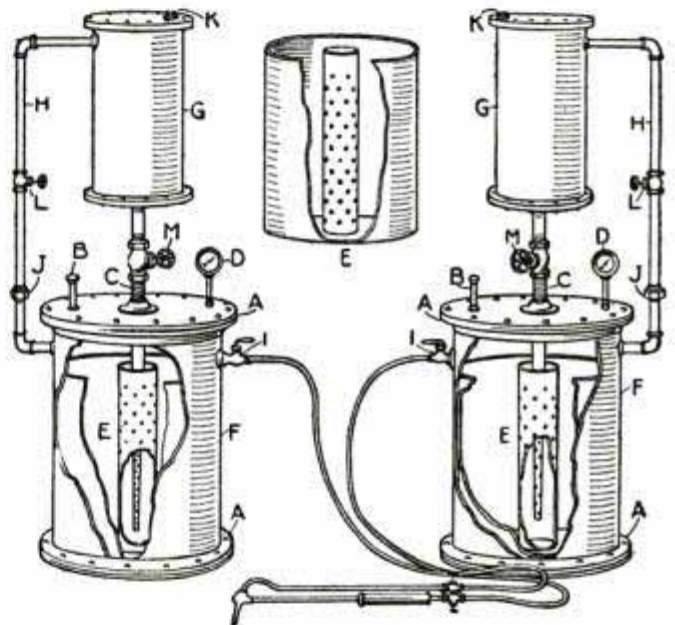
The plates used for the tops have three holes drilled and tapped for pipes, for attaching the safety valves B, the feed-water pipes C, and the gauges, D.

A cup, E, is made of sheet tin, or better still, aluminum, to fit snugly inside of each of the tubes F. These cups should have a central perforated tube fastened to the bottom and extending to the top, similar to a cake pan. The perforated tube should be about $\frac{3}{4}$ in. in diameter.

The water tanks G are made in the same manner as the tanks F, their size being 4 in. in diameter and 6 in. long. Drill and tap centrally the bottom plate of each tank for a $\frac{1}{4}$ -in. pipe,

and provide a tapped hole for a plug in the top plate.

The $\frac{1}{4}$ -in. pipes C are 10 in. long with a number of small holes drilled



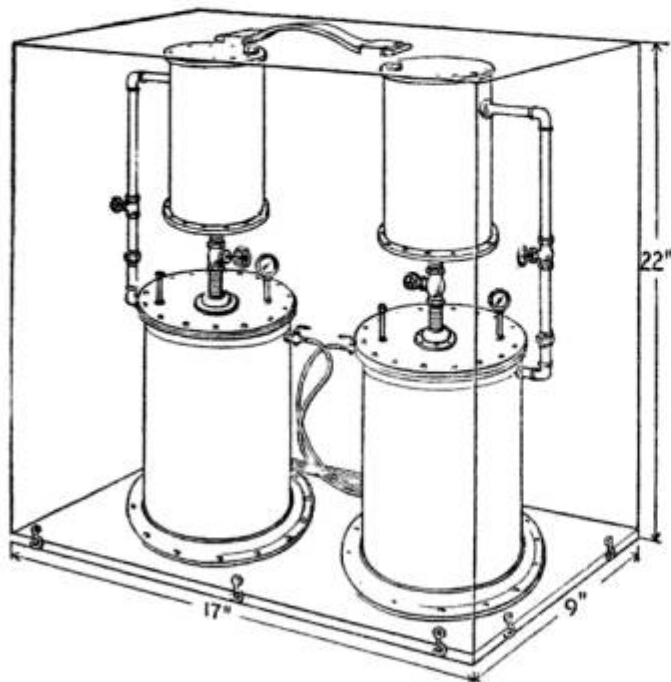
Each Pair of Tanks is Made and Connected Alike, the Operation Being the Same for Each Chemical

in one end for a length of 7 in., and the other end threaded for about 3 in. Screw this end of the pipe into the head of the tank F, from the under side, until about 2 in. of the threads extend through on the upper side of the plate. A $\frac{1}{4}$ -in. globe valve is attached on the upper end of the pipe, and a short nipple connects it with the water tank G. Both pair of tanks are made alike.

About 2 in. below the top of the tanks F, drill and tap holes for $\frac{1}{4}$ -in. pipe on the two sides of the tanks facing each other. Provide each opening with a gas cock so that hose may be attached connecting to the torch.

The outside of the tanks are drilled and tapped in like manner for connect-

ing a $\frac{1}{8}$ -in. pipe line, H, from the water tanks G to the gas chambers F. These outside pipes equalize the pressure so that the water feeds equally at any pressure of the gas.



The Tanks can be Attached to a Base over Which a Cover is Placed for Carrying

A small gauge, having a 3-in. face, is attached at D. Such gauges are used on gasoline-lighting systems.

To use the outfit when it is assembled, fill the cups with chemicals, using calcium carbide for the acetylene gas and sodium peroxide for the oxygen. Place the cups in their respective tanks and fasten the top plates on the tanks F. The unions J are placed in the pipe lines to enable disconnection when removing the cover for filling and cleaning the cups. Fill the water tanks through the hole in the top after removing the plug K, making sure that the valves L and M are closed.

In use, open the valves L a turn, then slowly open the valves M, allowing the water to enter the cups through the perforated pipes C where it will come in contact with the chemicals. The valves are only opened a little for light work. The safety valves B should be set for 15 lb. above the working pressure to prevent loss of gas. The chemicals must be kept in air-tight cans, as the air and dampness will spoil them.

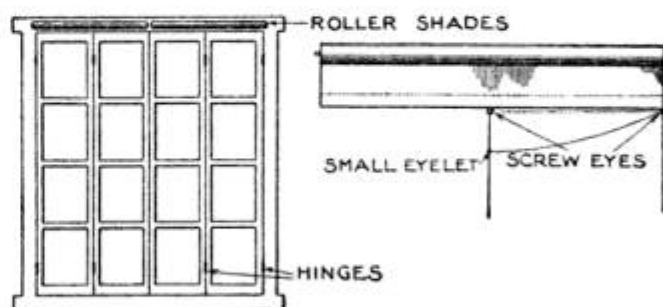
The tanks should be painted or labeled so that the proper chemical is always used in the same tank. Also take care not to exchange the cups; always use carbide in the carbide cup and tank, and peroxide in the peroxide cup and tank.

A very good method is to mount the tanks on a base and make a top that will fit over them, which is fastened to the base with hooks and eyes. A handle is attached to the top and the whole outfit can be carried where it is to be used.

Operating Roller Shades on Casement Windows

Casement windows are rapidly coming into general use. Home builders have come to realize that with this form of a window it is possible to get the full benefit of the entire window opening, whereas with the usual sliding-sash window only 50 per cent of the space is available for maximum ventilation. The one disadvantage of this form of window is the difficulty of operating the usual roller shade, due to the pull cord becoming caught between the top of the casement and the window as the latter is opened and closed. Under these conditions a long stick with a nail in the end is usually brought into play. A little forethought, however, when the shades are put up, will avoid all this trouble and will render their operation just as satisfactory on this form of window as any other.

To accomplish this, simply place a



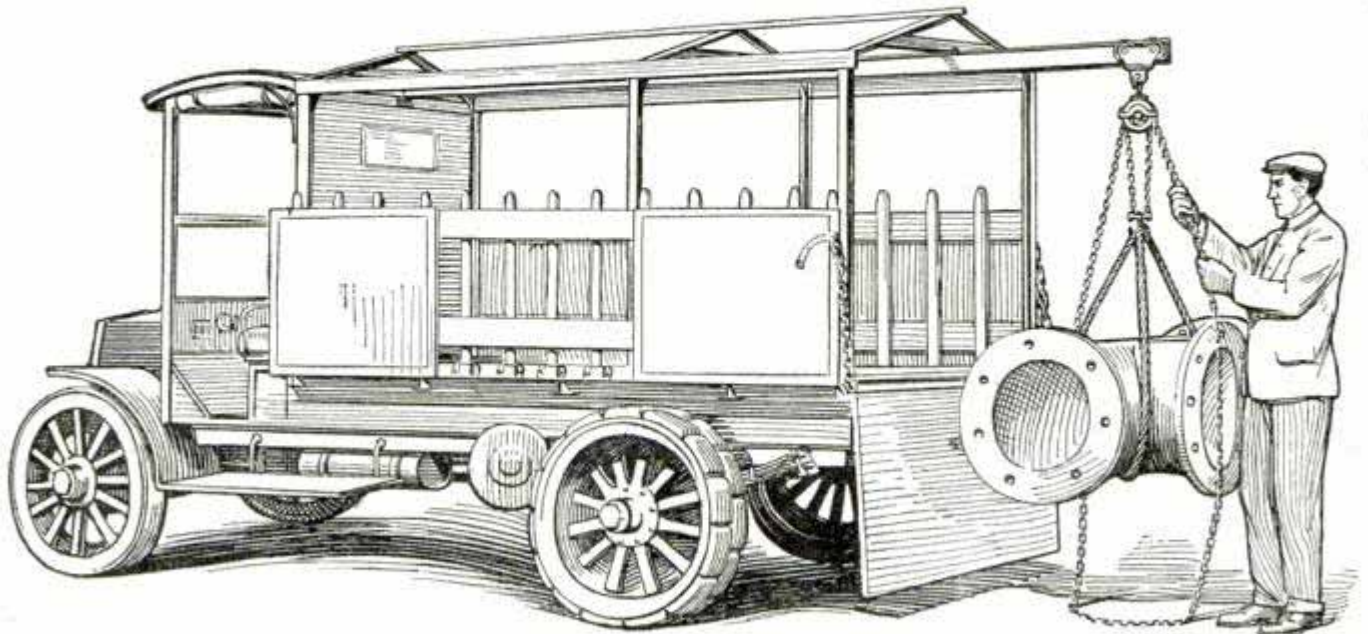
Pull Cord Attached to the Casement for Drawing the Shade Pull to One Side

small screweye, or staple, near the end of the stick in the bottom of the shade. Slip a small ring on the pull cord;

attach this ring to a second cord and then run the latter through the new screw-eye. Referring to the sketch it will be noted that this additional cord

use the hoist clear of the truck platform.

The frame consists of three parts, each constructed of two standards



The Track for the Chain Block is Supported at the Top by an Angle-Iron Frame, Which does Not Interfere with the Loading, the Chain Block Enabling One Man to Do the Work of Several

hangs somewhat loose when the pull cord is being, or has just been, pulled, but when the shade is up, it is merely necessary to pull on the side cord to pull the center cord over to that side. On account of the friction and the fact that the cords are about of equal weight, either one will remain where placed. When both are over to one side the window may be opened without further thought, and when it is closed, a slight pull will bring the pull cord again to the center so that the shade may be drawn down. The lower end of the side cord may be attached with a small tack at a point about half-way down on the casement, thus distinguishing it from the pull cord.

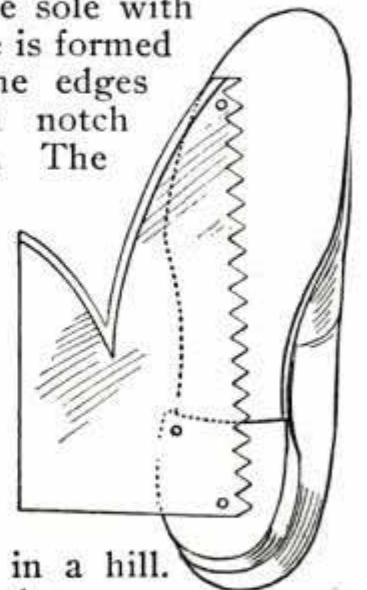
Chain Block and Runway on a Truck

Where a truck is used for hauling heavy objects the burdensome task comes in on the loading and unloading of the pieces. A truck driver having a considerable amount of this work to do built a frame of light angle iron on the truck platform to support an I-beam centrally, on which a chain hand hoist could be run. The I-beam extended out at the rear far enough to

joined together at the top similar to the gable of a house and trussed to keep them from spreading. The three parts are joined together with a ridge and two side bars. All connections are riveted.

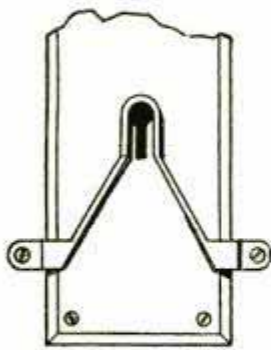
Corn Cutter on a Shoe

A piece of an old crosscut-saw blade constitutes the cutter which is attached to the shoe sole with screws. The blade is formed as shown and the edges of the V-shaped notch are ground sharp. The advantage of this cutter is that the operator has both hands free to hold the stalks. The cutter is adapted only for use in cutting drilled corn where there is only one stalk in a hill. It could not be used on corn where several stalks grow together.—Contributed by F. L. Patterson, Lockwood, Cal.



Locating Keyholes in the Dark

A particularly useful device for people who are forced to stay out late at night is the key guide illustrated. The



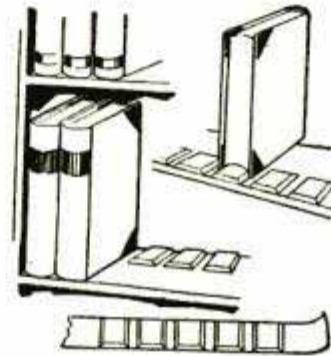
little guide is made in such a manner that it is capable of being applied to a door without any change in the construction. The device is placed over the escutcheon so that the diverging arms form a tapering passage through which the key will be guided to the keyhole by placing the point of the key between the arms and moving it upward until it enters the keyhole. This is a simple device and should prove very useful in places where it is impractical or impossible to have a light to illuminate the keyhole.—Contributed by H. Kaye Martin, Washington, D. C.

through the ring and bent over. It was originally expected that the bend would have to be loosened every time a bottle was changed, but this was found unnecessary throughout the year that it has been in use. In fact, the metal band acts as though it were quite springy, and the bottles never become loose or rattle. For desk use it is best to cut off the tops of the stoppers as shown.—Contributed by John D. Adams, Phoenix, Ariz.

To Prevent Book Leaves from Sagging

To Prevent Book Leaves from Sagging

The leaves of large books will sag down and cause the book to lose its original shape. A way to remedy this



is to mount a set of blocks that are beveled and rounded in front so that the book will slide upon it easily. The block keeps the leaves up, and the book will retain its shape. Blocks of

proper thickness may be glued directly to the surface of the shelf or mounted on a thin board.—Contributed by John V. Loeffler, Evansville, Ind.

Combination Safety Inkwell

Every draftsman knows how easily the usual bottle of drawing ink tips over, yet does not care to litter up the



board with more than one heavy cast-iron holder, such as are sold to prevent spilling. Having occasion to use the

red and black drawing ink and also the common writing fluid caused me to provide three bottles for them. In order to prevent overturning and at the same time arrange the three bottles so that they could be shifted about together, the very simple device here illustrated was contrived. A piece of $\frac{3}{4}$ -in. ribbon brass, about 12 in. long, such as is used to hold the asbestos covering on steam pipes, was procured. These strips usually have a narrow ring attached to one end. The three bottles were placed together, the brass wrapped around them and drawn up tightly, the free end being drawn

Pointed Ends for Small Lathe Boring Tools

When making small, fine tools like reamers, mandrels, staffs, etc., it is hard to turn them up on an ordinary



lathe center. When the center in the work is large enough to hold it well while turning, it makes a hole too large in proportion to the work and is also inconvenient in other ways. If the tool is to be hardened, the first place that will develop a crack will be around the large center end. If the tool is fluted, as a reamer or tap, the danger of cracks developing is further accentuated.

A remedy is to use male centers for the work and have a pair of female centers for the lathe and the grinder. The sketch illustrates such centers on a reamer. The piece can be turned as readily as if the holes had been drilled in the ends. In hardening, the risk of cracking is slight compared with what it would be if center holes had been used instead of the pointed ends.—Contributed by Donald A. Hampson, Middletown, N. Y.

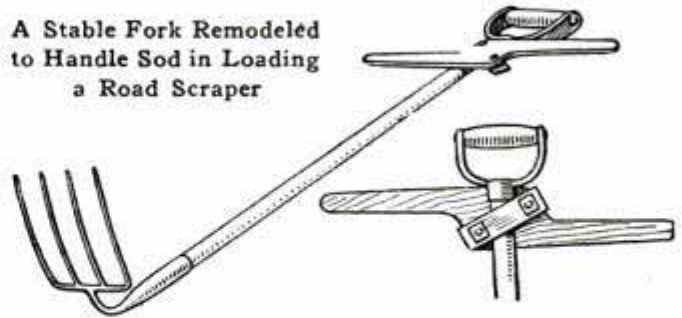
Substitute for Long-Spout Oilcan

An extension can be made to an ordinary oilcan spout if a piece of wire be put through the spout extending the desired distance on the outside. The inner end should be coiled around a pencil and the coil placed securely in the spout, thereby holding the wire in place. The oil will follow the wire to its outer end.—Contributed by Robert Byer, Chicago, Ill.

Loading Sod on a Scraper

In making a ditch with a plow and scraper, the first plowing in sod is difficult to load on a scraper. The only

A Stable Fork Remodeled to Handle Sod in Loading a Road Scraper

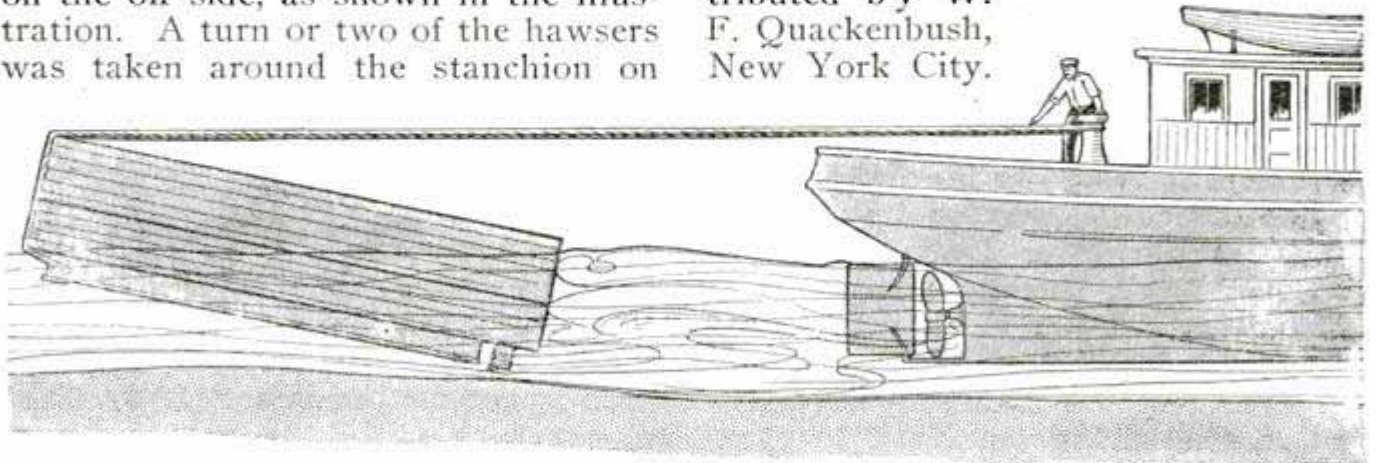


way to load the scraper is by hand. An improvement on this method was accomplished by the use of an ordinary stable fork, which was bent at the shank as shown and provided with a handle, fixed in connection with the regular handle. The chunks of sod could be easily picked up and moved without stooping.—Contributed by A. S. Thomas, Amherstburg, Can.

Turning Over a Scow

Having occasion to turn over a capsized scow, which floated bottom side up with only about 6 or 8 in. extending above the surface in the harbor, we proceeded as follows: When there was slack water two hawsers were lowered with weights, each hawser being supplied with an eye splice by means of which a loop was formed and slipped over the stanchions at either end of the scow on the off side, as shown in the illustration. A turn or two of the hawsers was taken around the stanchion on

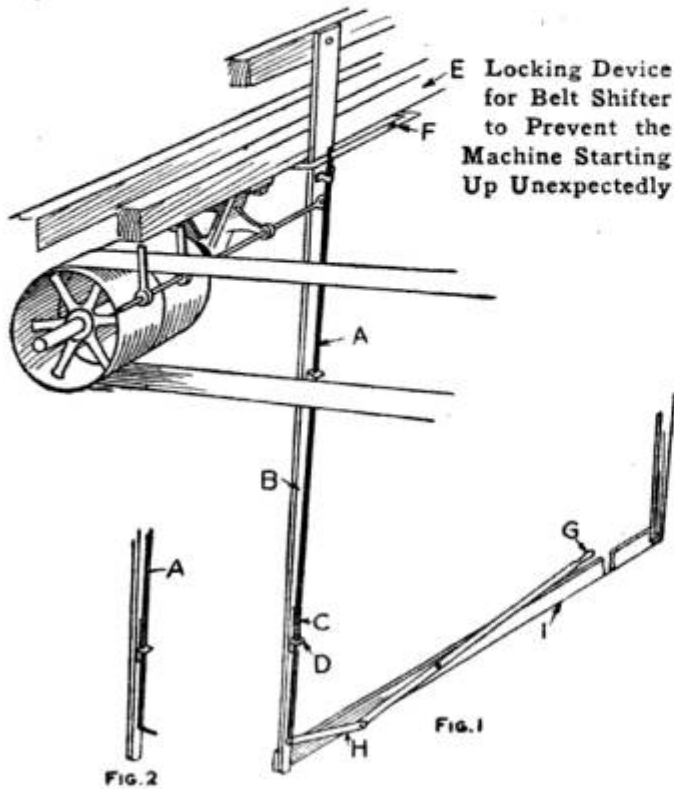
the tug and a strain was put on slowly with the tug until both hawsers were good and taut. Then the tug was "hooked up" on what marine engineers term "a strong gingle," full speed ahead. The result was that the strong pulling power of the tug and the "quick water" from the propeller forced against the near side of the sunken scow turned it right side up. It was then towed to a dry dock.—Contributed by W. F. Quackenbush, New York City.



After Attaching the Hawsers to the Off Side of the Scow, They were Drawn Taut with the Tug, Then the "Quick Water" Striking the Under Side of the Scow Forced It Over and Right Side Up

Locking Device for Shifter Lever

In the ordinary belt shifter, it frequently occurs that the belt will creep from the loose to the tight pulley,



thereby endangering the operator, who may be caught and injured in the revolving machinery. The locking arrangement shown in the sketch effectually prevents any such creeping. It consists of a latch rod, A, Fig. 1, attached to the shifter lever B so as to have a free, vertical movement. To this rod is attached a spiral spring, C, which, pressing against the lower angle bracket D, tends to keep A in one position. To the overhead beam E is fastened a U-shaped lock bar, F, with a hole at each end, of sufficient size for rod A to pass through freely. Sufficient distance must be allowed between the parallel sides of the U-shaped bar to allow lever B to shift the belt from the loose to the tight pulley.

The device is operated by pressing down on the lower L-shaped end of rod A, Fig. 2, thereby disconnecting it from the lock bar F, after which the lever may be shifted as desired and again locked in position by releasing rod A, the spring forcing it to enter the corresponding hole in the lock bar F when hole and rod are in line.

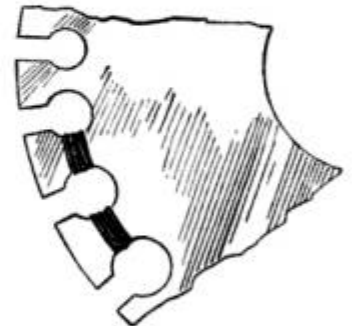
If the device is to be attached to a long lathe or machine where the operator could not always stand in reach of the shifter lever B, an arrangement of levers G and H, Fig. 1, can be attached to the horizontal bar I, usually found on long-machine belt shifters. By this connection, any downward pressure on the long end of lever G will cause a downward pull on rod A, disengaging it from the lock bar F. Releasing G will again cause the latch rod to resume its usual locked position when in line with one of the lock-bar holes.—Contributed by Joe Bovey, Houston, Texas.

Tanning a Hide

To tan a hide spread it out carefully, with the flesh side up, as soon as possible after skinning, and rub, or sprinkle, on equal parts of saltpeter and powdered alum mixed together; roll up the hide and lay it away for a few days. Unroll and remove the surplus flesh, then stretch it out tightly on a frame to dry. Rub on some neat's-foot oil, which is afterward rubbed out by means of a wedge-shaped paddle. Some trappers stretch the skin against a building where the sun's rays will strike it, and when warm rub out the grease or oil.—Contributed by A. Ashmund Kelly, Malvern, Pa.

Marking a Wire-Gauge Size

Where it is necessary to use one certain size on the wire gauge a great many times it will be convenient to mark that opening to quickly find it without referring to the figures impressed in the metal, which are hard to see. The marking may be made by placing rubber bands around the narrow metal between the gauge jaws, as shown, and the opening can be found quickly.



A Loud-Speaking Telephone

By HAROLD HINTON

An instrument that is rapidly replacing the old-style megaphone has been perfected and is extensively used for announcing the score at baseball games, interesting events, to give commands in the turrets of a battleship, etc. This instrument is known as the loud-speaking telephone, and the receiver closely resembles an electric automobile horn.

In the transmitter A the quality and articulation are largely dependent on the mechanical dimensions of the diaphragm and the manner in which it is mounted. In any diaphragm, a certain tone will be found which is fundamental to it, and as the weight of the moving part, which is attached to the diaphragm, is increased, this tone becomes emphasized. If the moving mass is not kept exceedingly small, this tone interferes with the proper production of the words transmitted.

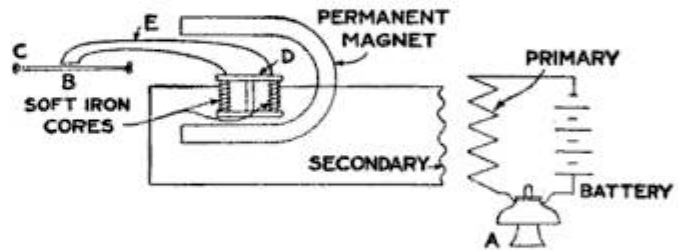
The problem of designing an efficient transmitter for this service has been that of making use of the largest possible mechanical proportions, in order to permit large currents, without making the moving parts so heavy that the distinctness of articulation is destroyed.

While the loud-speaking telephone is very similar in operation to the regular common-battery telephone, the one particular point followed in the design of the loud-speaking apparatus has been to obtain a method of construction which will give greater emphasis to the harmonics of the voice and less to the fundamental note. Altogether, this method will give better results as far as intelligibility is concerned, and it has been followed out consistently in the construction of both the receiver and transmitter.

In the transmitter, the articulation of the receiver is governed largely by the mechanical characteristics of the diaphragm and the method in which it is mounted.

In the receiver, the diaphragm B has

been corrugated and mounted on rubber cushions, C, along the line of phonograph construction, the sound being concentrated and delivered from a



Parts Used in the Construction of a Loud-Speaking Telephone That Are Different from the Ordinary

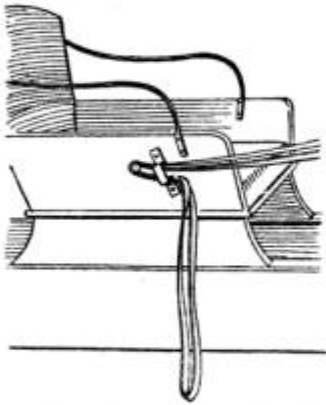
small metal megaphone-shaped horn. One of the usual features of the modern receiver construction has been departed from, in that metal other than iron is used for the diaphragm. This would be impossible but for the iron armature D, which is acted upon by the pole pieces and thereby allows a phosphor-bronze diaphragm to be used, as this metal produces the best results. A lever arm, E, connects the diaphragm to the armature.

By employing the magnetic principles used in the construction of polarized ringers, the efficiency of articulation was found to be still further increased. A two-way positive action of the diaphragm has become possible by the use of a differential magnetic circuit in the receiver. In the normal condition of the receiver, the diaphragm is practically free from all tension, and this has the effect of greatly increasing the efficiency of construction, due to the fact that a much smaller air gap may be used. It is these new and entirely original constructive features which have produced a loud-speaking telephone that combines clear articulation with a maximum of sound volume.

Ⓒ Bookbinder's varnish is made of 8 parts gum shellac, 3 parts gum benzoin, and 2 parts of gum mastic. These are pulverized and placed in 50 parts of denatured alcohol and $\frac{1}{2}$ part of oil of lavender.

A Rein Holder

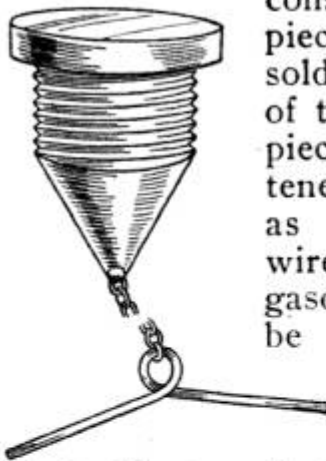
A piece of strap iron, $\frac{7}{8}$ in. wide, is bent as shown and fastened to the side of the seat with screws. A peg, or bolt, is attached to the seat, back of the opening in the strap iron. If a bolt is used, it should have threads long enough to permit a nut to be placed on each side of the seat



end, allowing the head to extend on the outside. The ends of the reins can be doubled and inserted in the opening of the bent iron, and then looped over the bolt or pin.—Contributed by Leo F. Wright, Warren, Ill.

Holder for a Motorcycle Tank-Filler Cap

A holder which will prevent the loss of the filler cap on a motorcycle gasoline tank is shown in the sketch. It consists of a short piece of small chain, soldered to the inside of the filler cap, and a piece of stiff wire, fastened on the other end as shown. Drop the wire and chain into the gasoline tank and it will be impossible to lose the cap.—Contributed by Abner B. Shaw, North Dartmouth, Mass.



Steady-Rest Bearing for Brass Rods

It is frequently necessary to machine a long bar of brass in a lathe and in some instances the only method of supporting the loose end of the brass rod is in the steady rest. Having such a job to do where the brass rod was of the exact required diameter of the

finished piece, I used the following method to prevent scoring by the steady-rest jaws:

A bushing was made twice as long as the diameter of the brass rod, with a hole to snugly fit it. The walls of the bushing were left a thickness equal to one-quarter of the diameter of the hole and slotted lengthwise through one side with a $\frac{1}{16}$ -in. milling cutter. This was slipped over the end of the brass rod and held in the steady rest. With a few drops of oil applied occasionally the rod may be worked for any length of time without danger of the surface being marred.—Contributed by M. B. McCall.

A Draftsman's Eraser

Break off one side, or nib, of an ordinary steel pen, then sharpen both sides of the remaining one, and a very good eraser for ink lines will be had. It is used in a penholder the same as a pen.—Contributed by H. Cranston, Ottawa, Can.

