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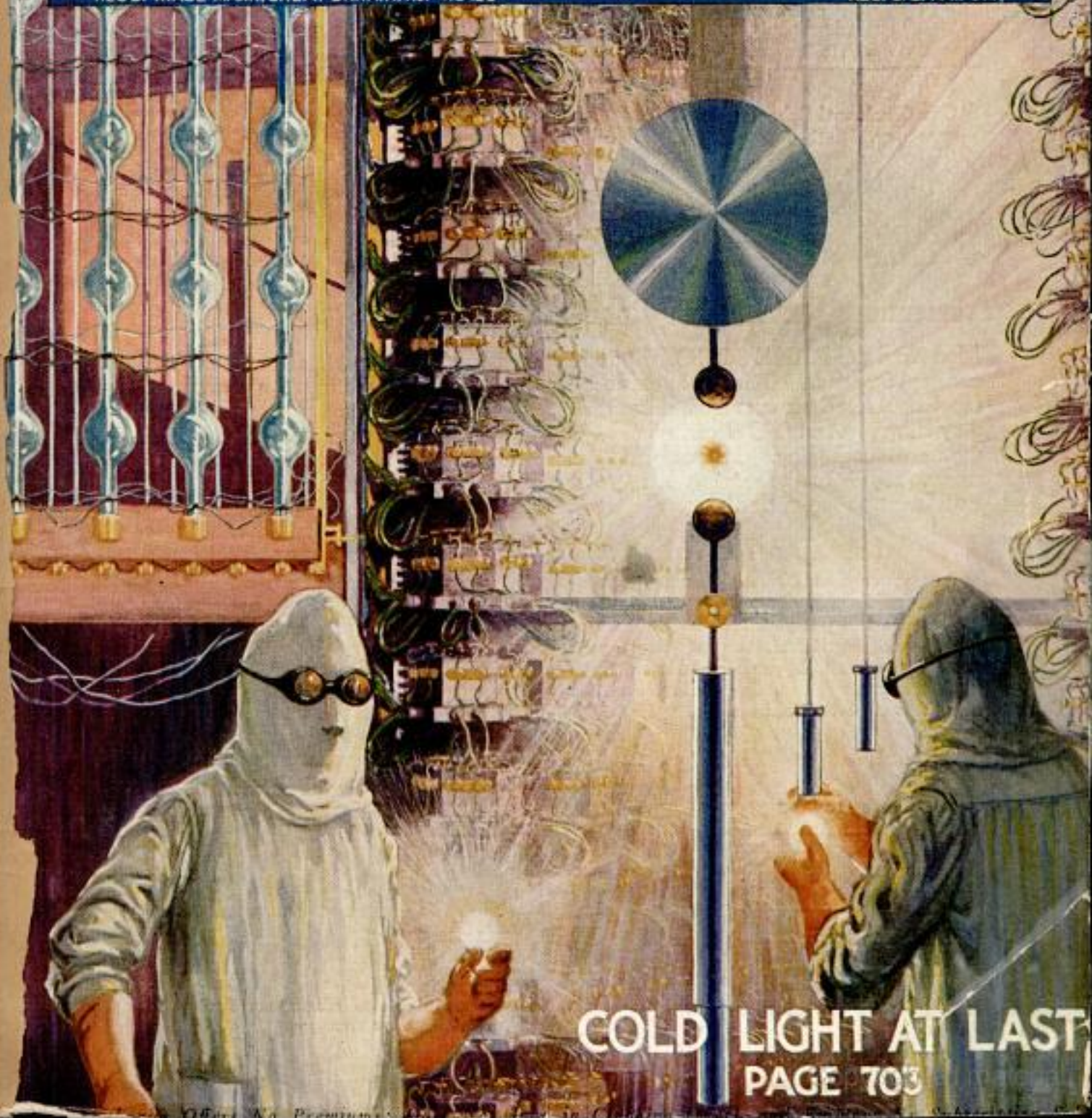
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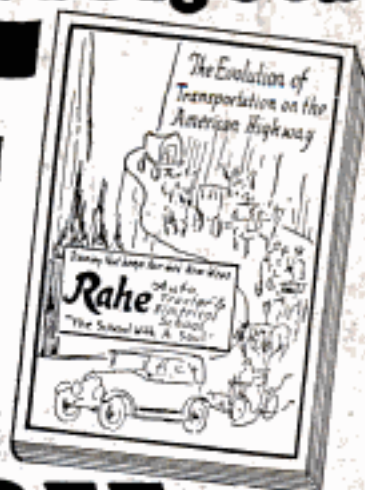
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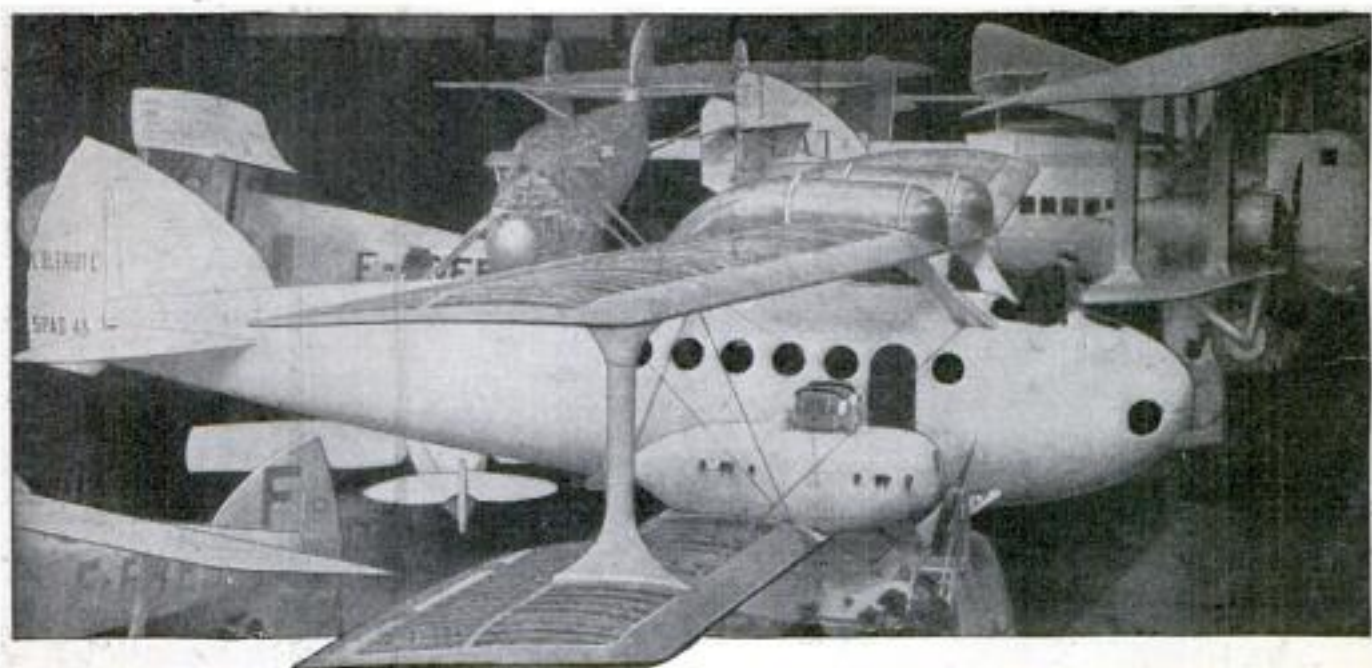
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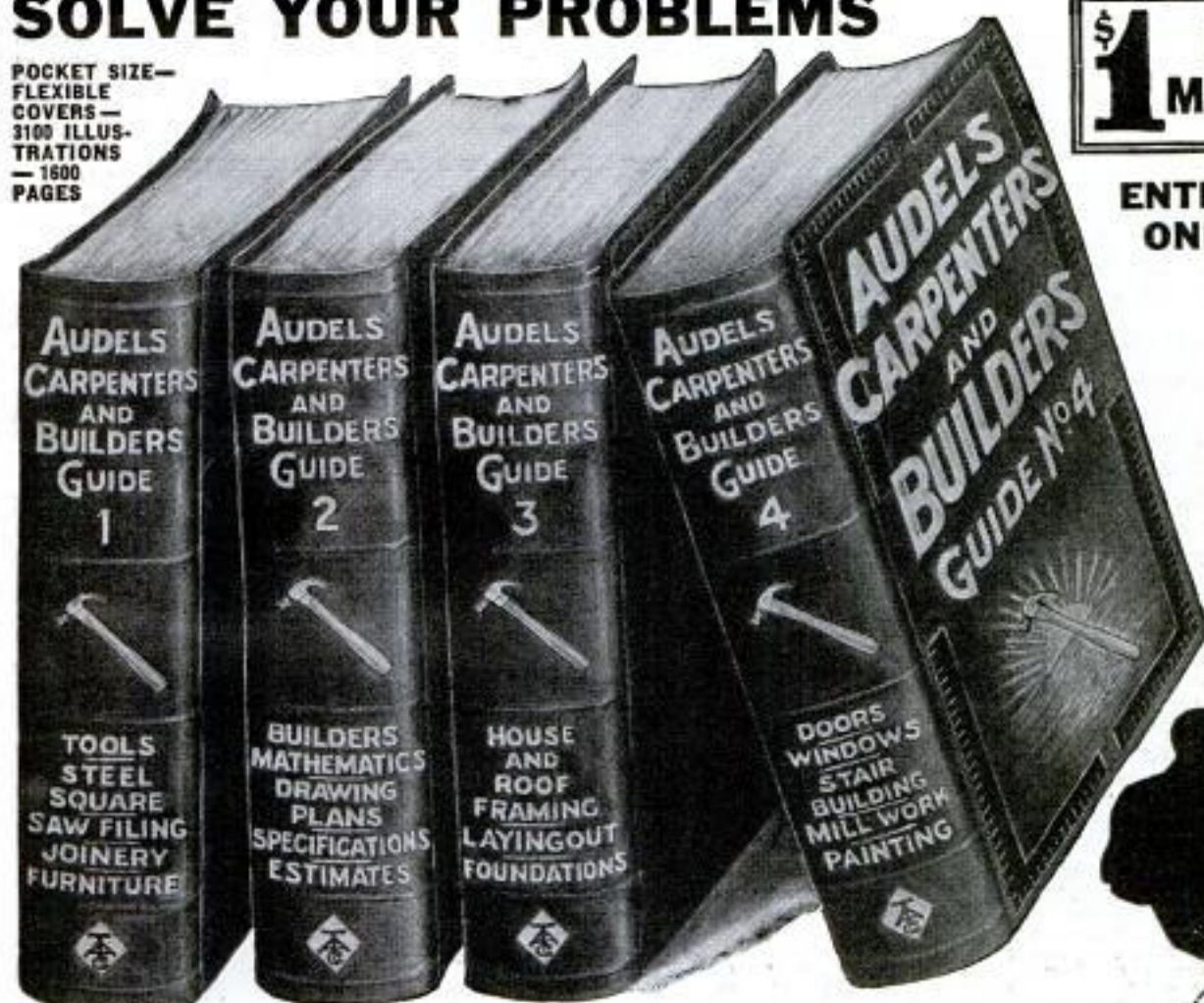
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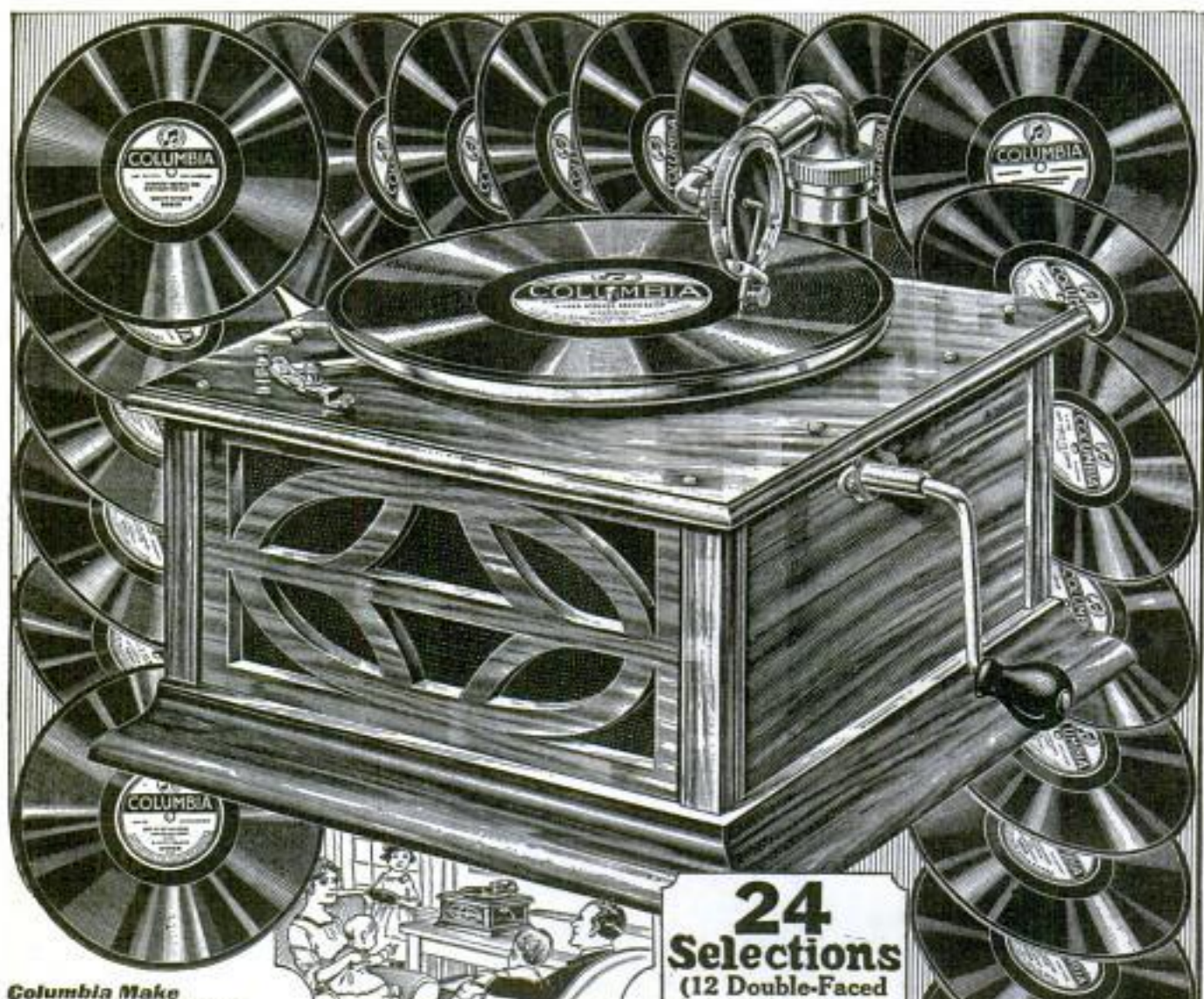
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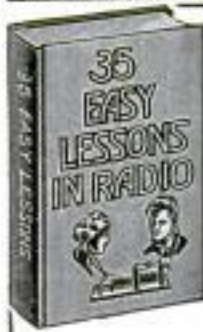
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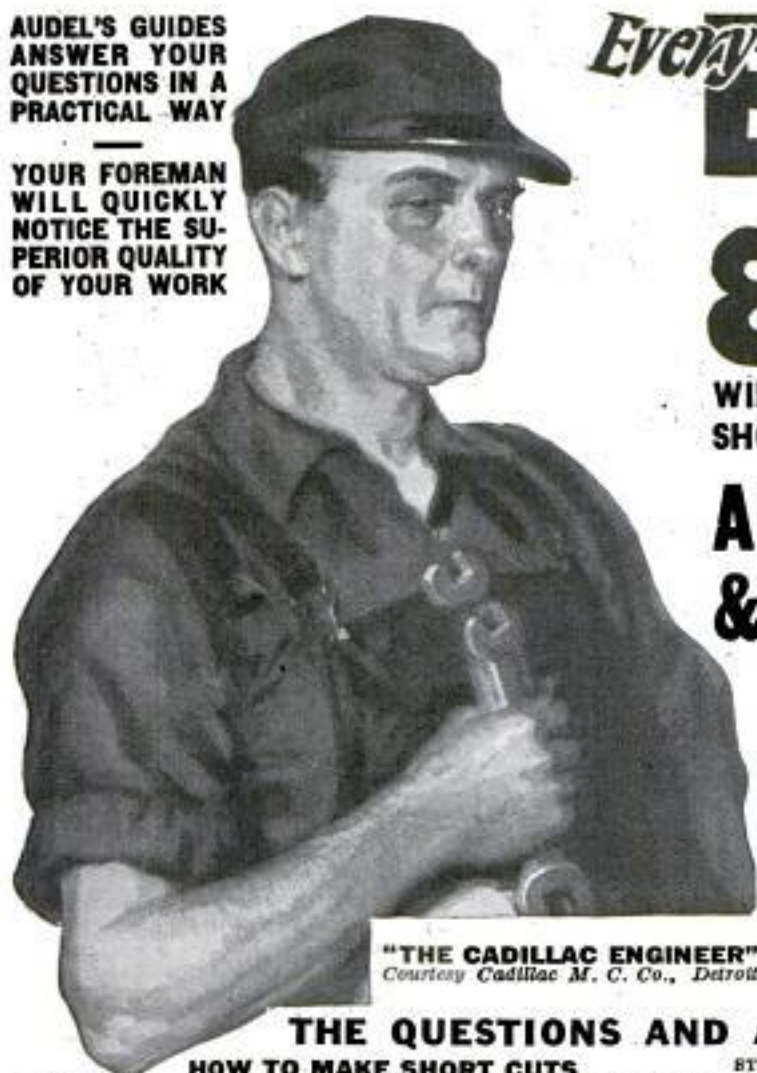
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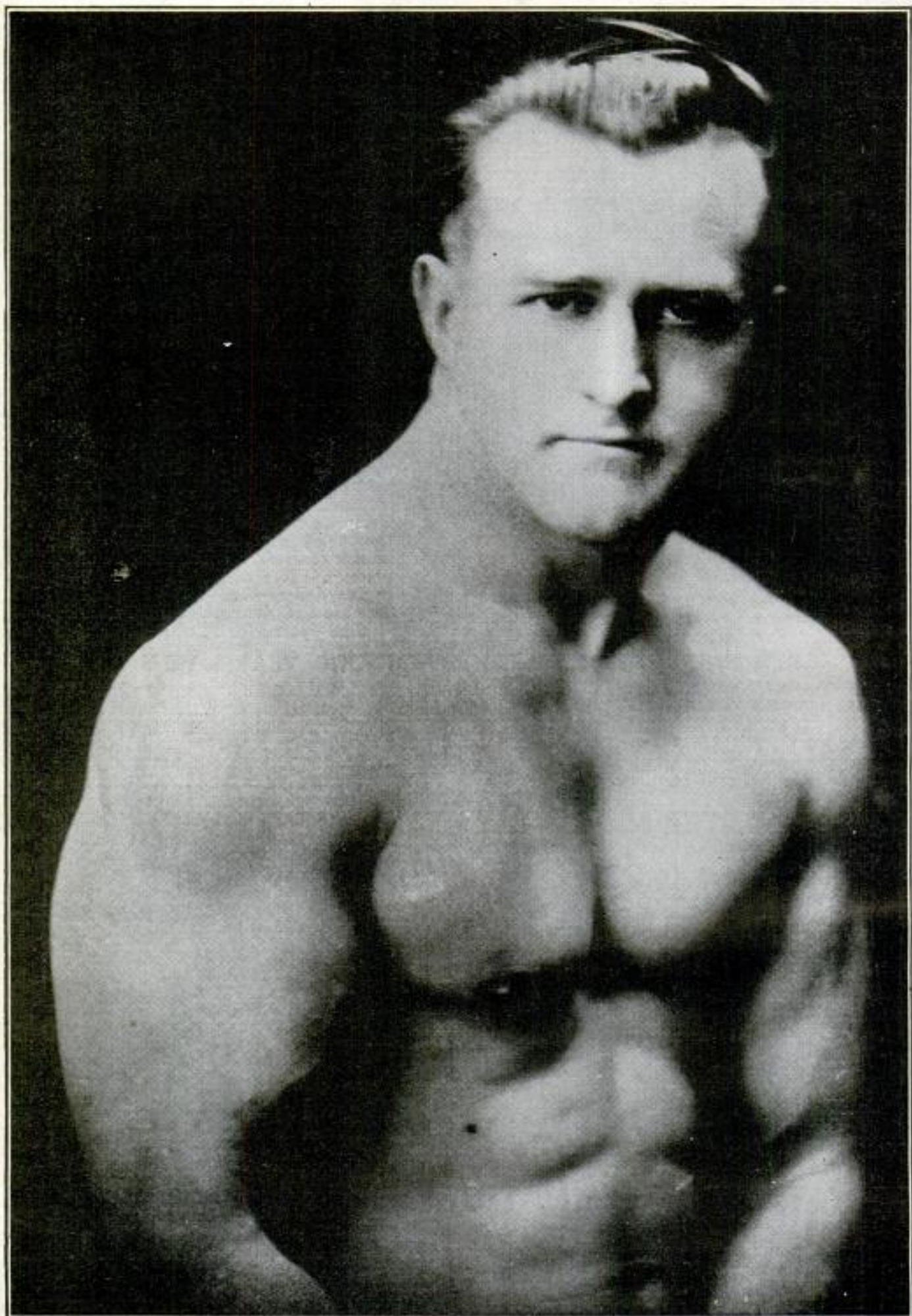


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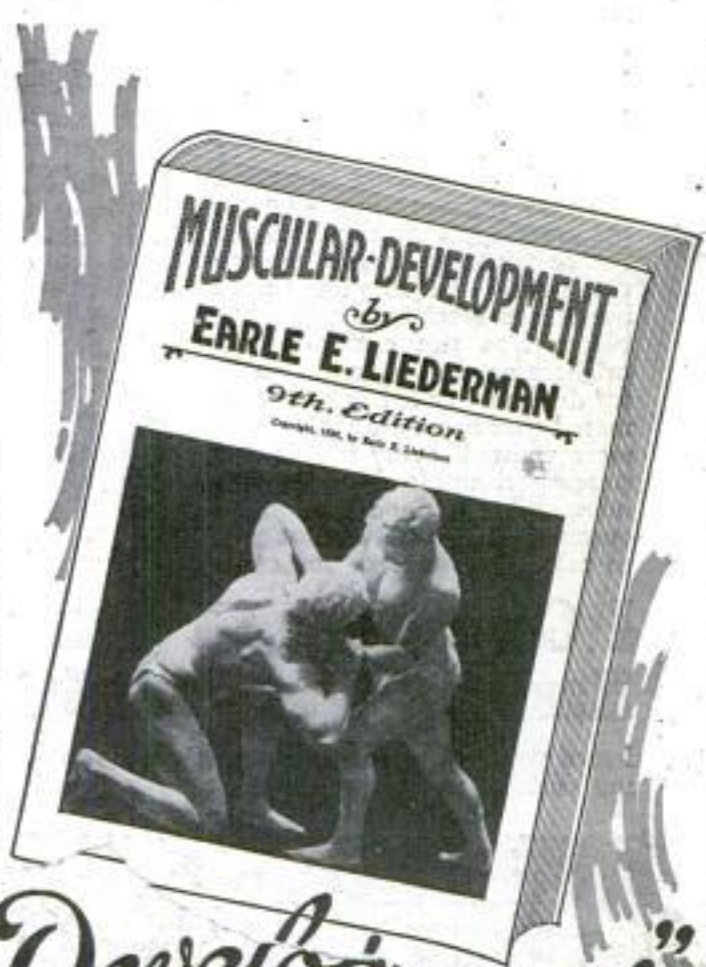
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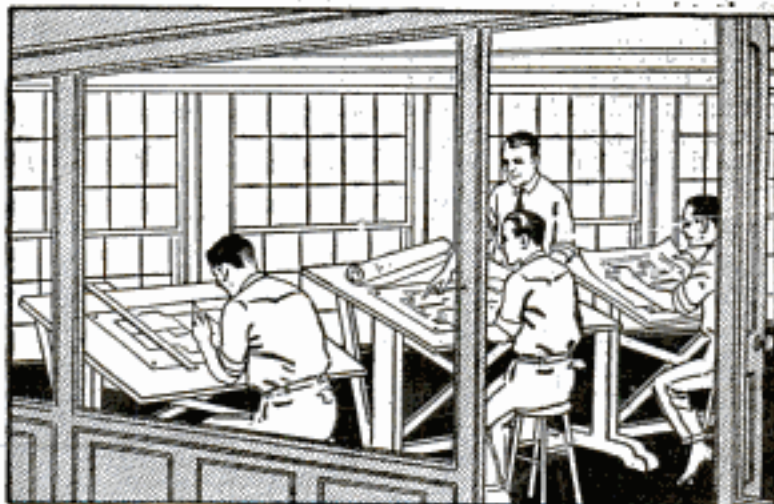
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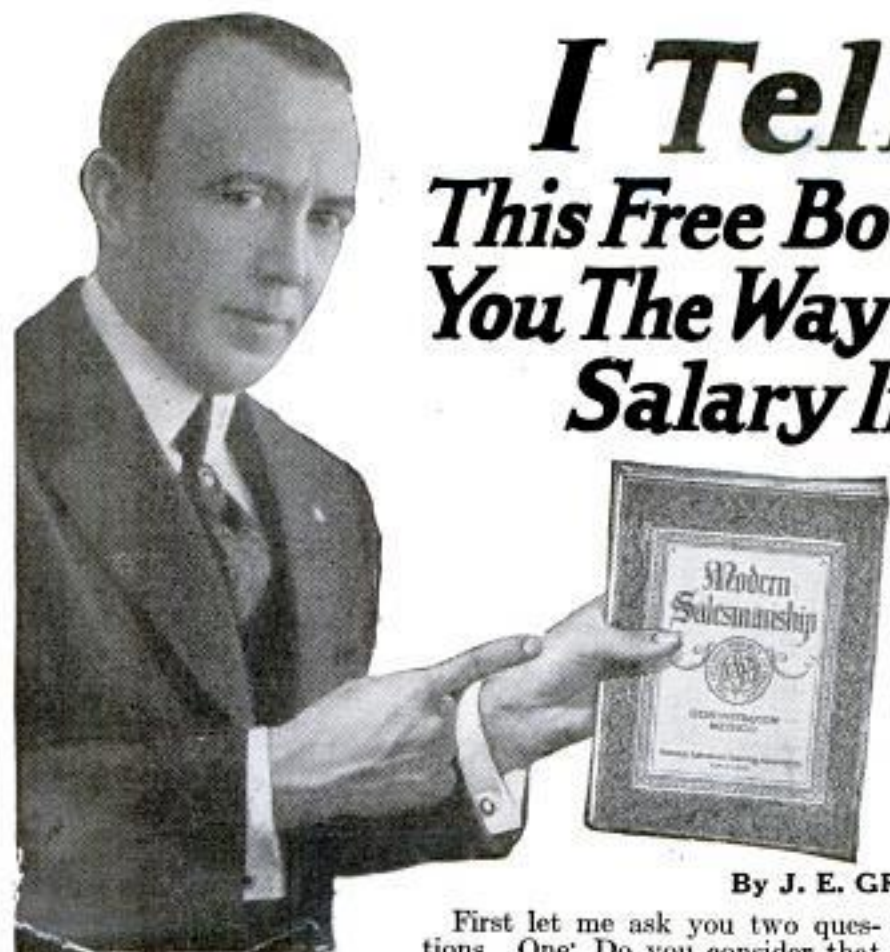
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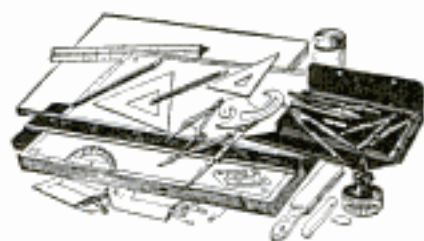
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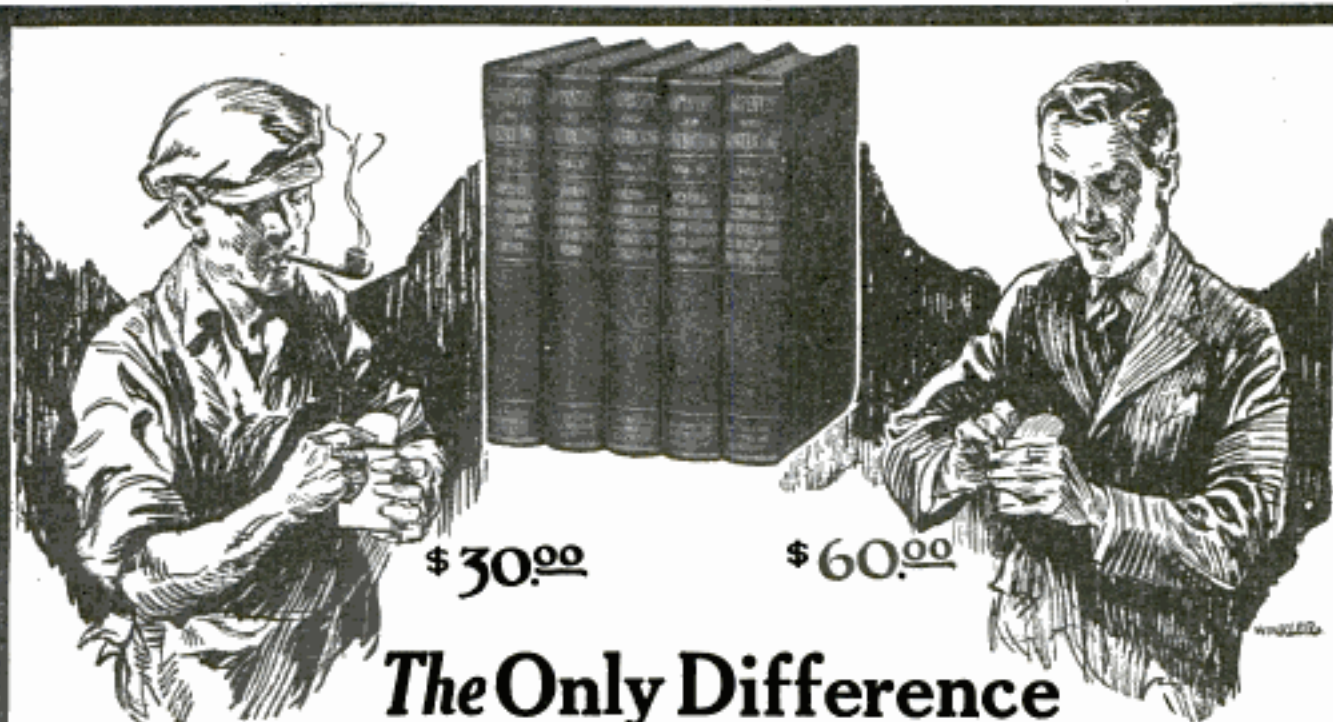
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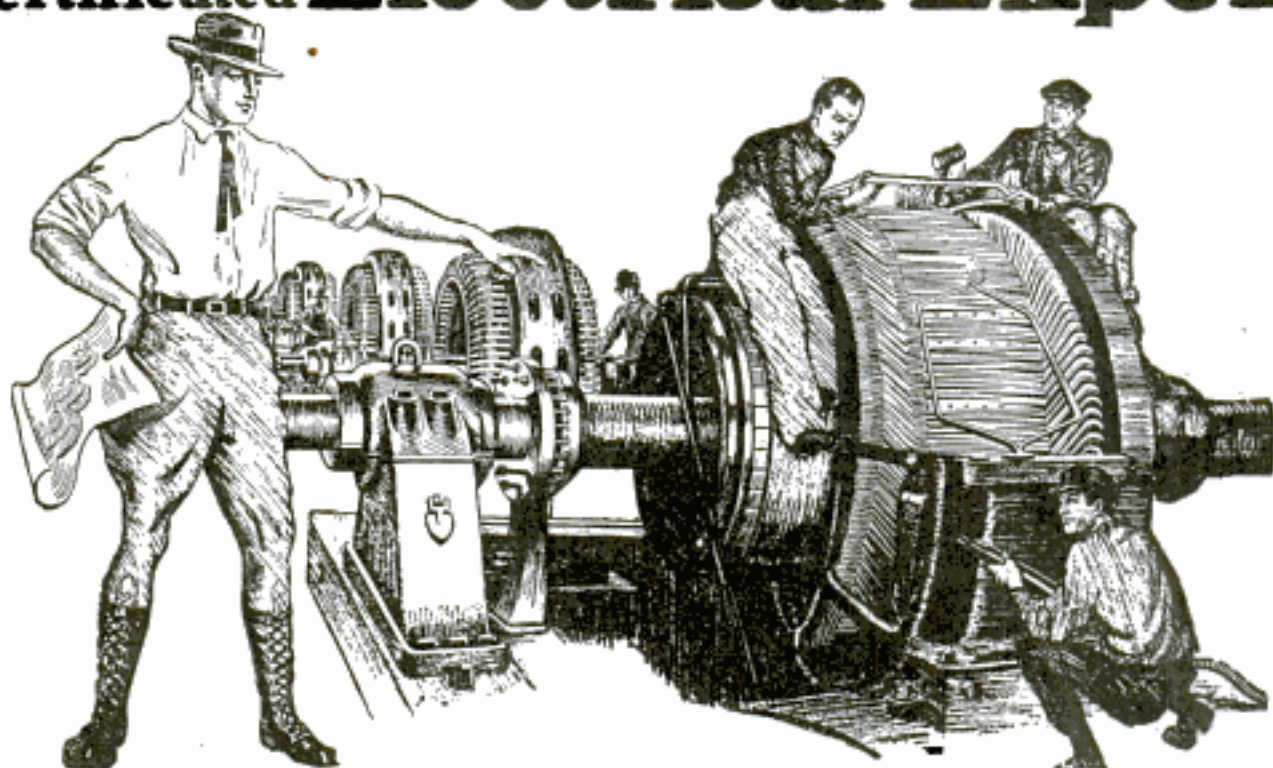
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SALESMEN—Get into the tailoring game—one of the most profitable of all specialty selling fields. Experience not necessary. We show you how to take measures, teach you how to sell our line and supply you with everything necessary to go out and make from \$10.00 to \$20.00 a day from the very first day. Our selling outfit is the finest of its kind ever gotten together and shows more than 100 large cloth samples of finest woolsens. You do no delivering. You just write your orders. We do the rest. Your profits run big and you get them cash with order. If you want to get into this most profitable of all lines, write us quick. Address Dept. 691, Goodwear Chicago, Inc., 814 W. Adams St., Chicago.

SELL direct to consumer men's knitted ties in novelty pocket box. Good staple seller and big for Xmas. Costs \$6.00 per dozen. Retail \$1.00. Start now. Sample 50c. Address Manager, 407 Searle Building, Rochester, N. Y.

PATENTED Cigar Lighters with Glass Advertising Front. Also Electric Cigar Moisteners. Wonderful Sellers. No Competition. Big Steady Profits. Proof, Cuts, Sales Plan Free. Drake Mfg. Co., Dept. M, Milwaukee, Wis.

MAKE Big Money. Spare or full time. Everybody loves Popular Music. Few hours a day with unique plan builds cumulative income. Representatives cashing in. Reserve territory. Get particulars quick. Crocker-Steinkamp, Dept. C-11, Quincy, Ill.

AGENTS—Portraits, medallions, frames, luminous crucifixes, pearl paintings, pictures, sell easy, always, everywhere at big profit. Pan American, 1217A Monroe, Chicago, Ill.

AGENTS—Moss-Corn and Calicos Remover will build you a steady repeat business. Send today for pocket size trial outfit. The Moss Company, 165 Searle Building, Rochester, N. Y.

AGENTS: \$10 a week selling guaranteed hosiery for men, women and children. Must wear 12 months or replaced free. Write for sample outfit. Thomas Mfg. Co., Class 162, Dayton, Ohio.

AGENTS—Send for sworn proof of \$5 to \$15 daily—introducing New Style Guaranteed Hosiery—57 styles, 17 colors. No capital or experience required. Just write orders—we deliver and collect. Your pay daily; also monthly bonus. Free auto offer besides. Complete outfit furnished, all colors—grades—including silks—wools—leathers. Mac-O-Chee Mills Company, Desk 25611, Cincinnati, Ohio.

YOU can sell every merchant in town our changeable signs. Large profits; easy sales. Write for territory now. Changeable Sign Co., 581 East 102nd, Cleveland.

SHEEP Wool Moccasins, Polishers, Dust-ers Box 26, East Boston, Mass.

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, 20 cents. Pease Die Works, Dept. M, Winchester, N. H.

AGENTS: Big money Monogramming by Transfer Method. Catalog Showing Over 50 Styles and Particulars Free. Motorists' Accessories Co., Mansfield, Ohio.

SELLS Like Hot-Cakes; Big Profits; New Ironing Wax Pad and Asbestos Rest; Clamps Board; Perfumes Clothes; Outfit 10c. Yankee Mfg's, 580 Atlantic Ave., Brooklyn, N. Y.

AGENTS—Easy Money. Interview motorists—Patented instrument every motor needs. It Saves Money Three Ways. Guaranteed. Thousands "Sold." Glad Users Everywhere. Big demand at your door. Pleasant work. Permanent business of your own—employ sub-agents—\$75.00 weekly up, all or part time. Experience unnecessary. Your opportunity for success. Wizard Mfg. Company, 453 Central Ave., Rochester, N. Y.

AGENTS: Big returns, fast office sellers; particulars and samples free. One Dip Pen Co., 2 Daily Record, Baltimore, Md.

DELICIOUS Desserts—\$1.00 an hour selling Stuart's delicious desserts, pudding powders and pie fillers. Write for terms and free samples. C. H. Stuart & Co., 5867 B'way, Newark, New York.

AGENTS sell made to measure gabardines, whincords, \$14.50; reversible rain-coats; \$75-\$100 weekly. Outfit free. Standard Raincoat, Dept. 5, 129 West 17th St., New York.

AGENTS. Sell Rich Looking Imported 36x66 rugs, \$1.00 each. Carter sold 115 in 4 days, his profit \$57. You can do the same. Write for sample offer. Sample prepaid \$1.39 each. E. G. Condon, Importer, 77 Bedford St., Boston, Mass.

MEN and women agents. Sell Box Stationery and Xmas card sets with name and address. New big profits. Samples. Teaply Co., 15D, Somerville, N. J.

AGENTS—The Big Seller of the year is the Universal Jar Opener. Has many uses. Sells for 50c. Costs \$2.00 dozen prepaid. Sample 25c. We offer agents the largest line of steel and wire specialties on the market. General Products Company, 7 Oliver Street, Newark, N. J.

NEW Business. Re-Dye Bugs on the Floor. Fibertint applied with brushes. Nine colors, \$1.00 box dyes 9x12. Sample for small rug 10c. Agencies granted. Teaply Co., Inc., 15-A, Somerville, N. J.

BIG Money and Fast Sales. Every owner buys Gold Initials for his auto. You charge \$1.50; make \$1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

START your own business as our sole agent, selling 100 famous home products. All or spare time. Dr. Blair Laboratories, Dept. 524, Lynchburg, Va.

REX India Fibre Broom; One of the biggest sellers on market. Outlasts five ordinary brooms—price no higher. 100% profit. Rex Fibre Products Company, 145-C New Jersey Ave., Brooklyn, New York.

AGENTS—\$4.25 Profit on every sale of Nibco Service Set. Needed in every home and building. Get particulars quick. A. A. Silver-Chamberlain Company, Clayton, N. J.

START and Operate Your Own Business and acquire financial independence. Openings everywhere. Either men or women. We furnish everything and show you how. Big explanatory book "The Open Door to Fortune" Free. Ask for it now. National Scientific Laboratories, 16A, Richmond, Va.

ANY man handy with paint brush or light tools can start new mechanical business on nearly nothing; needed everywhere; nearly all profit; experience not required. John Brace-land, 1457 So. Ninth, Philadelphia, Pa.

BIG Fast Profits for Agents. Repeater Six Fuse Plugs sell on sight wherever there is electricity. Do away with lightning troubles. Welcomed everywhere. Get details. Sample 25c. Moss-Schury Manufacturing Company, Inc., 10-A, Detroit, Mich.

PORTRAIT and Medallion Agents—Our Goods WILL Make You Big Profits; delivery guaranteed; prompt shipments; low prices; send for latest catalog. Adam J. Kroff & Co., 602 Blue Island Ave., Chicago.

EVERY home a prospect. Zenith Cleaner and Polish for Automobiles and Furniture. Agents make 100%. Sample 25 cents, refundable first order. Absolute repeater. Zenith Products Company, 202 Clay Ave., Rochester, N. Y.

VALUABLE Information I supply sells readily. 1000% profit. K. Home, 1957 Warren, Chicago.

GENERAL Distributors—Make \$100 to \$150 weekly as Distributor for World's Greatest Automobile Polish. Easily demonstrated, wonderful results, sure repeater. Sell to consumers, sub-agents, dealers. Big money-making proposition to hustlers. Write quickly for exclusive territory. The Armo Mfg. Co., N-130 Goodale, Columbus, Ohio.

AGENTS, both sexes, we manufacture and control new household article. Fast seller. Big profits. Exclusive territory. Write now. Connolly, 123 Liberty St., New York.

AGENTS: No matter what you are selling, you can make more money selling our finest made-to-measure clothes for men at sensationally low prices. We pay biggest profits and supply everything, including line of finest swatch samples in handy carrying case. Line shows big assortment of finest weave worsteds. Also ladies' man-tailored coats. Even if you've never sold before, we'll take you. But write at once. Don't delay. Lines are going fast. Address Dept. 285, Knickerbocker Tailoring Company, 131 South Peoria Street, Chicago.

AGENTS: New product no equal. 150% profit. 100% Repeater year round. Sells to everybody. Astounding results from first day. Surety Manufacturing Co., 26 W. Washington, Chicago.

AGENTS, I will show you how to sell \$100 a day with very little talking. Costs nothing to find how to make \$20 daily selling line so good people must buy. Men or women. Write me today. B. H. Hornig, President, The C. & D. Co., Grand Rapids, 41, Mich.

PORTRAITS, photo pillow tops, frames, sheet pictures, medallions, merchant's signs, water-proof and tea aprons, guaranteed hose, toilet requisites, luminous crucifixes; catalog. 50 specialties free. 30 days' credit. Jas. C. Bailey Co., Desk M 11, Chicago.

27,000 RECORDS guaranteed with one Everplay Phonograph Needle; new—different; cannot injure records; \$15.00 daily easy. Free sample to workers. Everplay, McClurg Bldg., Desk 116, Chicago.

AGENTS \$100 weekly selling fancy knitted ties. Sample 35 cents. Raymond's Mfg. Co., 31 East 132nd Street, New York.

DISTRIBUTORS wanted for the fastest selling shop tool on the market—the O'Brien Automobile Engine Support. Holds all detachable head motors while making repairs. Will pay for itself in time and labor saved in one week. Sells to repairmen and fleet owners for \$18.00 cash, \$20.00 on time. Write for details. Banner Accessory Mfg. Co., 2629 LaSalle St., St. Louis, Mo.

FORTUNE Maker—Thread-Cutting Thimble. Live wires only. Sample, 15c. Automobile Mfg. Co., 3753 Monticello, Chicago.

GOLD Leaf Sign Letters; make and sell; profits exceed 1,000%; immense demand; particulars free. Johnston Co., Quincy, Ill.

AGENTS—Distributors—make easily \$100 to \$200 a week. Be a "Pile-Rench Man." Get into a permanent business with growing profits. Sell marvelous Eifel-Flash Pile-Rench Tool Kit—Guaranteed to Do Tool Work better, quicker, and easier, than 60 pounds of best other tools costing \$50.00. Only kit that does all work around Home, Car, and Shop. Weighs 1½ Pounds. Sells quickly, when shown, at \$5.50. On market 3 years—thousands sold. Extra good for agents with cars. Fine side line—carry in pocket. State how you sell, territory wanted. The Flash Sales Corp., Dept. P, 4809 North Ashland Ave., Chicago.

AGENTS secure exclusive rights selling direct to consumers. High grade rubber necessities direct from manufacturer. Ohio Sales Mfg. Co., 1459 W. 6, Cleveland, O.

MAGICAL Necklace. "Shines in the Dark." Absolutely new. Be the first to sell this charming and captivating necklace. 100% to 400% profit. Send \$1.00 for sample and territory protection. W. G. Hasman Co., Dent, E. 57 E. 18th St., Chicago.

SUCCESS in Business and Personal Affairs! Read character by handwriting and features. Conlin System. Low price for entire course. Write, H. E. Conlin, Dept. B, 21 St. John's Place, Buffalo, N. Y.

MAKE \$25 to \$50 Week, representing Clows' Famous Philadelphia Hosiery, direct from mill—for men, women, children. Every pair guaranteed. Prices that win. Free book "How to Start" tells the story. George Clows Company, Desk 31, Philadelphia, Pa.

RUG Salesmen—Get next to the biggest seller of the year—Loomrite Felt Rugs. Sell at sight at \$2.50; cost \$15 dozen. Big, complete Rug Catalog, Free. Malsley-Payne Mfg. Co., 104-D Hanover St., Boston, Mass.

LIVE Agents make \$10 day selling Eureka Strainer and Splash Preventer for every water faucet. Takes on sight. Widely advertised and known. Get details today. A. B. Seed Filter Company, 73 Franklin, New York.

EARN big money fast applying gold initials to autos. Every owner buys—\$1.35 profit on \$1.50 sale—particulars and samples free. Write quick, Lithogram Co., Dept. 17, East Orange, N. J.

AGENTS—If you have formerly sold felt rugs, write for our new proposition concerning new goods. It's a winner. Newark Felt Rug Company, 27-C 16th Ave., Newark, N. J.

AGENTS, Mailorder Men, Beginners, Valuable Inside Information, 300% Profit. Nite Mail Order Supply Co., 609 27th, Denver, Colo.

UNBREAKABLE Combs, kind you can hit with hammer, saw wood with teeth, etc. Real money-makers for hustlers. Agency terms and convincing proof free. Oliver Gandy Co., Crisfield, Md.

THE Agent's Guide, Tells where to buy everything. Copy sent sealed for \$1.00. United Publishing Company, Box 74, Madison Square Station, New York.

AGENTS: Can start you in Mail Order Business Immediately. Been at it 17 years. Small Capital needed. Particulars stamp. Home Business Expert, Valdosta, Ga.

AGENTS: Where to buy 12,000 articles Wholesale. Actually worth \$50. Enclose stamp. Wholesale Supply Co., Valdosta, Ga.

EASY applied Transfer Lettering. Big Money proposition. Samples Free. Address Auto Monogram Supply, 14 Green St., Newark, N. J.

AGENTS, \$54 a week; travel by auto, install New Stone Converter in country homes. Wonderful invention. Cook and bake all year without coal or wood. No gas or electricity needed. We furnish the auto. Sample free. Thomas Mfg. Co., Class 2562, Dayton, Ohio.

WONDERFUL opportunity—establish permanent business. Most attractive line Toilet Requisites, entirely new. Be first in territory. Soaps, Extracts, Remedies, Jewelry. Big profits. Catalogue free. Van Ogden, Inc., 1923 Van Buren, Chicago.

SELF-THREADING Needles find sales in every home. Fine sideline, easy to carry. Big profits. Sample free. Prentice-Lee, 145 East 23rd St., New York.

AGENTS—Make big money selling Earl's "Cutwell" Imported Pocket Pencil Sharpener. Sample 15c prepaid. Sells on sight. B. G. Earl, 56 E. Randolph St., Chicago, Ill.

AGENTS—Earn \$75.00 to \$100.00 weekly selling "Sun Bright" Pure Aluminum guaranteed Cooking Utensils direct to housewife. Prices 25 to 50% lower than retail. Write today for particulars and state what territory you want. Hand Distributing Co., Inc., Direct Factory Rep., 35 So. Dearborn, St., Chicago, Ill.

AGENTS: make some real money selling our popular line of rubberized products. Catalog on request. Central Mail Order House, 223 Commercial St., Boston, Mass., Dept. M.

AGENTS. Free offer captivates customers. 20 first day—\$20.00 profit. 100 celebrated necessities. National Products Co., 855 Grand, St. Joseph, Mo.

BIG, Quick Money for agents, distributors, men and women everywhere; good for \$10-\$15 daily; everybody buys; rapid cash sales; repeat orders come fast; your opportunity for permanent business; samples, circulars furnished free. Send for facts without fail. Paul M. Smith, Kutzowen, Pa.

AUTOMATIC Kuff-Buttons, Wonderful Convenience, shirt and trouble saver. Sells like wildfire. Sales unlimited, direct to wearer. Sample pair \$1.00. Flexo Copm, Sheboygan, Wis.

RAINCOAT Agents. Get Our Prices. Sell made-to-measure raincoats. We deliver and collect. Outfits free. World Raincoat Co., 659 Morris Park Ave., New York.

AGENTS: Our line of Unique Diversified Products will make you big money. National Auto Accessories Mfg. Co., Saginaw, Mich.

AGENTS—Steady income. Large manufacturer of handkerchiefs and dress goods, etc., wishes representative in each locality. Factory to consumer. Big profits, honest goods. Credit given. Send for particulars. Freeport Mfg. Co., 59 Main St., Brooklyn, N. Y.

HANDKERCHIEFS, "Quality" line. Agents get bedrock factory prices. Write for the plan of this dependable business. Turnover Sales Company, 18-A East 17th St., New York.

EARN \$10 to \$25 a Day. Sell beautiful durable "Novo" Hosiery. Knitted Neckwear and Full-Cut Shirts. Direct Mill to Wearer. Complete family line, silks, sport-woods. Customer satisfaction defies competition. All or spare time. Investigate. Novo Mills, Dept. E, 3rd and Sedgley, Philadelphia, Pa.

CLARKE made \$18 an hour selling vest-pocket windshield cleaner needed by every autoist, motorman, engineer; one rub keeps glass clear 24 hours; 50,000 sold; amazing proposition free. Security Mfg. Co., Dept. 104, Toledo, Ohio.

AGENTS—Send for sample "Fretnet"—the washday wonder. Be convinced you can do a whirlwind business. You can clear at least \$20 to \$100 weekly, according to spare or whole time. You don't have to talk; if she doesn't buy at sight, leave sample; she will be looking for you long before you are able to make the rounds again. Samples furnished free. Premiums for your customers. Exclusive territory guaranteed to agents who can produce. Credits given. Don't call. P. M. Motter & Sons, 20 E. Jackson Blvd., Chicago.

GENUINE Gold Leaf Letters anyone can put on store windows. Guaranteed to never tarnish. Large profits. Enormous demand. Free samples. Write today. Metallic Letter Co., 438-A North Clark, Chicago.

RUMMAGE Sales make \$50,000 daily. We start you. Representatives wanted everywhere. "Wholesale Distributors," Dept. 92, 609 Division Street, Chicago.

POLMET—The polishing cloth approved by "Good Housekeeping" and "Modern Priscilla." Sells fast at 25c. Sample free. Gale & Co., Inc., 15 Edinboro St., Boston.

CALIFORNIA Rosebuds selling like hot cakes. Agents coining money; new stuff. Big profits. Catalog free. Mission Factory PM, 519 No. Halsted, Chicago, Ill.

AGENTS Wanted—Something New—Fire Fighter sells easily. Makes a spectacular demonstration; car owners, homes, factories, stores, practically buy on sight. Our men make \$10.00 to \$50.00 a day; exclusive territory. If you wish to establish a business of your own with unlimited possibilities for making big money, write us today. Fyr-Fyter Co., 103 Fyr-Fyter Bldg., Dayton, Ohio.

AMAZING auto necessity. Retail \$4.00. Your profit \$2.50. Territory going. Write Super, 1396 Fondulac, Milwaukee, Wis.

AGENTS Make Money; sell California Specialties. Sample 25c. W. Bedell, 789 So. 18th St., Newark, N. J.

AGENTS: C. T. A. prices lower than ever. Suits \$18.00, made to order, any size or style. Orders easy to get. Big profits. Agents' outfit free. Sample suit at cost. Write Chicago Tailors Ass'n, Dept. 418, Sta. C, Chicago.

AGENTS sell made to measure gaberdines, whipcords, \$14.50; reversible raincoats; \$75-\$100 weekly. Outfit free. Standard Raincoat, Dept. 5, 129 W. 17th St., New York.

SELL Something nine out of ten women will buy because it saves double its cost the day it is bought. 50c each. \$2.00 profit on \$3.00 sales. Premier Mfg. Company, Dept. 813, Detroit Mich.

PORTRAIT Agents—\$50,000 Profits I made canvassing. My valuable Free book explains all. Guaranteed Prints, Portraits, Frames, Photo-Pillow-tops, Sheet Pictures, shipped all over the world. Samples free. Picture Man Friedman, Dept. 8-H, 673 Madison, Chicago.

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.

SELL Madison "Better Made" Shirts direct from our factory to wearer. No capital or experience required. Easily sold. Big profits. Write for Free Samples. Madison Mills, 503 Broadway, New York.

AGENTS—W. F. Omels, a former brush salesman, made over \$5,000.00 during 1922 selling our \$1.50 kitchen specialty. He is now a district manager. We are offering you the same proposition—an opportunity as big as you want to make it. You can do what Omels did. Write today to M. H. Tyler Mfg. Co., Manager's Desk, Muncie, Ind.

AUTO owner tire agent wanted each locality to use and take orders for handmade Mellinger fabric and cord tires; guarantee bond 8,000 and 12,000 miles (no seconds); shipped prepaid on approval; get your tires free; no capital or experience required; make \$100 to \$300 weekly. Write for wholesale prices and sample kit. Address, Mellinger Tire Co., Dept. 100, Kansas City, Mo.

AT Last—World's Greatest Adding Machine. Almost human. Retail \$15; work equals \$300 machine. \$500 monthly easily made, demonstrating to stores, offices, garages, factories. Simple, easy; adds, subtracts, multiplies, divides automatically. Speedy, accurate, durable, handsome. Five year guarantee. Tremendous demand, amazing profits. Liberal trial offer. Protected territory. Write quick. Lightning Calculator Corp., Dept. F, Grand Rapids, Mich.