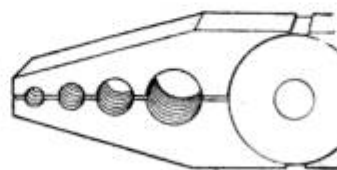


A Solder File

Procure an old 8-in. square and anneal it; then file teeth on one surface about $\frac{1}{16}$ in. deep and eight teeth to the inch. The file can be tempered again or used as it is annealed. This makes a fine solder file for metal-cornice workers.—Contributed by Wm. J. Tolson, Lyons, Ia.

Pliers for Holding Screws

Where it is necessary to handle screws or studs with the ordinary pliers the threads are apt to be damaged. Then, too, it is difficult to hold and handle a round object in flat jaws. A screw-holding plier can be made from the ordinary kind by clamping the jaws together and drilling four or more holes

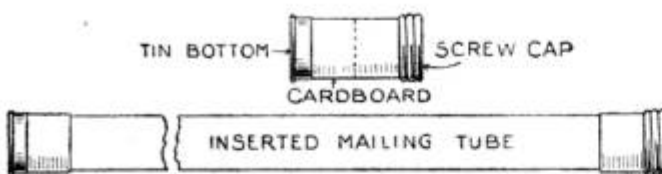


with their centers on the line or joint between the jaws. These holes are then tapped for standard threads. When a screw is taken up in the pliers, the threads are not damaged and the holding power is greater. The surfaces on the jaws should be ground slightly after the holes are finished to make them clamp tightly on the threads of the screw or bolt.—Contributed by J. J. Kolar, Maywood, Ill.

Tube for Preserving Blueprint Paper

Wrapping and unwrapping the roll of blueprint paper every time a print is desired is a good deal of a nuisance. The covering soon becomes torn and frayed so that neither light nor moisture is excluded. A long tube with a screw cap may be satisfactorily made in the manner indicated in the sketch.

Procure one of those strong cardboard containers with a tin bottom and a screw cap made for mailing bottles and powders. This should be about 2½ in. in diameter and 4 in. or more long. Neatly cut this in two with a sharp knife, and then procure a cardboard mailing tube having an out-



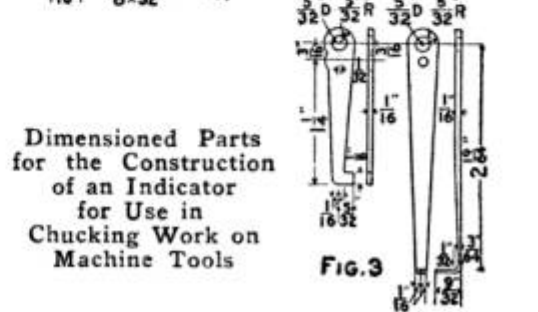
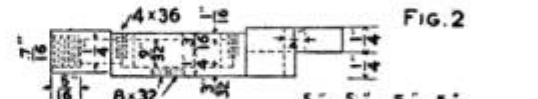
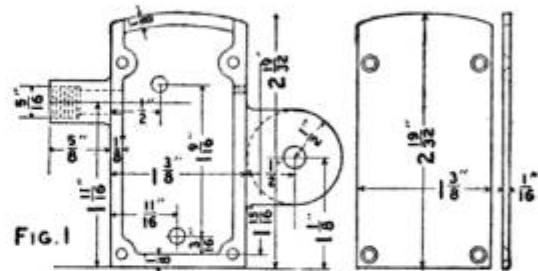
The Metal Ends of a Bottle-Mailing Tube Fastened to a Long Cardboard Tube

side diameter corresponding as closely as possible to the inside diameter of the container. Any slight difference may be remedied by sandpapering off the surplus or by applying a few turns of heavy glued paper if the mailing tube is too small. Having adjusted the diameters so that the two halves of the container closely fit on the ends of the mailing tube, fasten them permanently with glue and then varnish or shellac the entire tube. The container so formed is practically light and moisture-proof.

When replacing belts, put them on the driver wheel first.

An Indicator for Machine-Tool Work

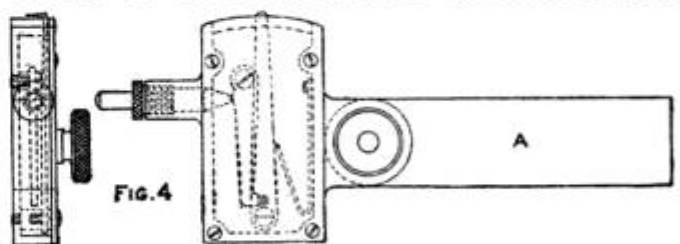
The use of a reliable indicator is almost indispensable for various chucking operations on a lathe, shaper or



Dimensioned Parts for the Construction of an Indicator for Use in Chucking Work on Machine Tools

mill. The one shown has been in use for some time and has given the best of satisfaction. The body of the instrument, Fig. 1, is made of gray iron, or it may be worked out of mild steel and casehardened. The cover, Fig. 2, and the levers, Fig. 3, are made of sheet steel and casehardened. The shank A, Fig. 4, is of tool steel hardened and drawn to a purple. The body hinges on the shank, so that it can be rotated about 20 deg. of the circle, and is clamped in the desired position with a knurled nut.

The plunger, Fig. 5, is made of tool steel and tempered very hard on the end that comes in contact with the work. All other parts, Fig. 6, are made of soft steel and casehardened.



Shank with the Movable Head That can be Clamped Wherever It is Set.

The graduations for the pointer may be spaced on a miller or laid off and etched by hand. Use a micrometer

The Construction of Wood Flooring

By WILLIAM GOODWIN

Wood is the material most commonly used in flooring, almost exclusively in private dwellings and for office floors, even in fireproof structures. It is comparatively low in first cost, can be laid with pleasing effects and is not cold nor hard on the feet, as is the case with composition floors of tiling and cement.

In the preparation for the floor, the joists must receive first attention. These depend in size on the load to be carried by the floor, the length of span, and the general proportions of the building. The allowable live load carried in various buildings, not including the weight of the materials of construction, should be estimated at not more than 70 lb. per square foot for dwellings, 100 lb. for office buildings, and 150 lb. for warehouses. The accompanying table gives the safe loads for white-oak beams, in tons of 2,000 lb. uniformly distributed. For woods other than white oak multiply the load figures in the table by .8 for hemlock, .9 for spruce, .9 for white pine, and 1.1 for oak and yellow pine.

Joists are usually spaced from 12 to 15 in. apart. To prevent their vibration and tipping tendency, herringbone

strutting, Fig. 1, or crossbridging of any rough material, about 1 by 3 in., is put in about every 8 ft. If solid

The Crossbridging Used between Joists to Make Them More Rigid and to Prevent Vibration

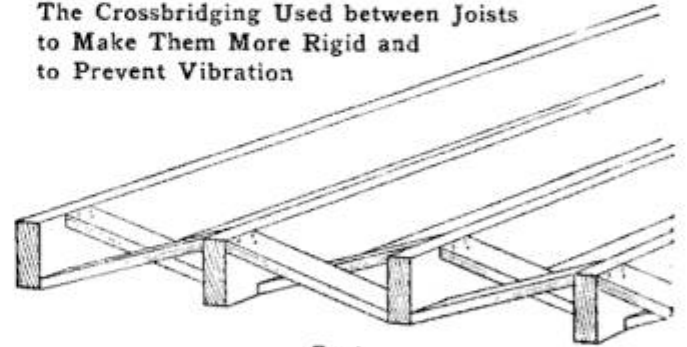


FIG. 1

blocks are used, the shrinkage of the joists will soon cause them to become loose, unless held in position by means of tie bolts, as shown in Fig. 2. The wall supports for the joists in brick or concrete buildings should consist of 2-in. planks, of the desired width for bearing surface, placed on the foundation walls, as shown in Fig. 3. If this piece be omitted and the joists placed directly on the walls, difficulties will arise in obtaining a level and smooth floor, and after completion serious warping and cracks will show up, due to uneven settling of the foundation. Should the length of the room be so great that the joists are not long

SIZE OF TIMBER	DISTANCE BETWEEN SUPPORTS IN FEET									
	6	8	10	11	12	14	15	16	17	18
	SAFE LOADS IN TONS OF 2000 LB. UNIFORMLY DISTRIBUTED									
2 X 6	0.67	0.50	0.40	0.36	0.33	0.29	0.27	0.25	0.24	0.22
2 X 8	1.19	0.89	0.71	0.65	0.59	0.51	0.47	0.44	0.42	0.40
2 X 10	1.85	1.39	1.11	1.01	0.93	0.79	0.74	0.69	0.65	0.62
2 X 12	2.67	2.00	1.60	1.45	1.33	1.14	1.07	1.00	0.94	0.89
3 X 6	1.00	0.75	0.60	0.55	0.50	0.43	0.40	0.37	0.35	0.33
3 X 8	1.78	1.33	1.07	0.97	0.89	0.76	0.71	0.67	0.63	0.59
3 X 10	2.78	2.08	1.67	1.52	1.39	1.19	1.11	1.04	0.98	0.93
3 X 12	4.00	3.00	2.40	2.18	2.00	1.71	1.60	1.50	1.41	1.33

Table for Determining the Sizes of Joists Necessary to Safely Carry a Load Uniformly Distributed

enough to span the distance between the partition walls, an intermediate supporting wall or girder will be neces-

Another Method of Bridging the Joists Which must be Strengthened with a Tie Bolt

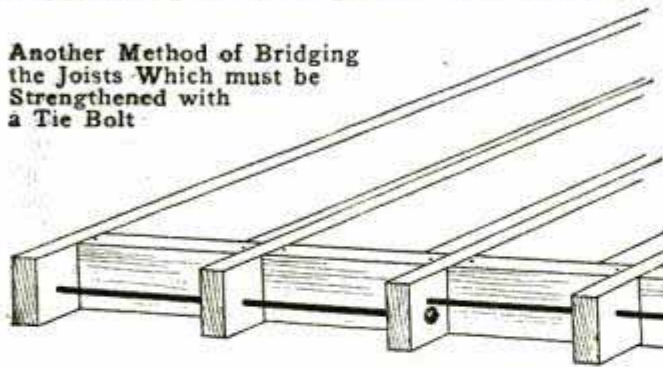


FIG. 2

sary. The joists then may be halved as shown in Fig. 4 by overlapping the ends. If the lengths are merely sufficient to allow the ends to butt, a construction as in Fig. 5 may be used. In figuring for lumber it should be kept in mind that lengths come in even feet, as for example 6, 8, 10, and 12 ft. If the joists fit into an unsupported girder or beam and this be weakened too much by the notches, constructions similar to Fig. 6 may be used.

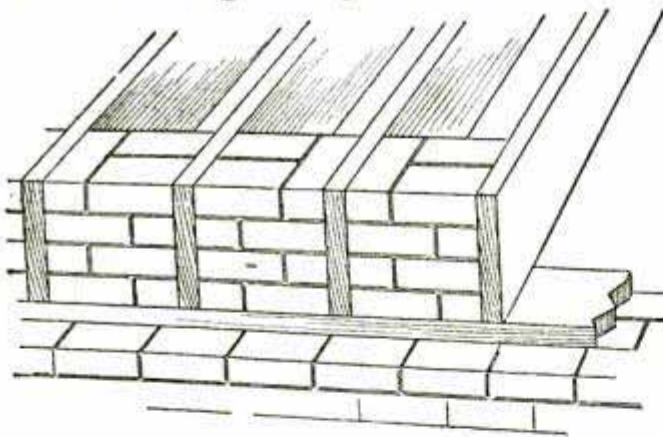


FIG. 3

A Plank is Placed in a Brick Wall on Which to Set the Ends of the Joists

In the usual construction of floors, laths are nailed directly to the joists. When girders or beams are used, special ceiling joists, Fig. 7, are frequently fastened to them, this construction preventing to quite an extent the transmission of vibration to the ceiling.

For sound-proof floors, filler strips may be nailed lengthwise with the joists and rough boards placed on them crosswise, the space between the boards and floor being filled in with sound-proof material, as sawdust, dry ashes, mineral wool, etc., as shown in Fig. 8.

A more expensive method, shown in Fig. 9, is to build special joists for ceiling and floor in such a way that no metal connection exists between the two sets. The sound and vibration are transmitted through the air medium only, which, in comparison with wood or iron, is a much poorer conductor. The simplest, though not such an effective, method of sound-proofing is produced by nailing strips of felt along the edge of the joists, the floor boards resting on these; by thus breaking the solid connection between the floor and the ceiling, a considerable amount of the

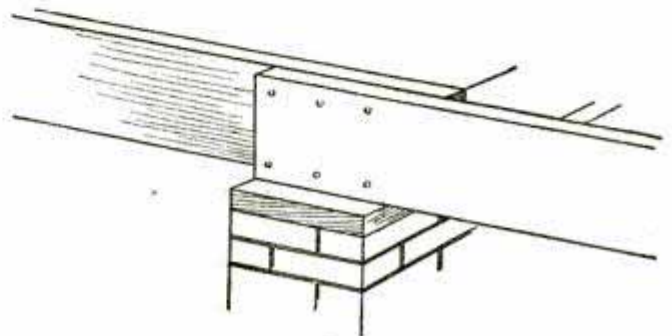


FIG. 4

Overlapping Joist Ends on an Intermediate Wall or Girder to Strengthen Them on a Long Span

vibration can be stopped and noise diminished. To avoid unevenness in the floor due to irregularities in the felt, laths may be first nailed to the felt, the flooring being put on the laths.

In very cheap floor construction, only one layer of board is usually put down, this being placed crosswise and at right angles to the joists. Even in that case, a fairly durable job can be made by taking care in the manner of laying the grain of the boards. With curved grain, the boards should be laid

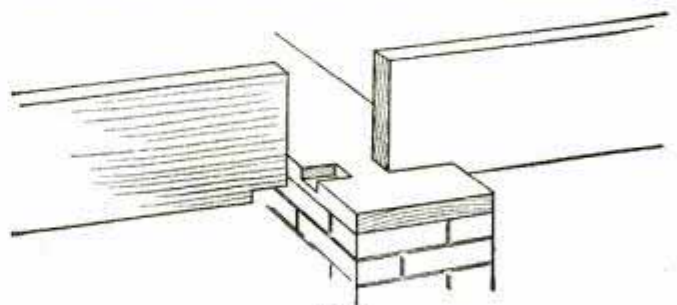


FIG. 5

Where Necessary to Butt the Ends of Joists on a Wall, This Method is Used

so that a natural arch is formed, as in Fig. 10. If this precaution is not observed, the floor will soon wear rough

and the edges have a tendency to curl up. Unevenness in floors can frequently be reduced by means of thin strips nailed to the joists to level up their top edges.

The first layer of boards in a double-floor construction is usually placed at an angle of 45° with the joists, thereby producing not only better bracing but also providing a more uniform and level surface for the upper boards. Whenever butt joints are necessary in a floor they should be placed over a joist, to prevent the possibility of sagging. Between the top and under flooring should be placed a layer of building paper to protect the room against cold and moisture.

The top flooring usually is made of hard woods matched on the edges and, in the best construction, also at the ends. Three grades of wood are adopted by hardwood dealers: Clear, No. 1, and factory. The clear wood is adapted for the best construction; No. 1, for service in stores and public buildings, and the factory grade, for rough wear, as in factories and warehouses. Three thicknesses can be obtained: $\frac{3}{8}$ in., in clear and No. 1 only; $\frac{13}{16}$ and $1\frac{1}{16}$ in., for all three grades. The widths of the stock vary from $1\frac{1}{2}$ to $3\frac{1}{4}$ inches.

The top boards should not be laid until the plastering is completed and dry, so as to avoid the chances of the flooring absorbing the moisture, causing warping and buckling. The top boards, if properly prepared, should have been thoroughly dried at the factory. It, therefore, is best not to accept flooring unloaded or delivered in wet weather. Neither should it be stored in freshly plastered buildings, damp places, or sheds with open sides, where the moisture would affect the exposed ends of the boards. If the boards are put down while damp, they will warp and expose large cracks after having been seasoned in a warm room. The top flooring should not be placed directly on the building paper, for by doing so the paper will wrinkle up and enter the grooves when the boards are being drawn up, thereby preventing a

close fit between tongue and groove. The difficulty can be overcome by placing laths or thin strips on top of

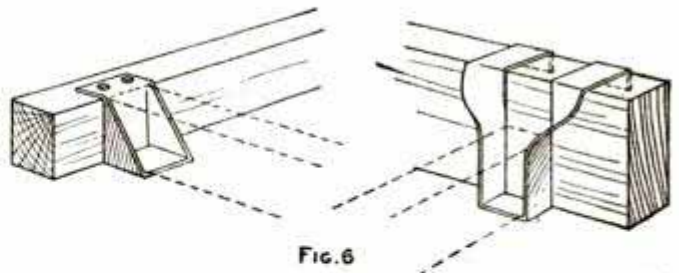


FIG. 6

Straps or Shoes are Used on an Unsupported Girder for the Joist Ends

the paper and laying the matched boards on these.

It is advisable not to allow the flooring to fill the space close up to the walls, as in that case any expansion of the boards would result in bulging the surface or spreading the walls. The molding or baseboard will cover up the space allowed for expansion. Special care should be taken to lay the

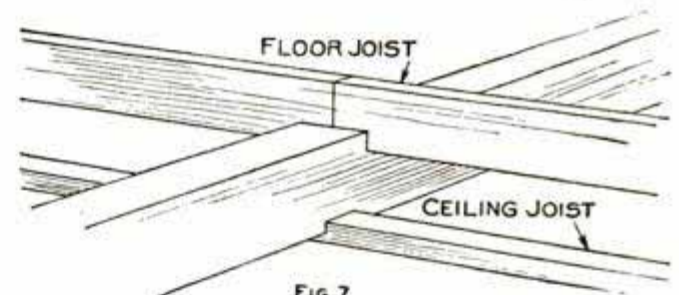


FIG. 7

Manner of Fastening a Ceiling Joist to Girders to Prevent Vibration of the Ceiling

first top board square with the sides of the room and each succeeding strip the same way; otherwise the end matching will be thrown out of line, exposing cracks. The boards should be drawn up tight against one another by placing a piece of two-by-four against the tongue and striking it with a sledge or heavy hammer.

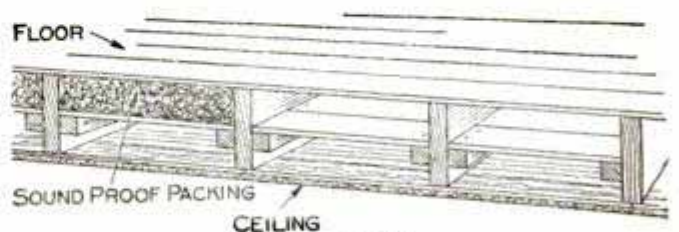
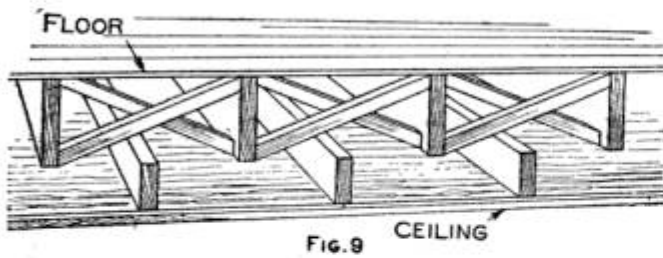


FIG. 8

A Part of the Space between the Joists Filled to Make Sound-Proof Floors

In fastening the boards, the nails should be driven at an angle of about 60° . If they are driven too perpen-

dicularly, the tongue is liable to split off; if at too small an angle, the floor will be liable to buckle. The $\frac{3}{8}$ -in.



Another Construction of a Sound-Proof Floor Where the Ceiling Joist is Separate from the Floor Joist

thick flooring should be nailed every 8 to 10 in. with 3-penny nails; the $\frac{1}{2}$ -in. should be held down by 8-penny cut flooring brads, approximately 16 in. apart. The nails, after being driven nearly their entire length, should be set by as few final blows as possible, any light tapping with the hammer having a tendency to loosen them. Bruising the edge of the board must be avoided, as such places cannot be easily fixed. If proper care is taken in the selection of the strips, the appearance of the floor can be improved by not putting together colors of great or striking contrast.

Due to irregularities in the under boards, a perfectly smooth surface cannot be obtained on a finished floor without first scraping and sandpapering it. This should be done in a lengthwise direction with the grain, and, in the absence of a regular scraping machine, may be done by means of a planer blade or broad chisel.

In finishing the floor, having thoroughly cleaned it with a dry rag, it should first be given a coat of filler carefully rubbed. This is especially



The Right and Wrong Way of Laying a Floor: The Former Prevents the Board from Warping

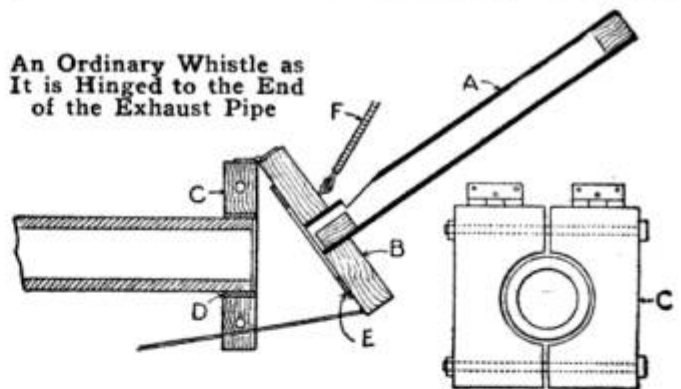
necessary with soft woods having large pores. Then several coats of alcohol shellac should be applied, each being allowed to dry before the next is put on, after which the finishing coats of varnish may be added, letting each dry

thoroughly as before. If it is desired to obtain a wax finish, use a light-colored floor wax instead of the varnish, taking the precaution to rub each coat in thoroughly before adding the next. Maplewood floors are frequently given coats of boiled linseed oil thoroughly rubbed into the surface with woolen cloths. For softwood floors, stains are frequently desired and should be put on after the filler coat, to get the best results.

Homemade Automobile Whistle

A simple exhaust whistle for an automobile may be made as follows: In a 10-in. length of $\frac{3}{4}$ or $\frac{7}{8}$ -in. piece of brass tubing, A, cut a notch, as shown, about 1 in. from the end. A wood stopper with one side shaved off flat, as in a toy whistle, is then inserted in the notched end and the other end completely stopped with a plug.

Procure two blocks of hard wood, B and C, 5 in. square and $\frac{3}{4}$ in. thick, and in the center of the block B bore



a hole so that the brass tube will be held snugly when driven in. In the other block C, cut a hole to fit the exhaust pipe from the muffler, and drill two $\frac{5}{16}$ -in. holes through it edgewise for $\frac{1}{4}$ -in. bolts. The block is then sawed in half so that it can be clamped over the exhaust pipe. A strip of asbestos, D, is placed around the pipe under the wood to insure a good grip when the bolts are drawn up. The blocks are hinged together so that the block B can be swung down flat against the block C. A thin, flat ring of asbestos, E, is fastened on the block to prevent leakage around the sides. A light screen-door spring, F, is stretched from

the block B to any convenient point under the car to draw the whistle end away when not in use. A wire, run over pulleys to the driver's seat, operates the device. The wire may be fastened to a pedal or to a small handle. The block may be secured to the muffler pipe in any position, with the hinges on the top or at the side, according to the space requirements under the car.—Contributed by B. A. Thresher, Lakeville, Conn.

To Repair a Felt Roof

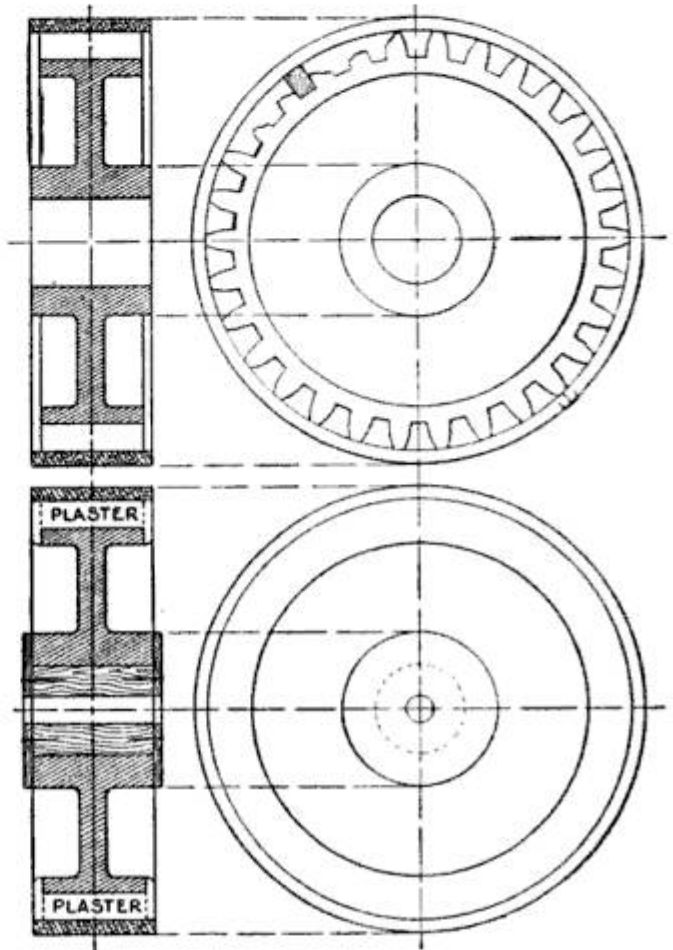
During the winter months snow and ice on the roofs present some unusual problems. One factory roof, with none too much pitch, was covered with a felt-composition roofing. Usually the snow was removed with shovels, but conditions after one snowfall of about 1 ft. were such that this was not cleared off and a few days later there was a troublesome leak developed on the lower side. The warmth from within heated the roof so that part of the snow melted and the water run slowly down and froze near the eaves, thus forming a dam. To chop off this ice meant to cut some holes in the roofing, and it appeared as if the only thing to do was to let it leak until the entire lot had melted and run away.

One of the carpenters asked permission to try an experiment, which was granted. Some cement was taken to the roof and a spot found where a lot of water was standing somewhat higher than the point of the leak. A quantity of the cement was poured into the water which carried it under the ice and snow to where it was escaping through the hole causing the leak. Enough cement was deposited in the hole to close it in two hours and the leak was entirely stopped in a short time afterward.—Contributed by Phil Wood, Rochester, N. Y.

☞ A knob formed of friction tape on the end of straight tool handles will aid in guiding the tool as well as prevent its slipping from the hand.

Gear-Blank Pattern from an Old Gear

To avoid the necessity of making a gear-blank pattern, particularly for a rush job, when the old gear is at hand,



Leather is Placed on the Addendum Line and the Spaces are Filled with Plaster of Paris

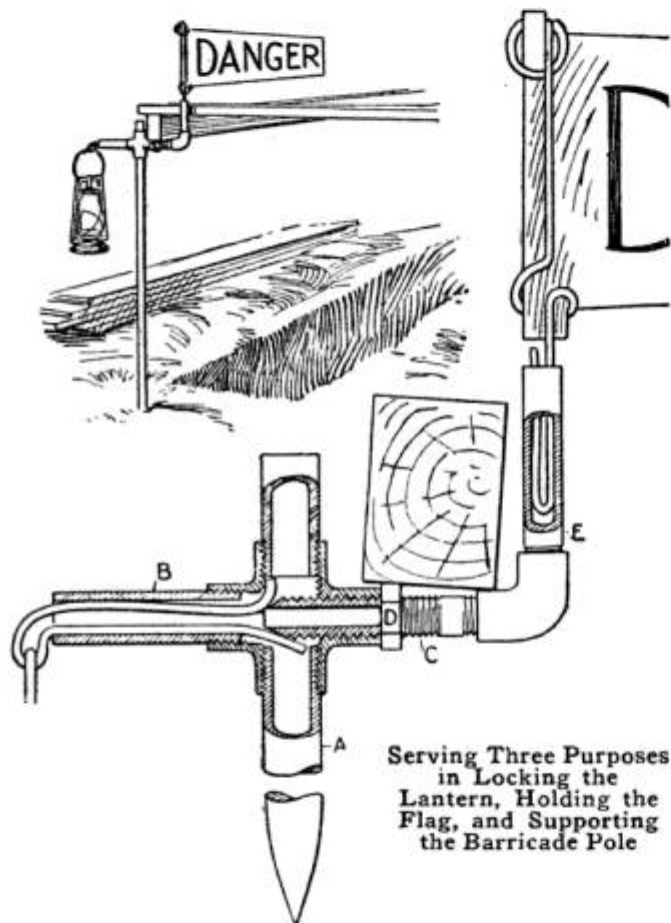
proceed as follows: For small gears, up to 12 in. in diameter, place a single thickness of leather around the old gear—belt leather will do very well—and join the ends by means of staples. For large wheels use double thicknesses of leather, to allow for shrinkage of the casting, and for finish. If necessary to finish the sides of the gear, the leather should be cut $\frac{1}{4}$ in. wider than the face. If the gear is badly stripped, small pieces of wood, as high as the depth of the teeth, should be placed between the casting and the leather, so the circumference will remain true. Plaster of paris can then be poured between the teeth and finished off even with the sides or leather band. The plaster can be stopped off from entering the side space by means of molding sand, wood, or clay. A plug is driven into the hole

in the hub and the necessary thickness of wood or leather for hub finish tacked on. The dowel-pin holes for the core print are then drilled in the plug, and the pattern is ready for the

foundry. By having some one prepare the plaster while the rest of the pattern is being made, a very quick job can be accomplished.—Contributed by N. H. Parry, Jr., Kenosha, Wis.

HOLDERS for Barricades Surrounding Street Excavations

The combination flagpole, lantern lock, and barricade holder is made of pipe fittings throughout, except for the



lantern and flag holder. A cross, having a $\frac{3}{4}$ -in. straightway opening, one $\frac{3}{8}$ -in. side outlet, and the other $\frac{1}{2}$ in., makes an excellent head for the post. The pipe A, of sufficient length, is pointed to enter the ground. The projecting $\frac{1}{2}$ -in. nipple B carries a $\frac{1}{8}$ -in. steel spring wire, bent as shown. When the spring is inserted in the nipple with the lantern swinging on the outer end, it is locked in place by the beveled end of the $\frac{3}{8}$ -in. nipple C. The locknut D holds it tightly. The el and nipple E make a standard for the flag wire and provide a place to lay the barricade pole.—Contributed by J. D. Westman, Pensacola, Fla.

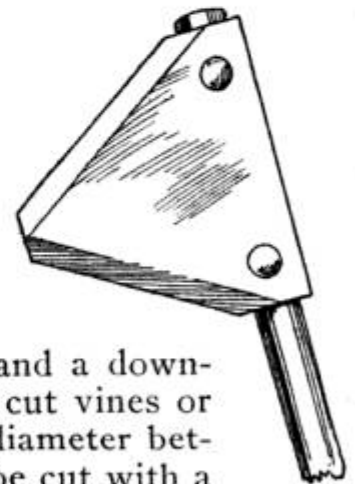
Large Hole in an Aluminum Crank Case Closed by Welding

There was a large hole broken in an aluminum crank case and the piece had been lost. From all appearances the cost of repairing would be considerable, but by adopting the following method it was accomplished at a very reasonable price.