AGENTS—\$3 per hour and more! Sell Iron Board Covers, Rubber Aprons, Shopping Bags, Embroidered Aprons, Saton Coverall Dresses. Free Sample offer. American Hauling Company, Dept. P, 329 W. Monroe, Chicago.

AGENTS: Big profits. Best and cheapest window letters made. Easily applied. Dime brings five samples. Particulars free. Stalbrite Co., 1115 Second Ave., New York.

AGENTS—Clever Invention! Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marul Company, Tribune Bldg., New York, N. Y.

EVERYBODY uses extracts. Sell Duo Double Strength Extracts. Complete line household necessities. Big repeaters. Write today. Duo Co., Dept. E1, Attica, N. Y.

AGENTS—Stamping names on Pocket Key Protectors; sample Check with your name and address, 25c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates. Hart Mfg. Co., Desk 2, 383 Degraw St., Brooklyn, N. Y.

IF you want good live agents—fellows who can get the business—ask me how others are doing it. I'll gladly render the necessary assistance. Geo. F. Baker, Mgr. Classified Advertising, Popular Mechanics Magazine, Chicago.

\$8.00 TO \$20.00 per day. A wonderful seller. Any man, woman, boy or girl can make big wages selling Crimp Grip Clothes Line Fasteners. It is a perfect rope holder and can be used for many purposes. Crimp Grips are a simple, time-saving device. They last a life time and will not rust; it holds the line tight, and saves time on wash days. Every buyer is a booster. Send 50c for Mounted Sample and one pair of Crimp Grip Clothes Line Fasteners. Write for particulars. Crimp Grip Company, Belvidere, Ill.

WE pay \$50 a week and expenses and give Ford auto for men to introduce poultry and stock compounds. Imperial Co., D-23, Parsons, Kan.

WANT Distributing Agents everywhere for Hanslick, the new original powdered hand soap. Removes grease, grime, ink, paint, and most anything from the hands without injury to the skin. Every mechanic and auto-owner, everybody who gets his hands dirty will be a customer. A great opportunity for a hustler to get in business for himself. Full information free. Send 10 cents, coin or stamps, for liberal sample can. Solar Products Company, 122 West Lake Street, Chicago.

AGENTS clear \$50.00 weekly selling Opaline Portraits. Expense money advanced. Credit given. Big line now ready. Samples and Catalog free. Consolidated Portrait Co., Desk 2, Chicago.

AGENTS—N-R-G Laundry Tablets, the old reliable moneymaker for live agents. Millions sold—used in many homes—sales waiting for you. Clothes washed spotlessly clean in 10 minutes without rubbing. Free samples. N-R-G Company, 732-A N. Franklin, Chicago.

SELL Necessities. Everybody needs and buys the "Business Guide." Bryant cleared \$800.00 in July. Send for sample. It's free. Nichols Co., Box 4-B, Naperville, Ill.

\$100 WEEKLY. Agents, Crew Managers. Absolutely new article selling big to housewives. No capital required. Commissions paid in advance. No collections. No delivery. Exclusive territory. Write quick. Pioneer Corp., 6301 Yale Ave., Chicago, Ill.

AGENTS make 500% profit handling Auto Monograms, New Pictures, Window Letters, Transfer Flags; Novelty Signs. Catalog Free. Write Hinton Co., Star City, Ind.

GET Our Free Sample Case—Toilet articles, perfumes and specialties. Wonderfully profitable. La Derma Co., Dept. A, St. Louis, Mo.

AGENTS—Good salary and commission selling "Ratskylil," new rat and mouse exterminator; ready for use; no bait required; non-poisonous; rodents die outside premises; no odor. Empire Specialties Co., 1549 N. Wells, Dept. 301, Chicago, Ill.

WANTED—Representatives to sell Automobile necessity. Kills headlight and sun glare. Write for sample. Dept. P, The Clark Products Co., Springfield, Ohio.

WE start You Without a Dollar. Soaps, Extracts, Perfumes, Toilet Goods. Experience unnecessary. Carnation Co., Dept. 201, St. Louis.

AGENTS make a dollar an hour. Sell Mendits, a patent patch for instantly mending leaks in all utensils. Sample package free. Collette Mfg. Co., Dept. 404-B, Amsterdam, N. Y.

AGENTS—Make big money selling the "Hatsaver," a waterproof cover which protects the hat from rain, snow and dust. Sample 25c. Weight one ounce. R. D. King, 312 South Dearborn St., Chicago.

AGENTS—Unusual opportunity \$2.70 profit on every \$4.50 sale; 30 sales daily easily made. Every home and office a live prospect. Re-orders. Write today for exclusive territory. Hoban, Receiver Holder Corporation, 520 West 41st, New York.

AGENTS: A sale in every home for our beautiful dress goods, silks and general yard goods. Quick sales! Big profits. Large book of nearly 1,000 handsome fabric samples furnished to agents. Write today. National Importing & Mfg. Co., Dept. 6X, 573 Broadway, New York, N. Y.

HIGH-GRADE SALESMEN WANTED

OFFICE Specialty—Costs 25c; sells \$1. Many buy hundreds. Big profits. Exclusive rights. Mfg., 3240 N. 13th St., Philadelphia.

RAPID Seller: Excellent side line for garage and repair shop trade, large profits. Utility Tools, Norfolk, Nebr.

SALESMEN and District Managers—Hundred Thousand Dollar Corporation wants capable salesmen to sell established, constantly used, repeating specialty to Hotels, Restaurants, Lodges, Dairies, Theatres, Garages, Schools, Hospitals, Institutions, etc. No dull seasons. Protected territories. Permanent, highly paid positions leading to District Managerships. Exceptional opportunity for live men with ability to organize District Sales Forces. Write at once, stating experience and territory desired. The Colorcraft Company, 1015 West 70th Street, Cleveland, Ohio.

\$4.00 PROFIT on Every \$5.00 sale. "Free Sample"—New Specialty. (Money Getter.) Every Storekeeper, Doctor, buys quickly. Experience unnecessary. Territories open. Box 596, Hartford, Conn.

SALESMEN—to sell X-Cell-All Master-lites, a commercial lighting unit, direct to stores, offices, etc. Permanent and profitable. Write X-Cell-All Co., Ltd., 19 S. Wells St., Chicago, Ill.

WORLD'S Fastest Selling Auto. Accessory County distributors wanted; write today. G. L. W. Spring Oiler Co., San Diego, Calif.

COLLECTIONS made where others fail. "Zim's Peerless"—once used, you'll stick forever. Retail, \$7.50. Creditors' Association, E-312 McKnight Bldg., Minneapolis, Minnesota.

1000 DOLLARS Monthly Proposition. Particulars Free. A. Davis, 1637 Roosevelt Road, Chicago.

SELL our advertising pencils. Big profits. Rose Pencil Co., 740 Hodapp, Dayton, Ohio.

\$3,000 AND more a year easy for capable salesmen selling Kit-Chin-Kits. Great, new idea. Tremendous sales possibilities. Get full particulars. Kit-Chin-Kit Corporation, A-1023, 6 West Randolph St., Chicago.

SALESMEN: If You Want \$6,000 This Year, write now. Strong line for retail stores. Nationally advertised; established concern. Liberal weekly advances to producers, George R. Williams, 1920 Euclid, Cleveland, Ohio, Dept. 200.

TAILORING Salesmen—Fastest selling line, suits, overcoats, made to measure—\$29.50—one price, all wool. Profits in advance. Biggest old reliable house. W. D. Smith & Co., established 1895, Chicago.

SALESMEN—Crew Managers. You will have the devil's own time trying to find a better seller than "Zippe." If there was such a thing we'd have it. Splendid profit on 50c "Go Getter" repeat article that sells on ten second demonstration. Works While You Watch It. Demonstrates value, while others waste time making claims. New Discovery! Greatest Scientific Triumph of the age. It's the berries. Haven't room to tell our story here. Write immediately. Karam-Smith Co., 6611 Bosan St., Fort Wayne, Ind.

SALESMEN, We pay larger commissions than any other Brush House in the country to men selling our line of Sanitary Twisted-in-wire Brushes. Sanitary Wire Grip Brush Co., 15 Mercer St., New York City.

MAKE \$120 Weekly in Spare Time. Sell what the public wants—long distance radio receiving sets. Two sales weekly pays \$120 profit. No big investment, no canvassing. Sharpe of Colorado made \$955 in one month. Representatives wanted at once. This plan is sweeping the country—write today before your county is gone. Ozarka, 802 Washington Blvd., Chicago.

SALESMEN—Become Independent. Own your business; experience unnecessary; selling our \$7,500 Accidental Death, \$50 Accident, \$25 Sick Weekly Benefits; \$12.50 yearly; other amounts proportionate. Guaranteed steady income from renewals. \$250,000 deposited Insurance Department. Registration Dept. A, Newark, N. J.

DISTRICT Managers! Are you making 290% on your sales? If not, get our proposition. High-grade line of Household Necessities. Write for territory and full particulars. Midwest Drug Co., 185 East Naghten St., Columbus, Ohio.

SALESMEN—Crew Managers to sell Kirby Telephone Pad Holders. Retail for 50c. No tools necessary to attach to telephone. With two places for pencil, a tearing edge and 4x5 pad, every office and home a prospect. Black enameled to match telephone. Big profit. Kirby Mfg. Co., 738 Middletown, Conn. "Prices guaranteed against a decline."

SALESMEN and Distributors for our Nationally Admitted line of Motorene Oils and Columbia Paints. We desire men of real ability who can establish a going business in their communities. This is an opportunity to establish a permanent business which will pay from \$2,000 to \$5,000 a year. Central Petroleum Company, Cleveland, Ohio.

BEST Seller: Jem Rubber Repair for tires and tubes; supersedes vulcanization at saving of over 80%; put it on cold, vulcanizes itself in two minutes, guaranteed to last life of tire or tube; sells to every auto owner and accessory dealer. Get particulars how to make big money and free sample. Amazon Rubber Co., Philadelphia, Pa., Dept. 510.

\$742 LAST month for Beck of Buffalo. Introducing latest advertising plan; nothing else like it; every merchant wants it; easy sales; no deliveries; no collections; specialty salesmen write quick for offer. National Adv. Service, P. O. Box 50, LaGrange, Ind.

BRUSH Salesmen, Dist. Mgrs. City and State. \$30-\$75 weekly. Get our 50-50 proposition. We train the inexperienced. Neway Brush Co., Hartford, Conn.

SALESMEN Wanted—We Have It: Something New; different, in demand; repeats; national adv., handled by all dealers; used by everybody; pays big comm. in advance; credits for reorders; samples easily carried in grip and may be carried as a side line or regular; a surprise waiting. World's Product Co., Spencer, Indiana, Dept. 25.

DISTRIBUTORS Wanted—Pay-Deo-Domes, unique deodorizer. Uniform, lasting, fragrant odor. Small, portable system. Low cost. Rapid seller. Appeals to all business people. Ideal work, no dull seasons. Manufactured by W. J. Howell, 1504 Turner St., Allentown, Pa.

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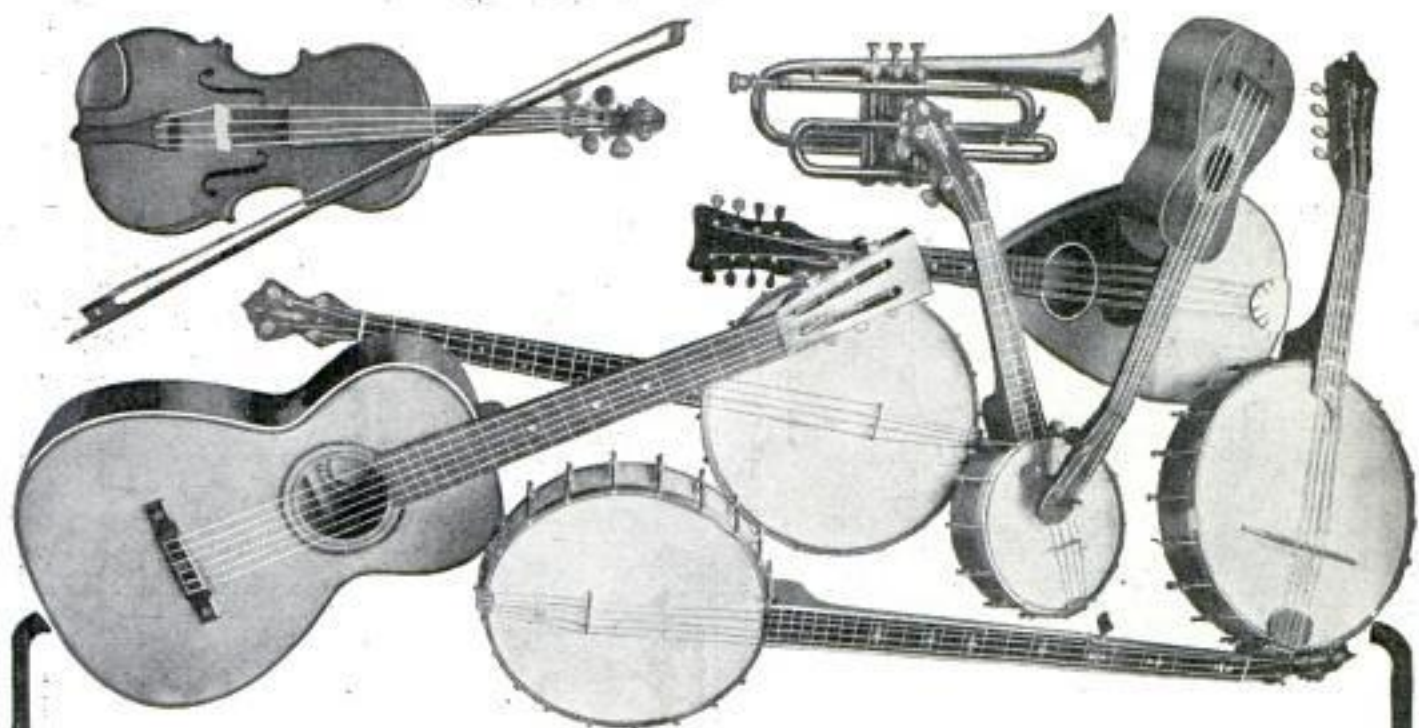
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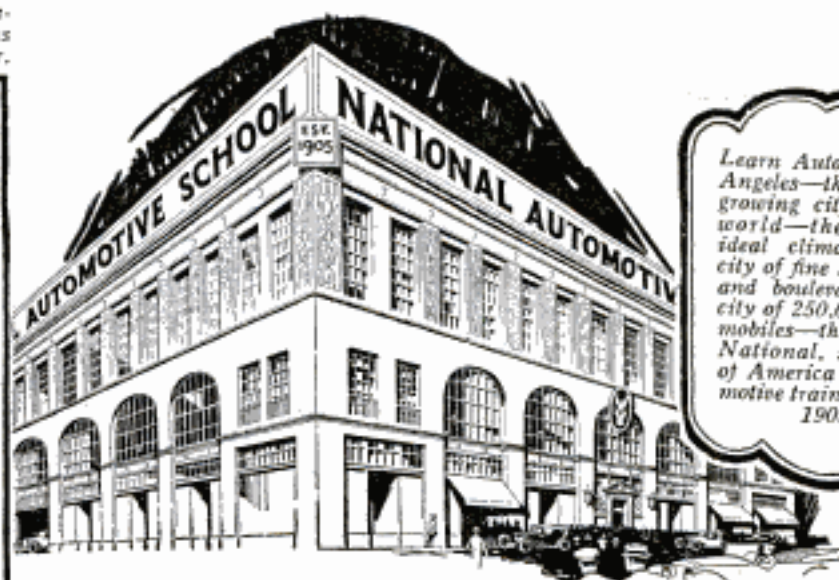
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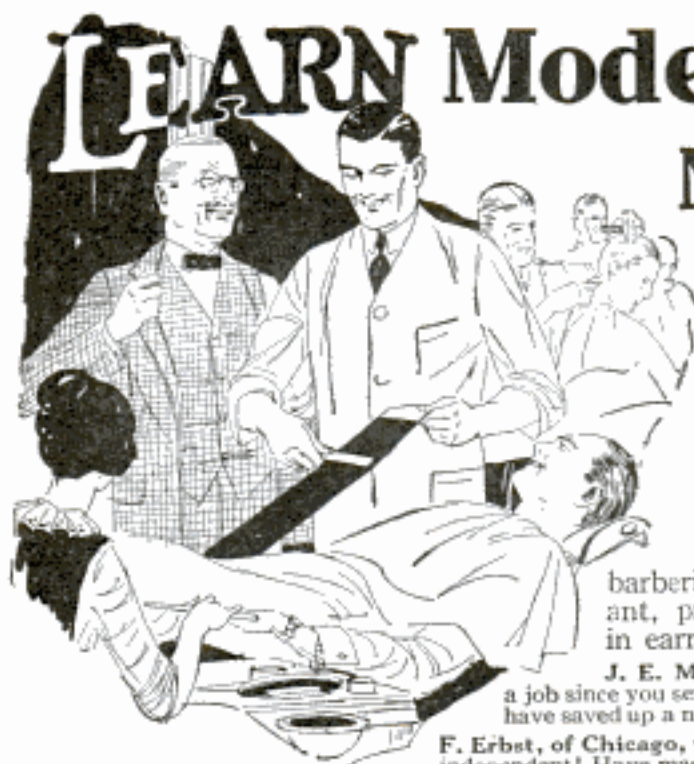
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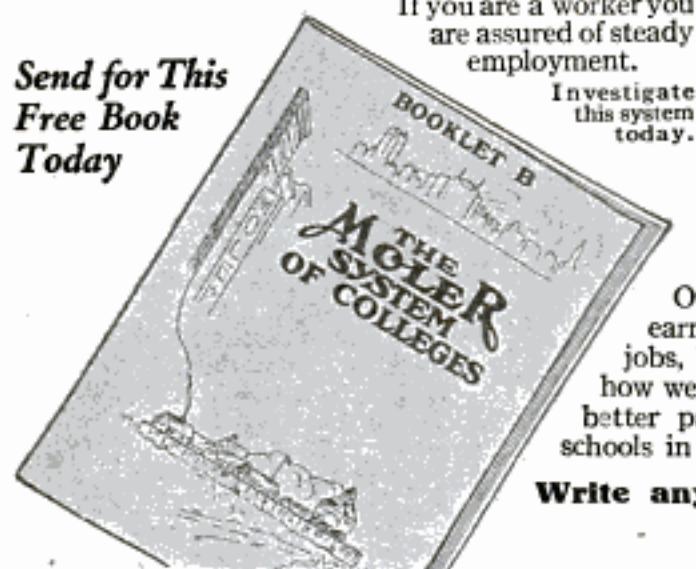
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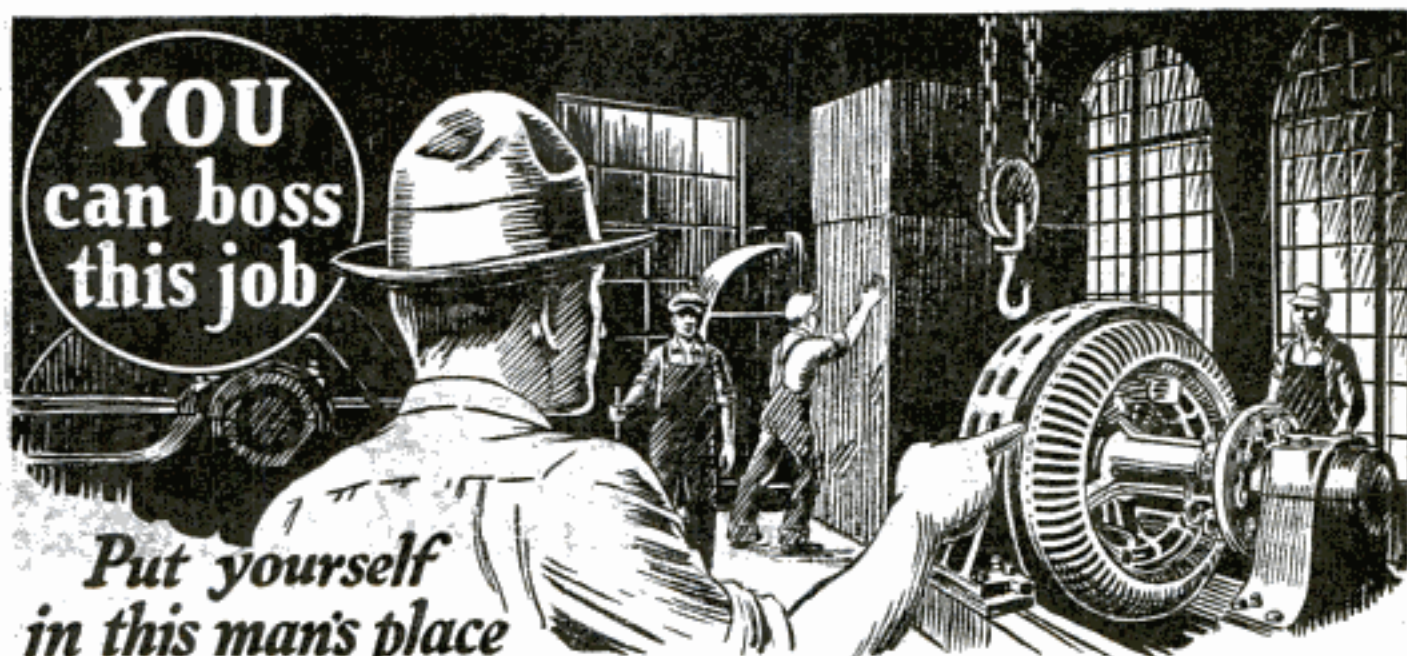
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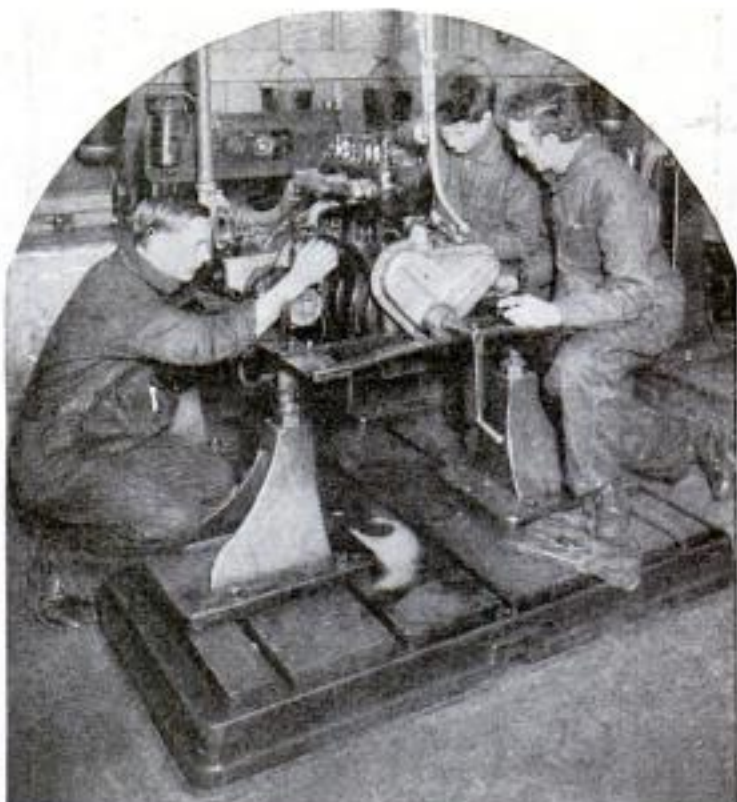
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Without cost or obligation, please tell me how I can qualify for the position or in the subject before which I have marked an X:

BUSINESS TRAINING COURSES

- | | |
|--|---|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Personnel Organization | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Show Card Lettering |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Accountancy (including C.P.A.) | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Cost Accounting | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|---|--|
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Architect |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Blue Print Reading |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Concrete Builder |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Gas Engine Operating | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Automobile Work |
| <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Airplane Engines |
| <input type="checkbox"/> Metallurgy | <input type="checkbox"/> Navigation |
| <input type="checkbox"/> Steam Engineering | <input type="checkbox"/> Agriculture and Poultry |
| <input type="checkbox"/> Radio | <input type="checkbox"/> Mathematics |

Name.....
 Street.....
 Address.....
 City..... Date.....

Occupation.....
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Formerly Vice-President, Crocker-Wheeler Electric Company, Atapara, New Jersey
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Mass. Institute of Technology
- William Esty, S. B., M. A.
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Formerly Professor of Electrical Engineering, Cornell University
- Dana Pierce, B. A.
Underwriters' Laboratories, Inc.
- E. W. Seeger, M. E.
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The American School is not a money-making corporation, but like resident schools and colleges, is chartered strictly as an "Educational Institution, not for profit."

More than 200 famous engineers and educators prepared the special instruction papers for our students.

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Big pay—fascinating work on land or sea—rapid advancement in a field where jobs are ten times more numerous than trained men to fill them, where \$75.00 a week is just a fair starter, where top notchers pull down ten thousand dollars or more a year—in a field, where any man, if he wishes, can easily have a business of his own, have men working for him, be his own boss! But what the average young man does NOT know, is what a simple, easy, A-B-C sort of a job it is to get started.

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Electrical Works Division

American School, Dept. G874 Drexel Ave. and 58th St., Chicago
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Come and master electricity. Be an Electrical Expert. Get the actual experience in doing the things you must do in actual electrical work. You work on \$200,000.00 worth of equipment.

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you actually work on motors, generators, autos, batteries, radios, switchboards, power plants and hundreds of other electrical devices, the greatest outlay of any school in the world. When you finish Coyne after a course of only 3½ months you are a certificated electrical expert ready to take a big-paying electrical position or to go into business for yourself.

FREE Radio

To every student who enrolls now we will give **FREE** a complete course in radio.

**\$200
to \$600
a Month**

Big salaries are paid to Coyne-equipped men as power plant operators, electrical superintendents, telephone men, electrical construction experts, auto, truck or tractor electricians and battery and radio experts. Or going into business for yourself you can make from \$3,000 to \$20,000 a year, as other Coyne graduates are now doing.

Only 3½ Months!

Many students, even with no previous knowledge of electricity can complete this course in 3½ months (study longer if you wish.) Students step from Coyne to big-paying positions because Coyne training is so practical and thorough that big employers welcome the Coyne-trained man

Note We help students to secure part time jobs while studying and assist you to a position after graduation. We also furnish every student with a life scholarship which permits you to study as long as you like.

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Send this coupon now. Determine today that you are going to become a part of the world's greatest force—electricity. Assure your future by sending this coupon now. It brings you full information. Think of it—if you send the coupon today, you can be fully equipped for a fine paying electrical job in a few months. Send the coupon now before the special offer we are making is withdrawn.

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INTERNATIONAL CORRESPONDENCE SCHOOLS
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Without cost or obligation, please tell me how I can qualify for the position or in the subject before which I have marked an X:

BUSINESS TRAINING COURSES

- | | |
|--|---|
| <input type="checkbox"/> Business Management | <input type="checkbox"/> Salesmanship |
| <input type="checkbox"/> Industrial Management | <input type="checkbox"/> Advertising |
| <input type="checkbox"/> Personnel Organization | <input type="checkbox"/> Better Letters |
| <input type="checkbox"/> Traffic Management | <input type="checkbox"/> Show Card Lettering |
| <input type="checkbox"/> Business Law | <input type="checkbox"/> Stenography and Typing |
| <input type="checkbox"/> Banking and Banking Law | <input type="checkbox"/> Business English |
| <input type="checkbox"/> Accountancy (including C.P.A.) | <input type="checkbox"/> Civil Service |
| <input type="checkbox"/> Cost Accounting | <input type="checkbox"/> Railway Mail Clerk |
| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Common School Subjects |
| <input type="checkbox"/> Private Secretary | <input type="checkbox"/> High School Subjects |
| <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning |

TECHNICAL AND INDUSTRIAL COURSES

- | | |
|---|--|
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> Architect |
| <input type="checkbox"/> Electric Lighting | <input type="checkbox"/> Blue Print Reading |
| <input type="checkbox"/> Mechanical Engineer | <input type="checkbox"/> Contractor and Builder |
| <input type="checkbox"/> Mechanical Draftsman | <input type="checkbox"/> Architectural Draftsman |
| <input type="checkbox"/> Machine Shop Practice | <input type="checkbox"/> Concrete Builder |
| <input type="checkbox"/> Railroad Positions | <input type="checkbox"/> Structural Engineer |
| <input type="checkbox"/> Gas Engine Operating | <input type="checkbox"/> Chemistry <input type="checkbox"/> Pharmacy |
| <input type="checkbox"/> Civil Engineer | <input type="checkbox"/> Automobile Work |
| <input type="checkbox"/> Surveying and Mapping | <input type="checkbox"/> Airplane Engines |
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Name.....
Street..... #3-23
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Occupation.....

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Send me your Free Book, "How to Succeed
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\$2500 Reward for the Conviction of—

WHO murdered John Blake? The country was stunned by the crime mystery of the year. A rich reward was offered. There were clues a-plenty. Circumstantial evidence pointed to a dozen men. But the District Attorney didn't dare bring anyone of them to trial. Then the Finger Print Expert stepped in.

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I Can Make YOU a Finger Print Expert

I have trained hundreds of the men now prominent in the Profession. For instance, there's Harry Passno, Chief of the Iowa State Bureau. He had no previous experience—no college or high school education. He was just a country photographer. I trained him.

I can do the same for YOU. You may study right at home—in your spare time.

Right NOW is the time to start. More trained men are needed to fill the positions created almost daily. Salaries are high. Chances for big rewards are frequent. The Finger Print Expert is respected and deferred to by all. I am offering you a big opportunity. Will you take it?

Professional Finger Print Outfit—Free

A professional outfit, just like the Finger Print Expert uses in court, in the laboratory and at the scene of crime, is yours FREE with this famous course of training. Also a course in Secret Service Intelligence is FREE to you if you enroll early. Mail the coupon for my free book telling all about the exploits of finger print detectives and full information about this wonderful profession, and your opportunity as a Finger Print Expert.

T. G. COOKE, President

UNIVERSITY OF APPLIED SCIENCE
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University of Applied Science,
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Gentlemen: Without any obligation whatever, send me your new, fully illustrated, FREE book on Finger Prints and your offer of a FREE course in Secret Service Intelligence and the Free Professional Finger Print outfit.

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Make Your Mind a File—Not a Pile

Let me show you how to make your mind as forget-proof as a card index file. When you wish to recall a name, place or date, must you grope in vain in a pile of miscellaneous knowledge? Summoned to give facts and figures does your mind become a blank? Be master of your mind's infinite resources—instead of a victim of its disordered details.

KNOWLEDGE IS POWER

and Memory Is the Basis of All Knowledge.

I HAVE HELPED THOUSANDS

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Perfect Your Memory and Command What Salary You Will

Send name and address and I will send you free, my interesting booklet, "How to Remember," and unique, copy-righted Memory Test; also tell you how to secure free of charge my \$3.00 book, "How to Speak in Public."

Prof. Henry Dickson, Principal
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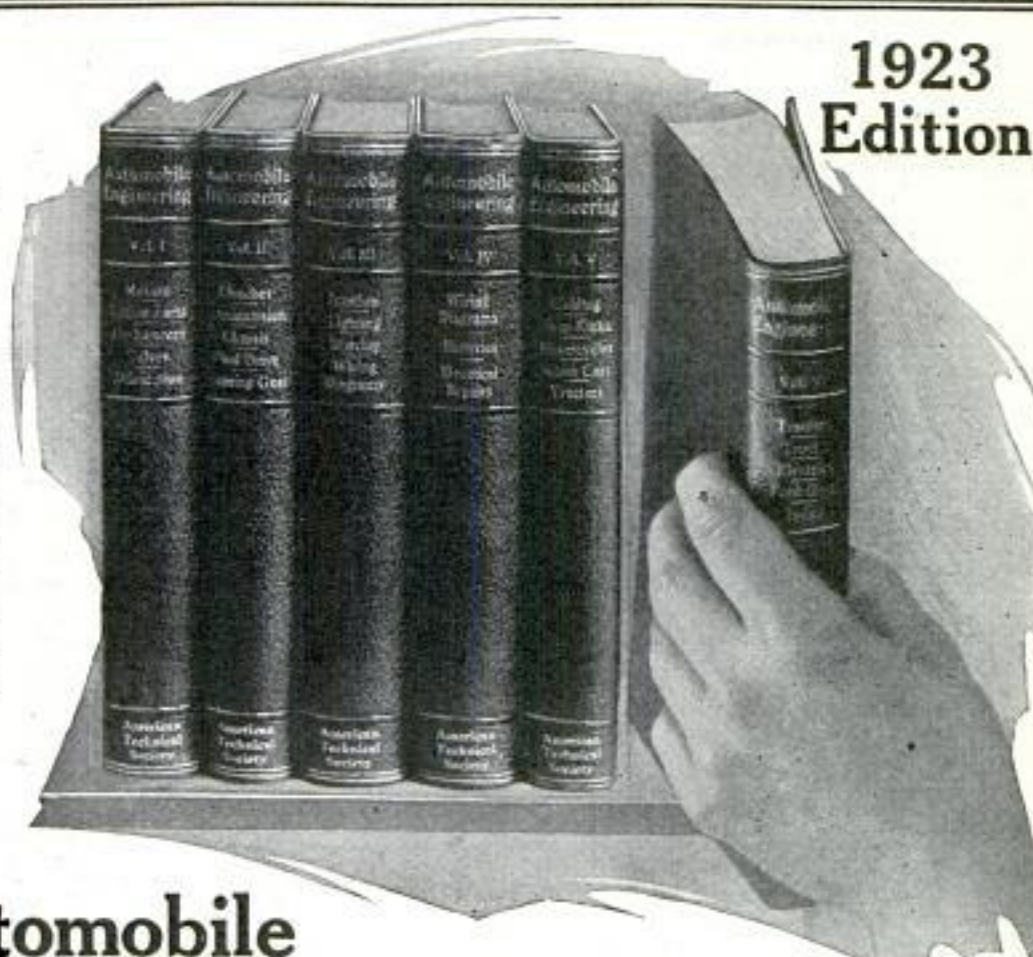
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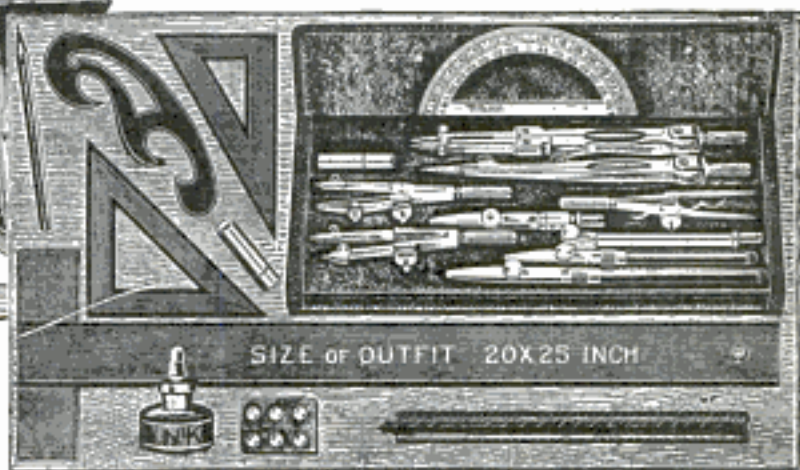
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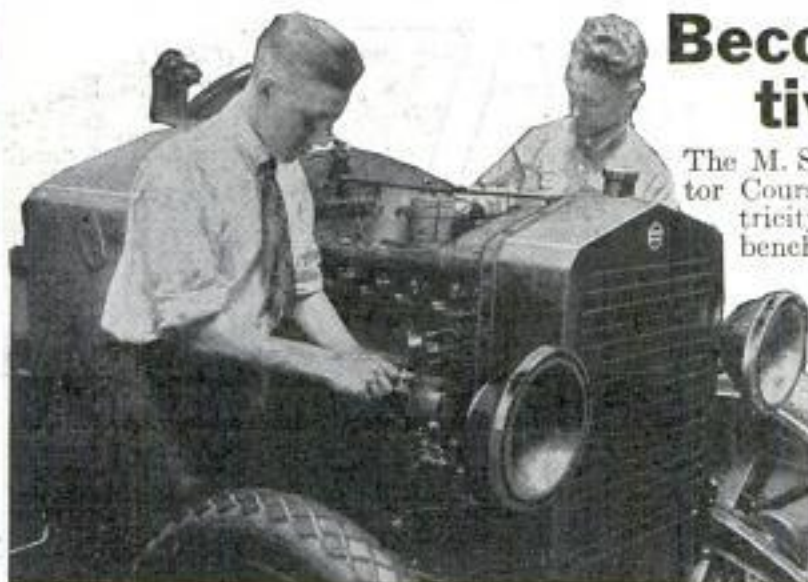
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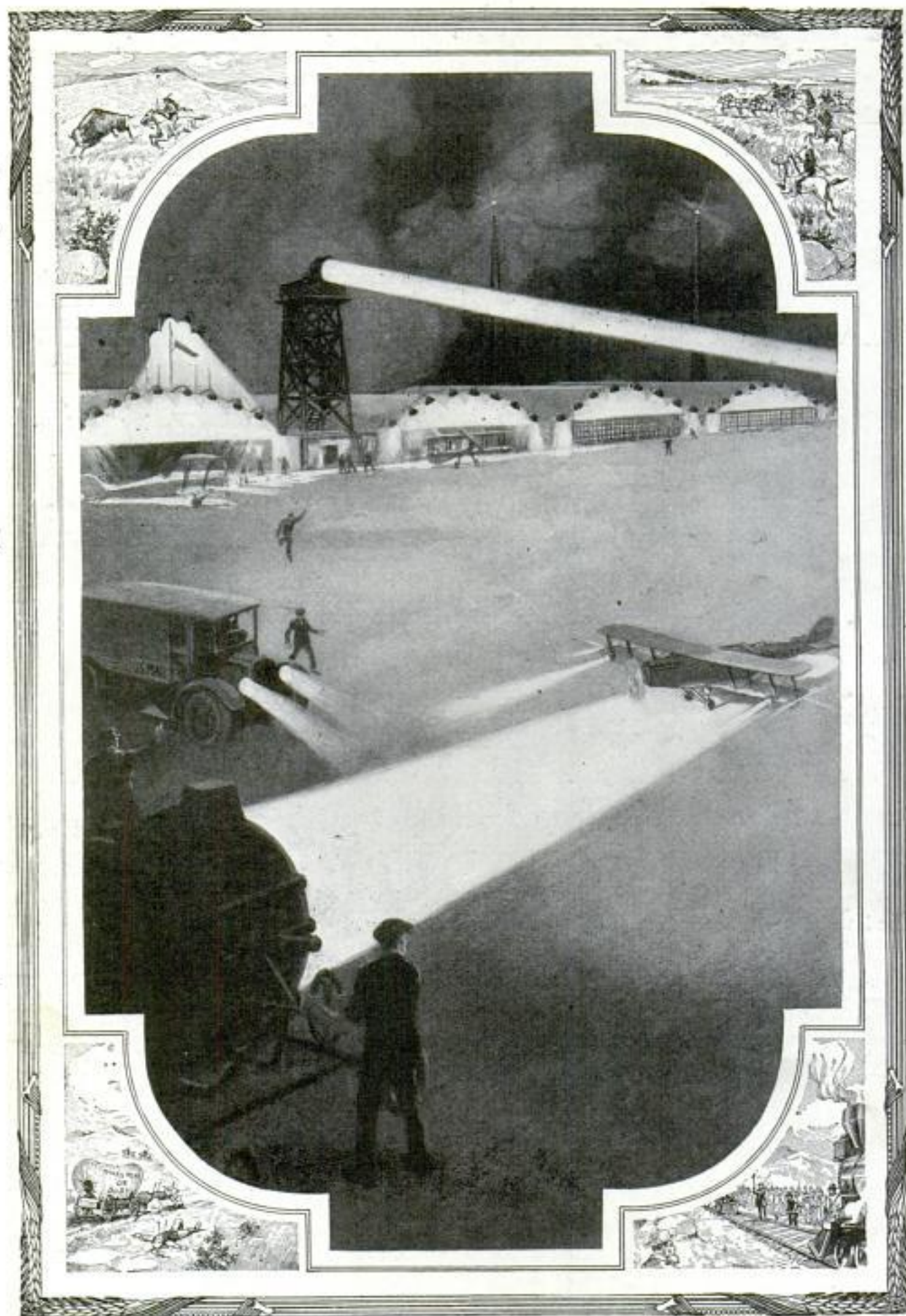
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From the Explorers, Goldseekers, Stagecoach, and Pony Express, to the Night Air Mail Flying Down a Pathway of Light to Great Landing Fields

Blazing a Trail with the Night Air Mail Across Nation in Twenty-Six Hours

'Planes in Great Transcontinental Flights Between New York and San Francisco Mark New Era in the History of Aviation

IN whirring through 2,680 miles of space between the Pacific and Atlantic oceans in just a little more than 26 hours, United States Air Mail planes have not only opened up a new era in the history of aviation, but have narrowed the map of a continent beyond the utmost dreams of a scant generation ago.

From the foot of Lake Michigan to the southeast corner of Wyoming, a distance of about 885 miles, the flights were made at night, the pilots being guided across the cloud-flecked highways of the heavens by a gleaming row of giant beacons. More powerful than millions of candles, the pillars of light represented the first attempt to illuminate the airways for the use of man, in a shimmering ribbon winding like a gigantic glow-worm.

Although the weather conditions during the first flights were bad, the planes being delayed for several hours one night by a fog so thick that the pilots could scarcely see their propellers, not a single mishap marred the experiment, on which the eyes of the entire world were focused. Government officials announced afterwards that the four-day test was an

unqualified success. Favored by a strong westward wind, the first plane took off from Hempstead, N. Y., at 11:00 a.

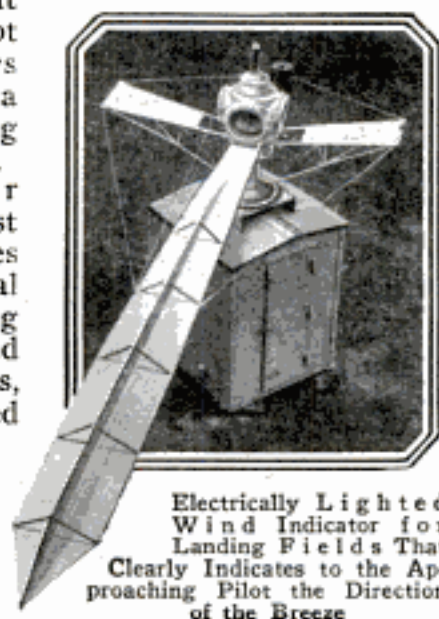
m., the morning of the 21st of August, drifted southward over 247 miles of continuous mountains where there are not more than five fields available in case of forced landings, to Bellefonte, Pa. Well ahead of schedule, the mail was carried into Cleveland, over Bryan, Ohio, and on to Checkerboard field, just outside of Chicago,

shortly before dusk. Quickly the pouches were transferred to another waiting plane and packed away as closely as sardines in the long underbody whose sweeping curves of yellow birch glistened in the slight rain that had begun to fall. Listed as No. 207, the huge De Haviland measured 30 feet from the tip of its tail to the steel-shod propeller blades, a tireless rival to dispute the eagle's flight across mountain, plain, or valley.

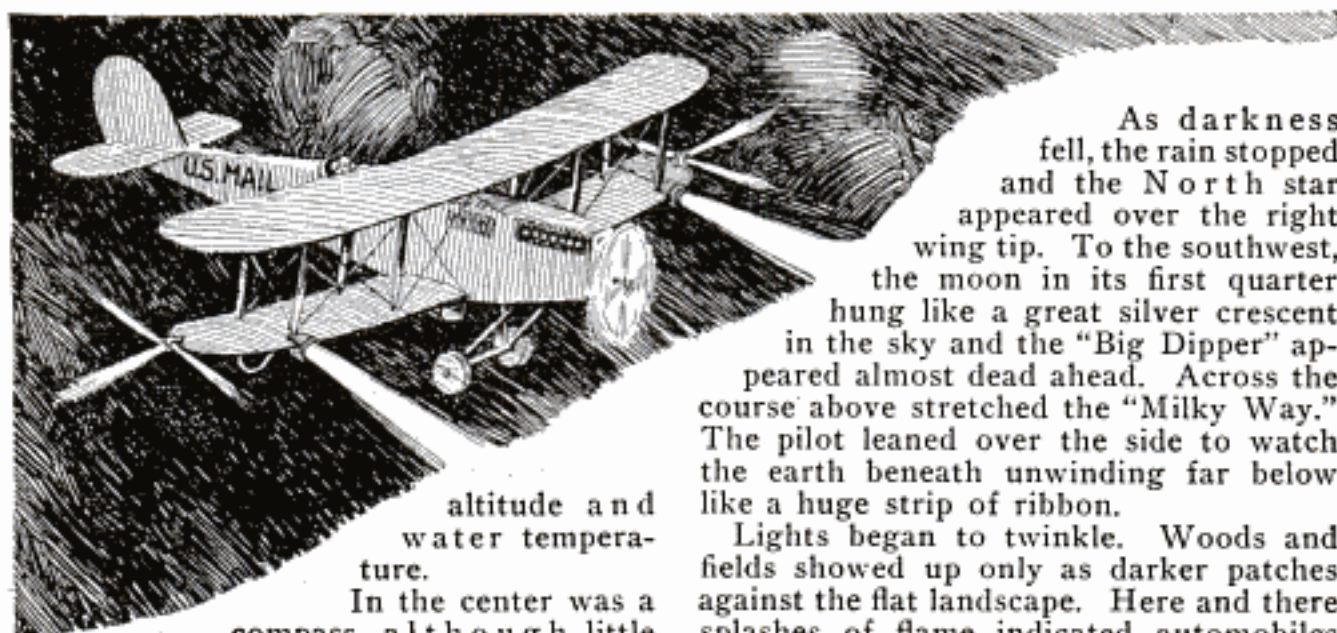
Across the slender fuselage stretched two sets of silver wings, 42 feet, overall. Back of them, and just behind the mail compartment, was the pilot's cockpit with control lever, rudder bar, stabilizer wheel, spark and throttle adjust-

EVEN THE VISION OF GENIUS IS ECLIPSED BY FACT

WHEN, with the prophetic vision of genius, Kipling wrote "With the Night Mail," in 1909, he labeled it "A Story of 2000 A. D." But so rapid has been the progress of science and industry, that fact has far outstripped romance, and the feat which was only a dream 14 years ago is the reality of today, as proved in the recent night flights of the post-office airplanes when letters were carried between New York and San Francisco in just a little over 26 hours.—Editor's Note.



Electrically Lighted
Wind Indicator for
Landing Fields That
Clearly Indicates to the Ap-
proaching Pilot the Direction
of the Breeze



altitude and water temperature.

In the center was a compass, although little reliance was placed upon this for night flying, as its readings would only be of service during daylight where a clear view of the earth's surface would permit accurate calculations as to the "drift" of the ship.

As the last bag of mail was stowed away, the pilot took his place in the cockpit, khaki overalls covering his neatly pressed blue-serge suit, an aviator's helmet drawn over his head and a safety parachute strapped in a knapsack to his back.

"Ready—Off—Contact!" came the cry as a mechanic swung the propeller.

At the last word, the 400-horsepower Liberty motor awoke with a roar, but soon settled down to the steady drone as of a huge contented bee. Heading toward the east, the ship rolled down the field, rose in a gentle curve, circled overhead toward the setting sun then hidden behind the clouds.

Picked up and driven back with the force of bullets by the whirring propeller blades, the raindrops beat fiercely against the stanch body and taut wing fabric. Seated so low that a straight forward view was impossible without leaning over the side, the pilot was partly protected from the fury of the blast, as the rain was swept past him.

As darkness fell, the rain stopped and the North star appeared over the right wing tip. To the southwest, the moon in its first quarter hung like a great silver crescent in the sky and the "Big Dipper" appeared almost dead ahead. Across the course above stretched the "Milky Way." The pilot leaned over the side to watch the earth beneath unwinding far below like a huge strip of ribbon.

Lights began to twinkle. Woods and fields showed up only as darker patches against the flat landscape. Here and there splashes of flame indicated automobiles moving over roads like fireflies crawling along confetti streamers.

Until the stars wheeled into view, the plane had been sweeping along at the 1,000-foot level because of the low "ceiling" of clouds which would have obscured the view of the guiding beacons that marked the route on the ground—the same natural thoroughfare followed by immense herds of buffalo, by the Indians, explorers, goldseekers, stagecoach, pony express and, lastly, by the railway.

Ninety miles an hour—95—100—the dial indicated, and the wail of the wind through the rigging rose to a shrill shriek as the "207" began nosing upward toward the 1,500-foot level. Then the gale took hold of the ship and the pilot shivered in the icy blast.

Patches of light beneath indicated towns—McGirr, Franklin Grove, and Rock Falls. Twisting across the course, two branches of the Mississippi shone like mirrors in the moonlight. Then a revolving pillar of fire stabbed upward against a bit of fleecy mist.

"The Iowa City beacon," said the pilot, and circled until he caught the wind



direction from a floodlight turned on a white "sock"—a stocking, the foot cut off, streaming from a mast on the landing field. The pilot touched a lever and two powerful searchlights flared out from beneath the small red and green navigating lights on the wing tips.

Although the speed of the ship had been reduced from about 100 to approximately 65 miles an hour, it actually seemed to increase as the earth came into clear view. Sliding gently down as if on the beam of the 500,000,000 candlepower searchlight on the ground, the "207" came to a full stop and the roar of its mighty motor was stilled.

From waiting supply wagons 97 gallons of gasoline were pumped into its tanks and the last lap of its 400-mile trip to Omaha began. While snatching a drink of hot coffee at the field, the pilot explained that the engine ate up from 14 to 24 gallons of "gas" an hour and that a few extra gallons were carried for emergency use in a narrow copper tank built into the center of the upper wing surface.

As the lights of Iowa City faded into the distance the plane's nose was again headed along the row of small, 5,000 candlepower beacons set three miles apart on the ground. "Flickers," the pilots call them, because they blink on and off 150 times a minute. There are 273 of these on the 885-mile course.

Emergency landing fields every 25 miles are marked with larger lights of 5,000,000 candlepower, which rotate high in the heavens. These are visible for 45 miles, while the smaller ones can be seen easily at only about half that distance. The flyer was within range of at least three of these all the time, along the route.

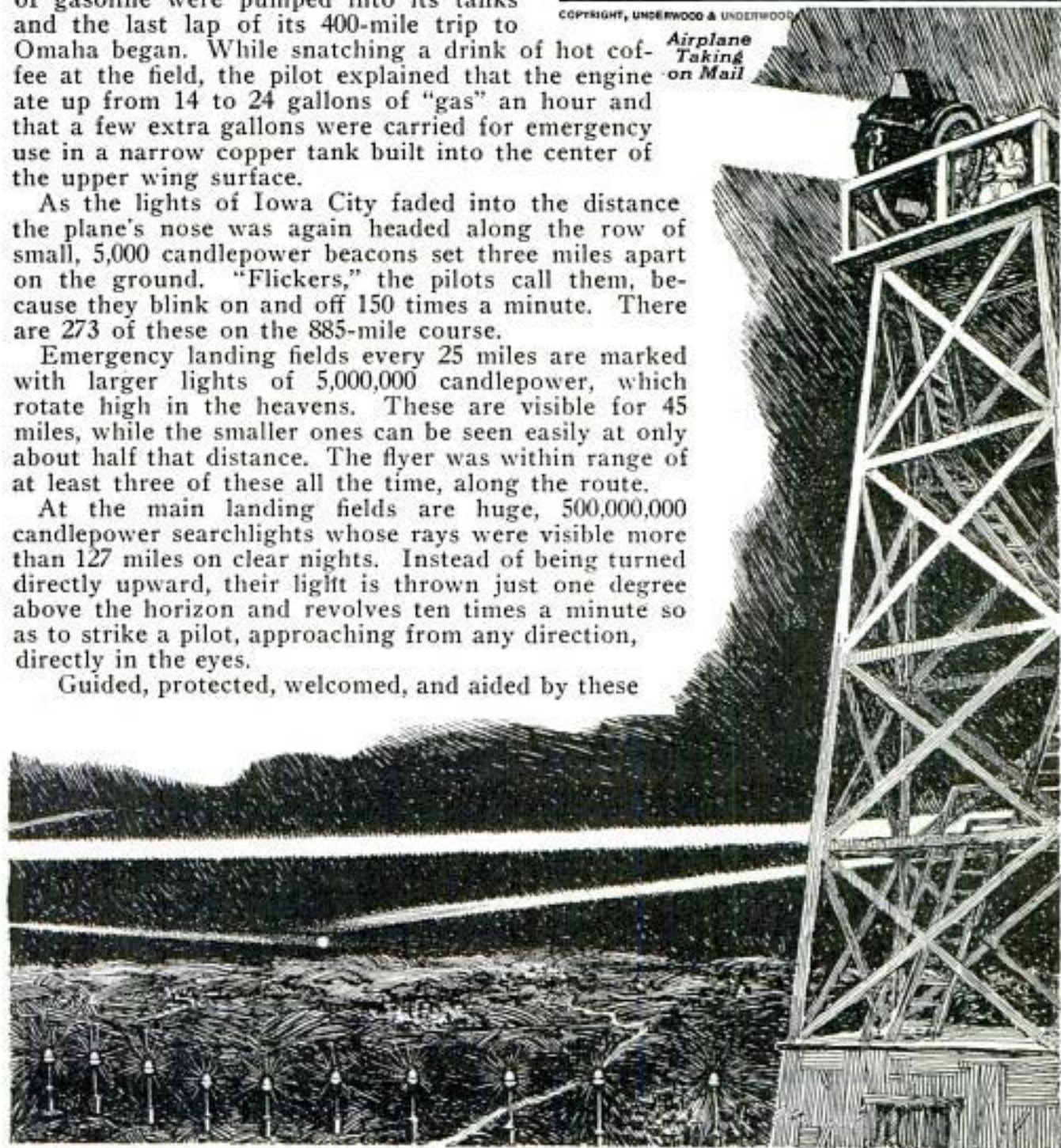
At the main landing fields are huge, 500,000,000 candlepower searchlights whose rays were visible more than 127 miles on clear nights. Instead of being turned directly upward, their light is thrown just one degree above the horizon and revolves ten times a minute so as to strike a pilot, approaching from any direction, directly in the eyes.