Back of the hole, which was about 5 in. across, and on the inside of the case I placed a thin sheet of aluminum; then a sufficient amount of waste was forced in behind to make the sheet conform to the contour of the inside of the crank case. The aluminum sheet and edge of the hole, which was previously filed level, were greased. The hole was then filled with plaster of paris which was molded to the shape of the lost part as near as possible. When the plaster had set it was removed, shellacked and used as a pattern. From this pattern a piece was cast that exactly fitted the hole. The welding was then a simple matter.—Contributed by P. D. Merrill, Chicago.

A Vine Cutter

Having need of a vine cutter with which to reach the tops of hop vines, I made one that gave remarkable results by fastening a mowing-machine sickle blade to a long pole with bolts. With an upward and a downward slash it will cut vines or branches 1 in. in diameter better than they can be cut with a pruning tool.—Contributed by L. Pedrose, Seattle, Wash.

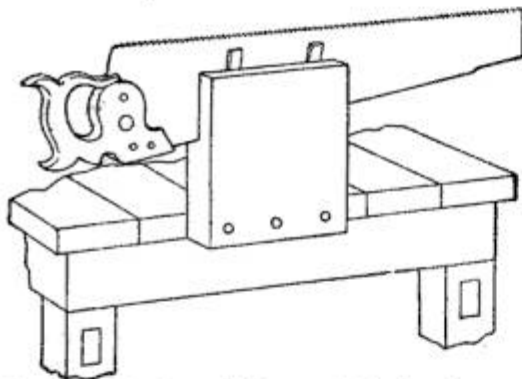


Remedy for Sprains

A reliable remedy for a slight sprain is the application of something cold to the injured member. Wring out a towel soaked in cold water, wrap it lightly about the injured part, covering all that is swollen. Cover this with a dry bath towel and securely fasten it. Allow the patient to remain under cover to keep warm and prevent the towel from drying out. This will remove the inflammation rapidly.—Contributed by L. Alberta Norrell, Gainesville, Ga.

A Saw Clamp

A carpenter being hindered in his work of placing hanger blocks by the dullness of his saw and having no way to sharpen it, happened to have a file, but the clamp was in the tool box about



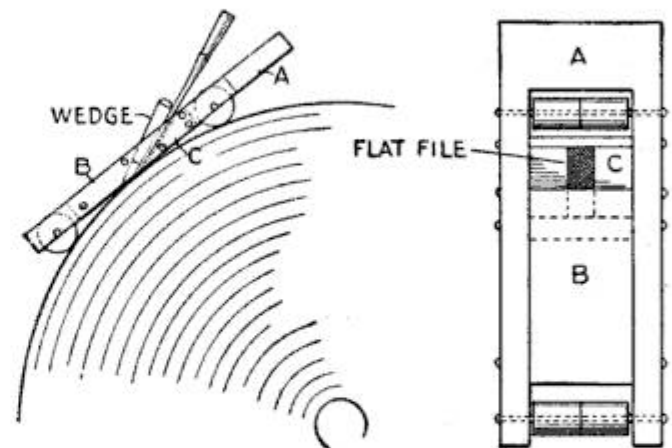
The Back of the Saw is Inserted in the Groove and Firmly Held with Wedges

a mile away. A piece of timber was ripped with the saw and the saw dropped back downward into the groove. A couple of wedges were whittled and forced into the groove with the saw which held it firmly in place. The block was nailed to the end of a bench and the saw then filed as neatly as if held with a regular saw clamp.—Contributed by F. W. Bently, Milwaukee, Wis.

Tool Holder for Grindstone

The illustration shows a simple device whereby chisels and similar tools may be ground rapidly and to the desired taper. It consists of a U-shaped frame, A, with a roller attached at each end and a holding arrangement

for the tool. Thread spools, with the flanges removed, will do very well for rollers. The tool is held in place on



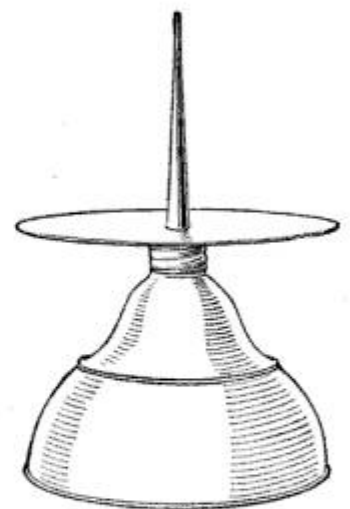
Holder for Chisels and Plane Irons to Sharpen Them Evenly on a Grindstone

the two tapered pieces, B and C, by means of a wedge, as shown. If a piece of a flat file is imbedded in the block C, the tool will be held more firmly. Variations in the taper of the tool point can be had by using a different size of roller at one end of the frame.

To Prevent Spilling Oil from Tipped-Over Can

Oilcans are easily turned over when working about machinery, and a considerable amount of oil is wasted before discovered.

A very simple little device to overcome this trouble can be made by anyone in a few minutes. Solder a disk of sheet metal on the upper surface of the base on the spout. The disk should be a little larger in diameter than

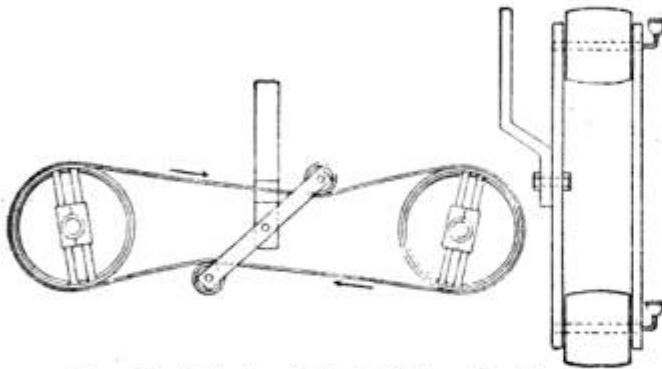


the bottom of the can. This will prevent the oil from running out of the can when upset.—Contributed by Stanley Radcliffe, Laurel, Md.

CA machine should never be stopped by grabbing the belt.

Adjusting Slack of a Belt

The slack of a belt running straight between two pulleys can be easily taken up by means of the adjuster

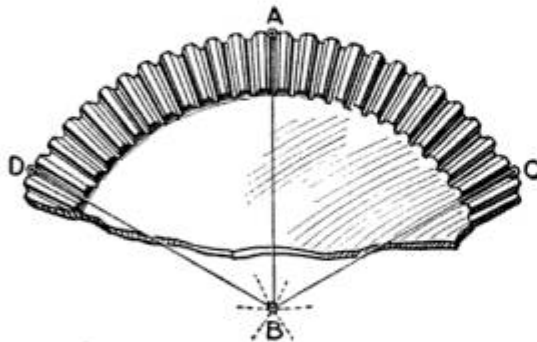


The Slack in the Belt is Taken Up Evenly from Both Sides

shown. The adjuster consists of a frame, carrying a small pulley at each end, supported loosely at its center. The pull of the belt will keep it taut.—Contributed by J. Harger, Honolulu, Hawaiian Islands.

Finding Gear Diameter with Only a Broken Piece

It is often necessary to find the diameter of a gear of which only a piece of the rim remains. This can be accomplished as follows. Place one point of the dividers on the extreme circumference, at A, and strike an arc near the center at B; then set one point of the dividers on the right side, at C, and strike another arc at B, being careful not to change the dividers. Do likewise on the point D. The point where the three arcs intersect at B



Locating the Center with Dividers to Find the Diameter of a Gear

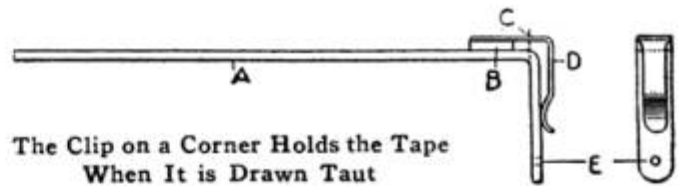
will be the center of the gear, from which the diameter may be found.—Contributed by Russel E. Hollis, Chicago.

Cleaning Carbon Commutator Brushes

A very easy method to clean carbon commutator brushes is to insert a piece of sandpaper between the brush and the commutator with the abrasive side to the brush. Draw the paper back and forth until all the dirt is removed. It is not necessary to remove the brushes from their position, and the paper takes the curve of the commutator. After cleaning the brush, be sure to remove all grit from the brush end and the commutator bars to prevent scoring.

Tape-Measure Holder

In measuring the distance between iron or brick columns, piers, walls of buildings, etc., it is necessary to have an assistant to hold the tape end. Many times no one is at hand and the measurement can only be made with difficulty. For such work I constructed



The Clip on a Corner Holds the Tape When It is Drawn Taut

a clip for holding the tape end as follows:

A strip of brass, A, about $\frac{1}{4}$ in. wide and 4 in. long, was obtained and a square bend made about 1 in. from the end. A block of metal, B, small enough to fit inside the tape ring, was soldered on the long piece near the bend, allowing sufficient distance, C, from the end to permit the tape ring to come in line with the inside of the bend. On this block was soldered a piece of spring brass, D, for the purpose of keeping the tape ring on the block.

In use, the tape ring is slipped under the brass spring clip and over the block. The device may be put on the corner of a building or edge of a pier, and if the tape is held fairly taut, measurements can be made. The device can be used in any position on flat or horizontal surfaces, and can be placed on square or round corners. If for any reason it is desired to keep the

holder in place after measurements are taken, a hole can be drilled at E, and a tack driven into the woodwork or mortar joint.—Contributed by Geo. L. Brown, Albany, N. Y.

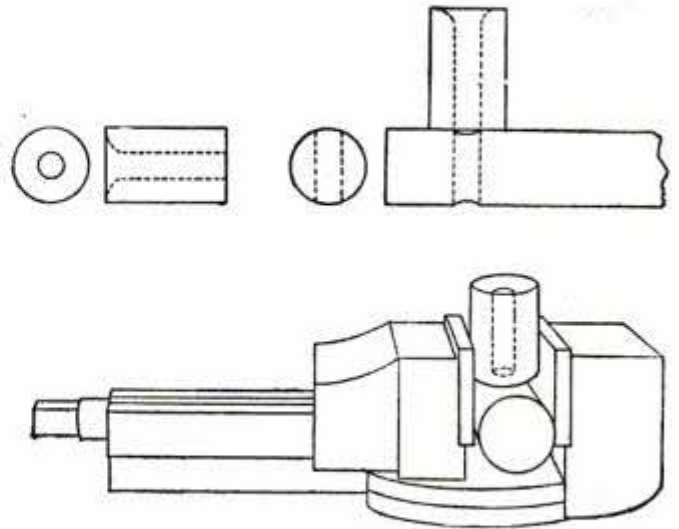
An Emergency Pipe Coupling

While doing work in the oil fields I found it difficult to keep a sufficient quantity of pipe couplings on hand and in their absence I have made quite a few of these fittings in the following manner: The threads of the pipe ends were thoroughly cleaned and given a coat of black lead. A piece of brass tube was procured having an inside diameter $\frac{1}{8}$ in., or more, larger than the outside pipe size. A hole was bored in a piece of hard wood to receive the brass shell which was cleaned and dipped into soldering fluid, then while hot it was driven into the hole bored in the wood. The tube with the wood was slipped on one pipe and then the pipe ends were brought together. A piece of copper wire of a size to let it halfway into the threads was procured and dipped in the soldering fluid. The wire was wrapped in the threads, beginning on one pipe and finishing on the other. Then the brass tube was moved centrally over the pipe threads, the ends stopped up with clay similar to babbitting a box on a shaft, allowing a vent at one end and a gate at the other, and babbitt poured in. This made a good, serviceable coupling and the wire made a steam-tight thread.—Contributed by J. B. Murphy, Plainfield, N. J.

Drilling Holes Straight Through Diameter of Shaft

It is impossible to drill a hole in a round shaft accurately unless some sort of a jig is used. One of the best and least expensive methods for this work is to make a collet of the same outside diameter as the shaft to be drilled, and bore a perfectly central hole through it the size of the drill used in drilling the hole through the shaft. The shaft is placed in a

vise and the collet set on top of it, as shown in the illustration, and both are clamped together. The drill is then



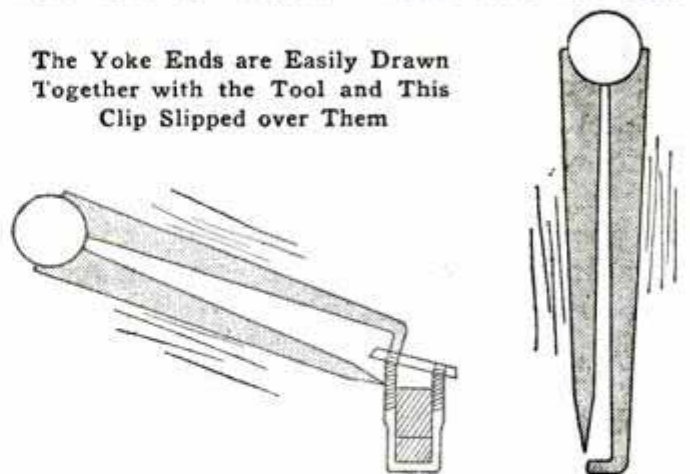
The Vise Grips Both Stock and Collet, and the Drill Must Enter Straight

run through the collet hole, which guides it for drilling the hole in the round stock.—Contributed by G. T. Du Bois, Detroit, Mich.

Putting on Buggy-Axle Clips

A very handy tool for putting on buggy-axle clips can be made of a joint taken from a discarded buggy top. The shape of the tool is shown to the right, and in applying the clips it is used as shown at the left. The tool is not difficult to make. One end of the

The Yoke Ends are Easily Drawn Together with the Tool and This Clip Slipped over Them



hinged forging is sharpened and the other turned in at right angles.—Contributed by H. T. Mitchell, Tayah, Texas.

Ⓒ Before starting a machine look it over carefully to make sure every part is in working order.

Magnet Support for an Electric Trouble Lamp

When one is working about a gasoline engine he is usually in his own light and some one must hold the lamp

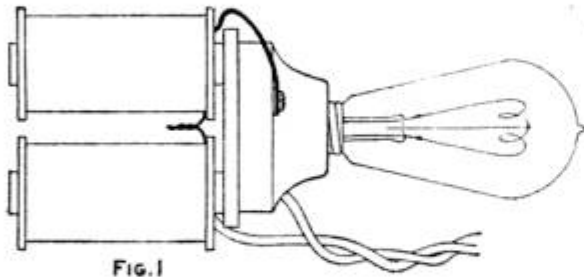


FIG. 1

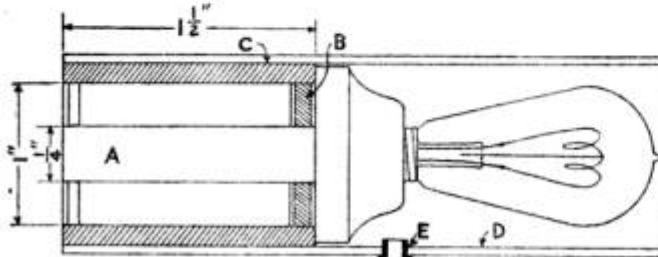


FIG. 2

The Lamp with the Magnet Base will Remain in Any Position on Iron

so that its light will fall where it is most desired. The simple device shown in Fig. 1 does away with the extra person for holding the lamp, as the electromagnet will hold it any place on an iron support. The winding of the electromagnet is connected in series with the lamp and it will be energized only when the lamp is being used.

The electromagnet is similar to the ones used in the ordinary vibrating bell; in fact, the one shown was taken from a discarded bell and the lamp socket mounted on it, which with the lamp and wire constituted the complete device. A suitable protection should be provided for the lamp, so that if the circuit happens to be broken the lamp will not be broken when it falls.

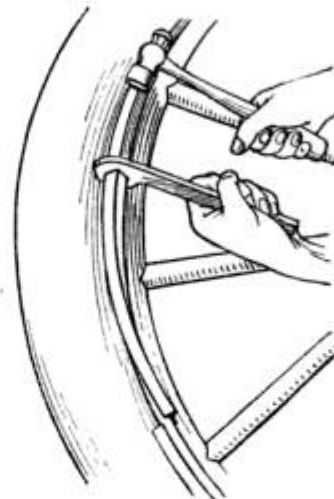
If a better-appearing outfit is desired, one may be constructed at a very small cost, as shown in the cross section, Fig. 2. The magnet instead of having two windings, as shown in Fig. 1, has a single winding around a soft core, A. One end of the spool on which the winding is placed is made from a piece of soft iron, as shown at B. The completed spool is inclosed in a short piece of soft-iron pipe, C, and is held in place by means of several small burrs made

on the inside edge of the pipe after the spool is in place. The magnetic circuit in this case is through the core of the magnet, the end of the spool, the piece of iron pipe and the metal connecting the core and the pipe at the left end, where it is placed against some iron object. The terminals of the winding are brought out through two insulated holes in the metal washer. The lamp is mounted on the end of the spool in such a way that it will not interfere with the terminals of the winding.

The whole device is inclosed in a piece of brass tubing, D, which fits on the outside of the pipe C, and extends out a sufficient distance to protect the lamp as shown in Fig. 2. An opening is cut out in the brass pipe through which the flexible cord connecting the device with the source of energy may pass. The opening is provided with a small insulating bushing, E. The spool is wound full of No. 22 gauge cotton-covered copper wire.

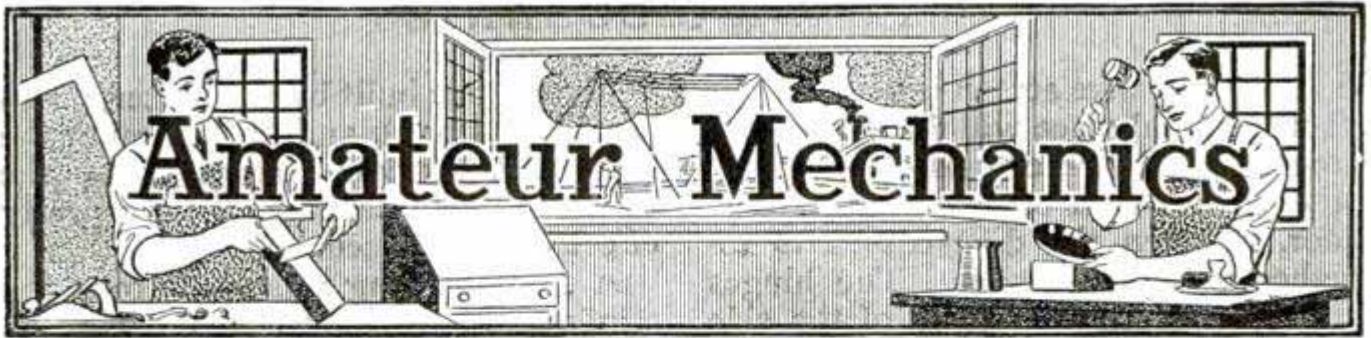
Replacing a Detachable Tire Rim

It is a more difficult job to replace an automobile tire rim than to remove it, but this can be made much easier with the use of an open-end wrench usually supplied with the tools in the box. Such a wrench with an opening to fit over both rims, as shown in the sketch, can be driven around the wheel, thus



forcing the tire rim in place.—Contributed by W. W. Slocum, Buffalo, New York.

☞ To prevent burning the hand with steam while filling a hot teakettle, run the water from the faucet through the spout.



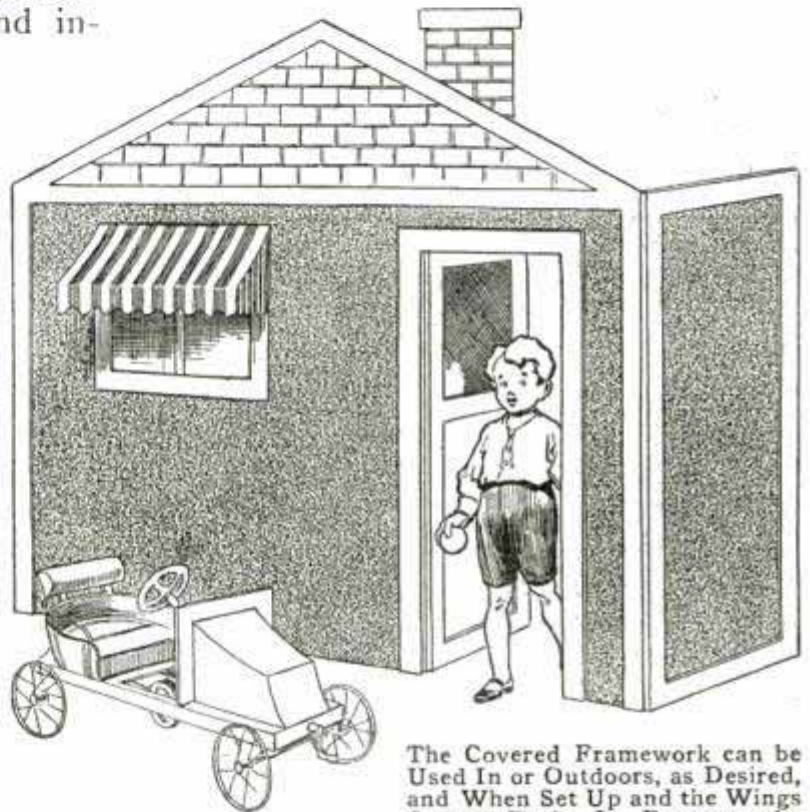
A Child's Playhouse

The child's playhouse is an expensive luxury, if it is purchased ready to set up, but by following the instructions given herewith a large and inexpensive one may be constructed.

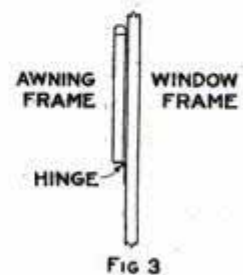
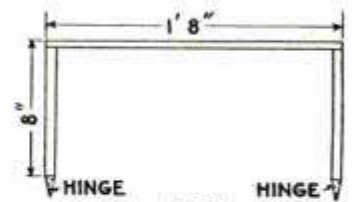
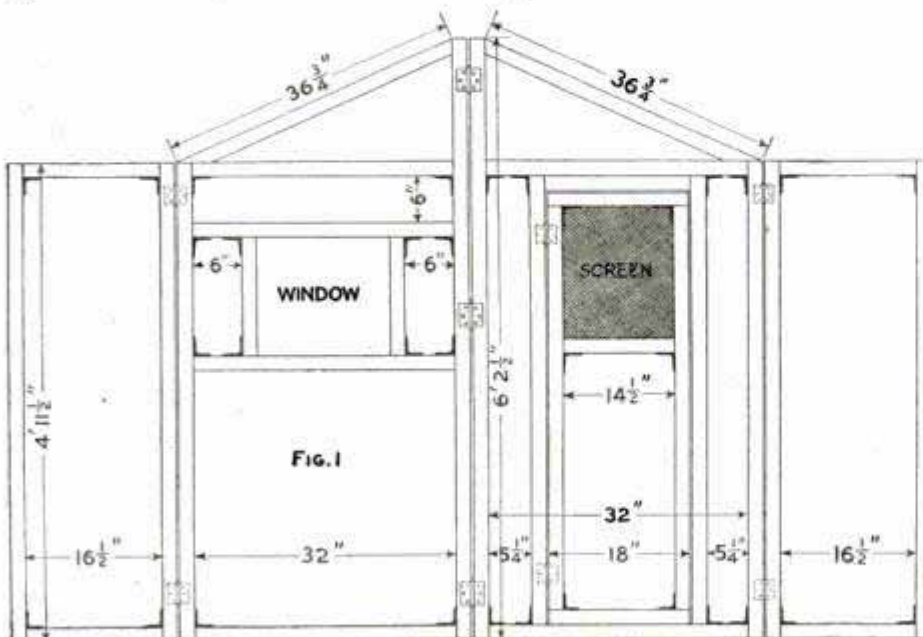
Procure about 100 ft. of $1\frac{3}{4}$ by $1\frac{1}{2}$ -in. boards, and saw out pieces, as shown. With the use of iron brackets instead of nails, it will be found much easier to construct than if the corners are mortised and nailed or glued. The frame will also be much stronger.

When the frame is completed, burlap is tacked on to make the covering. The burlap can be purchased cheaply, and the best color to use is either green, red or brown. This material should be fastened on the different sections before they are hinged together. To prevent the burlap

from unraveling, turn the edges under before tacking them down.



The Covered Framework can be Used In or Outdoors, as Desired, and When Set Up and the Wings Swung Back, It Presents the Appearance of a House

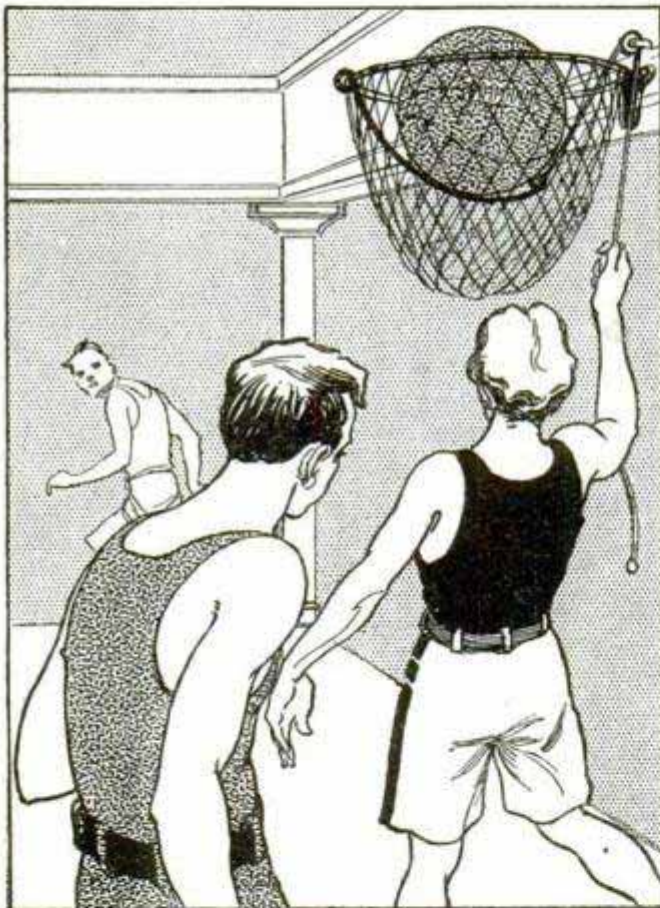


The Entire Framework is Held Together with Brackets, and is Hinged at the Joints, so That It can be Folded Up and Put into a Small Space, the Sections being Covered with Colored Burlap to Make Them Appear Solid. On the Right is Shown the Awning-Frame Construction

A piece of wire screen is used for the door. An old piece will do, if it is well coated with black or dark-green paint. It is then tacked on the inside of the door. Fasten the different parts together with the hinges. The hinges are fastened on the inside of the side wings, and on the outside of the two front pieces. With the hinges placed in this manner, the house can be folded into a small space.

Removing Basketball from Closed-Bottom Receptacle

The closed-bottom basket used in the game of basketball is so high that it is difficult to remove the ball after a



The Iron Rod in the Basket Throws the Ball Out When the Rope is Pulled

goal is made. Generally a long stick is used for this purpose, but I desired to have a better way, and the device shown in the illustration was the outcome. A light iron rod was hinged to the edge of the basket and bent to its inner shape, the lower end resting at about the center of the basket. A rope was attached to the lower end

For the one built by the writer, green burlap was used, and by trimming the door and window frames along the edges with white paint a very pretty effect was produced.

A small awning was made over the window, which improved the appearance very much. Roller shades on the door and window and an electric door bell completed a very neat and practical playhouse.

and run up and over a sheave pulley attached to the basket support, then down so it could be easily grasped. When a goal is made, it is only necessary to give a pull on the rope for throwing the ball out of the basket.—Contributed by Annie B. Currine, San Diego, Cal.

Testing Dry Batteries

For testing dry batteries or any low-voltage current, take an ordinary thermometer and wind around the mercury bulb enough wire to make about 10 ohms resistance. This will make a good tester. A dry cell of about 2 volts attached to the ends of the wire should generate enough heat to expand the mercury about four degrees in one-half minute.

This tester is not as fast as a voltmeter, nor has it as wide a range, but it is reasonably accurate, and by using a battery of known voltage, the winding can be increased or diminished to allow the mercury to expand as many degrees as desired per volt.—Contributed by E. H. Kimbrough, Bartlett, Kan.

A Wall-Paper Cleaner

To 1 qt. of flour add about 2 oz. of 90-per-cent ammonia and enough lukewarm water to make a dough. Wipe the paper with this preparation while turning and kneading it as in making dough. This will take up the dirt and a clean side is always presented to the paper.—Contributed by F. C. Myer, Tacoma, Wash.

How to Make a War Kite

By PARK SNYDER

The material required for the making of a war kite is three pine sticks, each 60 in. long, one stick 54 in. long, one stick 18 in. long, all $\frac{1}{2}$ in. square; 4 yd. of cambric; a box of tacks; some linen thread, and 16 ft. of stout twine.

Place two 60-in. sticks parallel with each other and 18 in. apart, then lay the 54-in. piece across at right angles to them 18 in. from the upper ends, as shown in Fig. 1, and fasten the joints with brads. At a point 21 in. below this crosspiece, attach the 18-in. crosspiece.

The extending ends of all the three long pieces are notched, Fig. 2, and the line is stretched taut around them, as shown by the dotted lines.

If the cambric is not of sufficient size to cover the frame, two pieces must be sewed together, then a piece cut out to the shape of the string, allowing 1 in. to project all around for a lap. The cambric is sewn fast to the string with the linen thread. Fasten the cloth to the frame part with the tacks, spacing them 1 in. apart. The space in the center, between the sticks, is cut out. Make two pieces of the re-

maining goods, one 36 in. by 18 in., and the other 36 in. by 21 in. The remaining stick is fastened to these cambric, as shown in the whole is fastened frame so as to make projection. The bridle for giving the proper pull on the line to fastened, one to the long stick in the middle attached to the top to the lower end, as shown in Fig. 4. The inclination can be varied to suit the builder by changing the point of attachment of the kite line to the bridle. If it is desired to fly the kite directly overhead, attach the line above the regular point and for low flying make the connection below this point. The regular point is found by trial flights with the line fastened temporarily to the bridle, after which the fastening is made permanent.