Guided, protected, welcomed, and aided by these



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Airplane Taking on Mail





intently earthward and then consulted his chart.

"Montezuma light's not working," he noted, some derangement of its mechanism having stopped its flickering and turned it into a steady beacon.

Passing over Earham, asleep in the darkness below, a narrow pencil of blinding flame began crossing the horizon in front of the plane. This rapidly increased in size until it became an orange-red ball of fire that cast the shadows of the wings back against the body and dulled the stabbing blue flashes from the open exhaust ports of the motor.

Then, with a sudden dip caused by tricky air currents, the ship sped over the Missouri River, the lights of Omaha casting a red glare on a drifting blanket of clouds, and circled over the landing field where another plane was waiting to carry the mail westward to Cheyenne in Wyoming.

Anxious watchers below saw the ship first as two bright sparks of red and green, the navigating lights on its wings. Then came the roar of the engine's exhaust as it wheeled over the field and the flash of its landing lights as it slid easily to the earth.

In the meantime, the plane that had left San Francisco at 6:00 o'clock the same morning had encountered bad head winds in its 15,000-foot climb over the mountains to Reno, Nevada, and had left

lights, the "207" sped toward its goal at a speed of well over 100 miles an hour. Skimming along the 1,500-foot level again, at least three of the ground beacons were always within sight. At one point, the pilot looked

Salt Lake behind schedule. In crossing Sherman Pass in the Black Mountains, clouds, mist, and a gusty breeze further retarded its progress.

Just outside of Cheyenne there was a solid wall of blinding fog, the aviator's worst enemy and far more to be feared than rain, snow, or sleet. Once enveloped in the mist, all sense of direction is lost and the pilot does not know whether his craft has navigating room or whether it is driving toward destruction against a mountain or into a valley.

It was still daylight, although the sun had set, and the pilot flew around and over the fog bank covering the city in the vain hope of finding a rift that would permit a landing. A mile thick, the vapor

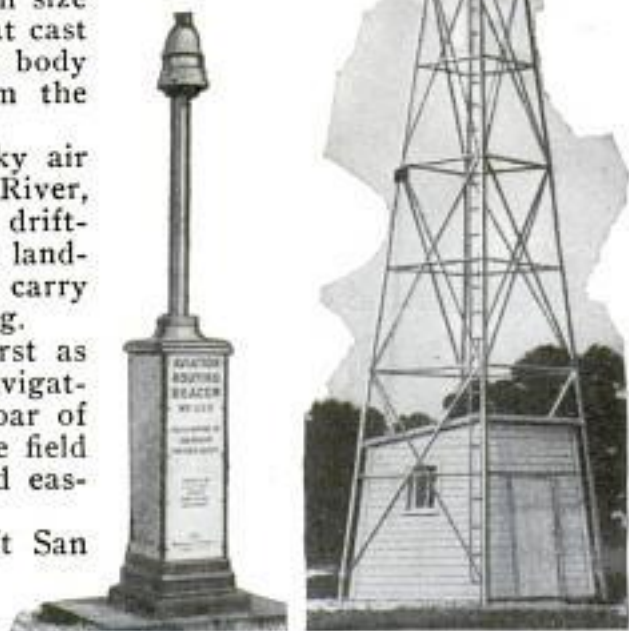
was as impenetrable as a stone wall and the plane finally returned to the nearest emergency landing

LIGHTING CLOUD-FLECKED PATH OF THE NIGHT AIR MAIL

IN a gleaming row, from the foot of Lake Michigan to the southeast corner of Wyoming, a distance of 885 miles, bright-burning beacons make a blazing highway across the heavens for the airplanes of the night mail.

If the illumination given off by the five 36-inch searchlights (rated at 500,000,000 candlepower each) and the smaller beacons placed approximately three miles apart, were merged in one mighty beam, it would be equivalent to the light of more than 2,520,145,000 candles.

As the ordinary electric bulb used in the home is rated at 32 candlepower, this gigantic, imaginary searchlight would be equal to nearly 750,000,000 such lamps.



Three Types of Beacons Used to Light Way of Night Air Mail Planes Across Country

field for a fresh supply of gasoline. "I'll make it or 'crack' my ship," was the laconic message he sent to the temporary headquarters at Omaha.

When three efforts had failed, however, the plane waiting at Cheyenne was started eastward without the San Francisco mail. After it had penetrated the fog in its rush toward the rising sun, it found a star and beacon-lighted path.

"The air was so clear that I could see the jackrabbits hopping along the roads," declared the pilot afterwards.

About a hundred miles west of Omaha, the two ships passed in the night, one bound west and the other east. Only their navigating lights were visible to the pilots, both of whom saluted.

In commenting on the success of the flights, Harry S. New, Postmaster General, pointed out that the planes of the air mail have been operated 2,500,000 miles without a single fatality and that in 160,000 miles of flying in 16 weeks there

had not been even a forced landing.

"Most of the fatal or distressing accidents which are so regularly recorded in the public press," he said, "are due to the fact that insecure or worn-out machines are taken up by fliers who are not qualified, and to whom it is an outrage to intrust other human lives. There should be governmental inspection of ships.

"Another feature that must have attention is the question of right of way through the air. There is now none to say to the irresponsible fly-by-nighter who has acquired a cast-off plane that he may not take some venturesome aspirants for a nocturnal joy-ride over the lighted course of the post office, without the slightest idea of the elevation at which the mail pilot is to fly.

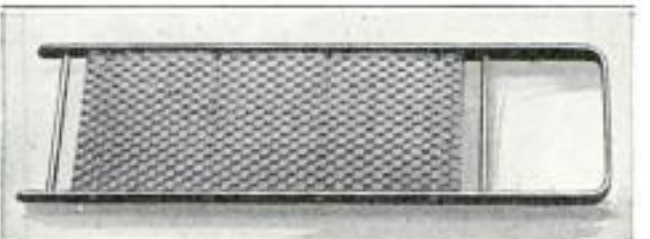
"National legislation governing the conditions under which planes may be flown, the quality and character of the machines and the qualifications of the pilot, is needed at once."

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STRAIGHT TEETH ON SHREDDER PREVENT CLOGGING *3560*

So food will not clog, making it easier to clean, and eliminating waste, a heavy, durable grater is being made with straight



Two-Sided Grater That Is Made with Straight Prongs So It Cannot Become Clogged

prongs that allow vegetable particles to shake out readily. One side is for coarse grating and the other for fine cutting.

Peoples Gas Light & Coke Co., 122 S Michigan Ave. Chicago

3552
BAMBOO FORESTS ARE TURNED INTO PHONOGRAPH NEEDLES

Whole forests of bamboo are being cut down every year to supply the need for phonograph needles. Although it



Operator Turning Out 180 Bamboo Phonograph Needles a Minute from Long Strips of the Material

grows 40 feet in six weeks, this material requires two years before it is ready to be turned into music producers. After being felled, it is split into proper lengths. These go to machines that make 180 needles a minute which are chemically treated to toughen them. They are then polished in hardwood sawdust and wax.

Secret Process.

3552
Hall Mfg. Co., 35 W. Kenzie St. Chicago

Smith - Endicott Egg
141 Milk St.
660

3512 Boston Mass.

CHURCH STEEPLE PULLED DOWN BY TRUCK WITH WINCH

In wrecking a church in an eastern city, a motor truck, equipped with a capstan winch, was used to tear down a lofty spire. From the steeple, a heavy cable was

swung to the automobile, standing at a safe distance from the structure. With the winch revolving slowly under the power of the truck's

Spire of Church Being Pulled Down by Winch Operated by a Motor Truck on Ground Below



motor, the tower strained and cracked for three minutes, and then with a loud snap, parted from the superstructure and fell to the ground with a crash.

3547
ONE LEFT OF SEVEN ANCIENT WONDERS OF THE WORLD

All except one of the seven ancient wonders of the world have been destroyed, recent researches have determined. Even the colossal pyramid of Cheops, the only one of the famed group remaining to the present day, has not entirely escaped the forces of nature, for portions of it have been torn down by earth tremors. The second wonder, the walls of Babylon, was torn down by Xerxes.

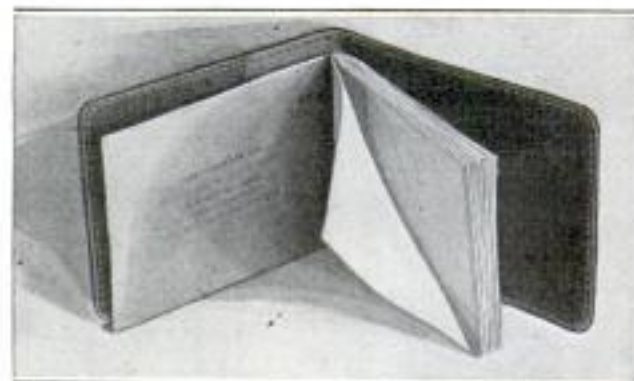
The third, the statue of Zeus in the temple of Olympus, was destroyed by fire in 408 A. D. Diana's temple at Ephesus, constructed in the 4th century B. C., and fired by the Goths in 262 A. D., was the fourth wonder to perish. The fifth was the mausoleum at Halicarnassus, in Caria, which was demolished by an earthquake. The Colossus of Rhodes, built in 280 B. C., that straddled the island harbor, also was wrecked by an earth tremor. The lighthouse built by Ptolemy Philadelphus at Pharos about 247 B. C. was the seventh and, perhaps, was the forerunner of the modern skyscraper, since it was between 400 and 600 feet high. An earthquake toppled it over in 1382.

3553
TABOO NOW PUT ON TATTOOING IN SOUTH SEA ISLANDS

Tattooing in the South Sea Islands is dying out, according to explorers who returned from there recently. The new generation of islanders, it is said, frown upon the practice until now the marks of the tattooer's needle are to be found only on the bodies of old natives. Although the custom seemed to have begun to wane about 30 years ago, one old man was found whose entire body was covered with designs.

3546
PAPER TO CLEAN EYEGLASSES KEPT IN LEATHER FOLDER

For cleaning eyeglasses, neat packages of paper tissue have been made to fit in leather pocket folders. When closed, these resemble an ordinary notebook, and are smaller in size than a cigarette case. When the leaves have all been used, a new supply is easily fitted into the same



Leather Pocket Folder Filled with Paper Tissue for Cleaning Eyeglasses

container. The material is specially prepared for the purpose and, it is claimed, will not scratch the lenses.

Schulte Optical Co.,
108 N. State
Chicago

Indianapolis News
7/4/23



Earth Tremors That Have Long Terrorized Man Disclose Secrets of Nature

Noted Scientists, Engineers, and a Traveler Give Views on Causes and Effects of Shocks Such as Plunged Japan Into Chaos



What Is the Matter with Japan's Land Formation

By E. M. Newman, Travel Lecturer

ANOTHER earthquake, loss of life, great destruction of property. Not the first experience of this kind, but the worst. Why not give up and move away? This for the average man is but a natural question to ask, but where shall the Japanese go?

I have been in Japan eight or perhaps ten times. On two occasions I was compelled to run out of my hotel, as rocked by an earthquake, it swayed to and fro. Buildings creaked, groaned, and fell to the ground in heaps of debris. A hospital caught fire and many of the helpless were burned to death. A large section of Tokio was swept by flames.

On another occasion, Yokohama was visited by a tidal wave, which converted my room in the hotel into a swimming pool. An earthquake followed and several square miles of property was destroyed, thousands of people were rendered homeless, and millions of dollars were lost.

At one time, Japan was part of the mainland of Asia. Probably an

earthquake tore it from its moorings, the sea flowed through a rent in the earth, and Japan became an island. Of volcanic origin, it has been subject to frequent earthquakes, each taking its human toll and exacting from the people a frightful tax in the form of property loss.

Not everyone has sufficient money to build of steel and concrete, and after all is said and done, are such buildings any safer than ordinary wooden houses? Probably not. A one-story building constructed of wood and thatch, may withstand an earthquake better than one built

of stone or concrete. To build skyscrapers in a land where earthquakes are frequent would be folly.

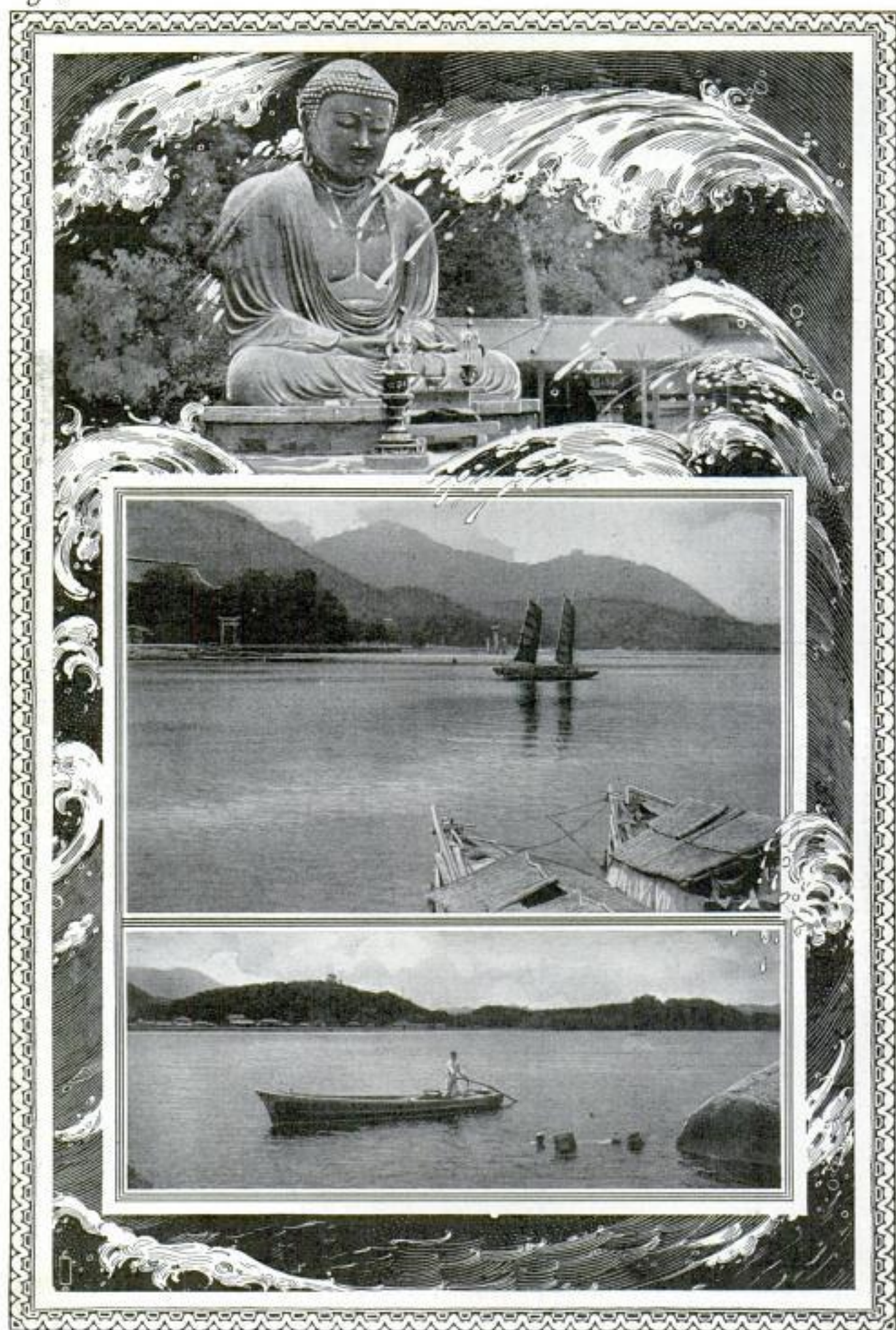
This explains why such cities as Yokohama and Tokio are composed mainly of one-story buildings, which stretch for miles in every direction. Experience has taught the Japanese many things, but the problem of how to protect themselves from the devastation caused by earthquake, is still unsolved.

EDITOR'S NOTE

As Popular Mechanics Magazine goes to press with this issue, the Japanese people are hidden from the view of the world beneath a terrible pall of catastrophe.

Accurate reports as to the extent of the disaster, and as to scientific facts connected therewith, are not obtainable. From its many friends and correspondents in Nippon, nothing has been heard.

Believing, however, that the accompanying articles, written by acknowledged authorities, would prove of interest, they are presented with the explanation that when more is learned of the Japanese holocaust there might be additions or reservations to be made which, of course, would be impossible after the magazine has "gone to press."



Quiet Bays and Peaceful Inlets Spilled Inland in Tidal Avalanches as the Sea's Bottom "Came Up." Above: Japan's Large "Buddha" Reported Thrown Down by the Rush of Water

There are many theories as to the cause of earthquakes. The one generally accepted is that they are due to faults in the earth's surface. In the readjustment, the crust rises and falls, at times breaking up and swallowing towns, lakes, and islands. Usually these phenomena take place in a volcanic region, indicating that so-called "faults" are mostly found where

nature's fires are near the earth's surface.

Japan in area is no larger than the states of Illinois and New York, but it has a population exceeding forty-seven million. A land teeming with human life, honeycombed with volcanoes, undermined by subterranean caverns in which seethe the mighty forces of nature. Is there a way to escape extermination?

— O O —

"Leak in the Floor of the Ocean Caused Japanese Quake"

By Capt. T. J. J. See, Professor of Mathematics, U. S. Navy

The basic cause of the earthquake which devastated Japan, as well as of other tremendously destructive earthquakes of history, is gradual leakage of the waters of the ocean through the earth's crust, bringing terrific upheavals when the water meets the hot lava in the interior.

Lying to the east of Japan is the "Tuscarora Deep," a pit in the Pacific (27,600 feet deep), the source of the greatest seismic disturbances which history records. Leakage from this

abyss into the depths of the earth is greater than it is anywhere else because of the tremendous pressure of the water. It is reported that this latest Japanese earthquake occupied six minutes of time, rather long duration for a heavy earthquake, and proving that the lava beneath the crust of the earth was adjusting itself from the sea toward the land. Further proof that the sea bottom was disturbed is found in the great tidal wave which followed the earthquake, and the broken cables, lying on the bed of the sea.

The earthquake is nature's method of building mountains, and, if there were no earthquakes, all our globe would be a dead level.

It is a well-established fact that the pressure at any point on the sea's bottom is great enough to throw a column of water as high as the sea is deep at that point. It is easy from this to see that the pressure at the bottom of the "Tuscarora Deep"—five miles below the surface of the ocean—would throw such a column of water

up to the highest clouds of our sky.

Pressure of this strength would force the water through the granite of the earth's crust, and thus cause the creation of untold forces of steam when the water hits the superheated lava of the earth's interior. Not only the main island of Hondo but the other bits of Japanese land have been so lifted up.

The Cordillera, or Andes Mountains, was similarly lifted up, and very deep water is still to be found along the Pacific coasts of both North and South America.



Insurance Policy in Operation in Japan, Providing in Many Cases Against Loss by Earthquakes

— O O —

Earthquakes Due to Creeping of the Earth's Crust

By Dr. A. C. Lawson, Professor of Geology at the University of California
(An Interview with H. H. Dunn)

Many people think that earthquakes are peculiar to some particular sections of the globe, but they are not. They are common the world over, and there probably is no fraction of the earth's surface that has not suffered from them. Now it has been found that certain points

on the earth's surface move in a rather mysterious manner. Mount Tamalpais, in California, moved 1.64 meters (approximately two yards) northward between 1854, when the latitude and longitude of the mountain were determined with great precision, and 1882, when its position was

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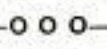
again learned. An observation station at Chaparral moved 2.06 meters in the 1906 earthquake.

These movements of the earth are not confined to the sudden and violent disturbance experienced at the time of an earthquake shock. The energy that was let loose in Japan, or that was released in San Francisco in 1906, had been stirred up in the earth's crust as an elastic compression. It seems probable that this energy was being stored by a slow accumulation of strain due to the application of some force, and that, when the strain reached the limit, things broke. It was the snapping at the time of the maximum possible strain that gave rise to the sudden shifting of the ground, and gave us the vibration that we recognized as an earthquake shock.

If the crust of the earth in any region is moving slowly to the north, as figures

and measurements indicate, certainly the force causing this movement is not applied at the surface.

The indications are that portions of the earth are in balance which sets up a disturbance, or undertow, of the deeper portions of the earth's crust toward the lighter portions. The process of erosion, the wearing down of mountains, is removing a load in an area where the mountains are and transferring it to a neighboring region. We are thereby disturbing what we call the "balance," and, if that disturbance be sufficiently great, then we must inevitably have a return flow from the region that is being loaded to the region that is being unloaded, and that return flow is very probably sufficient to bring about a drag effect on the brittle crust above it, and to apply to it a strain which can only be relieved by rupture, or slipping, giving rise to earthquakes.



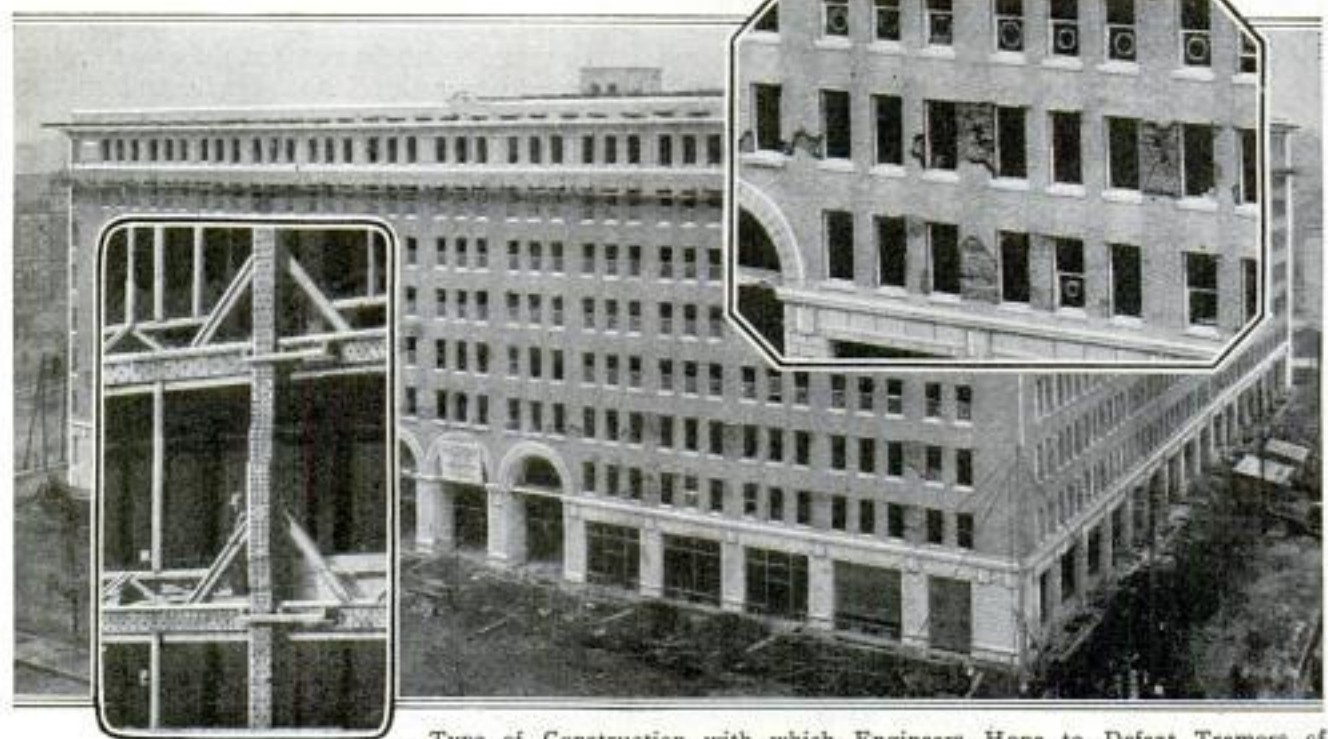
Nations Taking to Building in Steel to Defy Quakes of Earth

By James Baird (President, Geo. A. Fuller Co., Which Has Built \$50,000,000 Worth of Buildings in Tokio)

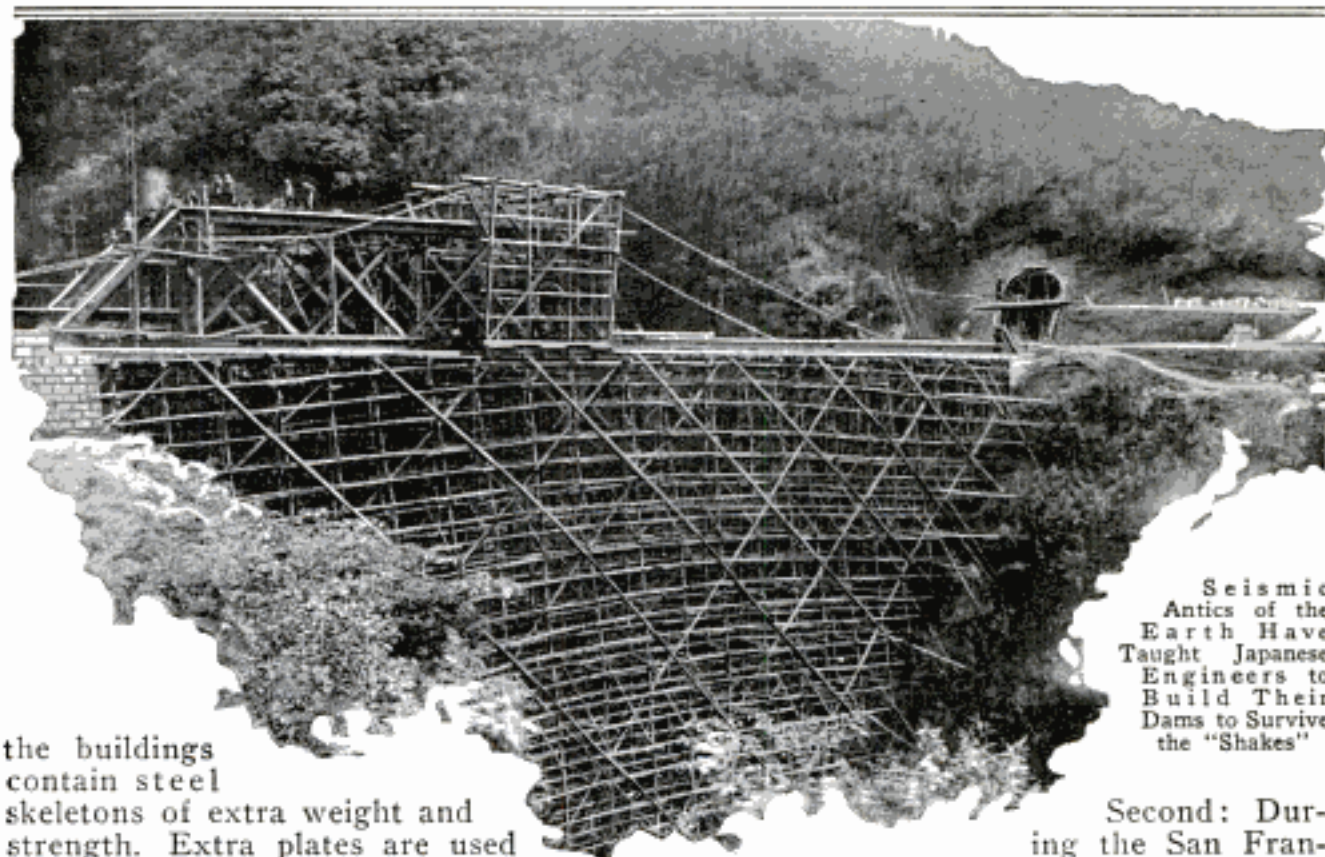
Private advices from our agents in Japan assure us that at least three of the large buildings we erected in Tokio withstood the terrible earthquake. We completed the last of these, which are respectively eight, seven, and eight stories high, in the fall of 1922, and a little more than a year ago they went through quite a severe quake and withstood the shock with practically no damage, except the

scaling off of a small amount of the tile used on the face of one of them.