The Line should be a Very Strong One, Then Banners can be Flown on It

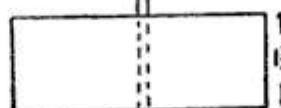
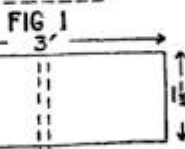
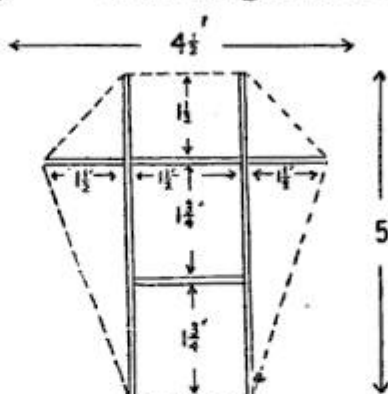
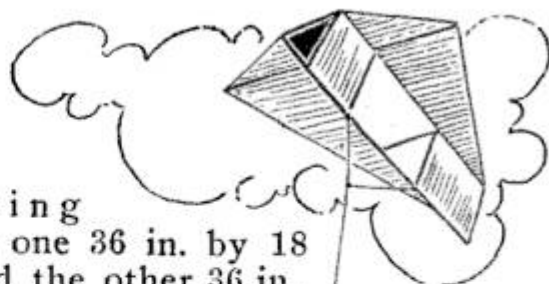


FIG 3

The Sticks are Fastened Solidly with Brads, and the Cloth Sewed to the String around Their Ends



FIG 2

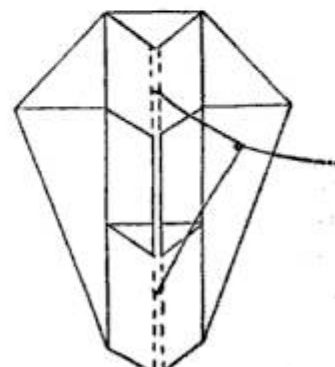
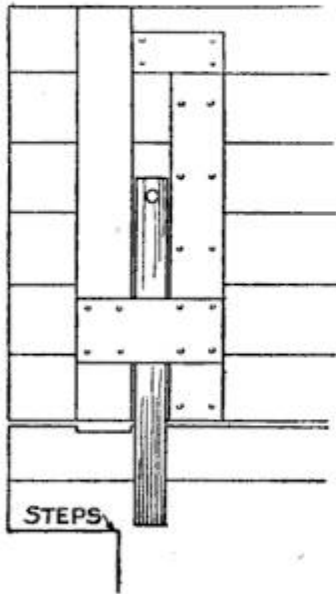


FIG 4

Cellar-Door Holder

A cellar door that opened up against a wall required a catch of some kind to keep it open at times. As I did not



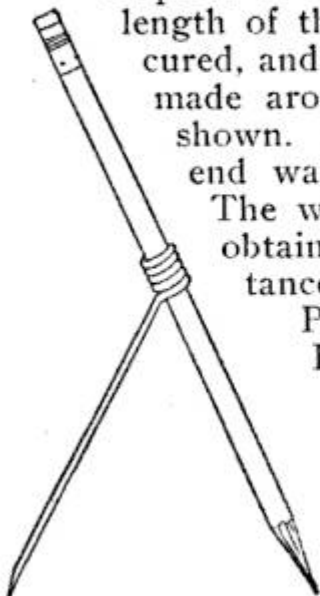
want a catch to show on the wall, I devised a holder as shown. Three pieces of wood were nailed to the under side of the door in such positions that they formed a recess in which a fourth piece, 2 in. wide and 1 in. thick, would slide endways. A knob was attached to the upper end of the slide, which served the double purpose of a handle and a stop for the slide. The manner of using the holder is clearly shown.—Contributed by H. T. Smith, Topeka, Kansas.

An Emergency Pencil Compass

The need of a compass when none was at hand caused me to quickly devise a substitute for the work.

A piece of stiff wire, about the length of the pencil, was procured, and several turns were made around the pencil, as shown. The lower straight end was filed to a point.

The wire can be bent to obtain the radius distance.—Contributed by Preston Ware, Rome, Ga.



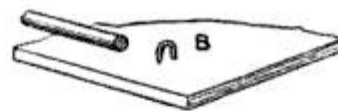
ⒸA very effective dip for brass and copper articles, that will leave a clean and bright finish, is 2 qt. of aqua fortis, 1 gal. of sulphuric acid, 1 pt. of water and a pinch of salt.

Renewing Carbon Paper

When carbon paper has been used several times, the preparation becomes almost worn off on some parts, while other parts of the paper are as good as new. The process of renewing is very simple and it can be done by anyone without special apparatus. All that is necessary is to hold the paper in front of a fire or over a radiator a few seconds. The heat will cause the preparation to dissolve and spread over the paper, so that when it is dry the paper will have a new coating. This can be repeated, and in some cases will double the life of the carbon paper.—Contributed by Chester M. Kearney, Danville, Quebec.

How to Clinch a Finishing Nail

A wire or finishing nail may be clinched as nicely as a wrought nail,



if a nail punch or piece of iron is placed along the side of it, as shown at A, and the nail hammered into an arched form,

as at B. The punch or rod is then withdrawn and the arch driven into the wood.—Contributed by James M. Kane, Doylestown, Pa.

To Prevent Washbasin Bottom from Wearing Out

The ears from some sirup buckets were removed and three of them soldered, at equal distances apart, on the bottom of the washbasin near the outside edge of the lower part. These prevented the wear from coming on the bottom of the basin, and it lasted several times as long as ordinarily.—Contributed by A. A. Ashley, Blanket, Texas.

ⒸTo curl feathers, heat slightly before a fire, then stroke with something like the back of a case knife.



THE BOY SURVEYOR

Camera Surveying

by Harold G. McGee

[This article explains the preparation of the camera for taking the pictures at each of the three stations, after which the plates are developed, printed and kept until a convenient time may be had for plotting the ground. The succeeding article will give in detail the making of the map from the photographs.—Editor.]

CAMERA surveying is simply plane-table surveying in which the landscape has been photographically picked up and carried indoors. It has the enormous advantage that one can obtain a record of the utmost fidelity in a small fraction of the time taken to do the field work of even a sketchy plane-table survey, and that plotting can be done in the comfort and with the conveniences of a drafting room. When the hours one can work are short or the periods of clear, dry weather are few and far between, a camera is an ideal surveying instrument. It sees and records with the click of the shutter.

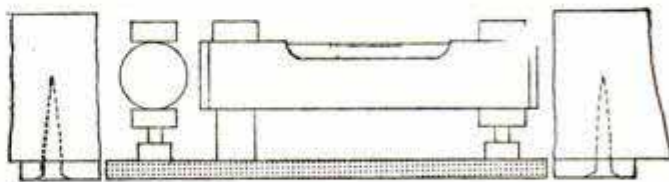
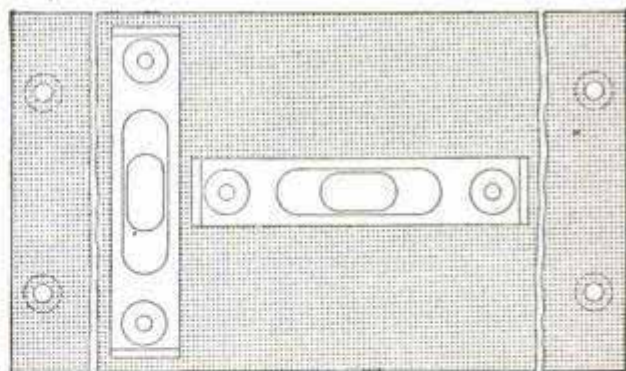
Surveying by camera was proposed early in the infant days of photography; but not until the eighties were photographic surveys commenced in earnest. With the extensive surveys of the Canadian Rockies by the Canadian government within the past decade and the topographic surveys of the Alps, the camera has very recently indeed achieved the dignity of being known as a "sure-enough" surveying instrument. Even today, few surveyors have ever used photography for making surveys, even though for mountain topography or any survey which includes a large number of distinctive, inaccessible landmarks, the camera asks no odds of either the plane table or the stadia transit.

A camera survey taken of the summer cottage or the camping ground will be a source of great delight while it is being plotted up of winter evenings. There is something weird in watching each tent and dock slip into

its place with naught but a pair of dividers and a few pictures to do the trick. And when the map is done, there are all the data to tell just where a tennis court can go or a walk ought to be built.

In making surveys, a plate camera will do more accurate work than will a film camera; and a fixed focus is a big help in plotting. In spite of the special and expensive instruments which have been designed solely for surveying work, a little ingenuity on the part of the owner of most any kind of a camera, be it big or little, film or plate, box or folding, will do wonders toward producing good results.

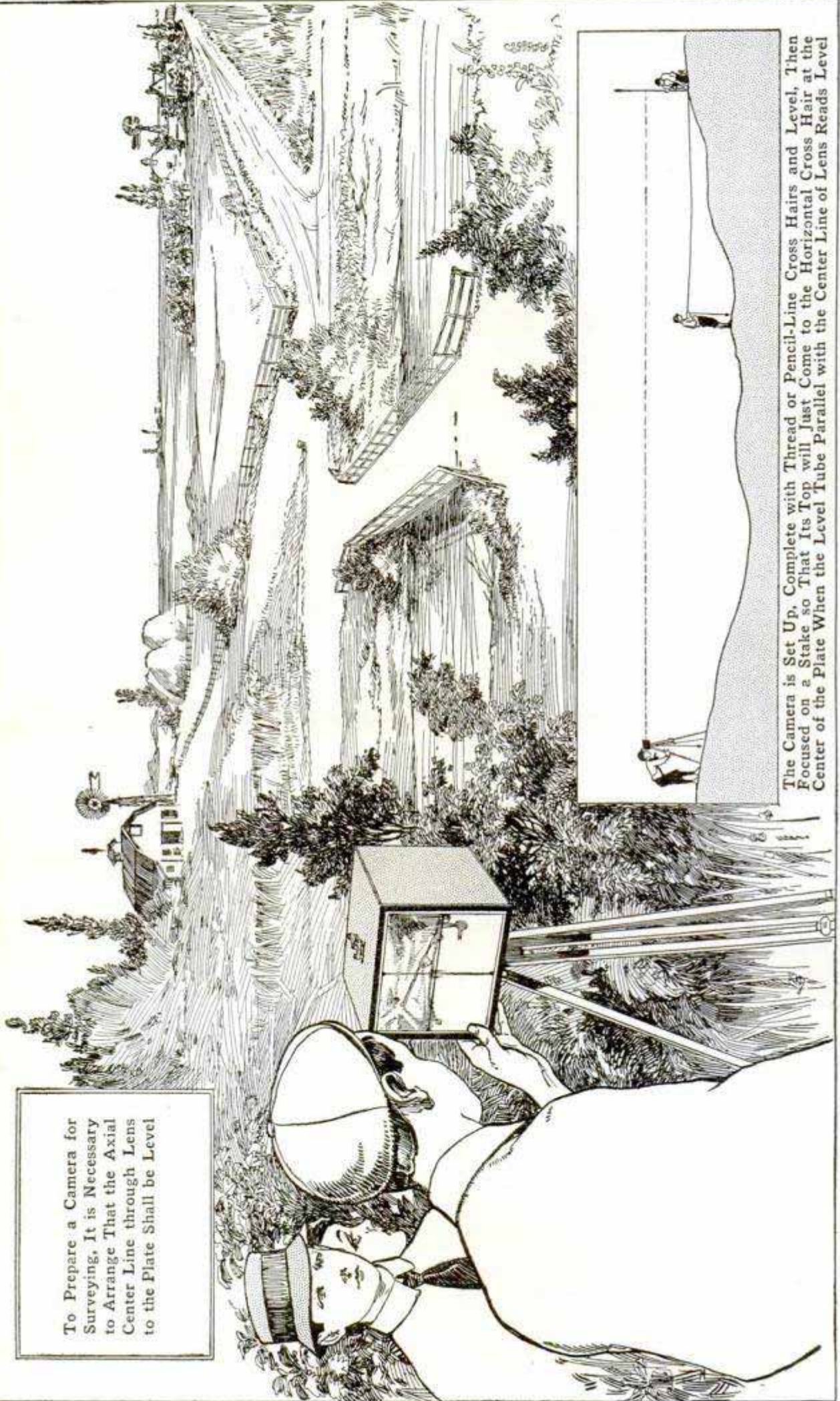
To be used for surveying, a camera



A T-Shaped Level with Adjusting Nuts is Located on the Camera Box, or on the Bed of the Folding Camera

must be fitted with a spirit level and some arrangement for cross hairs. A T-shaped level on the bed or the box, carefully adjusted, will show when the

To Prepare a Camera for Surveying, It is Necessary to Arrange That the Axial Center Line through Lens to the Plate Shall be Level



The Camera is Set Up, Complete with Thread or Pencil-Line Cross Hairs and Level, Then Focused on a Stake so That Its Top will Just Come to the Horizontal Cross Hair at the Center of the Plate When the Level Tube Parallel with the Center Line of Lens Reads Level

plate is vertical and when the perpendicular line from the center of the plate to the center of the lens is horizontal. Actual cross hairs in the camera are not as good as four tiny points of V's, one projecting from the middle of each side, top, and bottom of the camera box, just in front of the plate holder. How the level is to be adjusted so that a line between the upper and lower points will be truly vertical, and one through the die-side points truly horizontal and on a level with the center of the lens when the bubbles are in the center of the spirit level, will be described later.

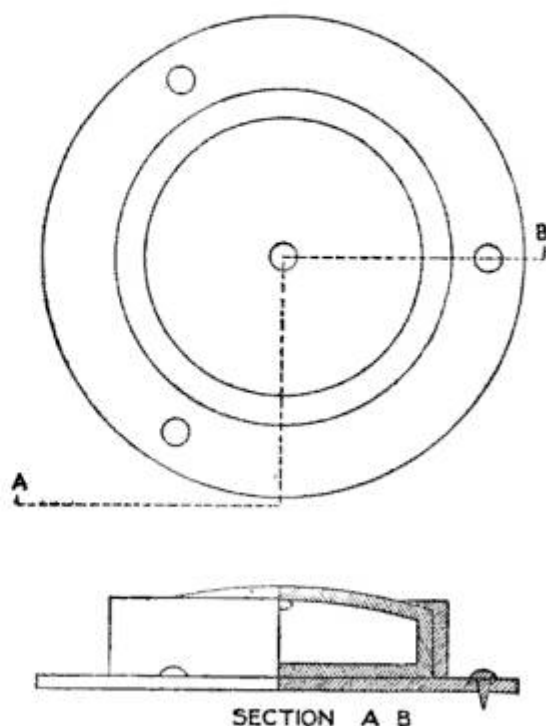
Camera Preparation

To prepare a camera for surveying, it is necessary to arrange that the axial center line through the lens to the plate shall be level, and that the location of the horizontal and vertical center lines shall be indicated on the plate. A spirit level is the best solution of the first problem, and indicated center points of the second.

The spirit level preferably may be of the T-form, with two level tubes, or of the "universal" circular form, with which some hand cameras are equipped. However, ordinary hand-camera levels are generally too rough and difficult of adjustment to insure accurate work. On a view camera, the level may be conveniently located on the bed which carries the lens board. If it is screwed to the under side of the arms it will be convenient for use and out of the way. The bed is likewise a good location for the level on a folding hand camera, while the top of the box is about the only possible location with a box-type instrument.

The cross hairs or center-line indicators should be placed on the back of the camera, just in front of the plate. If indicators are used, fine-thread cross hairs or pencil lines drawn on the ground glass must be used temporarily for making adjustments. Generally, the two cross hairs will divide the plate vertically and horizontally into four equal parts and the hairs or indicators will join the center point of the

sides and top and bottom of the opening immediately in front of the plate. But it is essential that the cross hairs have their intersection in a line per-



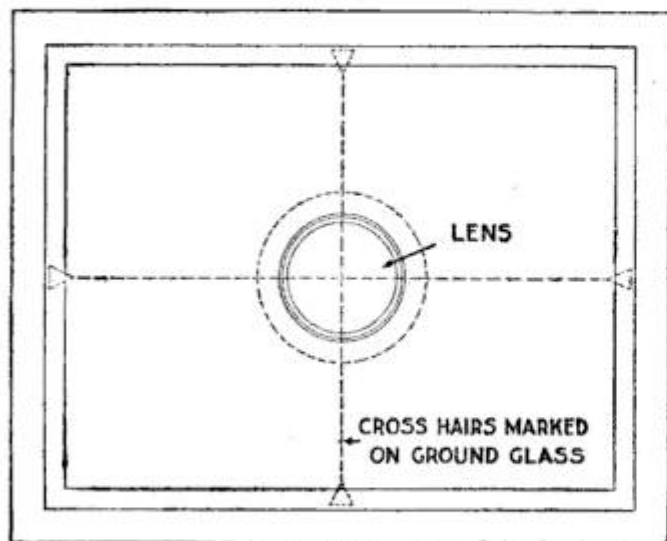
The Ordinary Round Level may be Used, but It Is Not so Good as the T-Level

pendicular to the plate and passing through the center of the lens. Thus in a camera in which the lens is not placed in the center of the plate, or in which the rising and sliding front has placed the lens off center, either or both of the cross hairs may be off center with regard to the plate.

After the cross-hair indicators and the level have been attached to the camera, adjustments are necessary. Surveyors distinguish between permanent and temporary adjustments, permanent adjustments being those for which the instrument maker is responsible, and temporary adjustments being those which can be and are made in the field. The principal permanent or maker's adjustments of the surveying camera are those which insure the center line through the lens, or axial center line, or line of collimation, being perpendicular to the plate, the intersection of the cross hairs being on this line, and that the cross hairs themselves are mutually perpendicular. Temporary or field adjustments must be so made that one tube of the spirit

level shall be parallel with the axial center line through the lens and the other parallel with the horizontal cross hair.

The first field adjustment is made in the following manner. The camera is

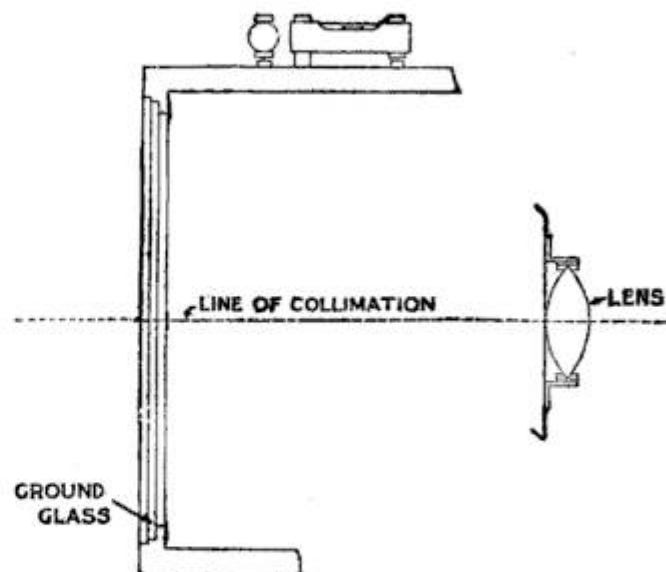


The Cross Hairs or Center-Line Indicators should be Placed on the Back of the Camera

set up, complete with thread or pencil-line cross hairs and level, and focused on a stake whose top shall just come to the horizontal cross hair at the center of the plate, when the level tube parallel with the center line of the lens reads level. This stake may be driven to the required elevation or a rod may be held on it and the point where, in the image on the ground glass, it is intersected by the cross hair marked with pencil on the rod as it is held vertically on the stake. The distance to this stake is measured from the camera and another similar stake set at the same elevation by the same method, but in an opposite direction and at the same distance from the camera. The two stakes or the mark on the vertical rod which is held on these stakes in turn will be level with each other, though they may not be level with the camera. The camera is then moved to a point very much closer to one stake than to the other and again leveled. The vertical distance from one stake-top or mark on the rod is measured and the camera then focused on the second stake. If the level is actually in adjustment, the distance from the second stake top or mark will be exactly the same as it was on the first. If not, the

difference, or "error," is found between the two vertical distances from the cross hair to the two stake tops. Half this error is corrected by raising or lowering one end of the level tube by means of the threaded nuts which are placed on it for the purpose. The whole process is then repeated until the vertical distances from the horizontal cross hair at the center to the two level stakes, one close to and one distant from the camera, are identical. The axial center line of the lens, or the line of collimation, is then in adjustment with the level. All that remains is to make the horizontal cross hair parallel with the cross level.

This is done by using one marked stake. The camera is leveled as far as the "fore-and-aft" level is concerned and the horizontal cross-hair point at the center marked on the stake. The camera is then swung round until the stake just shows on one edge of the ground glass, the fore-and-aft or longitudinal level being checked to make sure its bubble is still in the center. Then the bubble in the cross or transverse level tube is brought to the center by means of the threaded adjusting nuts, and the camera is thrown hard over so that the stake appears along the opposite



The Maker's Adjustments Should Insure the Line of Collimation being Perpendicular to the Plate

edge of the plate. This time, the bubble of the longitudinal level being kept in the center, half the error introduced by turning from one edge to the other

is corrected. All of the adjustments are then rechecked, and if they are found correct the instrument is ready for use. If a circular level be used, the method of adjustment is exactly the same, the swing of the bubble along the axis of the camera and transverse to it being used to determine the longitudinal and transverse adjustments. Slips of paper may be used for lifting one side in place of the adjustment nuts of the T-level.

To Make Transparent Paper

Transparent paper of parchmentlike appearance and strength, which can be dyed with almost all kinds of aniline dyes and assumes much more brilliant hues than ordinary colored glass, can be made in the following manner: Procure a white paper, made of cotton or linen rags, and put it in soak in a saturated solution of camphor in alcohol. When dry, the paper so treated can be cut up into any forms suitable for parts of lamp shades, etc.

Toasting Bread over an Open Fire

Having experienced some difficulty in obtaining good toast over a gas or open fire I tried the following plan with good results: An old tin pan was placed over the flame and the ordinary wire bread toaster clasping the slice of bread was held about $\frac{1}{2}$ in. from the pan. In a few minutes the toast was crisp and ready to serve.—Contributed by Katy Doherty, New York City.

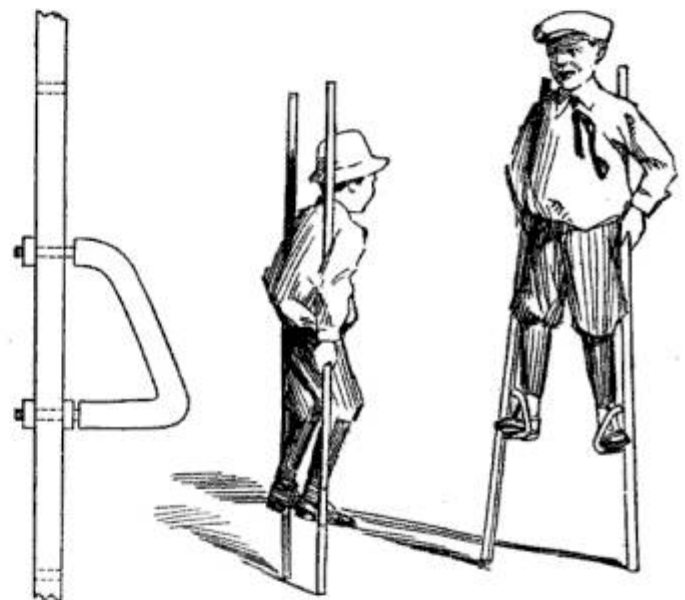
Adjustable Stilts

The beginner with stilts always selects short sticks so that he will not be very far from the ground, but as he becomes more experienced, the longer the sticks the better. Then, too, the small boy and the large boy require different lengths of sticks. The device shown makes a pair of sticks universal for use of beginners or a boy of any age or height.

A leveling head or ball-and-socket joint on the top of the tripod will be found of material aid in leveling the instrument.

No great mechanical genius is necessary to prepare a camera for or to make a successful camera survey. But if a boy have not patience and an infinite desire for accuracy, camera surveying, or indeed any sort of surveying, will be a source of neither pleasure, satisfaction, nor profit.

To make the stilts, procure two long hardwood sticks of even length, and smooth up the edges; then begin at a point 1 ft. from one end and bore 12



Stilts Having Stirrups That can be Set at Any Desired Height

holes, $\frac{3}{8}$ in. in diameter and 2 in. apart from center to center. If there is no diestock at hand, have a blacksmith, or mechanic, make a thread on both ends of a $\frac{3}{8}$ -in. rod, 12 in. long. Bend the rod in the shape shown, so that the two threaded ends will be just 2 in. apart from center to center. The thread on the straight horizontal end should be so long that a nut can be placed on both sides of the stick. A piece of a garden hose or small rubber hose, slipped on the rod, will keep the shoe sole from slipping. The steps can be set in any two adjacent holes to give the desired height.—Contributed by Walter Veene, San Diego, Cal.

Collar Fasteners

An excellent fastener to be used on soft collars can be assembled from an ordinary paper fastener and two shoe buttons of the desired color. This device keeps the soft collar in good shape at the front, and serves the purpose just as well as a more expensive collar fastener. The illustration shows how it is used.—Contributed by

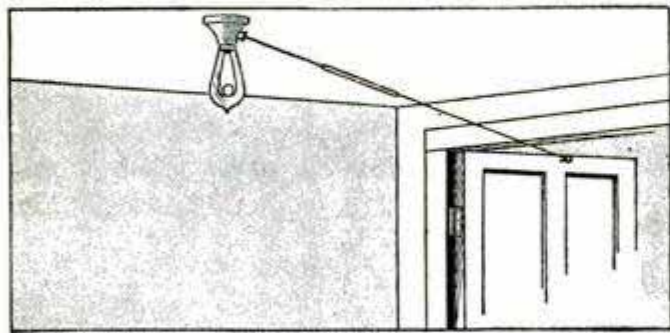


B. E. Ahlport, Oakland, Cal.

Operating a Bathroom Light Automatically

A device for automatically turning an electric light on and off when entering and leaving the room is illustrated in the sketch. A pull-chain lamp socket is placed upon the wall or ceiling, and is connected to a screw hook in the door by a cord and several rubber bands, as shown.

When the door is opened, the lamp is lit, and when leaving the room the opening of the door again turns it out. The hook should be placed quite close to the edge of the door, to reduce the



Operating the Electric Lamp Switch or Key by the Opening of the Door

length of the movement, and even then it is too much for the length of the pull required to operate the switch, hence the need of the rubber bands.

The lamp chain pulls out just 1 in., and consequently the lamp is lit when the door is opened part way; and swinging the door farther only stretches the rubber. This is an advantage, however, because the lamp is sure to light regardless of the swing of the door. If no rubber were used, the door would have to open just a certain distance each time.

If the cord is connected to the hook with a loop or a ring, it may be easily disconnected during the day when not needed. A light coil spring may be used in place of the rubbers.—Contributed by C. M. Rogers, Ann Arbor, Michigan.

A Finger-Ring Trick

A coin soldered to some inexpensive ring, or a piece of brass cut from tubing, will make an interesting surprise coin for friends. The ring when placed on the middle finger with the coin in the palm makes the trick complete.

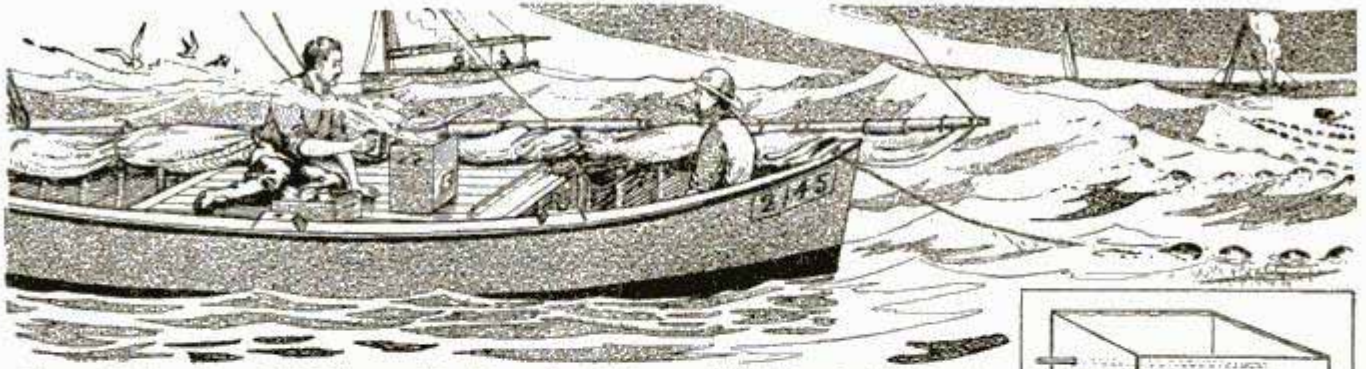


Ask some one if he has ever seen such a coin, or say it is a very old one, as the date is almost worn away. He will try to pick it up, but will find it fast to the finger.—Contributed by Wm. Jenkins, New York City.

Preventing Marks from Basting Threads on Wool

In making up woolen garments it is necessary to press portions of them before removing the basting threads. Sometimes the marks of the basting threads show after the pressing. This can be avoided by using silk thread for basting instead of the usual cotton thread. The silk thread will not leave any marks.—Contributed by L. Alberta Norrell, Gainesville, Ga.

☞Cranberries will keep fresh for weeks if placed in water in a cool place.



Stove Made of an Old Oilcan with Extending Sides and Weighted with Sand for Use on a Fishing Boat Holds the Cooking Vessel Safely in a Sea

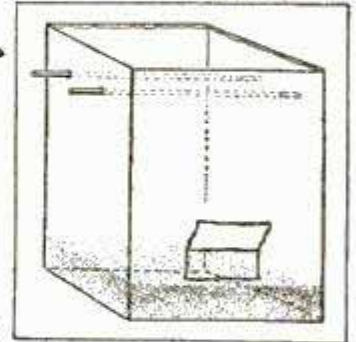
A Canoe Stove

By F. V. WILLIAMS

Limited space and the rocking motion of salmon-fishing boats in a heavy sea on the Pacific coast brought about the construction of the canoe stove shown in the illustration. It is made of a discarded kerosene can whose form is square. A draft hole is cut in one side of the can, 4 or 5 in. from the bottom, and a layer of sand placed on the bottom. Two holes are punched through opposite sides, parallel with the draft hole and about 3 in. from the top edge. Rods are run through these holes to provide a support for the cooking utensil. The smoke from the fire passes out at the corners around the vessel.

The main reason for making the stove in this manner is to hold the cooking vessel within the sides extending above the rods. No amount of rocking can cause the vessel to slide from the stove top, and as the stove is weighted with the sand, it cannot be easily moved from the place where it is set in the canoe.

The use of such a stove in a canoe has the advantage that the stove can be cleaned quickly, as the ashes and fire can be dumped into the water and the stove used for a storage box. The whole thing may be tossed overboard and a new one made for another trip.



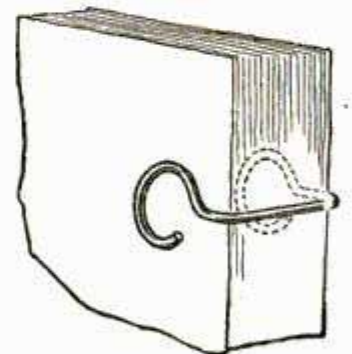
To Prevent Washboard from Slipping in Tub

The modern stationary washtubs are box-shaped, with one side set at an outward angle or slope. The washboard, when used in these tubs, will slide up and down against the sloping part of the tub while the clothes are rubbed against them. This annoying trouble can be avoided by tacking, on the top edge of the board, strips of rubber cut from a discarded bicycle tire, placing the rubber side out. The friction of the rubber prevents any motion of the board.—Contributed by Jas. A. Hart, Philadelphia, Pa.