Earthquakes do their damage on buildings that yield, because part of the building is thrown in one direction and part in another. Scientists, architects, and engineers have studied earthquake effects, and have decided on adopting many features to make the building rigid and resistant. In the first place,



Type of Construction with which Engineers Hope to Defeat Tremors of "Quakes." Left: Heavily Riveted Steel Skeleton. Above: Close View of Finished Wall



Seismic Antics of the Earth Have Taught Japanese Engineers to Build Their Dams to Survive the "Shakes"

the buildings contain steel skeletons of extra weight and strength. Extra plates are used to join steel beams on to the steel columns. Each floor level has very substantial steel braces extending from the columns to the floor beams, and at the roof line heavy plates are placed on the top of columns connected to the cross beams.

A very great number of rivets are used. There are perhaps three or four times as many rivets as in ordinary construction in this country. So it would seem that earthquake construction is very similar to what we call "wind bracing" in this country. The object is to stiffen the entire frame to resist choppy stresses.

Our confidence is based on various experiences and facts, of which we have knowledge, among them being the following:

First: During the great Baltimore disaster, fire, brick, and stone buildings crumbled and were practically flattened to the earth, but the steel structures, though they were gutted by fire, did not fall,

Second: During the San Francisco earthquake, substantial stone and brick buildings collapsed and were completely destroyed, but the steel-frame buildings survived with small damage.

Third: In wrecking steel structures it has been found practically impossible to tear the work apart or rupture it in any way, other than by cutting out all connecting rivets.

In the Baltimore fire, in a few cases, the fireproofing was broken from around columns, and the terrific heat melted the steel, but the beams were thereby put in tension, and although the floors sagged, yet there was no giving way, regardless of the fact that the weight from the six or eight floors above was left without support.

The various cables received by us from the institutions owning the buildings in Japan that were equipped with special steel skeletons, all indicate that they are quite safe and have come through practically unharmed.

— o o o —

Water-Proofing a City Against Earthquake Damage

By G. A. Elliott, (Chief Engineer, Spring Valley Water Company, of San Francisco)

The greatest damage done to cities by earthquakes arises from the conflagrations which almost always follow. In the earthquake of 1906, at San Francisco, it has been definitely determined that more

than 90 per cent of the property loss was caused by the fires occasioned by the breaking of gas mains and the firing of the gas by sparks from broken electrical connections.

3534
 San Francisco is considered by waterworks engineers to be one of the most difficult cities of its size in the United States to supply with water. When the earthquake hazard is added to the other considerations, the limits of the comparison may well be increased to the area of the world.

Situated, as it is, on the extreme tip of a peninsula which a number of earthquake faults cross, it is not hard to realize that all of the conduits carrying water to the city must of necessity be exposed to more or less interruption due to earthquakes. Another feature of importance is the fact that, to the south the neck of that tongue of land is cut almost across by marshy areas, which are subject to the same jellylike shaking.

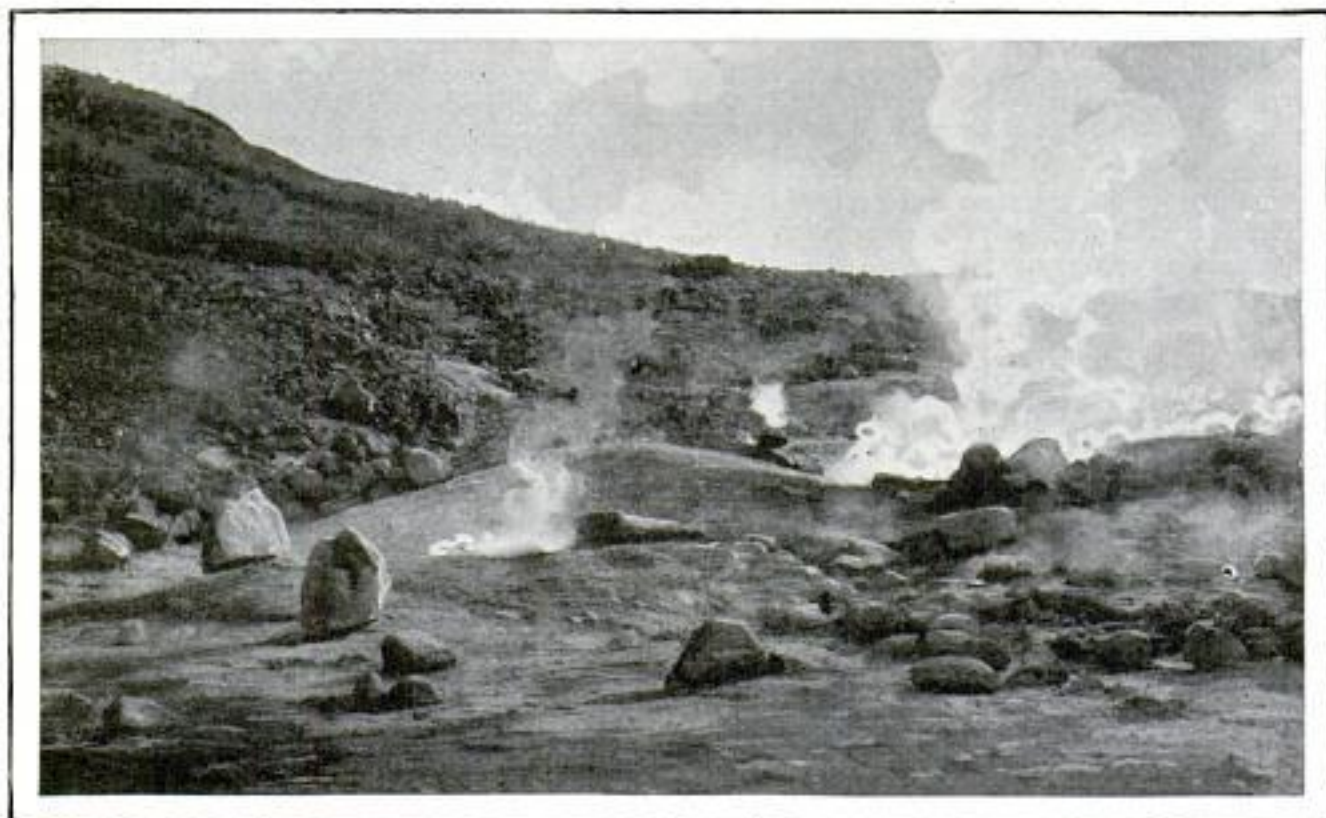
The principal lesson learned in 1906 in San Francisco was that if waterworks structures are located in soft or filled ground, or near a fault which moves, it is practically impossible to so construct certain parts of them, such as pipe lines, in such manner as to guarantee absolutely against earthquake damage. Three precautions may be taken, in this and in other cities in earthquake areas, to insure the water supply against damage from seismic disturbances:

First, waterworks structures should be so located as to avoid known areas which are subject to excessive movement.

Second, the isolation of selected sections of the system by means of gate valves, placed at all points where pipes cross the boundaries of the ground subject to such seismic movement. This precaution is, of course, involved in the treatment of the local distributing system in each city.

Third, and perhaps most important, the carrying in storage within the city limits of a large quantity of water available for distribution. With sufficient stored water breaks in the conduits carrying the water would be relatively far less important than breaks in the distributing system.

It developed in the San Francisco quake that water was needed more for fire fighting than for any other purpose, and, following the reconstruction of the burned district, plans were made and a system constructed that embodies all the best features of water supply for fire purposes that have been in use anywhere. Many features of this system are designed to meet earthquake conditions, such as the locations of the reservoirs and pumping stations on solid foundations, the avoidance of filled ground in laying large feeders, gating of distributing mains in filled ground, duplication of pumping stations and sources of supply, and the use of special joints in connecting pipes designed to allow greater movement before rupture.



Like Phantom Fires, the Smouldering Cauldrons of Nature, Ignited Long Before the Dawn of Ages, Are Still Burning in the Threatening Craters of Many Volcanoes

9/4/23

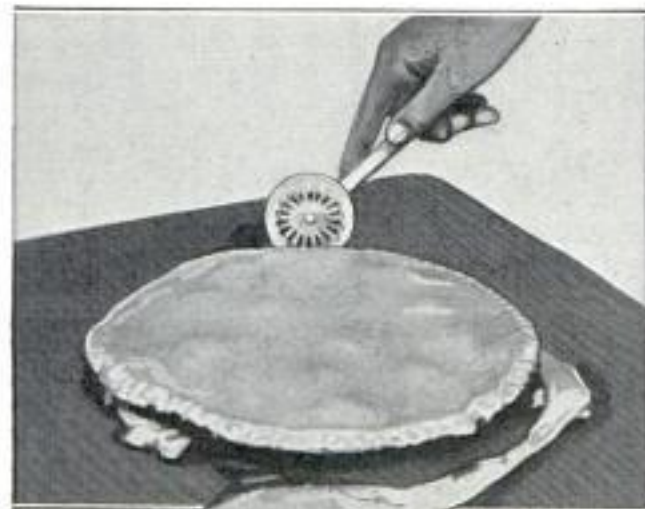
GHOSTLY LEGEND GUARDS PEAK OF TREASURE MOUNTAIN

Warned by a legend handed down for several generations, mountaineers in the vicinity of Bread Tray Mountain, in the Ozarks, are said to avoid the neighborhood of its slopes. Reported to have once harbored a garrison of Spanish explorers who enslaved Indians to work a rich silver mine, it is seldom referred to by the tourist guides. Throughout that section are caves believed to have at one time sheltered the intrepid soldiers of Spain who left writings on the cavern walls. But the treasure mine supposed to have held them in that locality has never been discovered, as it is said the residents refrain from exploring the mountain top for fear of a band of phantom defenders which they have been told guards its secrets. These ghostly forms, tradition says, are the specters of the massacred garrison which died at the hands of the revolted slaves. Many exploring parties braving the dangers said to exist, failed to find any trace of the mine, but reported discoveries of relics and the remains of a fortress which bore evidence of the presence of the Spaniards several centuries ago.

Malena - very young, married, probably married big town.

SEALER FOR PIE CRUSTS KEEPS FILLER IN WHILE BAKING

To press the dough for pie crusts together and prevent the escape of juice into the oven while baking, a metal



Metal Pie Marker That Trims and Joins the Crust and Prevents the Escape of Juice

marker has been made in the shape of a wheel with a handle. This is run around the edge of the crusts to mark the dough. As the wheel has a cutting edge, it trims the sides at the same time.

*Aunt Evelyn's Pie marker
Evelyn Simpson, 7 School St,
Waterville, Maine*

GRIP FOR ARMLESS PERSONS TURNS PAGES OF BOOKS

Armless persons may be assisted in turning pages of books and papers by an instrument recently made to be held at



Turning the Pages of a Magazine with a Mechanical "Finger" Designed to Aid Armless Persons

one end by the teeth. At the other end a rubber cap is pressed against the leaf, lifting it up and pushing it over. Two legs are provided on the device to keep it raised above flat surfaces so the operator will have no difficulty in seizing the handle in his mouth. A slight movement of the head is sufficient to operate this mechanical "finger."

EIGHT DAYS TO TAN LEATHER WITH VACUUM PROCESS

Great savings in time, labor, and power are claimed for a high vacuum tanning process recently announced by a Swedish inventor. Cylinders holding 400 hides are rotated by electric motors, the chemicals circulating in them constantly. A 60-per-cent reduction in the number of men employed is said to result from the use of the system.

☛The United States is a nation of ice-cream eaters. Last year it consumed four times as much as in 1914. In New York City 60,000,000 quarts are consumed in a year, an average of ten quarts for each resident.

*Albert Von
Horselles -
no address*

*A. F. Shipley, Christ's College
Lodge, Cambridge, England
Detroit Free Press
9/6/23*

3522

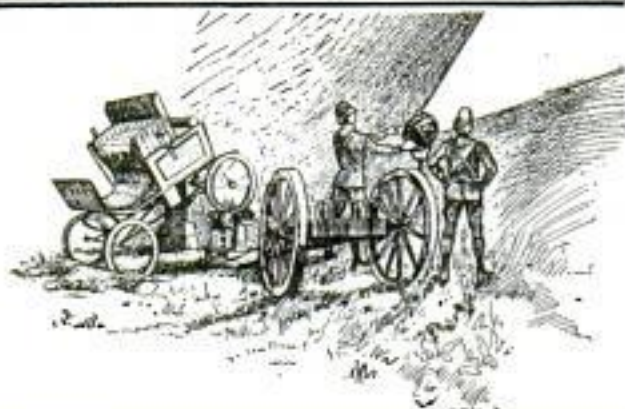
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When the Automobile Was "New" as Seen



Automobile of Twenty Years Ago Being Used as the Tender of a Searchlight

SO rapid has been the development of automobile transportation that it is difficult to realize that 20 years ago the "one lunger" had scarcely ceased to be a curiosity on city streets.

In 1903 Popular Mechanics Magazine told of the first use of motor cars in war. This was during the Boer conflict, and the British put American, steam-driven vehicles into service to explode mines, run dynamos, operate searchlights and transport men and supplies.

Of one of these cars, it was said that it carried blankets, waterproof sheets for four men, planks for crossing ditches, tools, spare parts, telephones, a mile of wire, and a day's supply of gasoline. In addition, there was a trailer carrying a search light, projector, and dynamo.

In the same issue of the magazine there was an article on wireless telegraphy, declared to be "one of the latest and most important developments of science." "The most prominent worker in this field is Mr. G. Marconi, an Anglo-Italian," the article continued under a caption that read: "Mysteries of the Radio Unfolded."

Another wonder of that period was a locomotive without fire, water, or smoke,

that was hailed as the "Dream of Modern Traction." This was a large car, propelled by electric motors, the current being supplied by generators driven by gasoline engines. "It is generally accepted by railroad managers that the limit has been reached in steam locomotive construction," it was said in describing the new power plant, which was believed capable of drawing a 2,000 ton train across the continent, from New York to San Francisco, without stop, and at a speed of 100 miles an hour.

Although this vision of speed has now been more than realized, it was through the air and not over steel rails, as the airplane was then only an unrealized hope in the minds of inventors who were regarded as "cranks." It was not until some



An Artist's Conception, Twenty Years Ago, of "the Electric Farm of the Future"

time later that Professor John J. Montgomery, of Santa Clara College, California, made one of the earliest tests with gliders

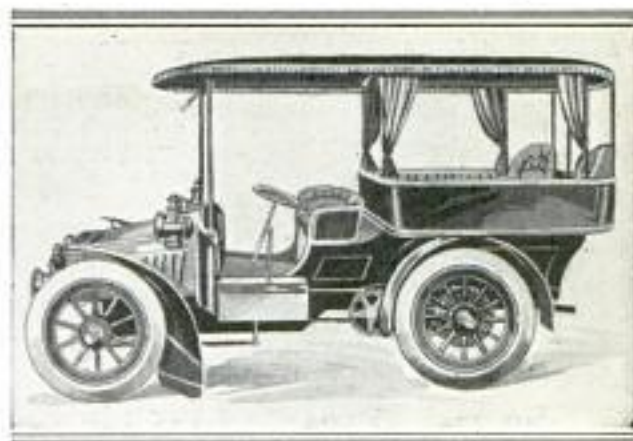


During the Boer War Motor Vehicles First Proved Their Value in Military Service. American Steam-Driven Cars Being Used by the British to Transport Supplies and Run Dynamos

in Popular Mechanics Twenty Years Ago

which were released, after being raised aloft by a balloon. Of his first successful flight, it was written that the experiment was "the greatest and most daring feat ever attempted." "All that is now wanting," it was said afterwards, "for complete success is a power in the machine itself to rise from the earth."

With the transportation dream of two decades ago now realized in the flights of army and air mail planes across the continent, another hope still lies in the realm of romance—the "Electrical Farm of the Future." That was the heading on an article that declared that "it is not impossible that the time when the farmer shall conduct the whole of his operations by machinery and the application of scientific principles will proceed the millennium—a time when there will be no drouth, nor ruinous floods of rain; when the crops shall not fail, but will be forced to perfect maturity in less time than now



Rear-Entrance Machine That Was the Pride of Its Owner 'Way Back in 1902

nessed may be as cheap as water. The whole system will be under the control of one or two operators, and the farmer can tilt back his chair, elevate his feet and smoke and watch the grain grow. We predict that an American farmer will be the first to have a plant of this kind."

Although this dream of the artist and writer is still to be realized, it is interesting to note how much farm work now is being done by tractors and gas engines, the great irrigation projects in the West that abolish all fear of drouth and the harnessing of streams and waterfalls to provide cheap electricity in all parts of the country. Also, the number of hothouses and truck gardens where plants are grown in and out of season under glass is increasing each year.

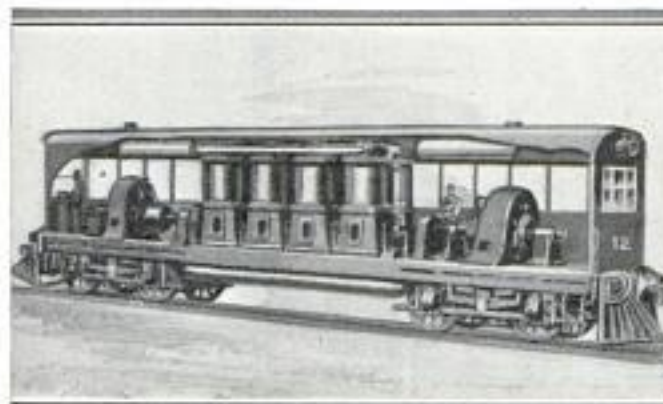
In discussing "The Beginning of the Horseless Age," Popular Mechanics Magazine in 1902 said: "We have already crossed the threshold, but henceforth machinery will perform the heavy work now done by animal power."



Mine Being Exploded During Boer War by Electric Current Supplied by Dynamo Driven by Steam Automobile

is required by the natural process."

The article then dealt with a period when there would be "a huge forcing house run entirely by electricity, which, when all the streams and falls are har-



"Locomotive without Fire or Water," the Power Being Provided by Dynamos Driven by Gasoline Motors, and a "Balloon Farm" That Attracted Attention Two Decades Ago

Played by Sailor

P. A. Heudale

TONE OF SAXOPHONE RIVALED BY THE SARRUSSOPHONE

After years of supremacy in the field of "jazz," the saxophone now has a rival in what is known as the sar-



COPYRIGHT, UNDERWOOD & UNDERWOOD

Latest "Jazz" Dispensing Instrument Whose Notes Are Deeper than Those of Saxophone

russophone, coming into use in America. It is said to be deeper toned than any instrument now generally used in orchestras and to have lower bass notes than the bassoon. One has proved popular with the navy band in Washington. *W. C.*

MOUNTAIN OF COPPER SPANS OCEAN IN DEEP-SEA CABLE

Four million pounds of copper drawn into wire serve as the core of a deep-sea cable recently laid across the Atlantic Ocean. Reported to be the largest line spanning the sea, it transmits 600 words a minute in each direction at the same time. Delicate and dangerous work was involved in its laying, as the heavy strands had to be carried by the ship in three-mile lengths and spliced by skilled jointers as each piece was payed out. Special brass tape surrounds the joints to ward off a species of sea worm that bores into the hard rubber covering, creating openings that admit water and acid-laden sediments which corrode and eat into the soft wires. The line is tested every five minutes from a station at the shore end connected with the testing room aboard the steamer. If interruptions are found in the transmission, the wire is attached to a float and the ship goes back over the route to find the defective spot. Storms often arise while the work is going on, and the heavy waves toss the great weight of the cable as it comes from the reel with

New York Times 9/2/23

such force as to snap it, when it often sinks so deep that many days and weeks are required to recover the severed end. Cases are on record where icebergs dragging on the bottom of the sea have crushed and torn the strong lines. A repair ship actually had to tow one of the icy masses out of the cable zone in order to mend a break the great hulk had caused. Whales with their ponderous bodies, and even the sharp teeth of sharks, have been known to cut wires.

FOOD TREES CROP OF FUTURE, PREDICTED BY SCIENTIST

On the ideal farm of the future, according to an opinion recently expressed by a scientist, trees that produce food for both men and animals will be grown extensively. Among them, he believes, will be walnuts, hickories, pecans, almonds, chestnuts, hazelnuts, mulberries, and others known to the present-day farmer. In addition, there will be many developed through grafting and other processes. In the honey locust, with its large pods, he sees the possibility of growing beans on trees instead of climbing vines. This manner of producing foodstuffs, he says, has the advantage that crops can be gathered for a number of years without annual cultivation and replanting, while the trees can be placed far enough apart to permit of cultivation of grain and other products. An acre of nut trees, it has been estimated, should yield from \$100 to \$1,000 a year above expenses.

New York Times 9/8/23

ROASTER WITH GLASS COVER MAKES COOKING VISIBLE

Through the glass top of a roaster now being marketed, the housewife can watch the progress of cooking meat without lifting the cover, or exposing her hands to burning steam and the heat of the oven. Self-basting also, the utensil relieves the cook



from care and worries of overdone food, since she can tell at a glance when it is ready for removing. Made of aluminum and round in shape, the cooker has no corners in which grease can lodge.

Carl W. Newton Associates 9 S. Wabash Chicago

Annual Report

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RARE SOLID-IVORY STATUE NOW IN AMERICA

Carved from a single piece of ivory, a rare statue of a Japanese mother and child, the work of the famous Godo, has reached America and is now in the private collection of M. Barrere Clawson. The figure was ordered by the British Museum, but when the war broke out in 1914, the order was countermanded, the statue finally being bought by an American, who later sold it to its present owner.

Earliest examples of ivory carving are believed to have been made by primitive cave dwellers of remote times. In China and Japan, the work of today has won an honored place in the history of art. During the 600 years that elapsed between the decline of the Roman empire and the Gothic revival of art, ivory sculpture recorded many of the changes in man's types which would otherwise have been lost to the modern world.

The ancients probably found that ivory was superior to bone for carving, because it requires no drying or other preparation for the tools of the craftsmen. Per-



haps the only exception to this is the large curved tusk of the hippopotamus, which is covered with a thin layer of enamel that is so hard it will strike fire when cut with a piece of steel. Before the carver can use its ivory center, the flint-like shell must be removed with acid or heating. If heat is used, the coating is scaled off, after it has been cracked by plunging suddenly into cold water.

With delicate strokes and quiet patience, the skilled ivory worker sometimes spends many months on one subject but in the end he has created a figure that is surprisingly lifelike. Ivory taken from the animals of Asia is softer and much easier to work with, compared to that found elsewhere. It is of a denser white and more porous in texture than the African product, but is apt to turn yellow sooner, and is harder to polish. No part of a piece of ivory is allowed to go to waste by the worker, who collects all trimmings and shavings for use in producing the smaller objects.

3393 New York Times 8/19/23

HEIGHT OF MOUNTAINS FIGURED FROM BOILING WATER

Although nearly 300 years old, the boiling-water test to determine altitudes is still the most accurate method known, despite the fact that barometers and delicate measuring instruments have been developed. For measuring heights by this method, a special instrument, called a hypsometer, has been invented. So compact that it can be carried easily on mountain-climbing expeditions, it has only one breakable part, the thermometer used for recording the temperature of the water, and is constructed so that it may be set up in snow or when high winds are blowing. Water boils at 212 degrees above zero at sea level, but, as the altitude

increases, the boiling point drops. On very high mountains, the liquid boils at temperatures so low that it is impossible to prepare a hot drink. Scientists found that on one of the world's loftiest summits when water came to a boil it was possible to put their hands into it without scalding them.

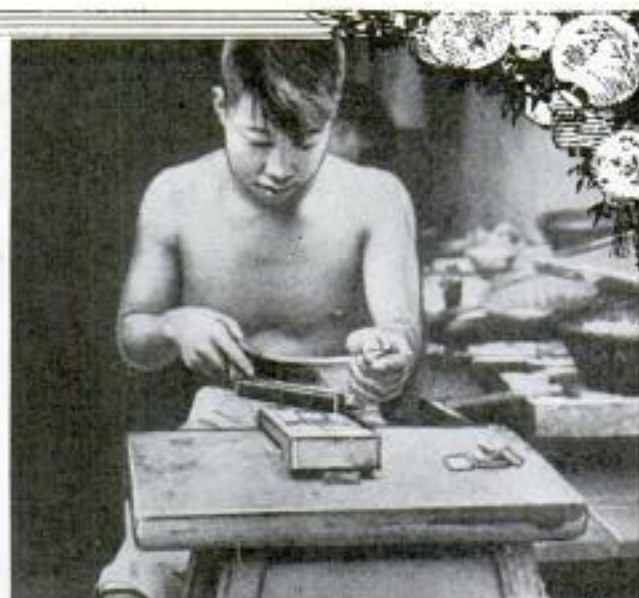
Short glides in the air were made as early as the reign of King Harold of England by a monk named Eilmer, who, after several successful flights, jumped from a lofty tower with wings strapped to his body. He glided for a furlong or more, when, striking a cross-air current, or "air pocket," he fell to the ground, breaking both legs. He attributed the accident to his neglect "to fit on a tail."

Emb. F. Scharlach, 3013 W. Maryland Blvd. Detroit, Mich.

CARVING MA CHANG PIECES FOR CHINA'S ROYAL GAME



Cutting the Bone into Small Slabs



Planing the Surface by Scraping



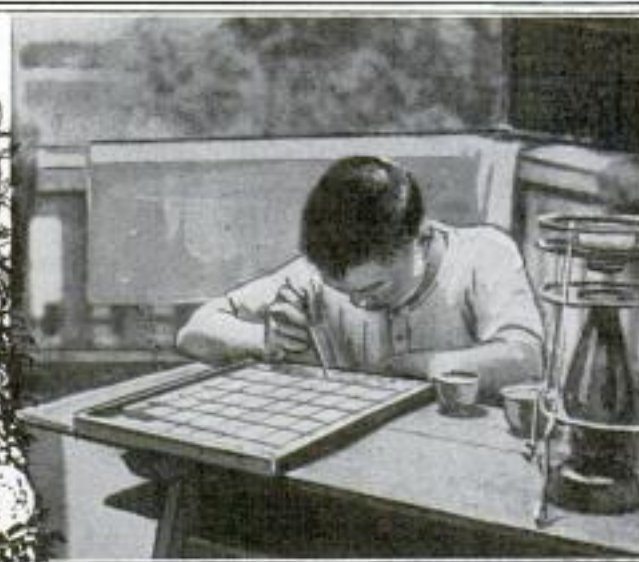
Trimming the Edges of the "Tiles"



Fitting the Blocks with Bamboo Backs



Engraving the Designs and Figures



Applying Paints to the Carved Pieces

Chicago

A CHINESE GIFT TO AMERICA

OUT of China, still a rich storehouse of treasure and tradition, has come another oriental gift to the western world—the fascinating game, Ma Chang. Known under a score of other names throughout the celestial nation, the pastime has long been a means of entertainment among all classes of the natives since the days of Confucius. Even before the Roman empire the Chinese occupied themselves with the delights of the marvelous little ivory “tiles” and “sticks.” Whether among the coolies loitering about the water front of Hong-kong, or in the households and tea gardens of the mandarins, the game was played with the same enthusiasm and eagerness with which it has been received in the cities of Europe and America.

Created by the genius of a lowly fisherman, it has remained for 3,000 years a national fad of China. The story tells of one Sze, who lived on the shore of a large lake, wherein he daily let down his fishing nets from his small sampan and brought to the villagers a fair supply of the catch. Having dreams of great riches in the future, he profited and saved, and by and by other boats fell under his possession. But Sze had no crews with which to man them. The lake was rough and the seasickness which the storms caused the sailors was a dreaded malady. Evil spirits that hovered over the waters were said to make their victims ill as a penalty for the invasion. Not to be outdone

in his determination to build up a great fleet of fishing craft, the wily celestial hired his help from a distant inland country. Here again he was confronted with the terrors of seasickness, for the landsmen could not withstand the hardships of a rough voyage. They often became so ill that he had to put back to shore and await calm weather. Then Sze decided that, after all, it was only a matter of imagination. If he could but devise some way to occupy the minds of his weak-hearted hirelings, while waiting for the nets to fill, they would have no time to spend in thinking of the evils that might beset them. With the aid of his family and some neighbors to whom he complained, he invented a game so intricate and amusing that he was sure it would take all of the boatmen's attention to play it. He called it “Mah Diau.”



Building the "City Wall" in the Ancient and Honorable Game of Ma Chang



Ma Chang Sales Co. of Chicago, North American

Originally it was played with 108 pieces of cardboard, and according to the legend, the fishermen forgot all about the sickness, so absorbed did they become in the little signs and figures that made up the pastime.

Next it fell under the eye of an officer of the imperial army, who introduced it to his followers. Gamblers who invariably followed the armies added their efforts to its spread. One of them finding that there were insufficient cards to permit more than four persons to play, added more pieces. To those blocks representing the winds of the heavens, and the fiery dragons of the empire, he added "tiles" for the seasons of the year.

Richer enthusiasts called upon skilled bone carvers and ivory workers to produce elaborate sets in materials of their trades, with brightly enameled or inlaid characters. Shanghai today is filled with shops devoted to the business of trading

in the little carved slabs made by Ma Chang workers.

Because it was necessary to read the strange Chinese characters, westerners were slow to form the acquaintance of the game. The Chinese did not trouble to place it on the market or introduce it to their foreign visitors, so it was left to an enterprising young American who had lived for years in China and knew the game. By placing an English letter or figure on each block he succeeded in teaching its points to friends that he met in the foreign quarters of the large seaport cities. By this means its spread to Europe and America became rapid.

Today so popular is the game in this country that the Chinese are no longer able to supply the demand for sets. Accordingly a surprisingly large industry has grown up in a few months in the United States for the purpose of making outfits of Ma Chang.

3405 RIVER IS "TUB" FOR WOMEN OF MADRID

In strange contrast to many of their sisters of the western hemisphere, the women of Madrid, Spain, still follow primitive methods in washing clothes. When it is washday, instead of using washing machines, or other labor-saving appliances of the more up-to-date housewives, they rush from their homes early in the morning with the family garments bundled on their backs, to a shallow river

that runs through the city. Rivalry is keen among them for choice locations on the stream's gently sloping banks. Kneeling on boxes, with washboards that extend into the water, they perform their tasks. For many years this has been a custom that has remained virtually unchanged. On a pleasant day, both sides of the river are dotted with the figures of busy women.



Housewives of Madrid, Spain, Following a Custom of Their Ancestors, Betake Themselves on Washdays to the River, Where the Sloping Banks Provide a Public Laundry "Tub"

Newman Travel Talks
Tribune Bldg., Chicago

Detroit News
8/24/23

POPULAR MECHANICS

FIGHT AGAINST PLANT DISEASE INCREASES CROP HARVESTS

As a result of efforts of scientists to increase crop production by preventing various plant diseases, a type of wheat, so delicate that it was easily damaged by early frosts, increased its yield by having other grades of grain crossed with it. A little more than ten years ago pineapples growing in the Hawaiian Islands were weak, unhealthy plants owing to their inability to absorb enough iron for their needs from the soil. A solution of sulphate of iron is now regularly sprayed over the fields and the crops have been so aided that the output each year is worth about \$20,000,000. In a middle-western state fungus plagues threatened to utterly destroy cabbage growth, but by separating the healthy plants that were found in almost every field, a sturdy species was developed that resists the parasite and has swelled the yearly production.

The Buffington Co.,
FOLDING CHAIR CAN'T TIP;
HAS CUSHION SEAT

342 *Made in U.S.A.* 3432
New York

With a frame of metal and wood, and so built that a person can stand on the edge of the seat without tipping it, a folding chair on the market requires so little room when collapsed that six of them occupy only seven and a half inches of space. It is equipped with a cushion bottom, and can be folded or



opened up without noise. The corners are all smoothly rounded so that there is no danger of injury to clothing.

— 3459 —
GLASS THAT WILL NOT BREAK RESISTS HEAT AND ACIDS

Practically unbreakable glass is said to be made by a factory in Bohemia from a formula recently discovered. Resisting heat and chemical action, it is adaptable for cooking utensils and laboratory vessels that are subjected to high temperatures and destructive acids.

Detroit Free Press
8/26/23

James McIntyre
Apartado 376
Mexico City, Mexico
675
RAINCOATS OF GRASS FIBERS WORN BY MEXICANS

3375 In warm, damp parts of Mexico where sugar cane grows, the native harvesters



Mexican Indian Sugar-Cane Worker Wearing Rain-proof Coat of Native Grass

wear loosely fitting raincoats made of long grasses, to keep dry and cool. Though water is shed quickly, the loose weave of the garment permits air to circulate freely. The jackets are popular among the Indians, who form a great part of the field labor. They are found to be of help in warding off flies and other insect pests that plague the workers during the rainy seasons.

3474
FISH AS PETS, ARE TRAINED TO FOLLOW OWNER ABOUT

Making pets of some hundreds of fish that he keeps in aquariums in his home and office is the hobby of a western business man. One of the most interesting specimens is the striped gourami that cannot breathe under water but must come to the surface every few minutes to fill its gills with air. It is said that the fish are so familiar with their owner that they will follow him about as he moves around their tanks and refuse to be lured in any other direction by anyone else. The finny creatures, most of which are native to foreign lands, vary in size from a half inch to two inches.

U.S. Patent Office, Washington, D.C.

Detroit News
8/29/23

3445

WET SPONGES TIED TO FACES HELP AUTO RACERS BREATHE

As a protection against dust, drivers in a recent automobile race run on a dirt track, covered their mouths and noses



Auto Racers with Wet Sponges Tied to Faces to Prevent Breathing of Dust from Clay Track

with wet sponges tied about their heads with cords. Although suffocating clouds of pulverized clay, raised by the sweeping machines, hung over the track, and at times almost hid the cars from view, the pilots were enabled to supply clean air to their lungs through the makeshift guards.

MISTLETOE IS PEST IN SOUTH, FESTIVE TWIG ELSEWHERE

3378

While mistletoe generally is favored as a yuletide decoration, it is regarded as a pest in the Southwest, and for the past 12 years scientists have been studying a way to exterminate it. Government experts call the green sprig and its white berries, an "insidious and destructive disease," because it finally kills the trees.

Detroit News 8/15/23

FISHHOOK HUNG FROM KITE TO CATCH GIANT TUNA

3376

To catch tuna and swordfish, kites are being used on the west coast to carry the hooks and bait far from the boats. After they are sent up, the fishing line is attached to the kite string which drags it over the water. When a fish bites, the sportsman reels it in close enough for a companion to strike with a harpoon. As some of the catches weigh from 100 to 300 pounds, lively battles take place. Rules of a club formed by fishermen permit only the angler and spear thrower to kill or gaff the fish. In contests, shooting disqualifies the participant. To be eligible for membership a candidate must land a tuna weighing at least 100 pounds or a swordfish of more than 200 pounds, using heavy tackle.

GIANT WATER SPOUT SHOOTS 3408 UP TO CLOUDS

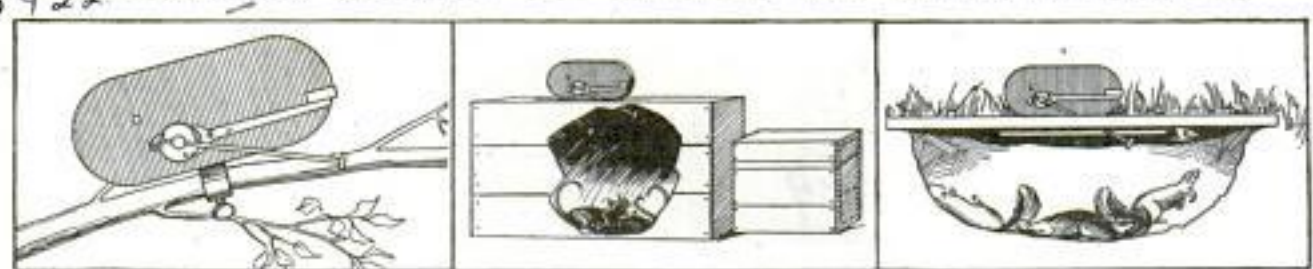
Believed to have been caused by a slight earth tremor, a huge water spout 100 feet wide recently rose out of the sea within two miles of the coast of England, near Brighton, and attained a height of 800 feet. Thousands of tons of water hurtled skyward, and, when the column broke, the din of the cascade that followed resembled the roaring of Niagara Falls.

Of thirteen plans for an underground moving pathway for Paris, France, five are being considered for tests. Of these, four work on the principle of parallel bands moving at graduated speeds. The fifth one slows down at each station.

Detroit Free Press 8/20/23

RAT TRAP WOUND BY KEY KILLS WITH HAMMER

3422



Self-Setting Rat Trap, Wound by Key, That Kills Rodents and Birds by Striking Them with Hammer as the Bait Prong is Disturbed by the Little Prowler

By hitting its victim on the head with a hammer, a self-setting animal trap, operated by a key-wound spring, kills rats and other rodents in buildings or fields. It is claimed that its sharp blow causes instant and painless death to the animal

which is struck when it touches the bait, the body falling into a space beneath. As there is no struggle or cry, other creatures are not frightened away. The snare may also be attached to tree limbs for destroying undesirable birds.

L. H. Beauchamp, 236 S. Electric Ave. Alhambra, Calif.

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33 76 The Tuna Club,
POPULAR MECHANICS
Santa Catalina Island, 677
Calif.



Anglers for Big-Game Fish along the West Coast Have Lately Devised a Scheme to Attach Kites to Their Lines So the Bait Will Be Skipped Along the Surface of the Water

Siemens-Schuckert-Werke.

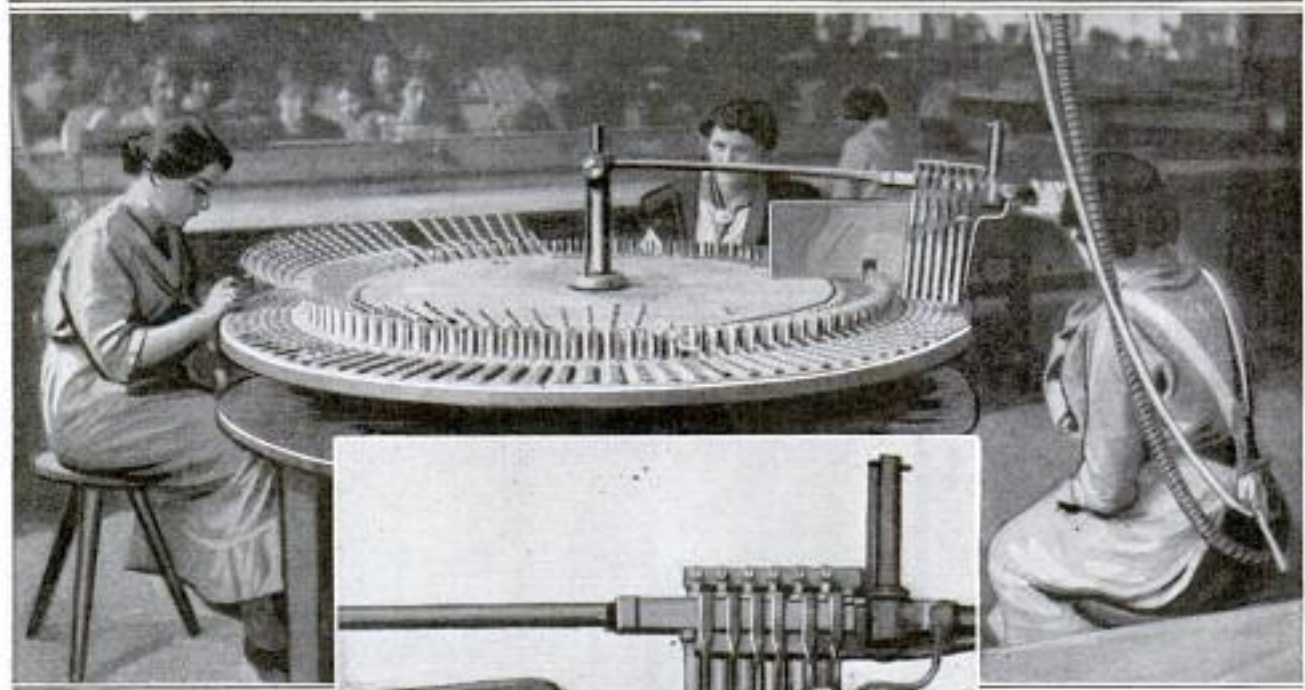
678

POPULAR MECHANICS

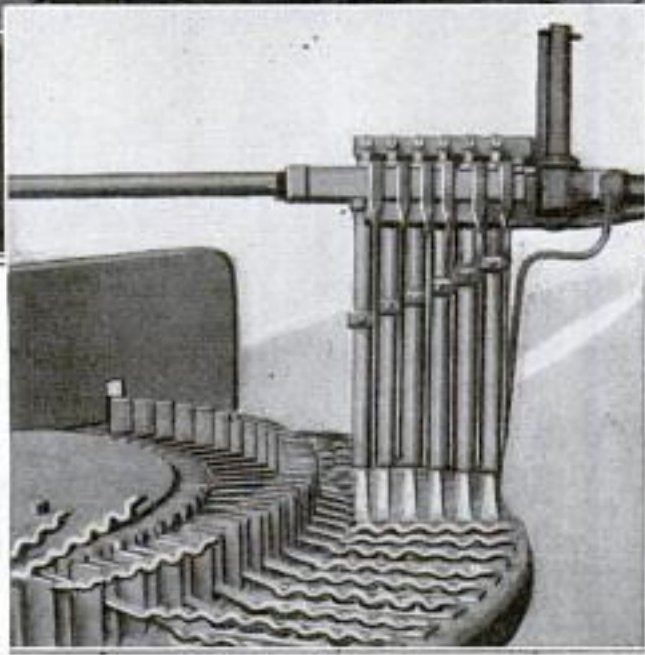
BLOWTORCHES ON TURNTABLE SOLDER BUTTONS

8401

Berlin, Germany



For soldering thread "eyes" to metal buttons, a machine has been invented in Europe. Around the grooved border of a revolving table the round metal pieces are placed, six in a row, while over each is suspended an arm carrying the same number of loops.



Above: Assembling Metal Buttons on Turntable.
Below: Torches Soldering Thread Loops

When these holders are pressed down to the plates, the six-flame blowtorch, mounted on a pivot is swung over them, melting the solder, thus connecting the loops to the buttons. As the table moves, the finished product is taken from the grooves.

33 50 SHADE ON LIGHT FOR AUTO OR HOME GUARDS EYES

For motorists, a shaded light is being made that may be attached to the car or used with a camping



Portable Electric Light for Use Around Automobile or in the Home

The Magnavox Co.,
2725 E. 14th St.,
Oakland, Calif.

outfit or in the home. Clamped to the spoke of a wheel or to the running board of an automobile while repairs are being made, the hood throws the beams on the work. It also may be attached to a bedpost or used as a table light. Although the bulb draws its current from the storage batteries of the automobile, it will supply illumination for all ordinary purposes.

ONE WAY STREETS FOR CITY

Convinced that Chicago's system of through streets is more or less ill-planned, a local transportation committee has recommended that a comprehensive survey be made of all the traffic thoroughfares. Its primary purpose will be the assignment of separate streets to motor trucks. The plan is expected to unravel Chicago's traffic tangle.

Card and data missing

Copyrighted material

Kansas City Star 8/19/23

Cml. Frances S. Coleman,
8315 Montgall Ave.

POPULAR MECHANICS

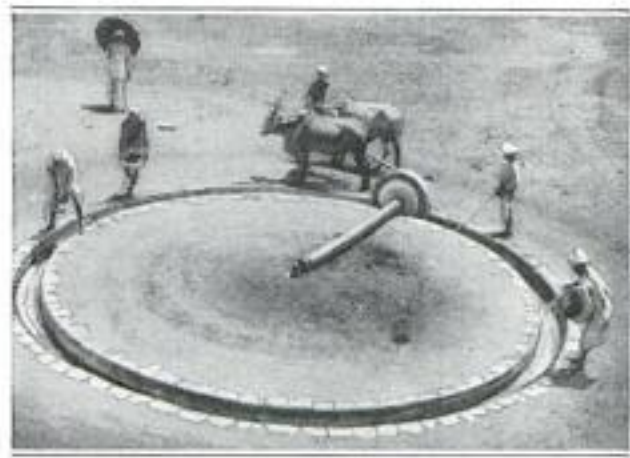
Kansas City Mo.

SHOWERS OF "SHOOTING" STARS
GATHER IN COMET'S PATH

3457
Showers of meteors that have been floating through space for ages return to earthly view at regular intervals. Large displays of these natural fireworks are visible every year for about a week during August. Their brilliant, flashing light is the result of the dust that forms them, and which has been left by comets, becoming heated by friction of the air, while traveling at great speeds. About every 33 years the earth runs into one of the denser clouds of meteors and is deluged with a shower of sparks, which generations ago caused terror among many people, who feared that they heralded the coming of the world's end. These bright little particles which are known as "shooting stars" weigh on an average less than a grain.

OX TEAM AND STONE WHEEL
MIX MORTAR FOR HINDU

3486
Reluctance of the people of India to give up old traditions is responsible for their time-honored way of mixing mortar. Two oxen hitched to a stone wheel that



Fear of Evils of Modern Civilization Keep Crude, Traditional Methods Alive in India

travels in a circular ditch furnish the power that mixes lime, sand, and water as it is thrown into the pit by a crew of natives. The laborers move slowly around the trough behind the roller, stirring the mass so that it will have an even mixture.

Williams Service 32 Union Square, S. New York

(There was a decrease in the birth rate in the United States last year and an increase in the death rate, according to recent government figures. The number of births dropped from 24.3 in a 1,000 population in 1921 to 22.7 in 1922, and deaths increased from 11.7 to 11.9.

WASHER FOR KITCHENETTES
HAS FOLDING WRINGER

3438
Resembling a small steel cabinet in size and shape, an electric washing ma-



Little Space Is Needed for This Washer with Folding Wringer Designed for Small Homes

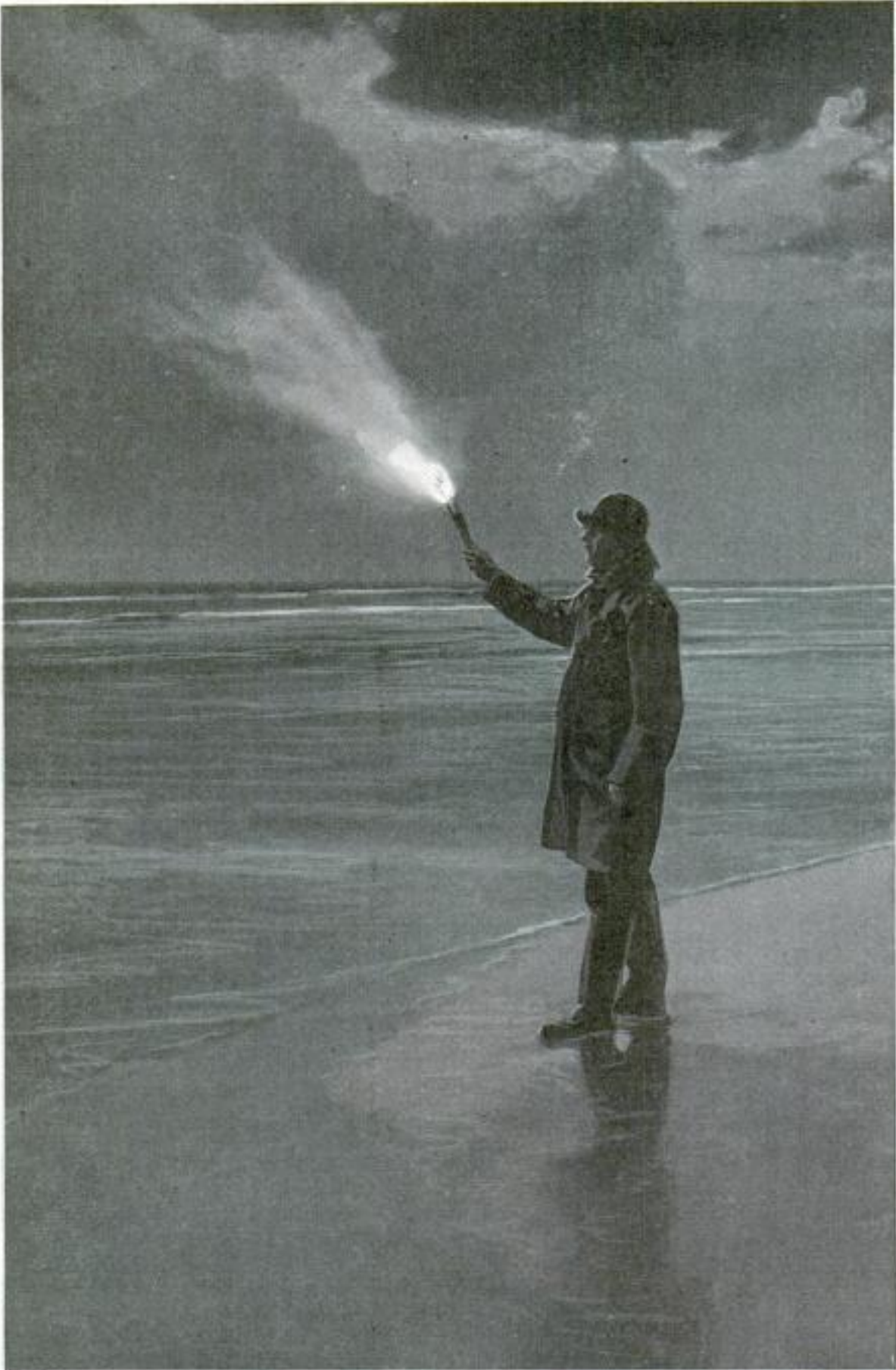
Price - \$100.00.
chine is being made for kitchenette apartments. Equipped with a folding wringer it occupies little more space than a chair, and its operation is said to be noiseless. When not in use all parts are concealed. After the contents have been washed, it may be rolled to any convenient location for the wringing.

COLLECTING SNAKES FOR ZOO
IS THRIVING BUSINESS

3462
Capturing rattlesnakes has become a profitable business for two eastern residents. One of them hunts the snakes, while the other supplies 200 frogs a week to feed the reptiles that are sold to a near-by city for exhibition in its parks. For live, healthy specimens, delivered, \$5 each is usually paid, but to those who carry their own purchases away, the hunter makes a reduction of \$2. After the buyer has received his snakes, he can arrange with the frog collector to furnish the live food supply.

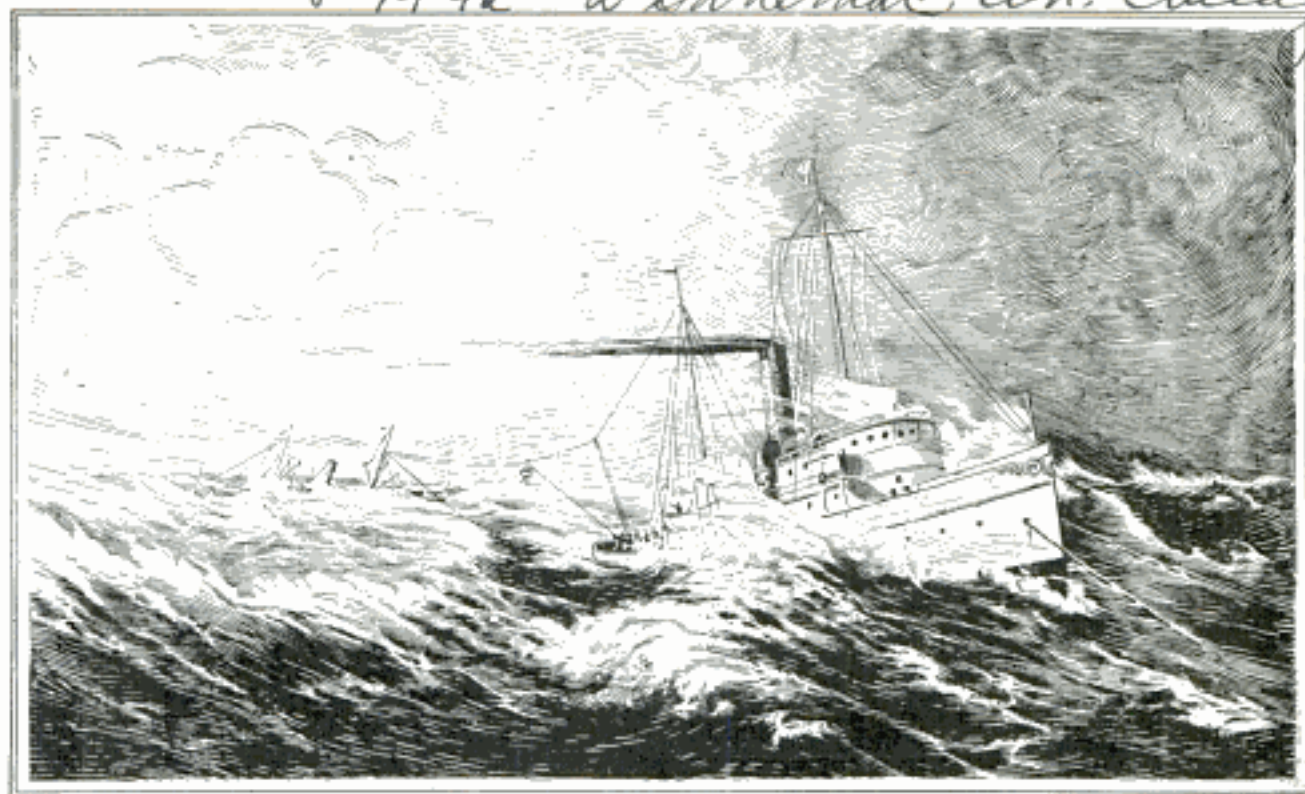
Detroit News 8/24/23
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Clements Mfg. Co., 601 Fulton St. Chicago



Surfman on Beach Patrol with Coston Signal, Warning an Approaching Vessel of the Danger of Sailing Too-Close to the Shore, and Helping It to Get Its Bearings

Com. Captain George Nightingale,
1442 Winnebago Ave. Chicago



Fighting Icebergs and Derelicts in Battle to Rob the Sea of Hidden Perils

Ceaseless Vigil of Coast Guards Protects Lives of Passengers
and Crews by Keeping Liner Lanes Free of Obstructions

FIGHTING monster icebergs and drifting derelicts with long-range guns, undersea mines, and the famous depth bombs of war days, the United States coast guard has developed a successful method of destroying two of the greatest menaces to human life and shipping.