☞ To print on celluloid, use a good gloss ink and old rollers.

Clips to Hold Magazine Pages Together

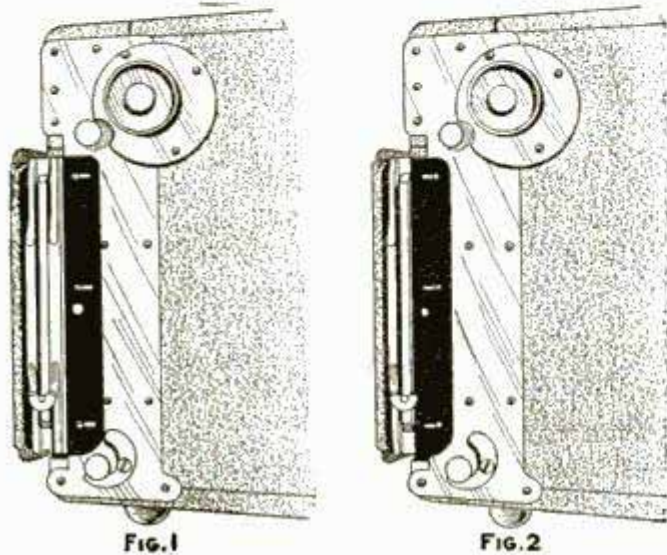
When a magazine is placed in a bookcase the outer pages are liable to turn back if it is inserted with the back on the outside. To overcome this difficulty I made clips for each magazine to hold the open pages together. Each clip was made of wire, about 8 in. long, shaped as shown. The width of the clip is made equal to the thickness of the magazine and the extending ends are



slightly pressed together so that they will spring and grip the pages.—Contributed by W. A. Saul, E. Lexington, Massachusetts.

Slide-Opening Cover for a Plate Holder

The length of time required for the slide of a plate holder to be removed



The Two Positions Occupied by the Slide-Opening Cover as It is Used on a Camera

on a reflecting camera spoiled many of my plates, because strong light would enter the unprotected slot when the camera was in certain positions. To protect this slot so that the slide could be left out indefinitely, I made a cover of a piece of sheet metal having three slots, to admit screws turned into the camera. A knob was attached at the center. The illustration shows the application of this cover. In Fig. 1 the plate holder is shown slipped in with the cover back, and Fig. 2 shows the slide drawn and the cover over the slot opening.—Contributed by B. J. Weeber, New York City.

Magnetic-Suspension Pendulum

When a pendulum is not periodically supplied with energy its amplitude grows smaller and finally the motion ceases, due to the resistance of the air and the friction at the point of suspension. Usually the suspension is in the form of a knife edge bearing against

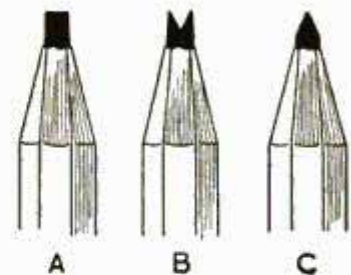
plates of agate; sometimes the pendulum rod is simply attached to a very slender and flexible spring without any bearings. But the minimum of friction is obtained by means of magnetic suspension, as the following experiment will prove.

If the rod of a pendulum about 12 in. long, beating half seconds, is sharpened to a needle point and suspended from one of the poles of a magnet, it will be found that, if set into motion, it will continue to swing 15 times as long as the ordinary knife-edge suspended pendulum, and it will not stop until after about 16 hours, while one working on agate plates will stop in from 50 to 60 minutes. Similarly a top, provided with a fine-pointed axis of iron, will spin much longer when suspended from a magnet.

Magnetic suspension is used in precision instruments; for example, the minute mirrors which are used in certain telegraph systems to register writing photographically at the receiving end.

Use for Pencil Stubs

In mechanical drawings cast iron is indicated by a series of straight lines across the parts made of this material. These lines can be quickly made with the usually discarded pencil stubs, if these are saved and sharpened in the following manner:



The point is filed flat, as shown at A; then a slot is filed in the center of the lead with a knife file, as shown at B, and the points sharpened as in C. In this way two lines are drawn at one stroke neatly and in half the time.—Contributed by J. Kolar, Maywood, Ill.

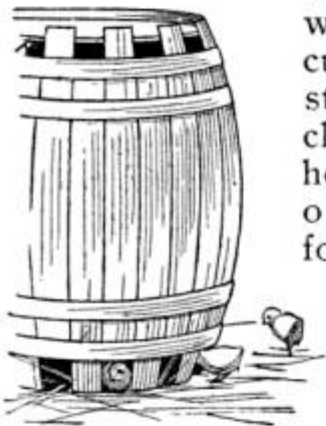
ⒸTo sharpen a carving knife draw the edge through and against the open edge of a pair of shears.

A Substitute for Candles

One evening our electric light was cut off by a storm, and having no gas, candles, or oil lamps, a very good light was made in the following manner: A tablespoonful of lard was melted and poured in the top of a baking-powder can, and four strands of ordinary white wrapping twine were put into it, allowing one end to stand up for about $\frac{1}{2}$ in. above the edge of the can. The end was lighted the same as a candle.—Contributed by B. E. Cole, Eureka, California.

A Poultry Coop

A barrel makes a good protection for a hen with a brood of chicks, if it is arranged as shown in the sketch. Procure a good barrel with a bottom and cut off each alternate stave at both ends close up to the first hoop. The lower openings thus formed make entrances for the chickens and the upper ones admit air and light.



—Contributed by Wm. R. Konnan, Neillsville, Wis.

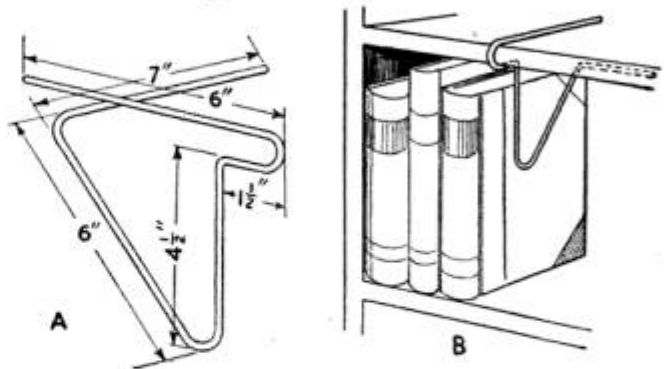
Preventing Mildew on Canvas

To prevent mildew on canvas, soak it in bluestone water, or if the mildew is already present, coat the parts well with ordinary soap and rub on powdered chalk, or whiting. A solution of corrosive sublimate, well weakened with water, will also prevent mildew, but owing to its poisonous nature it is best to use the former method.—Contributed by A. Ashmund Kelly, Malvern, Pa.

☞When the steel point of a compass is lost, a phonograph needle makes a good substitute.

Holder for Books in a Case

Very often it is found, after arranging the books in a case, that the rows are not complete and the books at the



The Shape of the Wire Makes It Easily Applicable to Any Open Bookshelf

end are continually sliding down on the shelf. The sketch shows a very useful type of wire bracket to support the last book.

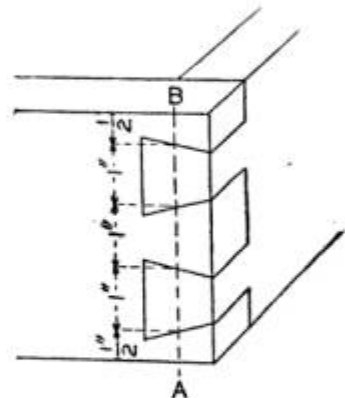
A brass wire, 26 in. long and about $\frac{1}{8}$ in. in diameter, is bent, with the use of a vise or pliers, to the shape and dimensions shown at A. When the wire is placed on the bookshelf, as shown at B, it prevents the end book from falling. Its location can be changed as books are added to the shelf.—Contributed by John Y. Dunlop, Craighead, Scotland.

Laying Out a Dovetail Joint

With dividers and compass lay off the width of the board into twice as many parts as the dovetails wanted.

Draw a light line, AB, across the board as far from the end as half the thickness of the board. On this line step off the divisions with the dividers, beginning with a half space or division.

With the bevel square, set to a bevel of 1 in. in 3, draw lines through the division dots. This method will save much time and give accurate results.—Contributed by Joseph F. Parks, Wichita, Kan.



Clothespin Newspaper Holder

A simple newspaper holder can be made by cutting away a portion of one side of an ordinary clothespin, drilling

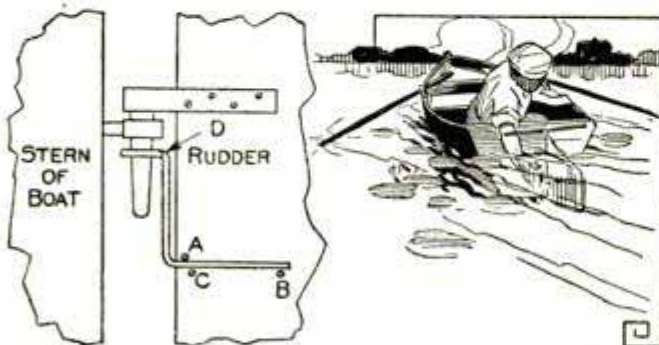


Shaping a Clothespin Head and Fastening It to a Wall Provides a Holder for Newspapers

a hole through the thick end for a screw or nail, and fastening it in place where desired. Another way is to split off one side of a clothespin and cut the bottom of the remaining part tapering as shown; then drill a hole to avoid splitting the piece and fasten in a convenient place.—Contributed by J. P. Rupp, Norwalk, O.

Holder for a Dory Rudder

The rudder of a sailing dory or row-boat often comes off in rough water,



The Loop on the Iron Rod Holds the Pin of the Rudder in the Eye

and in order to keep it in place and yet have it easily detachable at will,

the following method is useful: Procure a 10-in. length of soft-iron rod and bend one end of it into a loop large enough to fit around the rudder pin after the latter is inserted in the eyelet. Insert screws at A, B and C, letting them project about $\frac{1}{2}$ in. from the surface. Bend the rod at D and A in the shape shown, and with a little adjustment it will easily snap into position. It will prevent the rudder from riding up out of the eyelets, but can be detached instantly. The device should be applied to the upper pin so as to be within easy reach.—Contributed by B. A. Thresher, Lakeville, Connecticut.

Trimming Photographs

In trimming small photograph prints I experienced some difficulty in getting them square, and I did not care to invest in a trimming board. By following a line drawn around the print with a triangle, it was impossible to make a perfect rectangle. In the place of a trimming board I now use a piece of glass cut a little smaller than the desired print. The edges of the glass are smoothed by filing or grinding them. In making a glass, be sure to have the corners cut at perfect right angles and the edges ground straight.

The glass is easily located over the print, and by holding the two tightly together the edges of the print can be trimmed with a pair of shears.—Contributed by E. Leslie McFarlane, Nashwaaksis, N. B.

A Metal Polish

A metal polish that is safe to use about the home is composed of 30 parts alcohol, 3 parts ammonia water, 45 parts water, $6\frac{1}{2}$ parts carbon tetrachloride, 8 parts kieselguhr, 4 parts white bole, and 8 parts of chalk. These substances can be purchased at a local drug store and should be mixed in the order named. Any grease on metal will be dissolved by this solution.—Contributed by Loren Ward, Des Moines, Iowa.

Electrical Heating Apparatus for the Home

By ARTHUR MOORE

PART VI—An Electric Iron

AN ordinary iron is used in the construction of this electric iron, the heating element being inserted in a hole drilled horizontally into it from the rear end. The construction of the iron may be very conveniently divided into three parts, namely, the iron, the heating element, and the plug and connecting leads. Each of these parts will be considered in their turn, as mentioned.

Obtain from a hardware dealer an ordinary 9-lb. iron having a form approximating that shown in Fig. 1. Drill a 1-in. hole into the back end of the iron, parallel with the smoothing surface, so that the lower edge is about $\frac{3}{8}$ in. from the face of the iron, and to a depth of $4\frac{1}{2}$ in. From this point it is continued with a $\frac{3}{4}$ -in. drill for about 1 in. The dimensions of this hole and its location are shown by the dotted lines. The mouth of the hole is enlarged by means of a small drill, about $\frac{5}{16}$ in. on each side and to a depth of 1 in., to make it oblong, the greatest dimension being parallel with the face of the iron.

Remove the handle from the iron and smooth off the upper surface with a file. Procure a piece of sheet steel, 10 in. long, $\frac{7}{8}$ in. wide and $\frac{1}{16}$ in. thick, file it down to the form shown in Fig. 2, and drill holes in it as indicated. Bend it along the dotted lines so that it will form a support for the handle, as shown in Fig. 1. Place the piece in position on top of the iron and mark the location of the holes for the screws A, then drill and tap them for machine screws. A suitable handle can be made from hard wood or fiber, which is fastened to the uprights with a $\frac{1}{4}$ -in. bolt. If heavier metal is used, one of the end supports can be cut off on the dotted line, which form sometimes is preferred.

Procure a piece of at least $\frac{1}{8}$ -in. sheet asbestos, of sufficient size to

cover the top of the iron, and drill two holes in it to coincide with those on the handle; also a hole in each back corner and one at the point, and drill holes in the iron for screws to hold the asbestos in place and prevent it from curling. The asbestos serves as an insulator for the heat between the iron and the handle.

Cut from a piece of sheet iron, $\frac{1}{16}$ in.

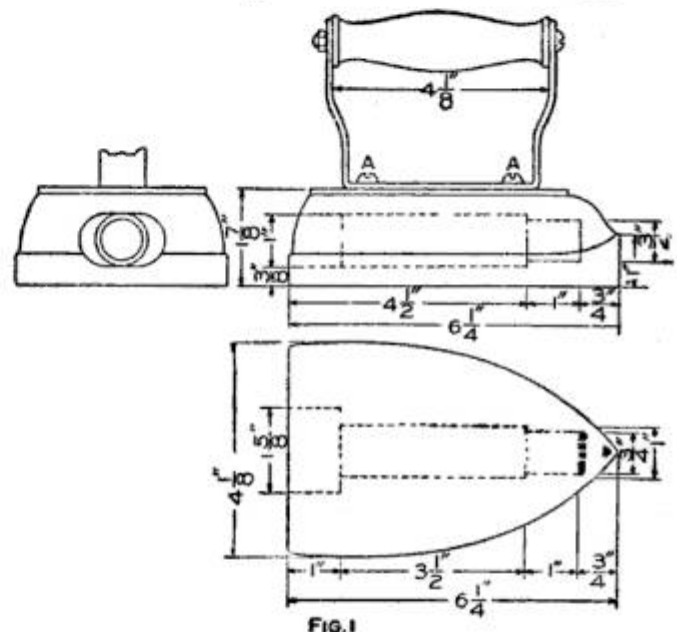


FIG. 1

An Ordinary Iron is Drilled to Provide a Place for the Heating Element

in thickness, a cover having the dimensions and form shown in Fig. 3, for closing the opening in the iron after the heating element is in place. The opening in the cover should be of such a size that it will admit the plug end of the connecting cord for engaging the terminals provided on the heating element. The holes in this piece are not drilled until after making the heating element and placing it in position; then a perfect fit can be obtained.

The heating element consists of a cast-iron core with a winding of high-resistance wire, or ribbon, about it. The dimensions of the core are given in Fig. 4. To have the core fit freely in the opening it is best to make the dimensions given slightly undersize. If the over-all dimensions of the iron will

not accommodate this size of heating element, the dimensions of the latter must be changed accordingly. Drill two $\frac{1}{8}$ -in. holes, $\frac{3}{4}$ in. apart, through

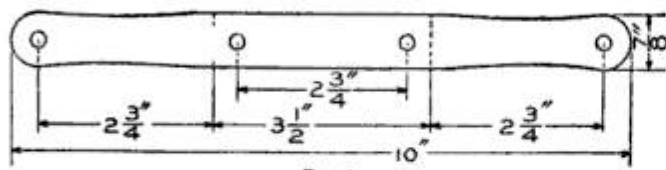


Fig. 2

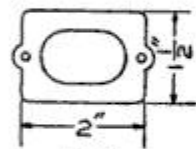


Fig. 3

The Piece of Sheet Metal to Make the Handle Support, and the Plate Cover for the Back End

the large end of the core at an angle, as shown by the dotted line B. These holes are countersunk with a $\frac{7}{32}$ -in. drill, on the under side, to such a depth that the $\frac{1}{8}$ -in. portion is about $\frac{3}{8}$ in. long. Obtain two pieces of $\frac{3}{16}$ -in. brass rod, each $1\frac{1}{4}$ in. long; turn one end of each piece down to $\frac{3}{32}$ in. in diameter for a distance of $\frac{5}{8}$ in., and cut a fine thread on the smaller-diameter portion. Make two small hexagonal nuts, to fit the threaded ends and of such size that they will fit in the countersunk portion of the holes in the end of the iron core without touching the sides. Drill a $\frac{1}{16}$ -in. hole in the unthreaded ends of the rods to a depth of $\frac{3}{16}$ in. Obtain four small washers, having a $\frac{1}{8}$ -in. hole and about $\frac{3}{16}$ -in. outside diameter. Place one of these washers on each of

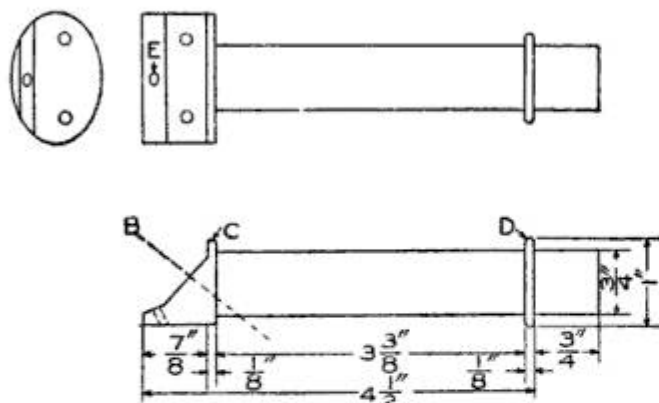


Fig. 4

The Iron Core around Which the Coils of Resistance are Wound and Insulated with Mica

the brass pieces, and then put on several small mica washers. Form a small insulating tube of mica by wrapping a strip of thin mica, which has a width equal to the length of the $\frac{1}{8}$ -in. holes in the end of the core, around the

threaded portions of the brass. The outer diameter of these tubes should fit very tightly in the hole when the pieces of brass are forced in place. Put several mica washers on the threaded end of the pieces of brass, then the metal washers, and lastly the small nuts, and draw them up tightly.

Three pieces are cut from a sheet of mica .003 in. in thickness, having a width equal to the length of the iron core between the flanges C and D, and long enough to reach around the core and make a lap of at least $\frac{1}{4}$ in. Obtain 10 ft. of nichrome resistance ribbon, .004 in. thick and $\frac{1}{16}$ in. in width. Fasten one end of the ribbon to one of the brass terminals with a small brass wedge, driven in with the ribbon in the end of the terminal piece. Place one of the sheets of mica around the iron core and wind on half of the ribbon, arranging the turns so that they are equally spaced; then place a second sheet of mica outside of the first layer of resistance ribbon and wind on the remainder in the opposite direction around the core, which gives what is termed a "noninductive" winding. Such a winding can be used equally well on either a direct or alternating-current circuit. The end of the resistance ribbon is fastened to the other terminal in the manner described for the first one. A third sheet of mica is now placed outside of the last layer of the ribbon and held in place with several narrow strips of sheet copper or brass, which must have their ends brazed together, so as to resist the extreme temperature to which they will be subjected.

A $\frac{1}{8}$ -in. hole, E, Fig. 4, is drilled in the back of the core; then the heating element is put in place in the iron, and the location of the hole marked on the bottom of the iron. A hole is then drilled and tapped on the mark for a small machine screw to fasten the heating element in place. This completes the iron proper.

The plug connector is made of two pieces of insulating material which is not affected by heat, having the dimensions and form given in Fig. 5.

Grooves are carefully cut in one side of each of these pieces, as shown, so that they will be exactly opposite each other when the surfaces of the pieces are placed in contact. Only the main dimensions are given, and the builder can shape the piece as desired. After the grooves have been cut, holes are drilled through the two pieces, as indicated at F. These holes should be countersunk on both sides, so that both the head and nut on the screws used will be beneath the surface. Two clips are made from some thin spring brass, like the one shown in Fig. 6. The screw G should be long enough to extend through the clip end and enter well into the holes H. The terminals of the cord, leading from the source of electrical energy, are fastened under the heads of these screws. The cord

should be protected in some way where it leaves the back end of the plug. This protection can be easily made by winding a piece of spring wire around a rod

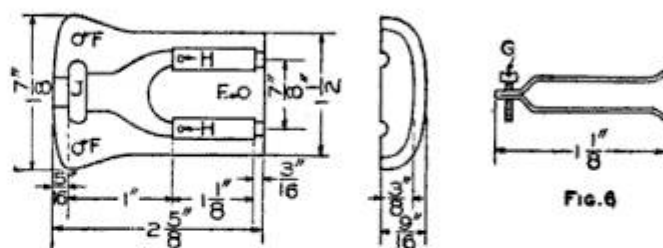


FIG. 5

The Plug Connector and Clip for Gripping the Pins on the Heating Element

having a diameter a little greater than the diameter of the cord, and making one end enlarged so that the coils will fit in the groove J, Fig. 5, and thus hold the spring in place. Use a piece of asbestos-insulated cord with a strong braiding for the connection.

To Remove Gloss on Clothing

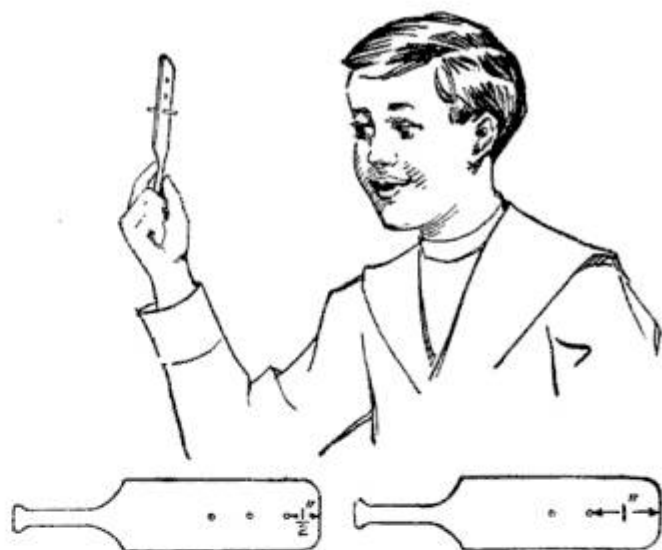
Saturate a cloth well with witch-hazel and use it in pressing in the ordinary way. Have the iron quite warm and go over the cloth slowly so as to make a steam. This will remove all gloss and it will not come back.—Contributed by Mrs. Nellie Beck, Highbridge, N. Y.

A Paddle Trick

Take a piece of wood, 4 in. long, 1 in. wide and $\frac{1}{2}$ in. thick, and form a handle on one end, as shown. Drill three holes about the size of a match in the wood, beginning $\frac{1}{2}$ in. from the top with the first and spacing them $\frac{1}{2}$ in. apart. The first hole is drilled only halfway through the wood, the second and third run through. This completes one side, being the first shown. Turn the paddle over, and the first hole will be 1 in. and the second $1\frac{1}{2}$ in. from the end. Space off another $\frac{1}{2}$ in. and drill a hole halfway through the wood. This completes the paddle for the trick.

Break off a piece of a match, $\frac{3}{4}$ in. long, and run it through the center hole of the first side. Turn the paddle over and the peg will be found in the first

hole of the second side. If the peg is put in the center hole of the second side, then when the paddle is turned



A Quick Turn of the Paddle Apparently Changes the Location of the Pin in the Hole

over it will show in the lower hole of the first side. Show the audience that the peg is inserted in the center hole of one side and tell them to watch it change. Swing the paddle and at the same time turn it and the peg will appear to have changed.—Contributed by Geo. W. Catlin, Winnipeg, Can.

☞ The screw collar of a vise should be oiled at least once a month.

INTERESTING NEW PATENTS

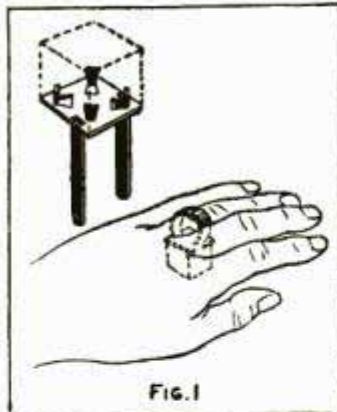


FIG. 1

HOLDER FOR CUE CHALK WORN ON FINGER (Fig. 1)—This holder is designed for the convenience of billiard players and is worn on the finger after the fashion of a ring. It has ears projecting from the lower edge for holding the chalk, and flexible arms that project upward and are easily bent around the finger.

HEATER THAT CAN BE SUBMERGED IN LIQUID (Fig. 2; British patent to a German)—The heater is water-tight and is provided with one pipe for admitting air to the burner and another for carrying off the smoke, both pipes extending well above the surface of the liquid. An air-tight horizontal partition divides the upper and lower parts, so that all the air admitted must pass through the burner.

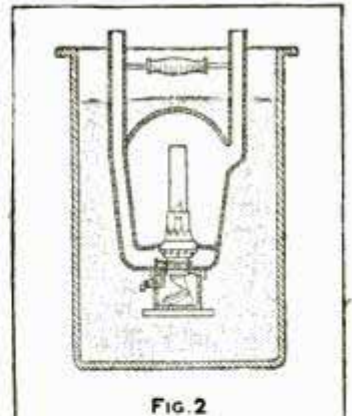


FIG. 2

HOOK FASTENER (Fig. 3)—Pivoted on the ring in which the point of the hook is held is a fastener consisting of a flat piece of metal with a point that engages a groove in the point of the hook. The opposite end of the fastener is made heavy so that it will bear against the hook and lock it in position.



FIG. 3

HOLDER FOR POST-HOLE AUGER (Fig. 4)—The auger has a threaded staff which works in the threads of a block held stationary near the ground level. To the block are attached two or more foot rests that span the post hole and enable the operator to bring his weight to bear effectively on the auger.

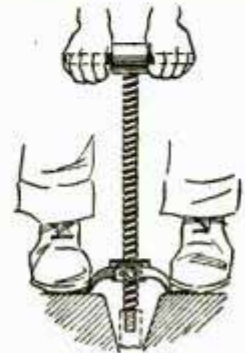


FIG. 4

INKSTAND WITH AUTOMATICALLY FED DIPPING WELL (Fig. 5; U. S. patent to a German)—Projecting through the outlet of the ink reservoir into the dipping well is a small air pipe that curves upward in the reservoir to a point near the top. The lower end of the pipe is slightly below the normal level of the ink in the dipping well. When the ink is lowered to a level below the end of this pipe, air enters the reservoir and causes ink to flow into the dipping well until the end of the pipe is again covered.



FIG. 5

COMBINED COFFEE POT AND CREAM CUP (Fig. 6; British patent to a New Zealander)—A vertical partition divides the receptacle into two compartments, one of which is designed for coffee and the other for cream, with a spout for each compartment. Each compartment has a semicircular lid hinged to the top of the partition.



FIG. 6

COLLAPSIBLE STOVE (Fig. 7)—This stove, which is evidently intended for camping purposes, consists of an upper or furnace part which is easily taken apart, and a boxlike base in which, when it is inverted, all the other parts of the stove except the top may be packed for storage or transportation, the top being placed over and closing the open side of the base. When the stove is set up, the top, sides and base are held together by flanges and by rods at the corners which pass through openings in each of the parts. The top of the furnace part is provided with stove holes and lids.

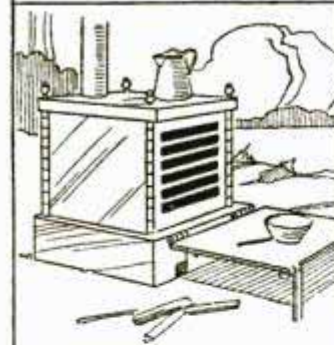


FIG. 7

COMBINED MATCH BOX AND HOLDER (Fig. 8)—The lid is hinged to the box at the back, and when the box is opened the lid is used for attaching the whole device to the wall so that it may be used as a match holder. This device is made of cardboard, and to make it rigid when extended the end walls of the box are provided with slotted extensions which may be unfolded to an upright position, while the ends of the lid are provided with arms that may be bent out to engage the slots in the side extensions.

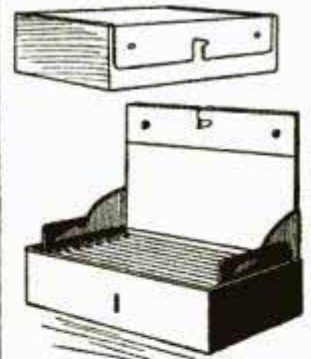


FIG. 8

REFRIGERATING COVER FOR MILK CANS (Fig. 9)—This cover is made of flexible material and is attached to the can by a strap passing around the can beneath an annular flange. The open top of the cover is drawn together by a cord.

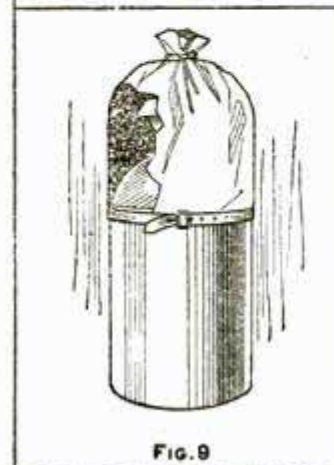


FIG. 9

FIRE KINDLER (Fig. 10)—This kindler consists simply of a series of sticks wired together in parallel position and rolled to a cylindrical form around a core of combustible material.

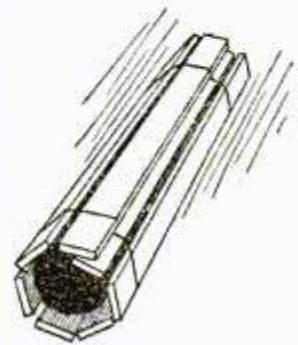


FIG. 10



Fig. 11

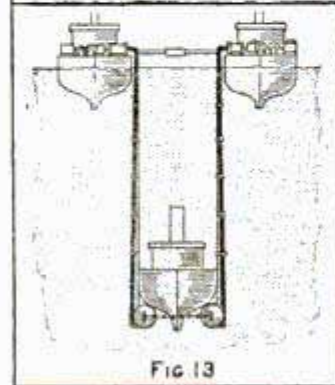


Fig. 13

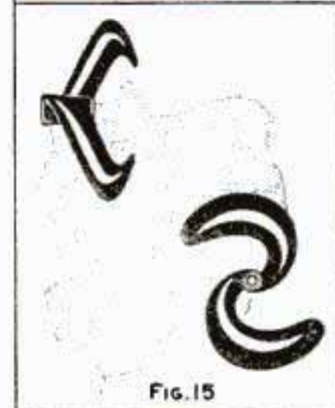


Fig. 15

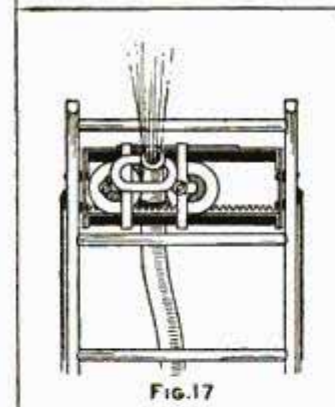


Fig. 17

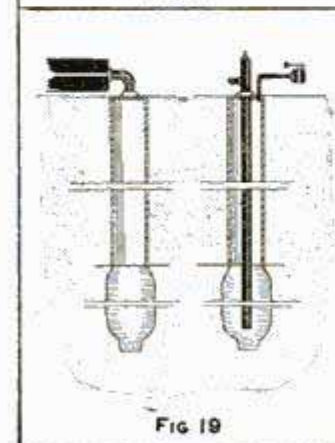


Fig. 19

HOLDER FOR NURSING BOTTLE OR TOY (Fig. 11)—The rod is adjusted to the required position and fixed with a thumbscrew. From the forked end of the rod two springs converge to a snap hook by which the bottle or toy is suspended. Around the bottle is buttoned a fabric cover which has a handle provided with spaced openings for receiving the snap hook.

COLLAPSIBLE WASHTUB (Fig. 12)—The side of the tub is made up of telescoping members with the bottom of the tub attached to the lower member. When extended for use the parts are held in position by a locking bar which is pivoted to one of the upper members and is equipped with means for attaching to each of the other members and to the flange of the bottom.

APPARATUS FOR RAISING SUNKEN VESSELS (Fig. 13)—The special feature about this apparatus is the cylinders, which, when placed under the sides of the vessel and filled with air, supply a certain amount of buoyancy and lighten the work of the raising gear. Each cylinder is equipped with apparatus by which the water is forced out when compressed air is pumped into the cylinder, the air being supplied through a jointed pipe. The lifting boats are held at a spaced distance apart by strut connections.

FLY CATCHER (Fig. 14)—This device, which is evidently intended to take the place of the ordinary swatter, consists of two wire frames pivoted together and each carrying a section of wire netting in the rectangular loop at the outer end. Each frame is carried back beyond the pivot rod and formed into a handle loop.

PROPELLER DESIGNED TO PREVENT VORTEX ACTION (Fig. 15)—This propeller is made in the form of a conical spiral, each arm being enlarged and flattened at the outer end and extended backward from the end of the hub. The attachment to the hub is such as to permit the free passage of water past the center of the propeller. The purpose of the device is to secure a worm action and prevent the formation of a vortex.

TIDE MOTOR (Fig. 16; British patent to an American)—The float is held between upright guides and is free to rise and fall with the tide. As it rises it spreads apart the ends of the two pivoted arms, and as it falls it draws the ends together. At the upper end of each arm is a quadrant gear. These quadrants drive a mechanism by which energy is stored up at each movement of the tide.

OSCILLATING HOLDER FOR FIRE HOSE (Fig. 17)—This holder is designed to be secured between the uprights of a fire ladder, is operated by cords from a lower level, and enables the fireman to fight the fire at points where it might be impossible to carry a hose. The hose is securely fastened in the truck, which gives the hose an up and down motion as it is pulled back and forth across the ladder.

TOOTHBRUSH THAT CAN BE STORED IN HANDLE (Fig. 18)—This toothbrush has a tubular handle in which the brush, after being detached and reversed, may be stored when not in use. Both the tube and the brush holder are provided with screw threads which serve to hold the parts together in either position. The two sections of screw threads on the brush holder are separated by a flange.

PROCESS FOR INCREASING FLOW IN OIL WELLS (Fig. 19)—This process consists simply in forcing gas under pressure into the oil-bearing rock through a well drilled for the purpose, the pressure thus created forcing the oil into the well that is being treated.

DEVICE FOR SAWING BOX LIDS (Fig. 20)—This device is apparently intended for sawing off one end of a cigar-box lid so that a portion of the cigars may be displayed without exposing the remainder to the action of the air. It consists of a plate with upturned tapering flanges to which a holder with sliding pivoted connection for the saw is attached.



Fig. 12

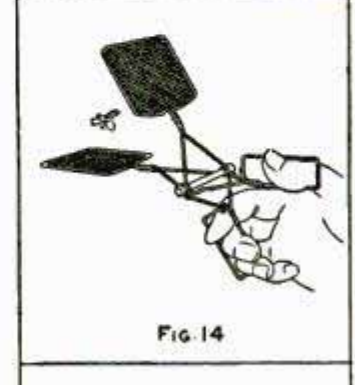


Fig. 14

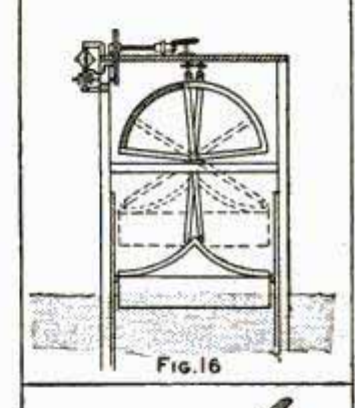


Fig. 16



Fig. 18

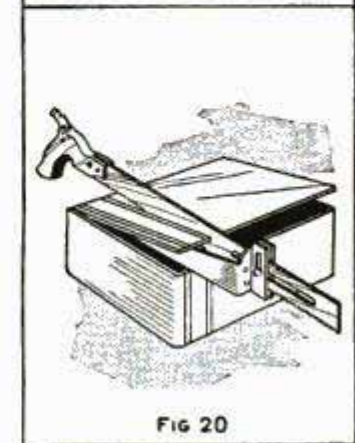
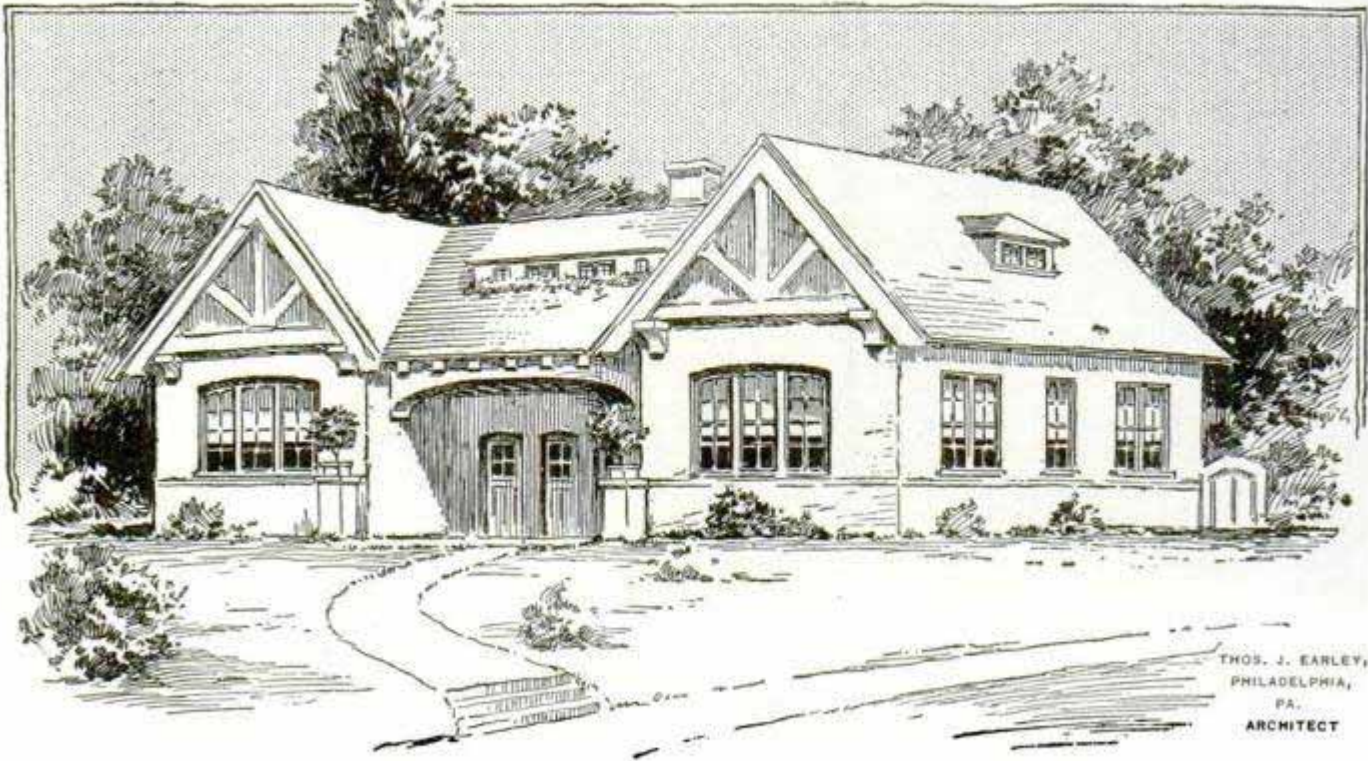


Fig. 20

A PICTURESQUE CONCRETE BUNGALOW



THIS bungalow, with its novel and convenient arrangement of rooms, is designed with the idea of securing at moderate cost the greatest amount of light and air consistent with economy in the use of space. The building is in effect a one and one-half story structure, being provided with an attic which may be utilized for bedrooms if desired. The estimated cost with this attic left unfinished, but with the stairway in place, is \$2,850. The finished portion of the building, which comprises the first floor, consists of five rooms — a living room, dining room, kitchen, and two bedrooms, with a 6 by 6½-ft. bathroom.

In spite of its size and relatively low cost, the building is of good construction. The foundations are of concrete, while the house itself is of frame construction with walls of cement stucco laid on wire lath, and with a shingle roof. Only one chimney is provided and this serves for the cook range and for the fireplace in the living room as well as for the heating plant in the basement.

The most striking feature, and one that leads naturally to the picturesque treatment of the exterior, is the ground plan. The building consists of two gabled wings connected by an intermediate structure in which are the living room and a spacious veranda. With this arrangement the living room is conveniently located with reference to all the other rooms, while the bedrooms and bath are entirely segregated from the kitchen and dining room. This arrangement also provides front exposure for the dining room and one of the bedrooms without detracting materially from the lighting and outlook of the living room. The entire floor plan is skillfully worked out. Each of the bedrooms is 13 ft. long and 12 ft. wide. This leaves an intervening space that is utilized to the utmost advantage for the location of the bathroom, for bedroom

closets that do not encroach on the bedroom spaces and for a single entrance from the living room to the bathroom and to each of the bedrooms. The same general plan is followed on the opposite side of the building where the space between the kitchen and dining room is utilized for the stairways, one of which leads to the basement and the other to the attic. An excellent feature here is the location behind the stairways of the passageway between the kitchen and dining room, thus separating this passageway from the vestibule that connects these two rooms with the living room. Each of these rooms is 13 ft. long. The dining room is 12 ft. wide, while, to allow space for the stairways, the kitchen is made only 10 ft. wide. The living room is 16 by 21 ft. and is provided with an ornamental fireplace. As will be seen from the plan, every room has good light.

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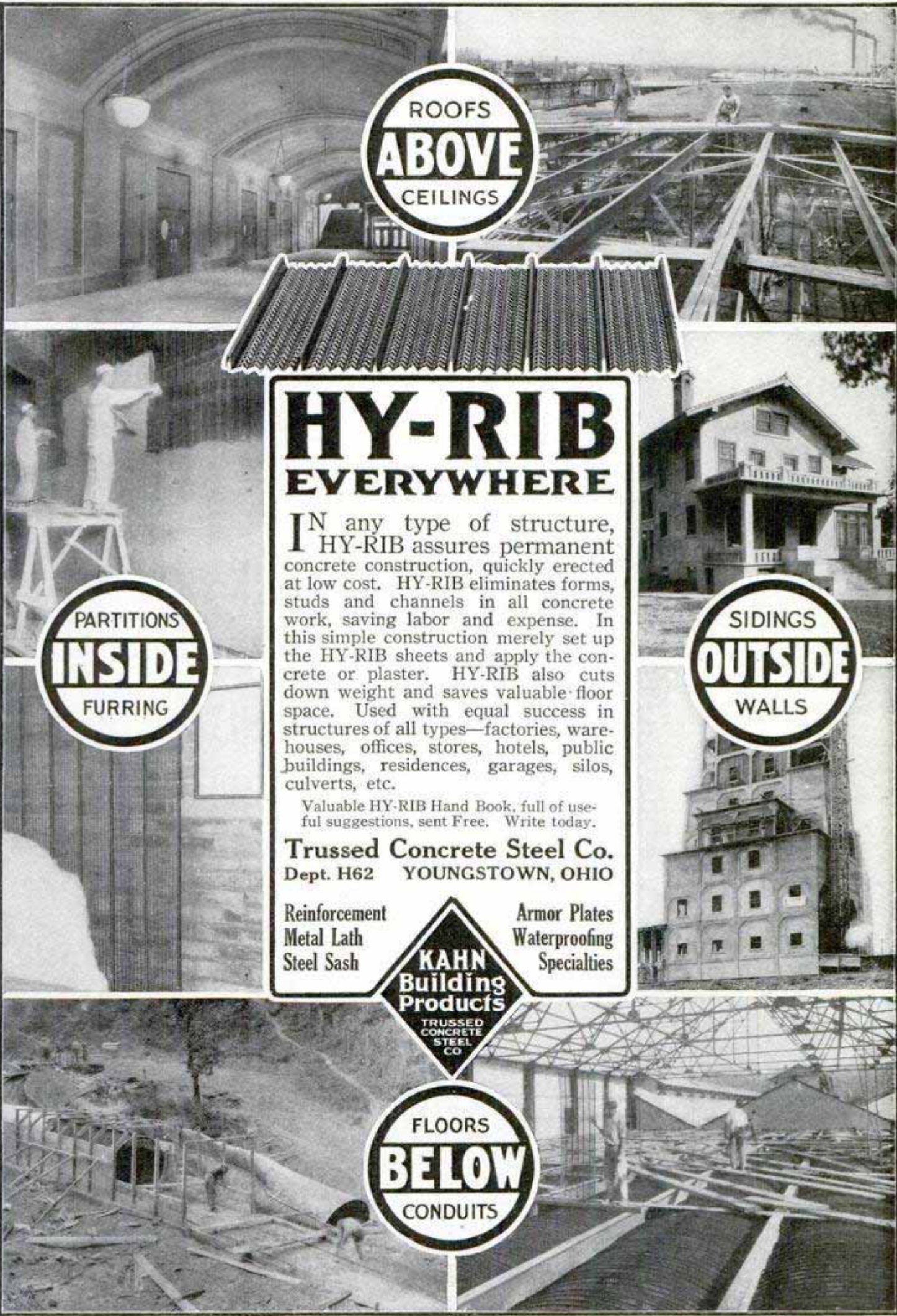
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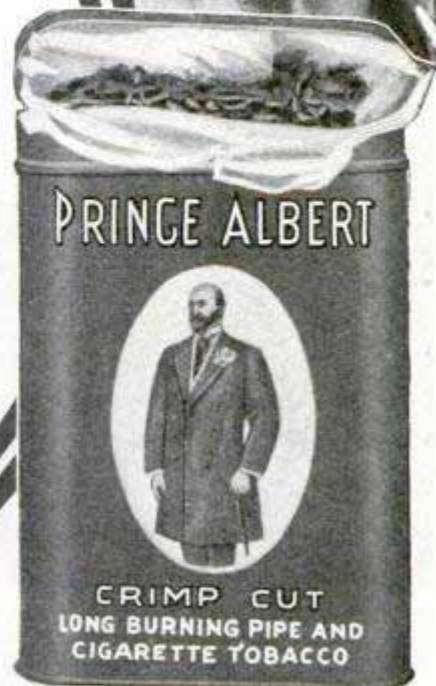
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has the bite taken out by an exclusive, patented process. It simply *can't* bite. You go and swap the change for a helping and know real tobacco. 10c for the tidy red tin or 5c for the tippy red bag. The best bet for keeping P. A. at home is the handsome glass humidor; holds a pound of P. A. and keeps it in prime smoking condition all the time. There are also pound and half-pound humidors of tin.

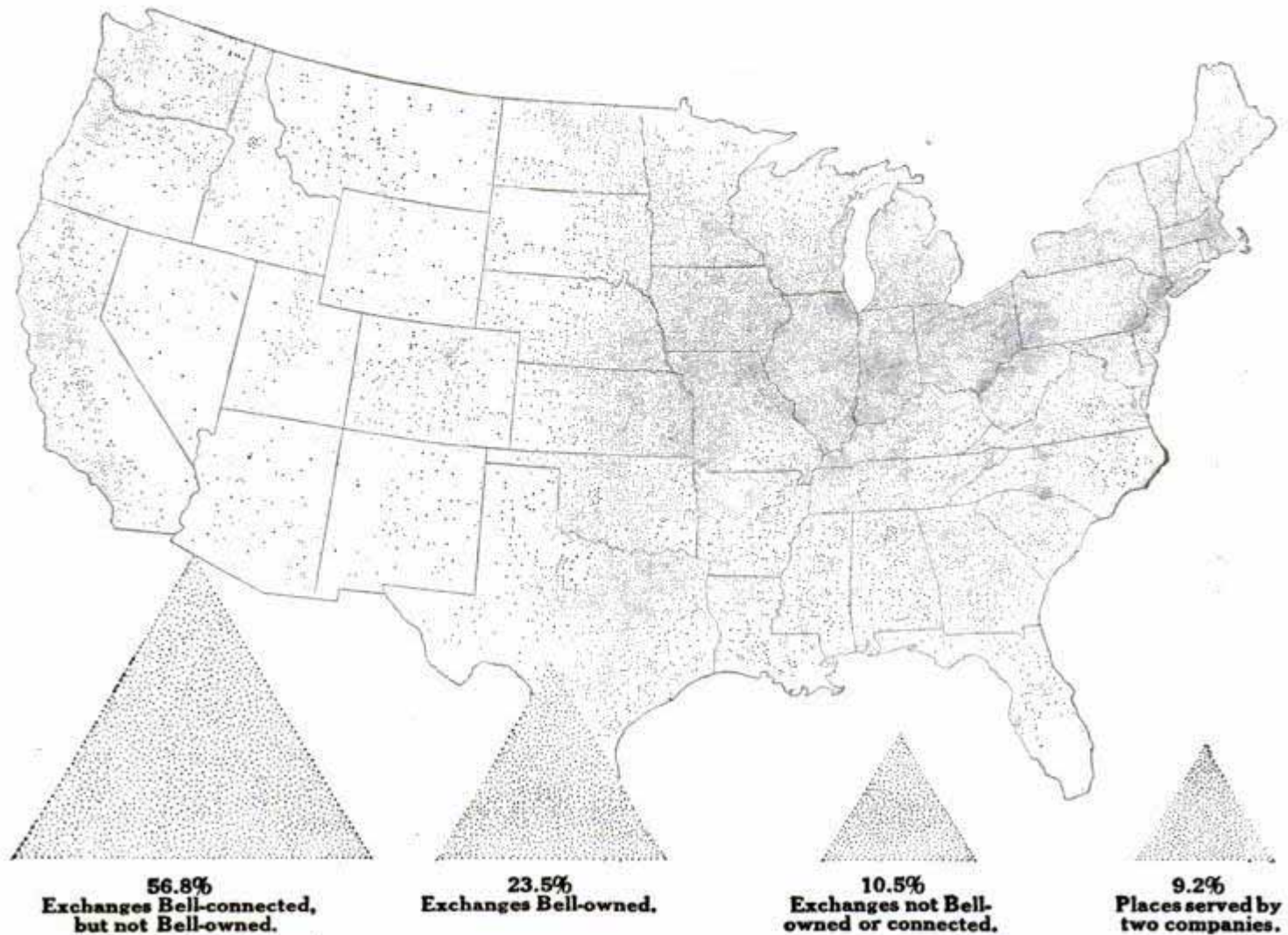
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Winston-Salem, N. C.



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Please Mention Popular Mechanics

What the Telephone Map Shows



EVERY dot on the map marks a town where there is a telephone exchange, the same sized dot being used for a large city as for a small village. Some of these exchanges are owned by the Associated Bell companies and some by independent companies. Where joined together in one system they meet the needs of each community and, with their suburban lines, reach 70,000 places and over 8,000,000 subscribers.

The pyramids show that only a minority of the exchanges are Bell-owned, and that the greater majority of the exchanges are owned by independent companies and connected with the Bell System.

At comparatively few points are there two telephone companies, and there are comparatively few exchanges, chiefly rural, which do not have outside connections.

The recent agreement between the Attorney General of the United States and the Bell System will facilitate connections between all telephone subscribers regardless of who owns the exchanges.

Over 8,000 different telephone companies have already connected their exchanges to provide universal service for the whole country.





**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES**

One Policy

One System

Universal Service

Please Mention Popular Mechanics



Johnson's Wood Dye

Johnson's Wood Dye has many uses for artisan and amateur. **Architects and contractors** specify it for coloring floors and woodwork in new buildings. With it inexpensive soft woods may be finished so they are as beautiful as hard wood. **Painters and decorators** use it with equal satisfaction on new and old woodwork of all kinds. It is economical, dries immediately and is very easy to apply. **Housewives** delight in it for doing over old furniture—for coloring reed and wicker baskets—and renewing summer furniture. **Manual training teachers and pupils** use it for finishing their models. **Upholsterers and furniture repairers** all use "Johnson's" for a faultless Wood Dye. Made in 17 standard shades including Mahogany, Early English, Mission, Fumed, Golden Oak, etc.

Johnson's Prepared Wax

Johnson's Prepared Wax is a complete finish and polish to use over Johnson's Wood Dye. It gives perfect results over any finish—varnish, shellac or oil—for floors, woodwork, furniture, pianos, automobile bodies, etc.—also for linoleum, leather goods and metals. It imparts a beautiful, velvet-like protecting finish which does not become sticky, tacky or greasy looking in the hottest weather or from the heat of the body. **For floors** Johnson's Prepared Wax is the only proper finish. It does not show scratches or heel marks and is easily kept in perfect condition. **For pianos** of finest mahogany and expensive imported furniture, it is unsurpassed as a polish.

Automobile Bodies

For polishing Automobile Bodies nothing equals Johnson's Prepared Wax. It preserves and protects the varnish from wear and weather. It sheds water, does not gather dust and is easily cleaned. The hard, dry, high gloss holds its luster indefinitely.

Ask your paint, hardware or drug dealer for a free copy of our 25c book, "The Proper Treatment for Floors, Woodwork and Furniture." If he hasn't a copy, write us.

**S. C. Johnson
& Son**

"The Wood Finishing
Authorities"

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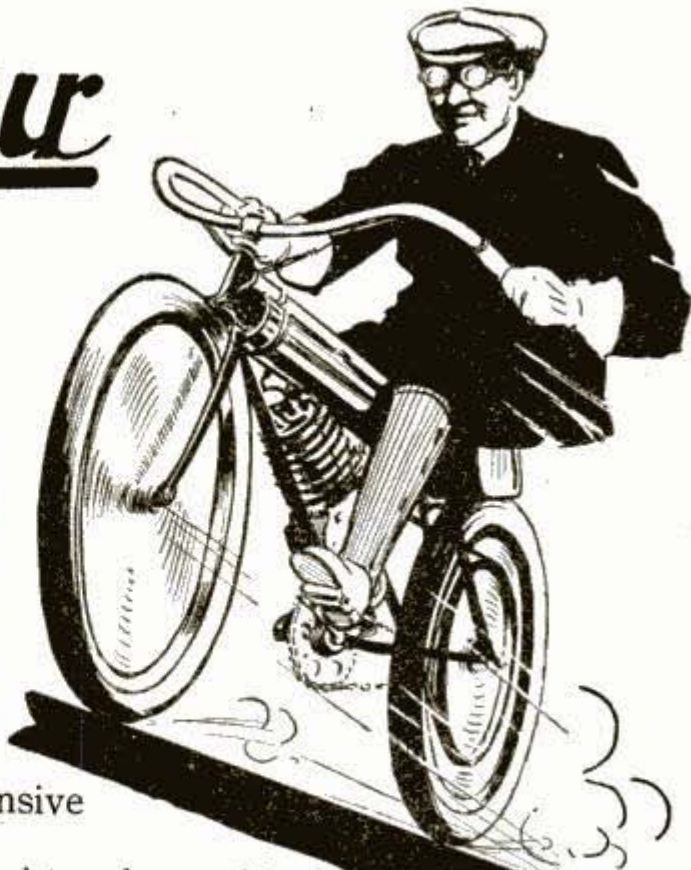


Polish
Your Woodwork
With Johnson's
Prepared Wax



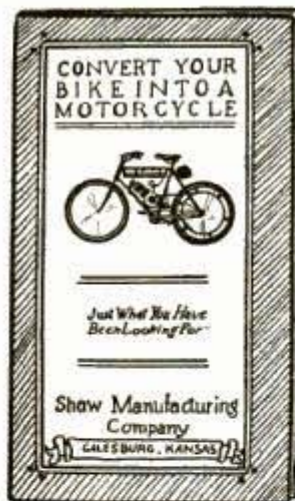
There is Nothing equal to
Johnson's Prepared Wax
for polishing Automobile bodies

Make Your "Bike" a Motorcycle



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!



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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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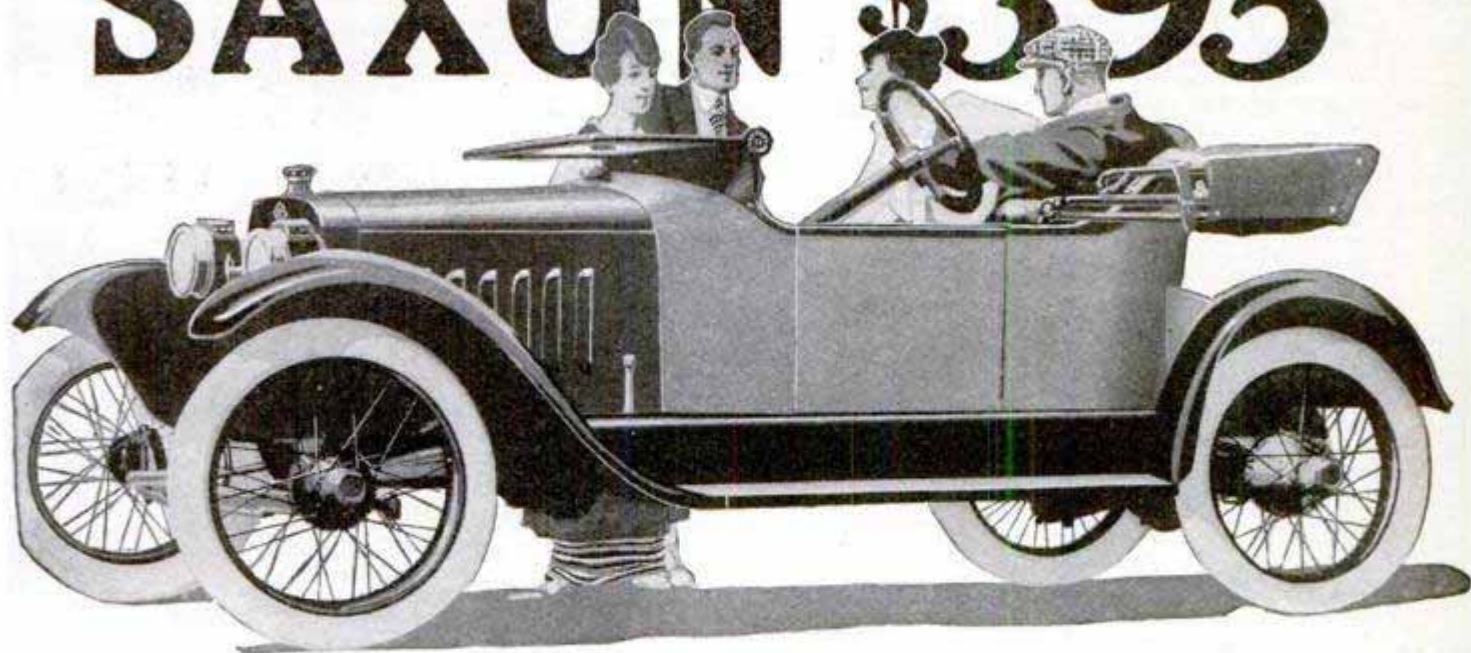
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Several men of big reputation in the costly car field got together and decided to build just such a car as you, and hundreds like you, have been waiting for—a good looking, strongly made, durable car of low first cost and low upkeep expense.

For months they schemed and planned. At last they triumphed. The car of your dreams became a reality.

They named it the "SAXON." Today over 5000 men are riding behind its wheel. One of these splendid cars has just finished a coast to coast trip—3389 miles in 30 days.

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Many of the features of the SAXON at \$395 you will also find in the costly big cars. The motor is lighter and smaller, it is true, but of great sturdiness and power.

The car is of standard design throughout. Note these features: sliding gear transmission, beautiful streamline body, automatic spark control, honey-comb radiator, dry plate clutch and wire wheels.

And there's room a-plenty in the seat for two big people. Of all cars the SAXON costs the least to maintain. *Records prove this.*

You Be the Cross Examiner

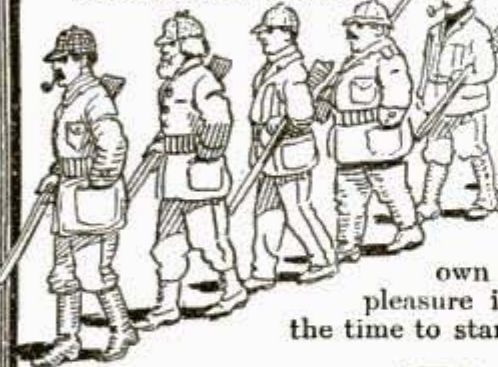
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You won't want to send this machine back after you have seen it and tried it. You can't imagine the perfection of these machines till you see one, and the price is \$70.20 less than the catalogue price, and it is guaranteed just as if you paid \$100.

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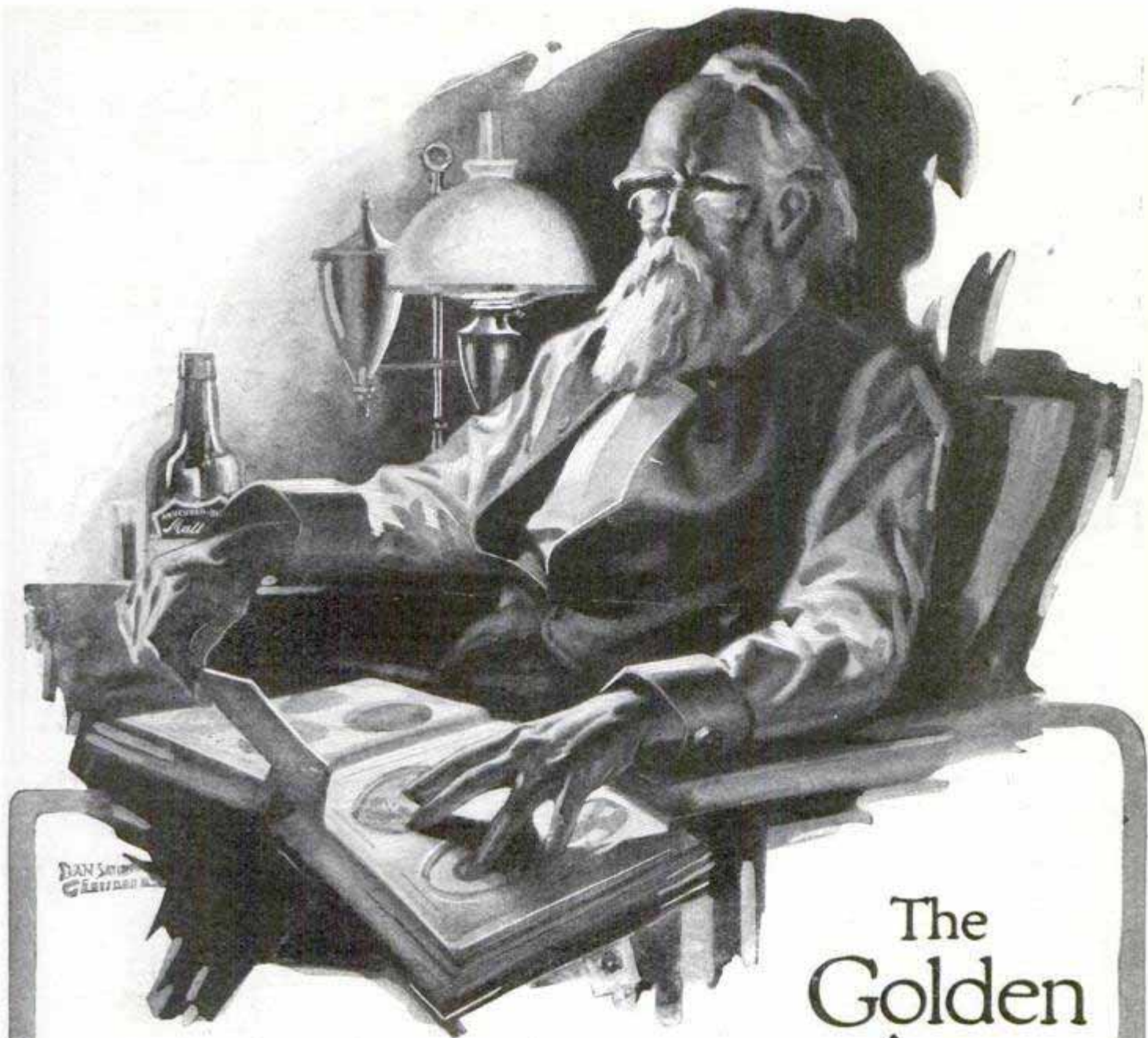
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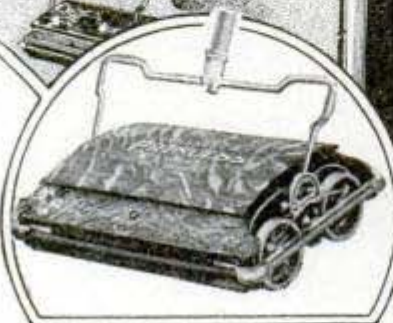
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One day Talmage stopped off at a little town in Illinois. He rushed into the station and looked for the operator. A young man came forward.

"Where is the operator?" Talmage roared.

The young fellow came modestly to the fore and

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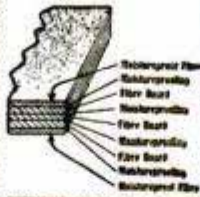
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vouchsafed: "I am the agent."

"Where is your desk?" bellowed the superintendent.

"I have no desk," replied the young man.

"You the agent here and you have no desk?"

"Yes, I am the agent and I have no desk!"

"Well, why haven't you a desk?"

"Because I don't need a desk. My business is to get other people to do the work."

Talmage started, stared, stammered, stuck. He ex-



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No. 1G772. A comfortable large rocker made of seasoned hardwood, American quartered oak finish. Upholstered in "Imperial" leather. Strongly built, stout runners, carved front posts and back panels.

50c Per Month
Seat has full spring construction and ruffled edge. Offered at a price that causes people to wonder how we do it.

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Oldest and Biggest Sixty years in business—sixty years of success. Started before the name of Lincoln became famous, passed through wars, panics, floods and epidemics, but built upon the strong foundation of honesty and square dealing—gaining the confidence of the people, we stand today without a rival. Sixty years the leaders. Today our lead is far greater than ever before. Our record breaking money-saving sale in the celebration of this Sixtieth Anniversary is an epoch maker in merchandising. You should take advantage of this rare opportunity to furnish your home.

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The Specially advertised items and prices shown here are a part of our great Sixtieth Anniversary Souvenir Offering. If you want any of them—don't bother sending any money with your order—just tell us at once which one you want—no red tape about references or first payments—but we can only afford to send one of these specially advertised Sixtieth Anniversary items at these terms and prices to each family. But when you receive your Bargain Book you may select any amount from \$5 to \$500 worth on our broad, liberal credit terms and money-saving prices—no restrictions whatever.

You can pay cash if you wish to but there is not a single penny saved by doing so, because our prices are rock bottom—prices made possible only by our immense \$10,000,000 purchasing power—and enormous output. So, no matter what you need for the home, get it now.

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No matter who you are—or how small your income—or where you live, your credit is good at Hartman's—on an open charge account without any red tape whatever. There are no extra charges, no mortgages to sign, no interest to pay—nor do we ask for any security. Hartman's transactions with you are strictly confidential, no references are asked—no embarrassment. The Hartman modern credit system is free from all objectionable features—you'll like it when you know all about it. With long credit as easy to get as it is from Hartman there is no longer any reason for anyone, even of limited income, to live in a meagerly furnished home.

Mammoth Souvenir Bargain Book

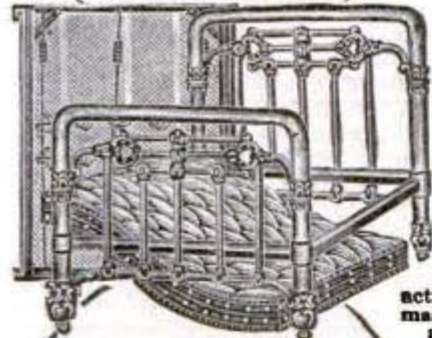
This wonderful Credit Bargain Book is a fitting souvenir for our Sixtieth Anniversary and should be in the possession of every home lover. It shows you how the house of Hartman not only brought the necessities, but the comforts and even luxuries heretofore only found in the homes of the rich and prosperous, within the reach of those of limited means by their remarkable low prices and most liberal easy payment plan.

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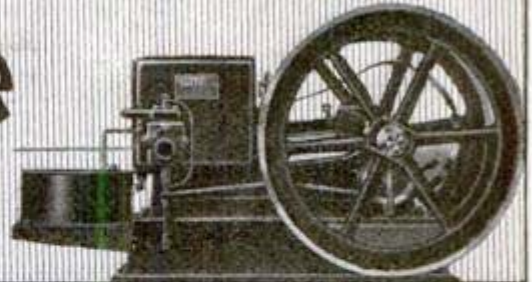
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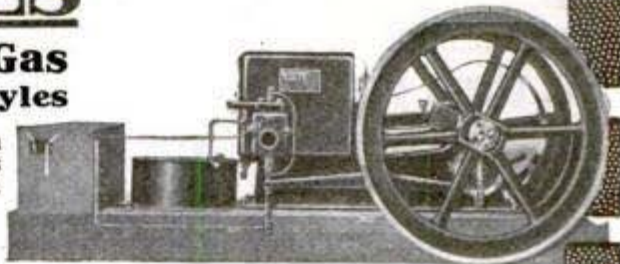
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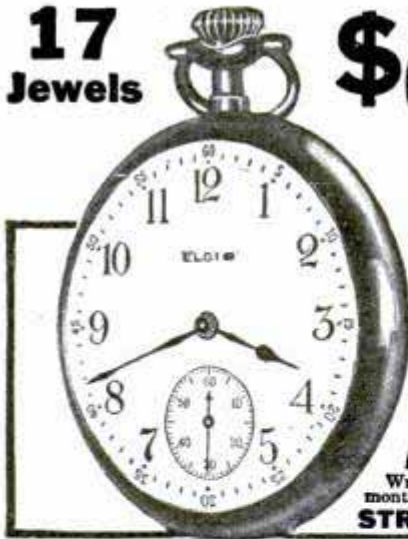
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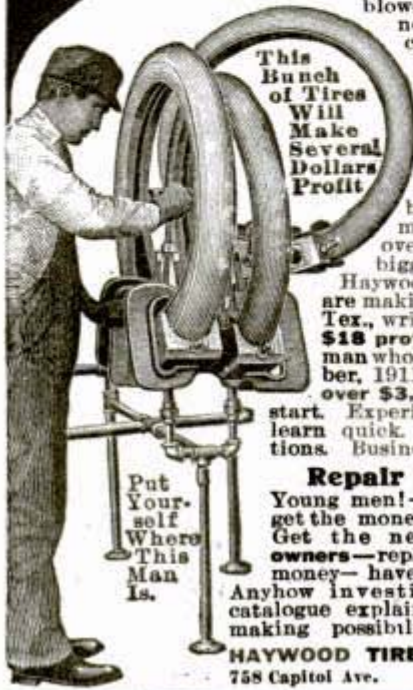
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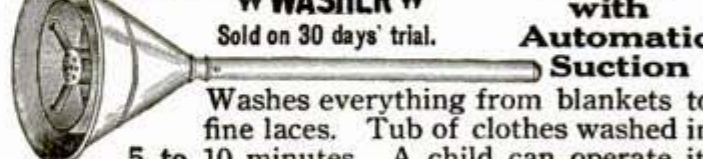
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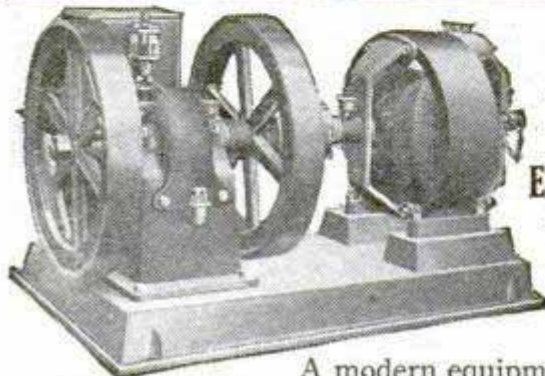
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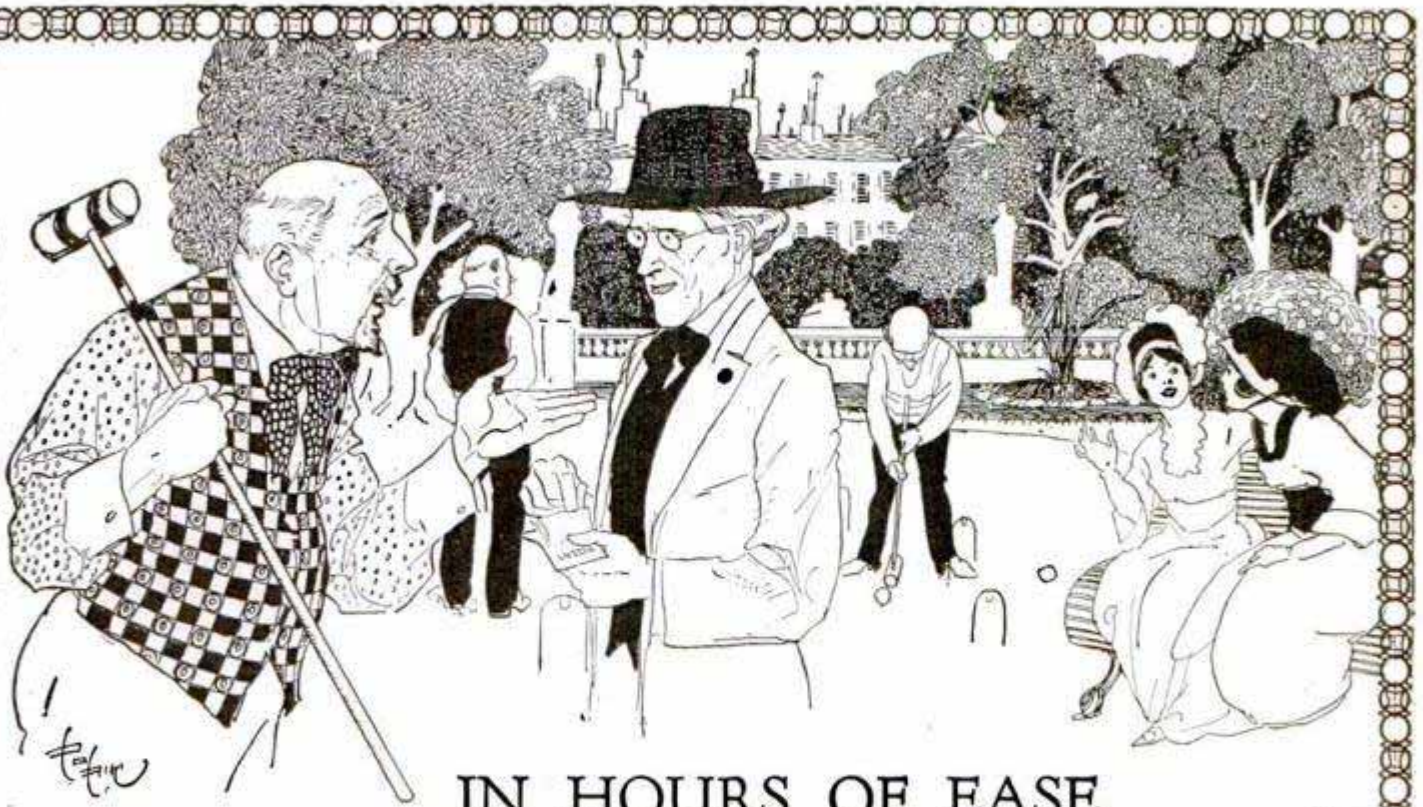
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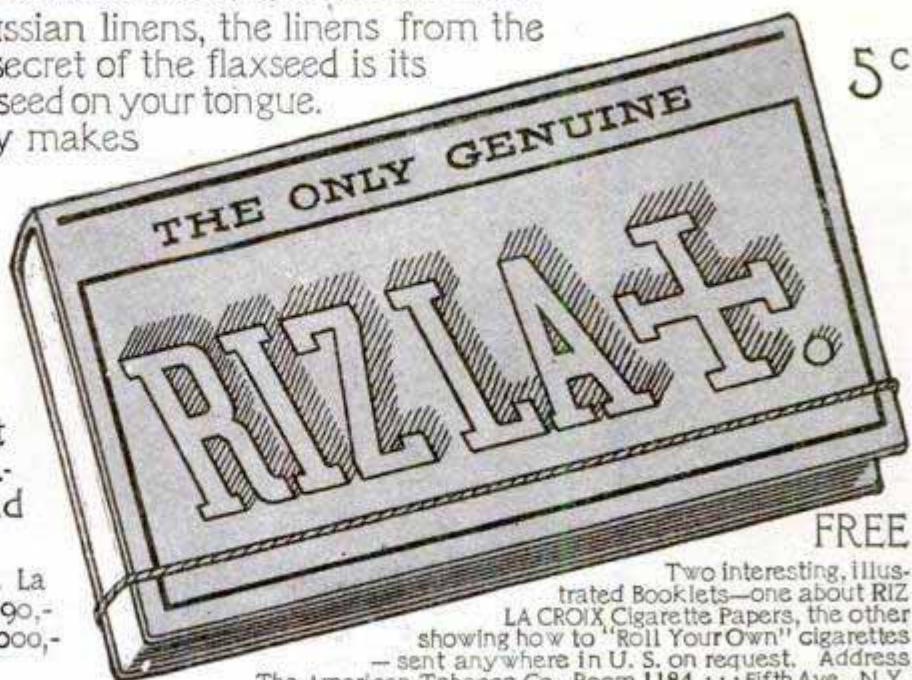
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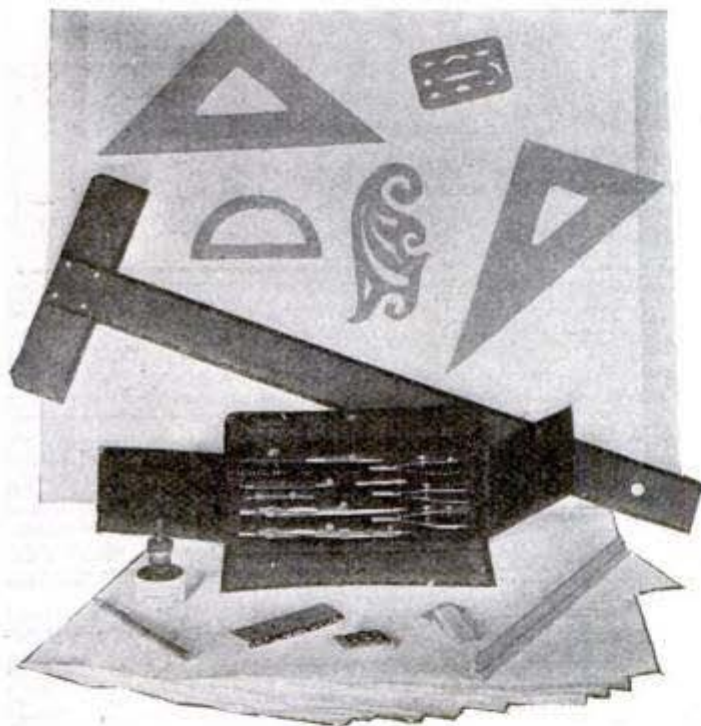


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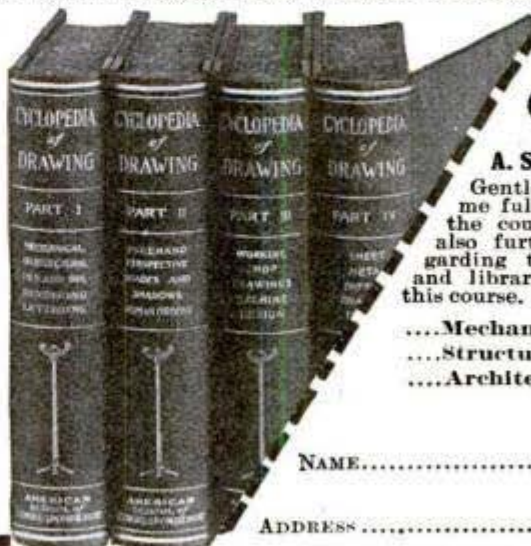


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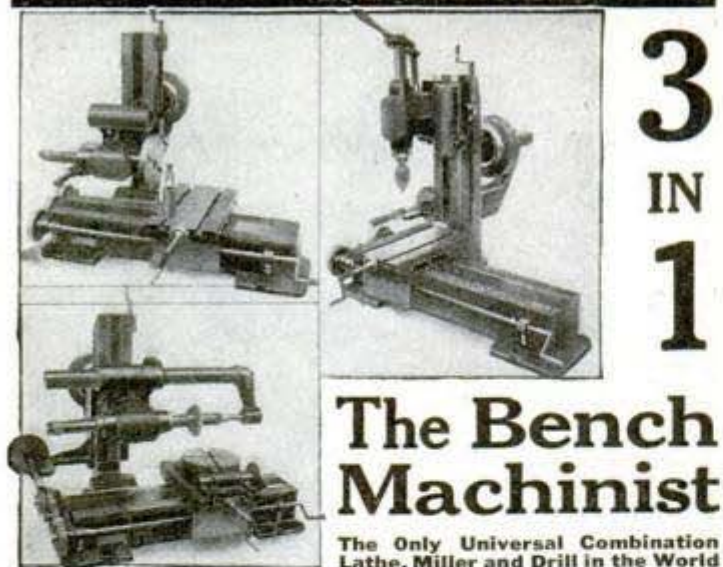
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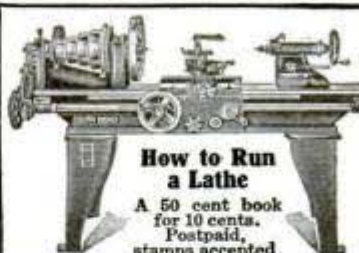
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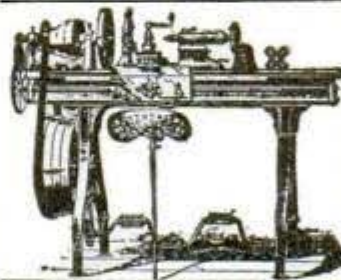
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Back of this offer is the positive knowledge that the

"Clipper" Belt Lacer

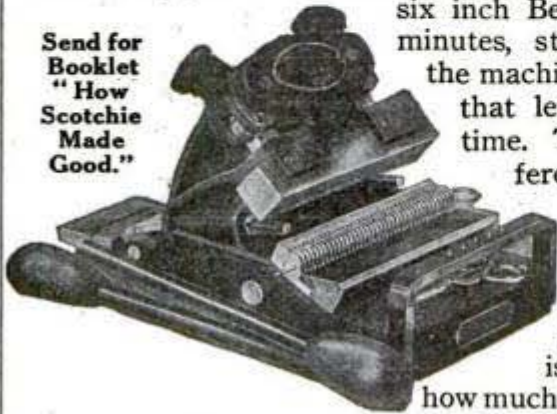
TRADE MARK LACES IN THREE MINUTES

will do all we claim for it. You will not want to return it after a fair trial as it

Saves Money for You

The Clipper Belt Lacer will lace a six inch Belt in 3 minutes, stopping the machine only that length of time. The difference in time consumed lacing by hand is worth how much to you?

Send for Booklet "How Scotchie Made Good."



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CRESCENT Wood Working Machines

are the kind you want for hard continuous service. Send for catalog today. Band saws, saw tables, planers, planers and matchers, disk grinders, borers, swing cut off saws, variety wood workers, Universal wood workers.

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You can do it with a Williamson New-feed Underfeed furnace or boiler. And over 25,000 users have proved it. With the Underfeed you can use cheap slack soft coal or pea and buckwheat sizes of hard coal and secure better, even heat than from highest-priced coal, with no smoke, soot, smell, clinkers and dirt. Adapted to warm air, steam and hot water. Write for full information. It will pay you well.

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1914 Champion Racer
Designed by Harry Schultz,
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You build it - - - \$2.50
We build it - - - \$7.50



"The Rifle that will get him"

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REPEATING RIFLE
Model 27

Powerful,
Accurate,
Safe for
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RIFLE WITH ROUND BARREL

.25 R.F. Only \$13.15

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IN .25 Rim-Fire Calibre

(8 shots), it is the only repeater made for the splendid cartridge illustrated — a cartridge twice as powerful as any .22 R. F. cartridge. It is often used successfully on deer; accurate enough for fine target work, and so cheap you can shoot it freely without counting the expenses.

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This rifle has the quick, smooth-working "pump" action and the Marlin solid-top and side-ejector for rapid, accurate firing, increased safety and convenience. It has take down construction; action parts removable without tools; it is easy to keep clean. Has Ivory Bead front sight and Rocky Mountain rear sight. Price, with 24-inch octagon Special Smokeless Steel barrel, \$15.00.

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Please Mention Popular Mechanics



As necessary as a saw or a hammer in your tool kit

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Quick, clean-cutting stones, that bring the edge to the tool with just a few strokes.

And they cut the edge on the tool—They don't merely rub it on.

Every stone positively uniform in grit and hardness, holds its shape, shows long life.

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Change the head.



Put in the jaws that are exactly right for the job

There's no need to carry around the weight of 5 extra handles in order to have the right tool. KIT Multiple-head Plier heads make tin snips, pipe wrenches, pruning shears, leather punch, alligator wrench, and others—fifteen combinations in all.

Every head inspected and tested at factory and guaranteed

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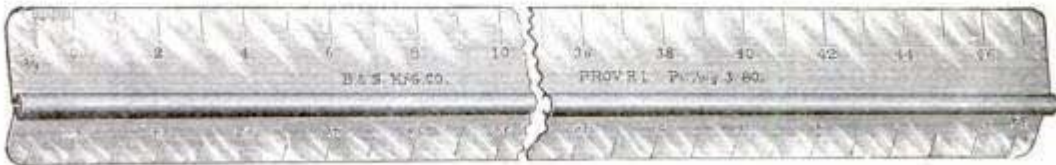


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THE MASTER SLIDE RULE,

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.

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47 types and sizes

Bulldog



No. 104½.
¼ in. to 2 in. pipe

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Five Adjustments

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With Double Ratchet every crank movement, forward and back, causes the drill to cut continuously—

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A Bit of toughest steel for the tough, knotty jobs. Trip hammer forged out of one solid piece of steel and tempered to perfection.

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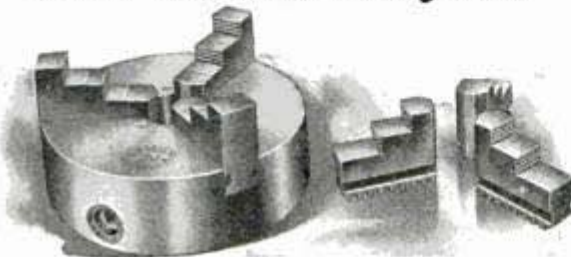
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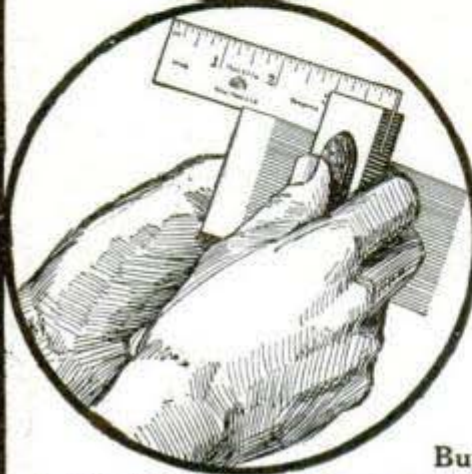


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This will keep razor so keen that you'll never gouge your face or fail of a smooth shave. Don't scoff.

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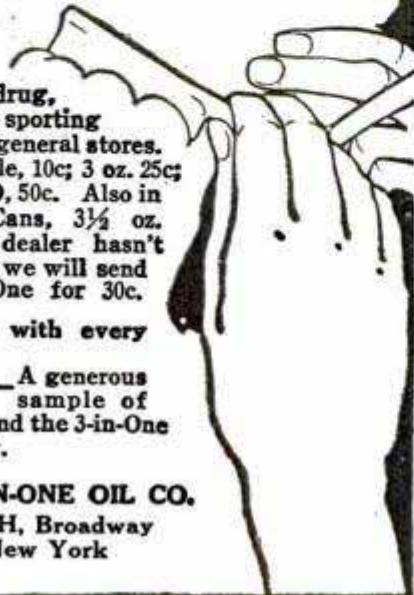
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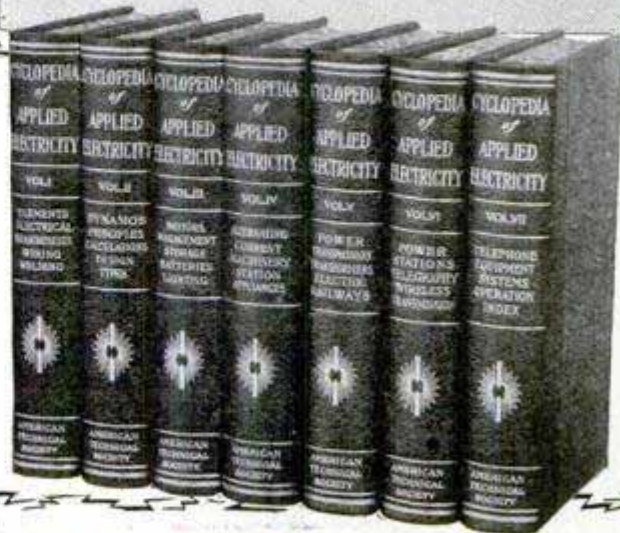
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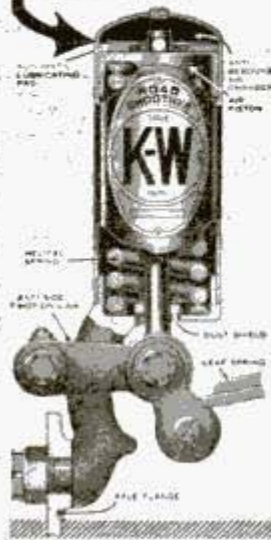
Beware of Imitations. There is only one Road Smoother. Look for the name: **K-W ROAD SMOOTHER**

**\$25 SET OF FOUR
ONE FOR EACH WHEEL**

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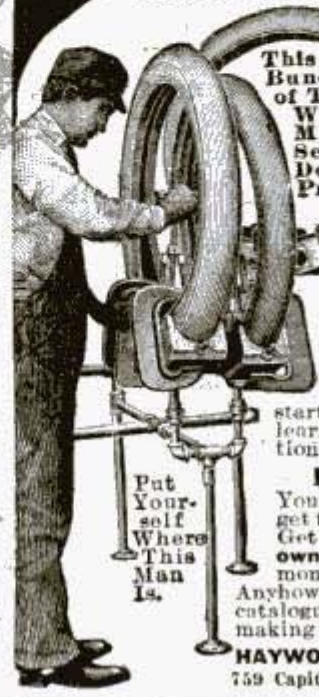
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Garage \$49.50

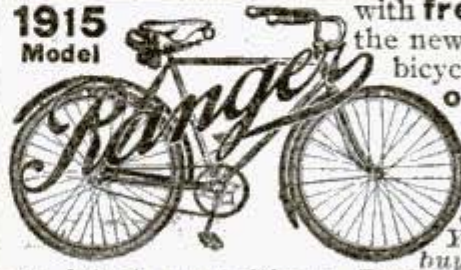
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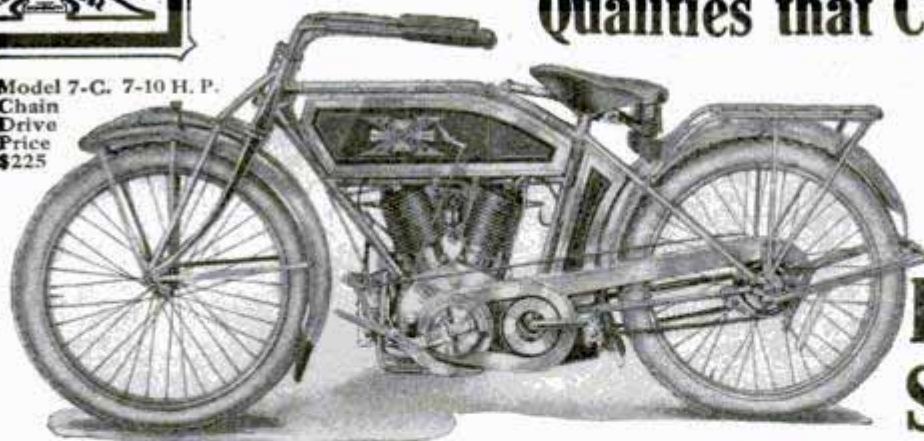
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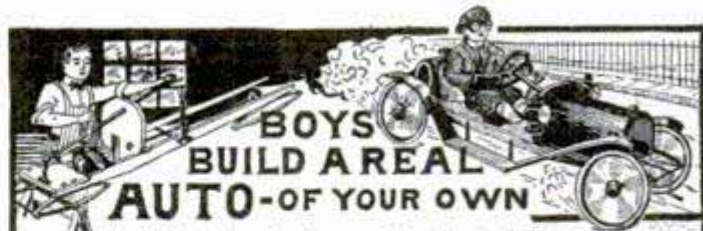
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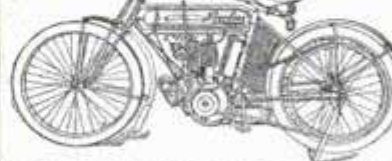
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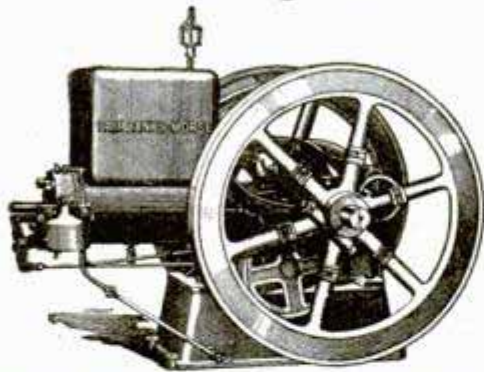
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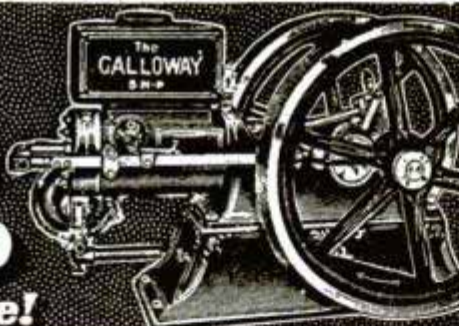
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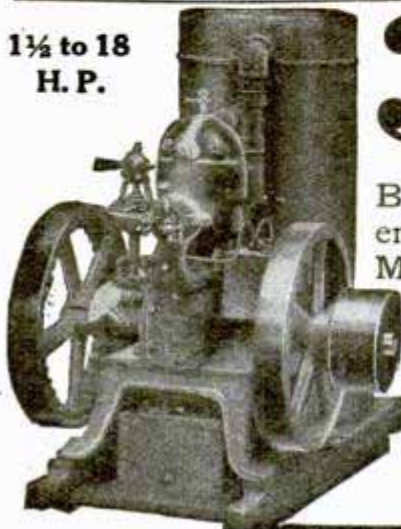


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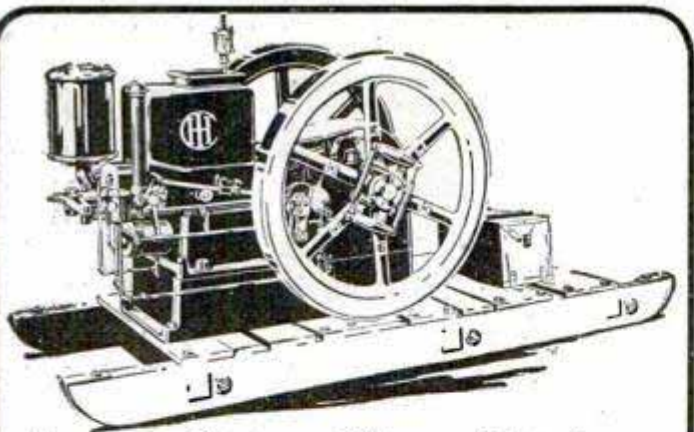
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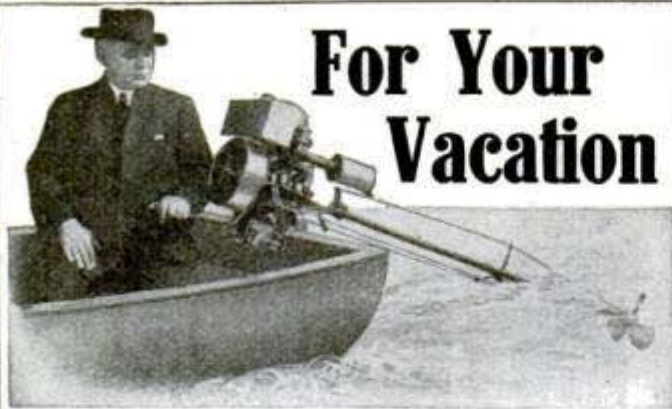
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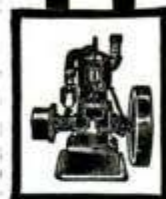


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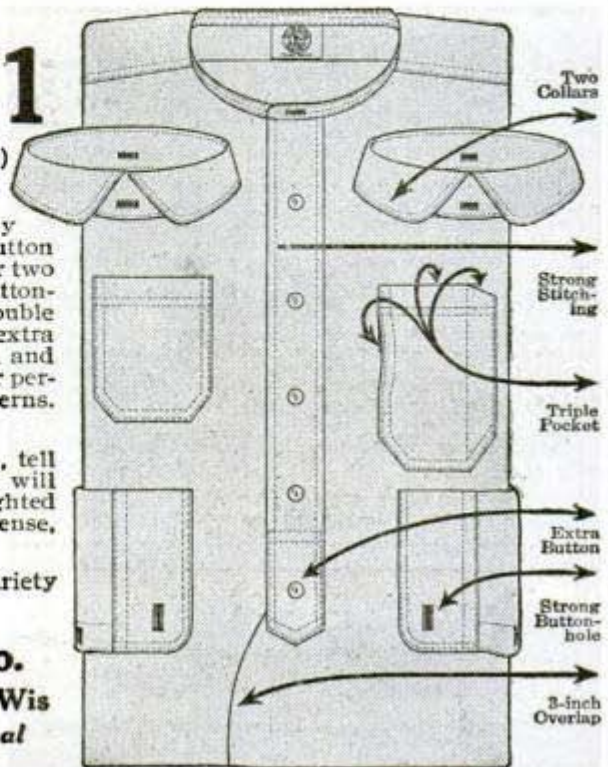
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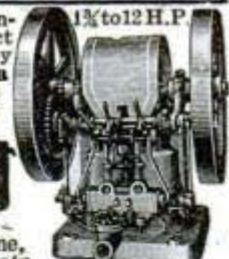
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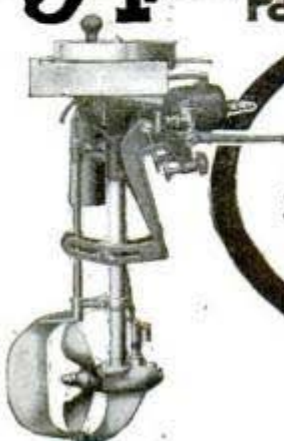
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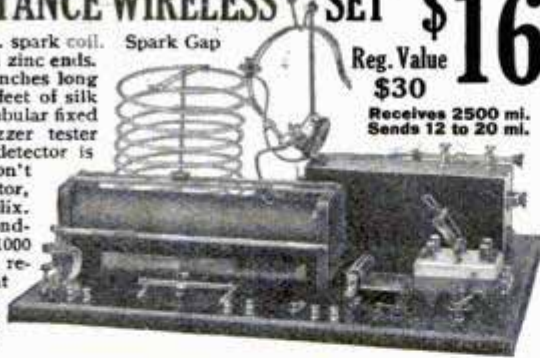
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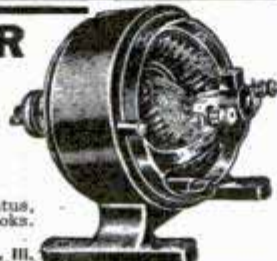
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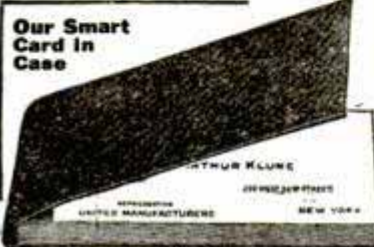
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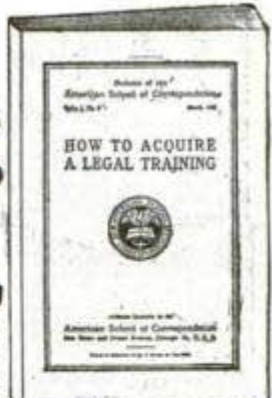
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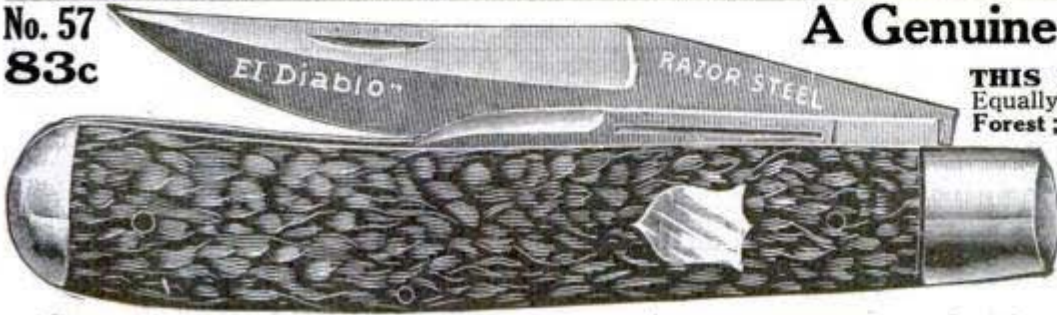
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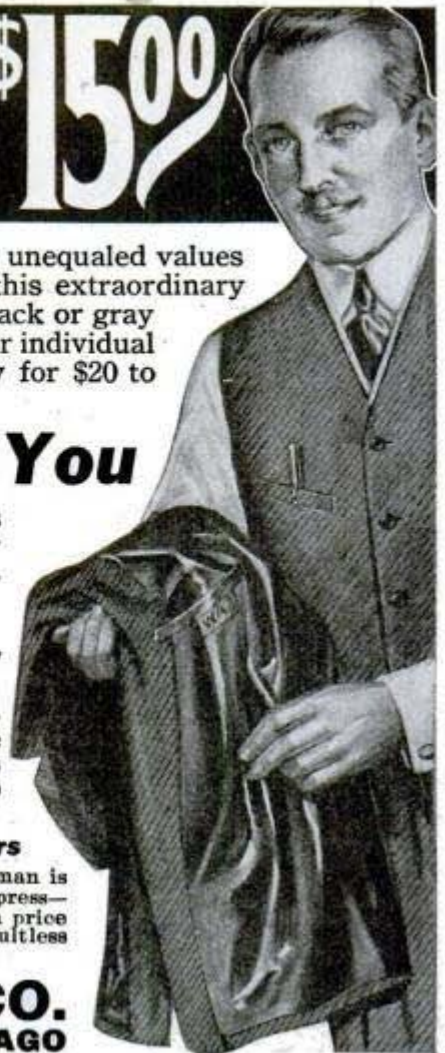
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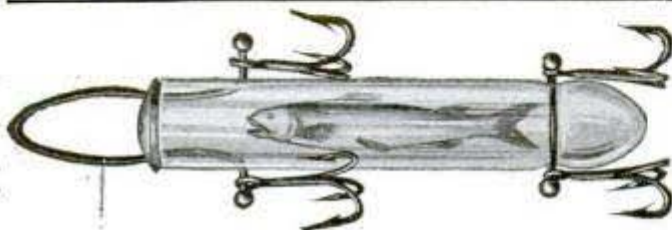
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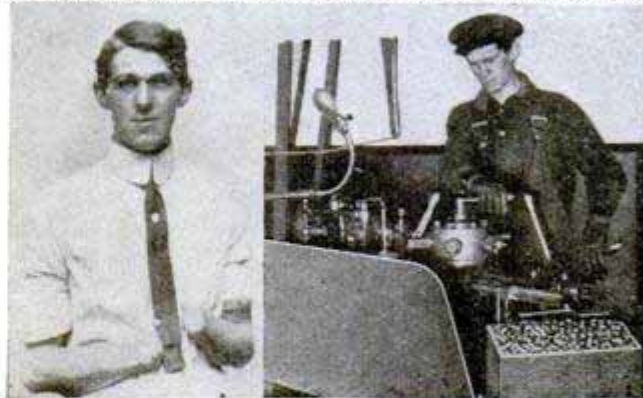
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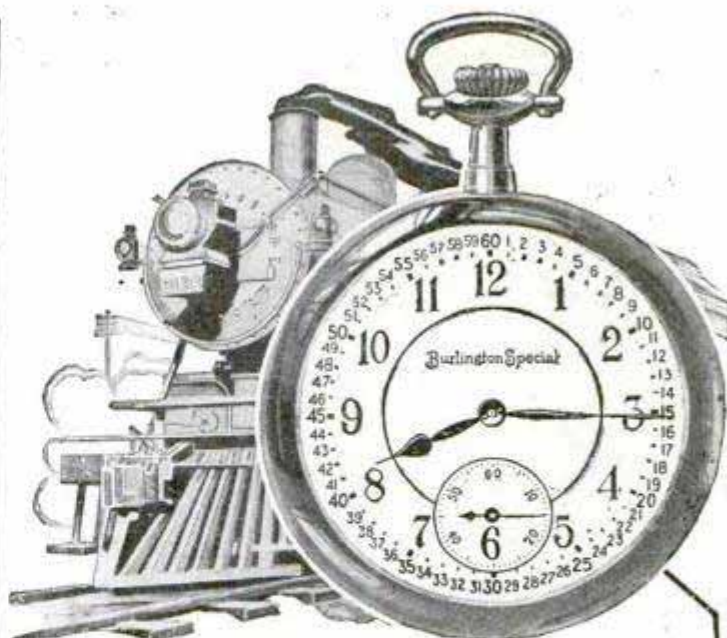
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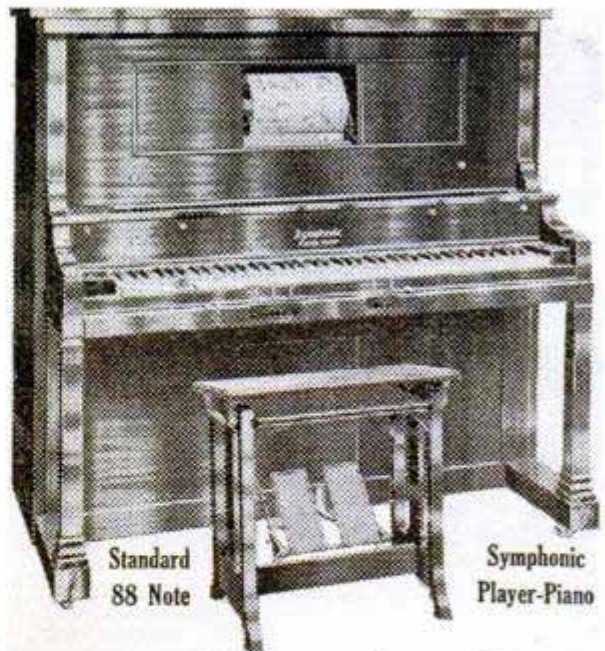
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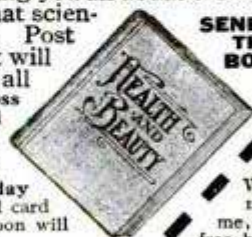
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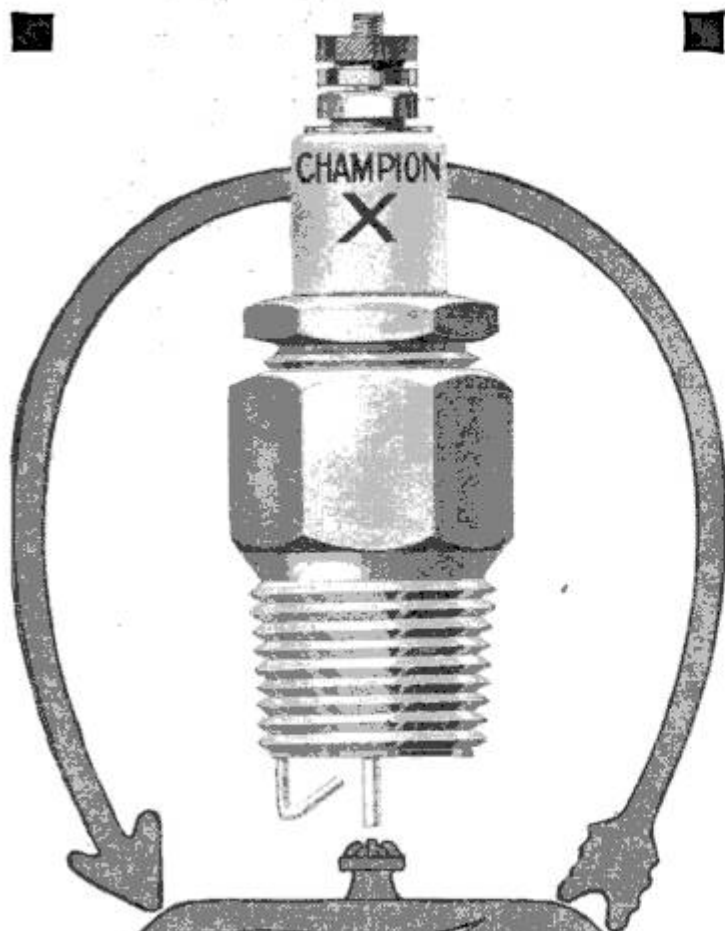
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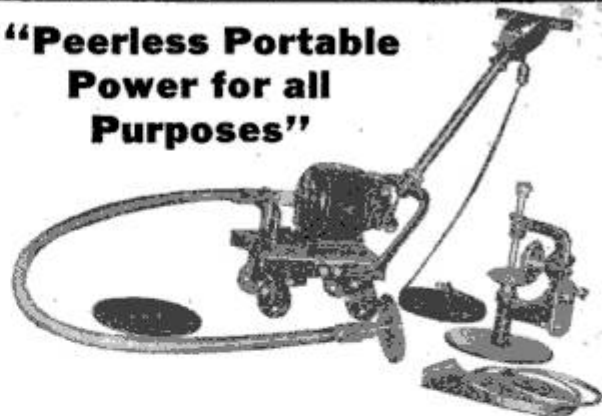
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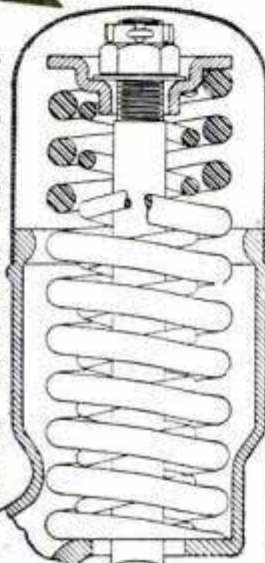
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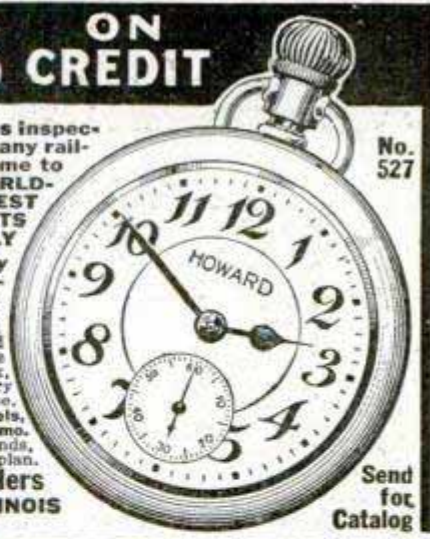
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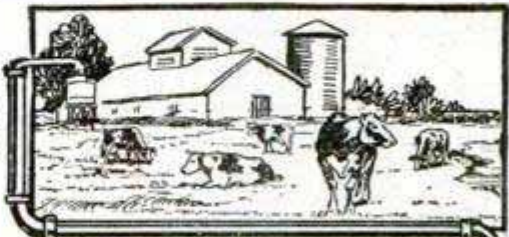
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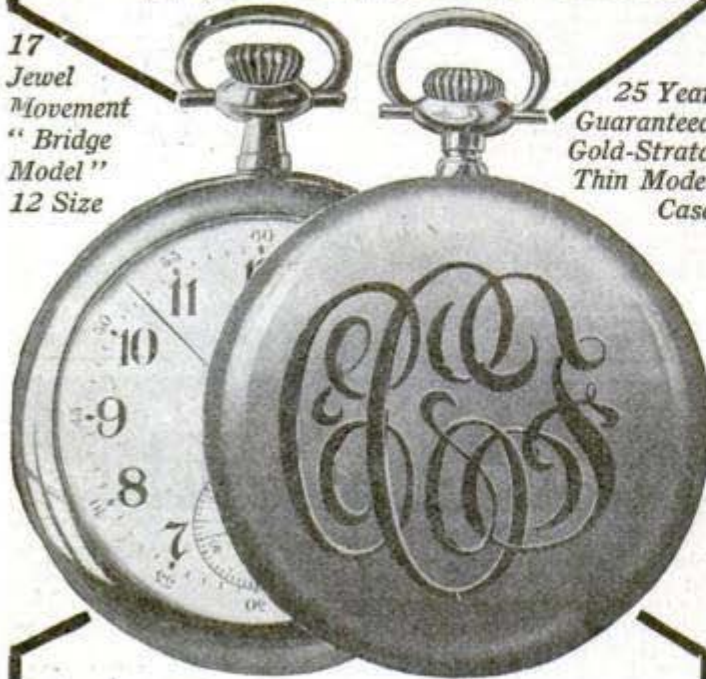
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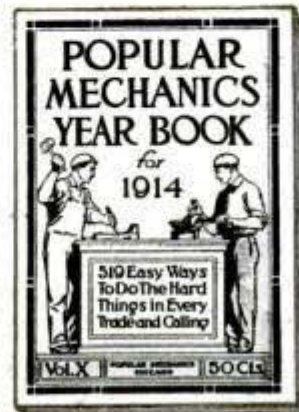
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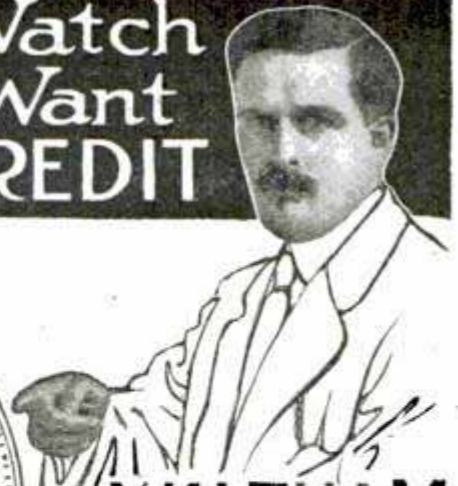
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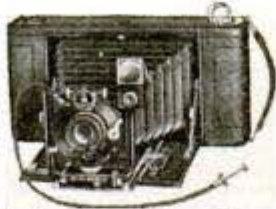
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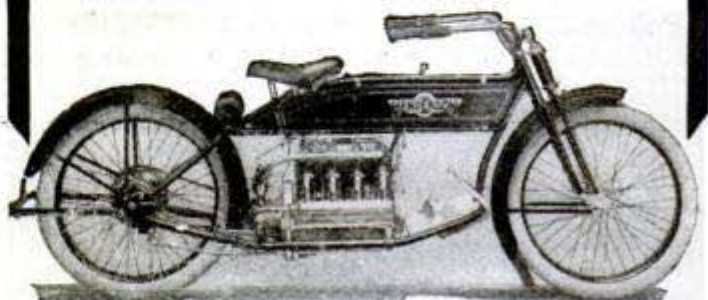
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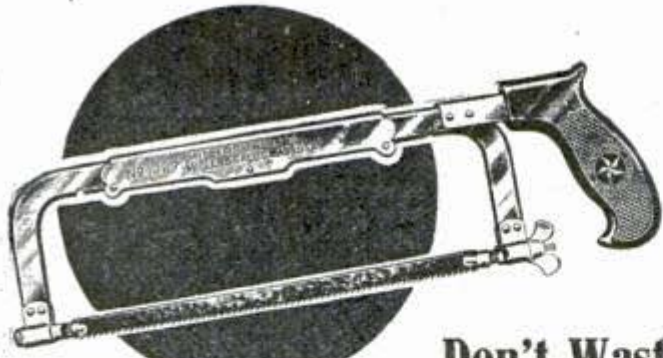
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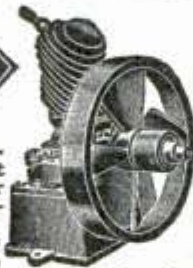
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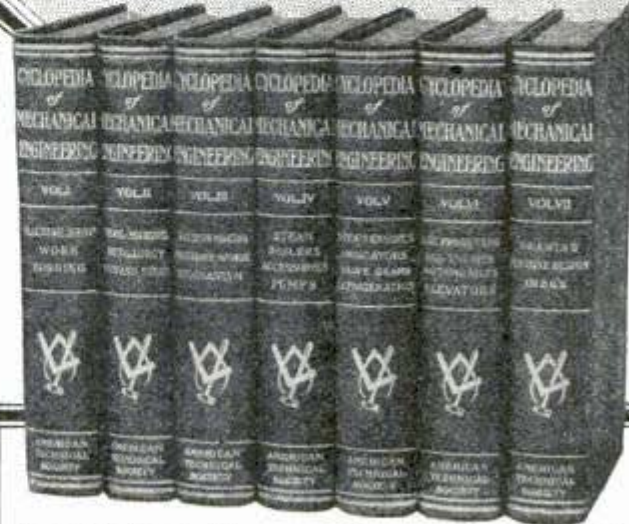
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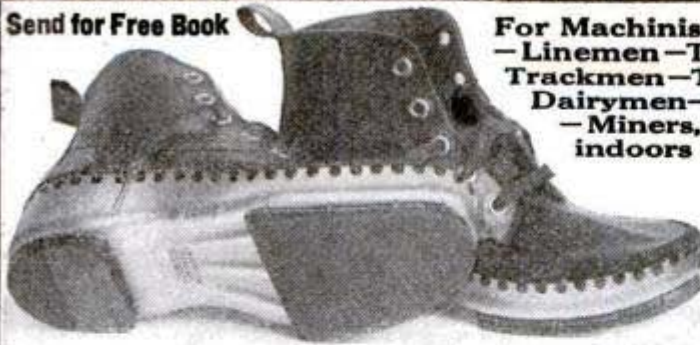
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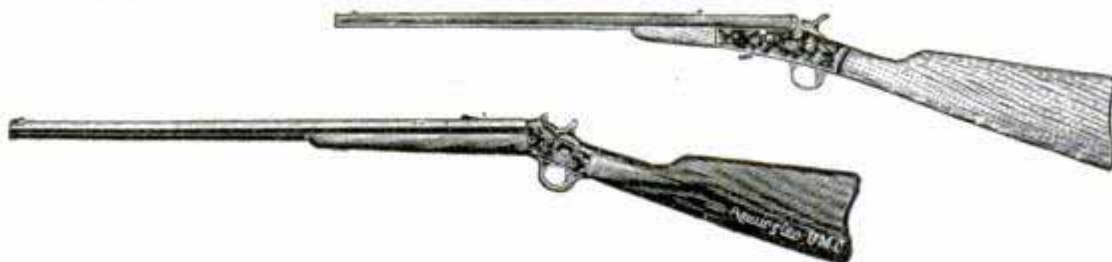
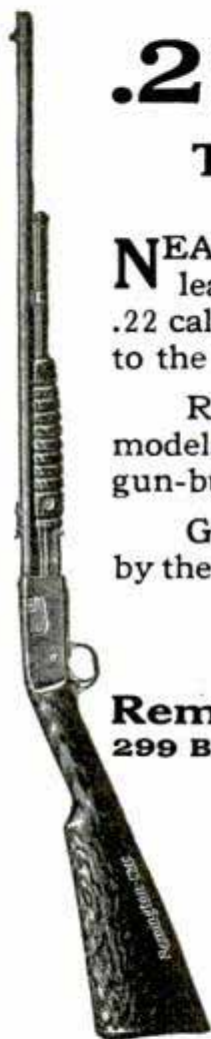
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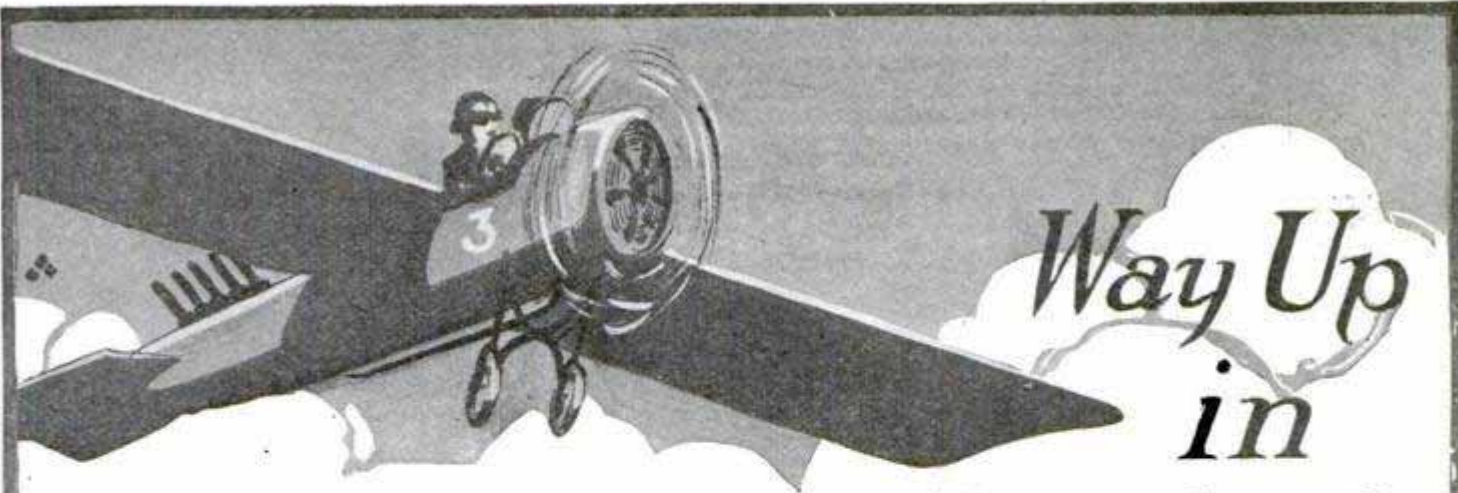
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