Keeping ceaseless vigil over the great transatlantic liner lanes, every obstruction to navigation, from a dead whale to a capsized schooner, dismasted ships, abandoned rowboats, and deadly torpedoes, is removed or sunk by explosives—an arduous and often a dangerous task.

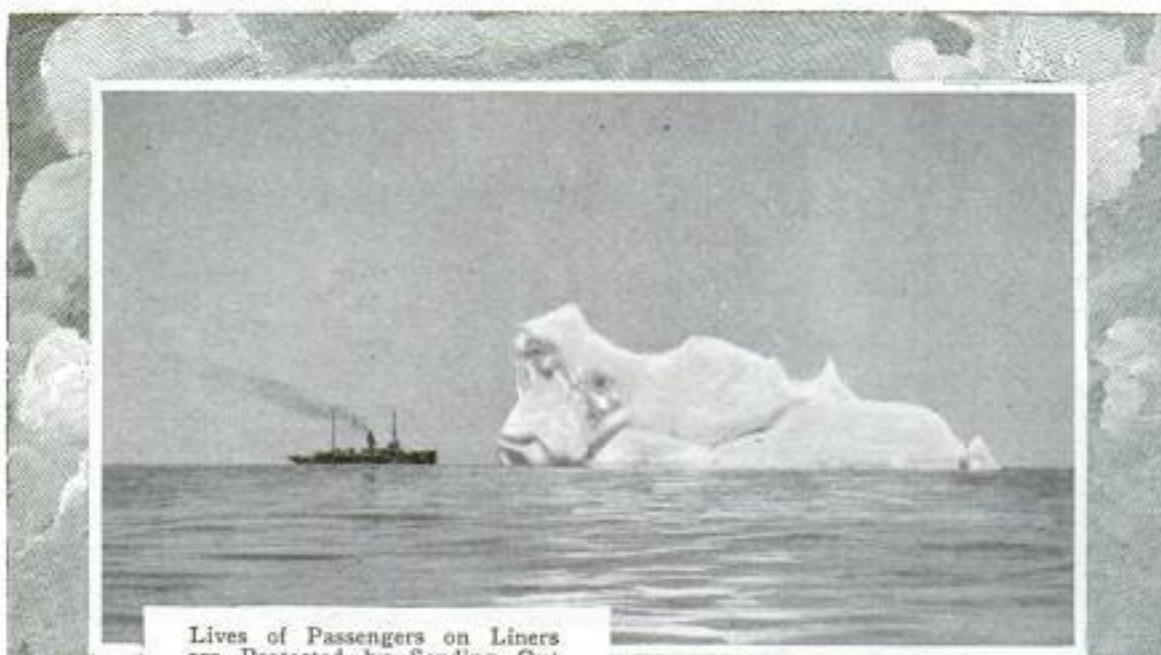
Ever since a huge "berg" ripped open the hull of the "Titanic" on April 14, 1912, resulting in the death of 1,517 persons, the ocean highways have been constantly patrolled, ice warnings being sent out whenever danger threatens. In the winter months, when the peril is greatest despite the decrease in shipping, more than 30,000 miles of steamer lanes are under constant guard.

In battling huge icebergs with high explosives, great difficulty is encountered, as the floating mass is hard to approach in boats and offers no projections to which a bomb or mine can be attached.

To set foot upon it is virtually out of the question. One of the first bergs attacked projected about 200 feet above the sea level, seven-tenths of its mass being under water. Overhanging ledges rendered a near approach highly perilous.

After several efforts to attach the explosives had failed, a bit of lead, fastened to the end of a rope, was thrown over a wall of ice. It was found, however, that it was not heavy enough to counterbalance the weight of a mine, and the attacking party went to the opposite side of the berg. With "shoulder guns," several lines were shot over the hill of ice. Two oars and a sounding lead were fastened to the shot lines. Later the boat returned, picked up the projectile, and pulled in the lines until the oars held fast in a crevice on the other side. A bomb was lowered so that it would hang 30 feet under water, and fired.

For an instant the huge mass of ice seemed to lift itself from the sea, and then, with a splintering crash, fell back, breaking squarely in two. As the pieces soon melted, they disappeared in a short time and were erased from the charts where such menaces to navigation are noted.



Lives of Passengers on Liners
are Protected by Sending Out
Warnings of Menacing Icebergs



Small Cannon Used to Shoot
Life Lines to Wrecked Ships
So Victims may be Removed

Constantly Called Upon to Risk Death, Members of the United States Coast Guard Keep Ceaseless Vigil on Land, Sea, and Lake, Awaiting the Cry for Aid

The line-throwing gun used is of small size and light weight, and can be fired like a rifle, from the shoulder. It is of .45-caliber and propels a strong cord for 100 yards, which, on being cast over a berg or wreck, can be tied to a rope, enabling the latter to be pulled across. Thus, a hawser strong enough to support a big mine or depth charge can be secured to the ice. A small cannon is also employed for the same purpose.

Destroying icebergs, however, is only one of the many functions of the coast guard, which was created in 1915, combining the then existing revenue-cutter and life-saving services. In general, it is a naval-military establishment, a fire-prevention brigade, and a mail, food, and medicine distribution bureau in one, all of these departments coöperating for the protection of life and property on the high seas and Great Lakes. During times of war, it is attached to either the naval or military forces at the order of the President.

In 1922, the organization's activities resulted in the saving of 2,954 lives and more than 14,000 persons were taken off of wrecks. During that year alone, 596 vessels were seized for violation of marine law, the fines paid amounting to \$135,990. Forty-eight derelicts and other obstructions were removed from the pathways of navigation and the actual value of vessels and cargoes benefited through these

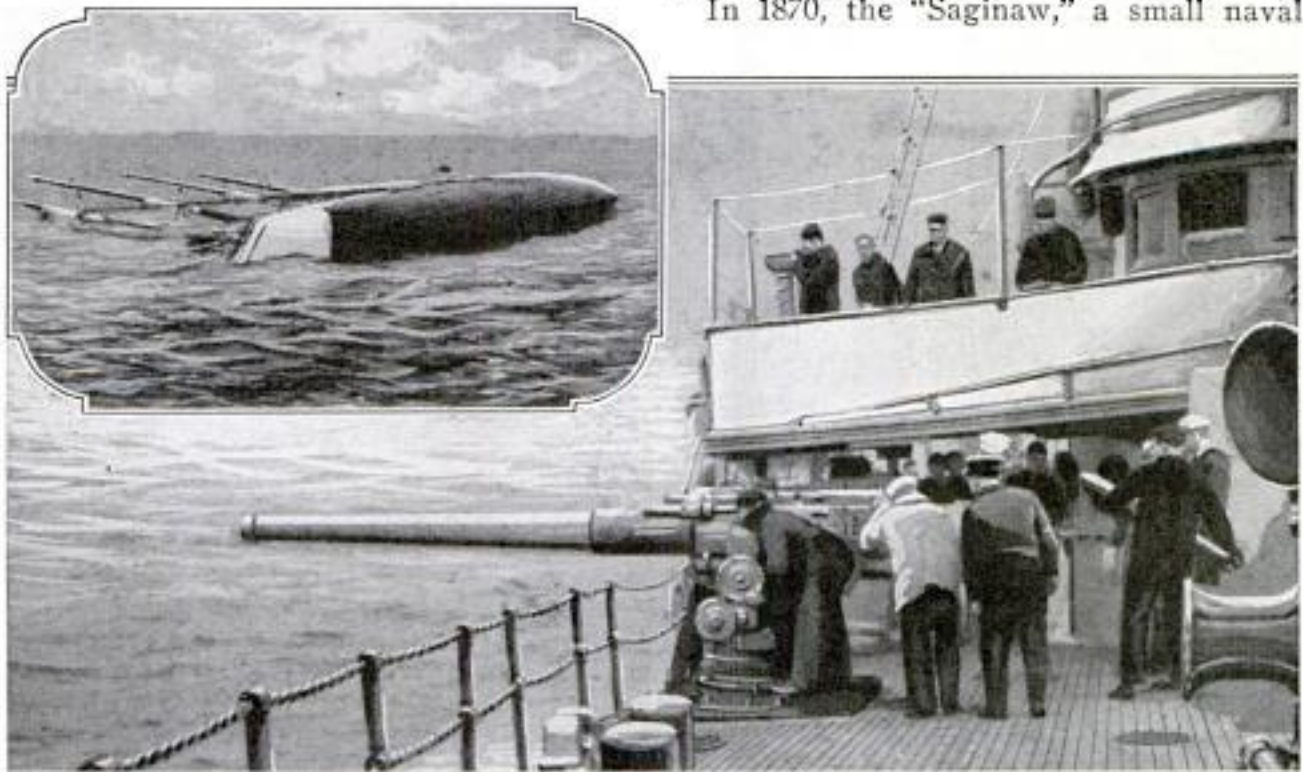
removals amounted to more than 35 million dollars.

Although their work is little known to the general public, stories of the daring and heroism of the coast guards may be heard in any port. A thousand romances have been written about such things, but of them all there is hardly one that approaches the stark reality. To the city dweller they bring wonderment and the tribute of admiration that lies beneath the landsman's sense of superiority in his security. But to the men who know the sea, these are not things smacking of the marvelous—they are just a part of the 24-hour day's work.

Tossed about raging seas in cockleshell boats laden to the gunwales with men, no water save rain, a day's rations stretched out to five, heat that maddens, nights worse than the glaring days—and yet victory at last. These, together with other hardships that would try the stoutest hearts, are the lot of the coast guard. His reward is the often wordless gratitude of those he has rescued. Forgotten, save in the admiralty registers, his deeds show what man can endure and still live.

Entwined with their records are the stories of shipwrecked crews that have traveled thousands of miles in open boats, suffering the tortures of thirst and hunger, mutiny, typhoon, sirocco, and monsoon—names that call up the glint of sun on breaking waves and the sheen of plume-like palms.

In 1870, the "Saginaw," a small naval



Drifting, Half-Concealed Derelicts, Known as One of the Most Dreaded Dangers of the Deep, are Sought Out and Destroyed with Guns, Mines, or Torpedoes

ship, went to Ocean Island, 1,700 miles beyond Hawaii, to look for castaways. The vessel struck a reef and all hands crawled to the sandbank, which is the island, a few feet high at the most. They faced starvation. Lieut. J. G. Talbot fitted up a whaleboat and, with four volunteers, departed in search of help. Navigation was difficult. There was food for five for 30 days—on quarter rations. All but one of the men, Halford, became ill. In 25 days the last of the provisions were gone. Three days later Halford knocked a booby bird on the head. It made five raw portions. A day or two later, he saw land astern. It had been passed in the night. The men were ill. Some were dying. The gig was leaking.

Then a storm broke and there was a cry of "Surf ahead!" A mistaken order from the dazed lieutenant, and the boat veered and was bowled over by the waves. Halford held fast and the boat rode clear and righted. He heard a groan. One other man had come through. Caught in an air pocket under the deck, he was insane. Halford got him through the surf, reached a footing, and collapsed. Hours later, he recovered, his feet still in the water, but his head on land. His one companion was dead.

Another Robinson Crusoe schooner was that built by the survivors of the "Hermes." Two British whalers, the "Hermes" and the "Pearl," were lost ten miles apart in 1822 on the reef that bears their names. A passing ship picked up the

survivors in a short time, but twelve stayed with James Robinson, who had started building a schooner. They took their chances—and arrived at Honolulu all but starved after ten weeks at sea.

In 1866 two Kanakas saw a small boat off the Hawaiian coast. They swam out, shook hands all round with the fifteen thin strangers aboard, and, still swimming, guided the boat through the breakers. The fifteen were the survivors of the clipper ship "Hornet," New York to San Francisco, which flared up like a match—a wooden ship filled with oil—a thousand miles at sea.

There had been three boats. Captain Josiah A. Mitchell took a mate, two passengers, and eleven seamen in the larger and towed the two smaller boats. Twenty-one days out he had to cut them adrift. Night came on and separation. The other two were never heard of again. There were flying fish for the big boat and booby birds, dolphins, a bonita, and a turtle, but before the Kanakas shook hands, on the 43d day, the survivors had gnawed the bare bones of a ham and had eaten the canvas wrapping.

Pitcairn Island, inhabited now by descendants of castaways, has annals that stand alone. In 1789 the crew of the British navy ship, "Bounty," mutinied near Tahiti, and the commander, Lieutenant Blight, was set adrift with eighteen men. Their 23-foot boat was so laden that a fair swell was a crisis, yet they covered 3,618 miles westward in 50 days.

WATER "BUG BALL" IS PLAYED WITH ROUND MOTOR BOATS

Built like a canoe, but round in shape and driven by a small motor, a queer-



Round Boat with an Outboard Motor, Built for Playing a New Water Game Known as "Bug Ball"

looking boat is being made for a new water sport—"bug ball." The object of the game is to push a large, air-inflated ball,

30 inches in diameter, across the goal line without touching it with the hands. The boats are capable of surprising speed. When going straight ahead, the back end, to which the motor is attached, goes down into the water slightly, while the front tips up, so that the strange craft acts like a hydroplane. They are very sensitive to steering and the slightest turn of the motor, or variation of the propeller, will change the direction.

PAPER BAGS FOR AUTOMOBILES KEEP OUT DUST AND DAMP

For covering automobiles in storage, during the winter season or at any other time, heavy bags of dust-proof paper are being marketed. Made in different sizes and shaped to fit all cars, the enveloping covers hang evenly to the floor, keep out dust, absorb moisture, and afford a measure of protection against insects which destroy cloth upholstery.

Beckley - Oakland Co.,
18th Michigan
Chicago

Johnson motor Co. d'ind.
3364
3354

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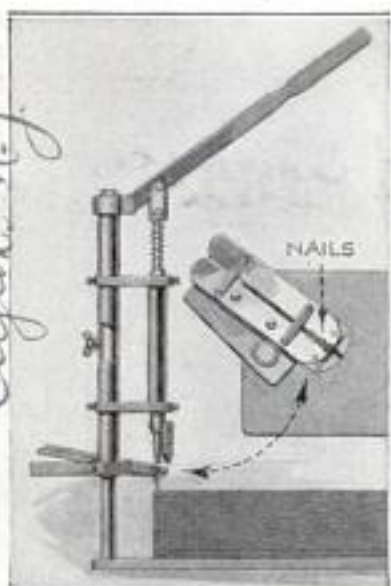
No. 226, Aug. 20, 1923

POLES OF ELASTIC CONCRETE BEND WITHOUT BREAKING

Hollow, concrete poles, designed to carry electric transmission lines, are being made by a process that allows them to bend under heavy strains without breaking. The top of a 64-foot pole will swing 7 feet from its normal position and back again without injury. Laid in a horizontal mold, the steel skeleton of the pole is covered with concrete, and revolved 1,000 times a minute. The force drives the concrete against the sides, where it forms a shell over the framework. The finished product is kept in the mold for two days and then buried in damp sand for four weeks to season. This method of manufacture was developed in Europe.

No other information
LEVER DRIVES NAILS FED INTO SPRING JAWS

To make rapid nailing possible, a hand-operated device has been patented that removes the danger of smashed thumbs and fingers.



With each downward motion of its handle, a nail is driven home, another falling into position automatically when the lever is raised. Its capacity depends upon the speed with which it is manipulated. In shops or factories where boxes, door casings, and other easily handled articles are put together, it can be used to save time.

So numerous are the frauds practiced in the mails, that post-office officials are constantly alert to save the gullible from hundreds of thousands of dollars loss every year. Recently 21,000 letters, each thought to contain a dollar bill addressed to a fake company, were returned to the senders. To keep from the mails advertisements of "get rich quick" swindlers, the government issues fraud orders whenever dishonest schemes are detected.

THORNS OF CACTUS BECOME PHONOGRAPH NEEDLES

Thorns of the desert cactus weed are being used for phonograph needles after they have been dressed and sharpened



Above: Watering Cactus Plants in Back-Yard Garden. Below: Filing Thorns for Phonograph Needles

with a file. Besides producing a softer tone without scratching the records, they are said to last considerably longer than the metal article. One man who lives along the Pacific coast cultivates the plants in his back yard after they have been lifted from the desert soil. For many years this species was regarded as worthless, for, unlike many of its relatives, it is neither edible nor beautiful.

JAPAN BARS CHINESE WORDS FROM SCHOOLBOOKS

Chinese words to the number of 20,000 that slowly crept into the printed language of Japan, is said to be causing much concern among the teachers and officials of the latter country. Difficult to learn, they have hampered the education of the children in the public schools to such an extent that a society has formed to limit their use in textbooks. Reports say that the development of a Japanese typewriter has been made impossible by the great number of foreign signs and letters in general use that do not belong in the native alphabet. Not more than 2,000 of the characters will be permitted in future printing.

Emb. N. Sakata #19
Es-chome, Tada-yachi
Kojimachi-ku, Tokyo, Japan

d.m. Chas. Schmitt & Elfen, N.Y.

H. Leonard, Calif.

d.m.

3470

3349

3364

d no. James Pearson.

686

Box 32128

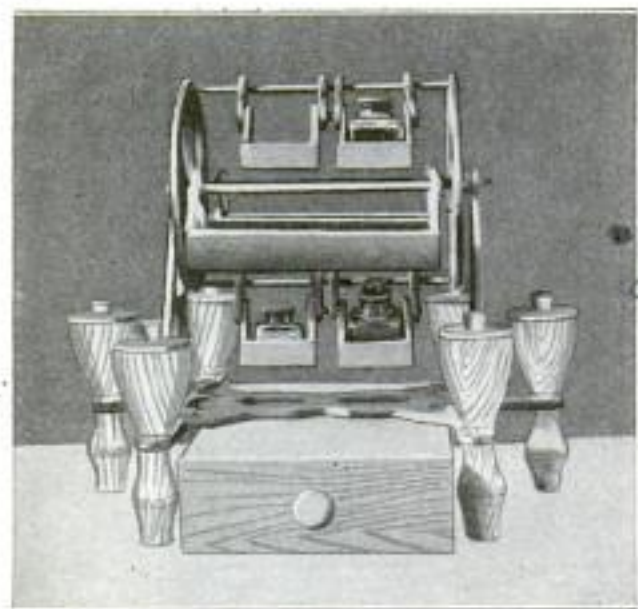
San Quentin, Calif.

3403

POPULAR MECHANICS

"FERRIS WHEEL" INKSTAND
CAN'T SPILL CONTENTS

Built like a Ferris wheel, an inkstand made by a California man prevents bottles of writing fluid which it holds from being knocked over or spilled while uncorked. Holders that keep them always



Holder for Ink Bottles and Desk Accessories That Operates Like a Ferris Wheel

in an upright position are fastened to a shaft that can be turned by a touch of the hand to bring the desired liquid with-

in reach. Containers for pencils and pens are also provided on the wheel, and six small cups for pins, paper clips, and other desk accessories, surround the stand.

PAPIER-MÂCHÉ REPLACES ICE
IN FRESH FIG SHIPMENTS

Papier-mâché, instead of ice, is being used to preserve shipments of fresh figs from the Pacific to the Atlantic coast. Containers of that material are in layer form, indented in the shape of the fruit so that each fig has an individual compartment. This method of shipping is expected to open unlimited markets, as it eliminates the cost of refrigeration.

d no. F. B. Scott, Los Angeles, Calif.

RADIO VIOLATIONS DETECTED
560 BY WIRELESS AUTO

Using a wireless-equipped automobile to detect any violations of the radio laws, is the method employed by the U. S. Bureau of Navigation, in the third and eighth districts of the radio service. The inspector of these districts and an assistant travel in the machine. These men regularly tour the middle Atlantic states in their car, which contains a complete receiving set, having masts mounted at the front and rear, between which is strung the antenna.

U. S. Dept. of Commerce, Bureau of Navigation

AFRICANS MAKE FISH-NET FRAME TO SAVE LABOR



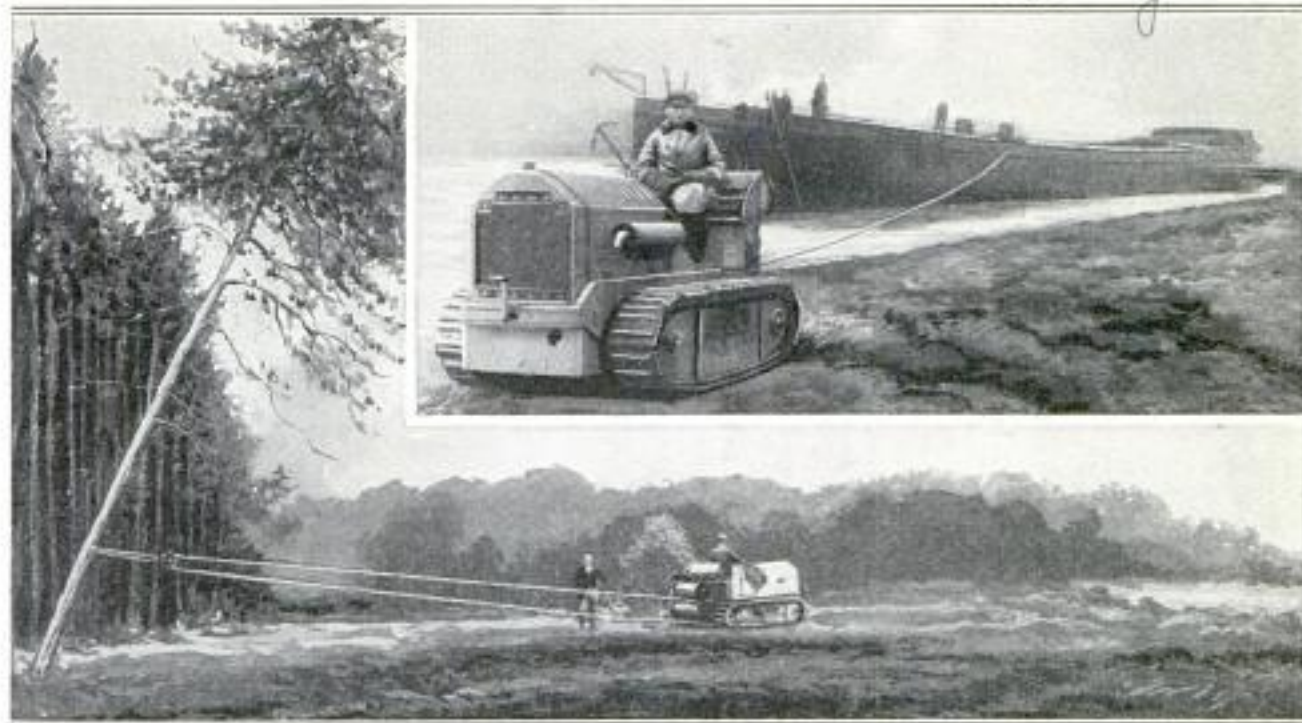
As a Result of Ages of Experience, African Fishermen Fastened Cone-Shaped Nets on a Frame of Tree Trunks and Branches Built Across a Swift River

To save labor of catching fish by hand nets, natives in an isolated part of Africa have stretched a big frame of tree trunks and branches across a swiftly moving river. From the crosspieces at

the top, are hung large cone-shaped nets, which trap the fish. Ages of experience in fishing with various sorts of spears, hooks, and seines, resulted in this crudely built net.

Neuman Travel Talks, Tribune Bids, Chicago

copyrighted material



Above: Tractor Hauling Heavy Barge Through Canal, Performing a Task Requiring Several Horses.
 Below: Doing the Work of the Lumbermen in Felling Forests of Great Trees

TRACTORS TOW CANAL BARGES AND FELL GIANT TREES

In Europe the farm tractor is being put to work towing large ships and heavy barges through canals. Running along the banks it requires very little in the way of a towpath, as its caterpillar tread surmounts almost any obstruction. Many horses are released by this arrangement for work in other fields. Lumbermen have also called upon the tractor to pull down trees in the timber forests. It accomplishes in a few moments tasks that usually require the services of several men with saws and axes.

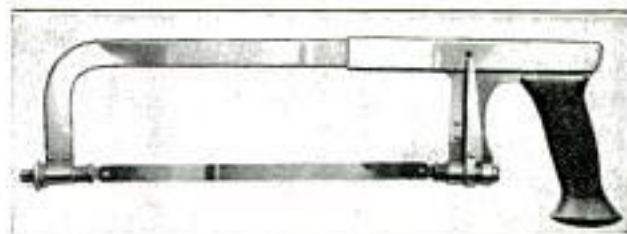
FOSSIL SIMILAR TO CORNSTALK MYSTIFIES SCIENTISTS

With the finding, in an Illinois coal mine, of a plant fossil resembling a cornstalk, previously accepted theories on the evolution of flowering plants are blasted, according to some botanists, and the mystery of their origin is pushed thousands of years farther back into the geological past. The strata from which the fossil was obtained were identified as belonging to the Paleozoic era, next to the oldest time division of geology, containing traces of long-extinct plant and animal life. Heretofore all reported specimens of land plants possessing highly organized structures, such as attributed to this recently discovered fossil, have been found in parts of the earth's crust formed during

the Mesozoic period, which came millions of years after the Paleozoic era. From these previous findings, botanists have assumed that flowering plants began to appear about the latter part of the age during which the coal-forming plants flourished. They had expected to discover more primitive growths in these strata, but the new find indicates that flowering plants had already gone through an exceedingly long process of development before the earliest period recorded in the fossil rocks.

HACKSAW WITH PISTOL GRIP FITS MANY BLADES

Designed to reduce fatigue, a hacksaw is being made with a handle shaped like a pistol grip. By sliding the frame forward or backward, many different sizes of blades can be fitted to it. Bolts that lock the saw in place are so arranged



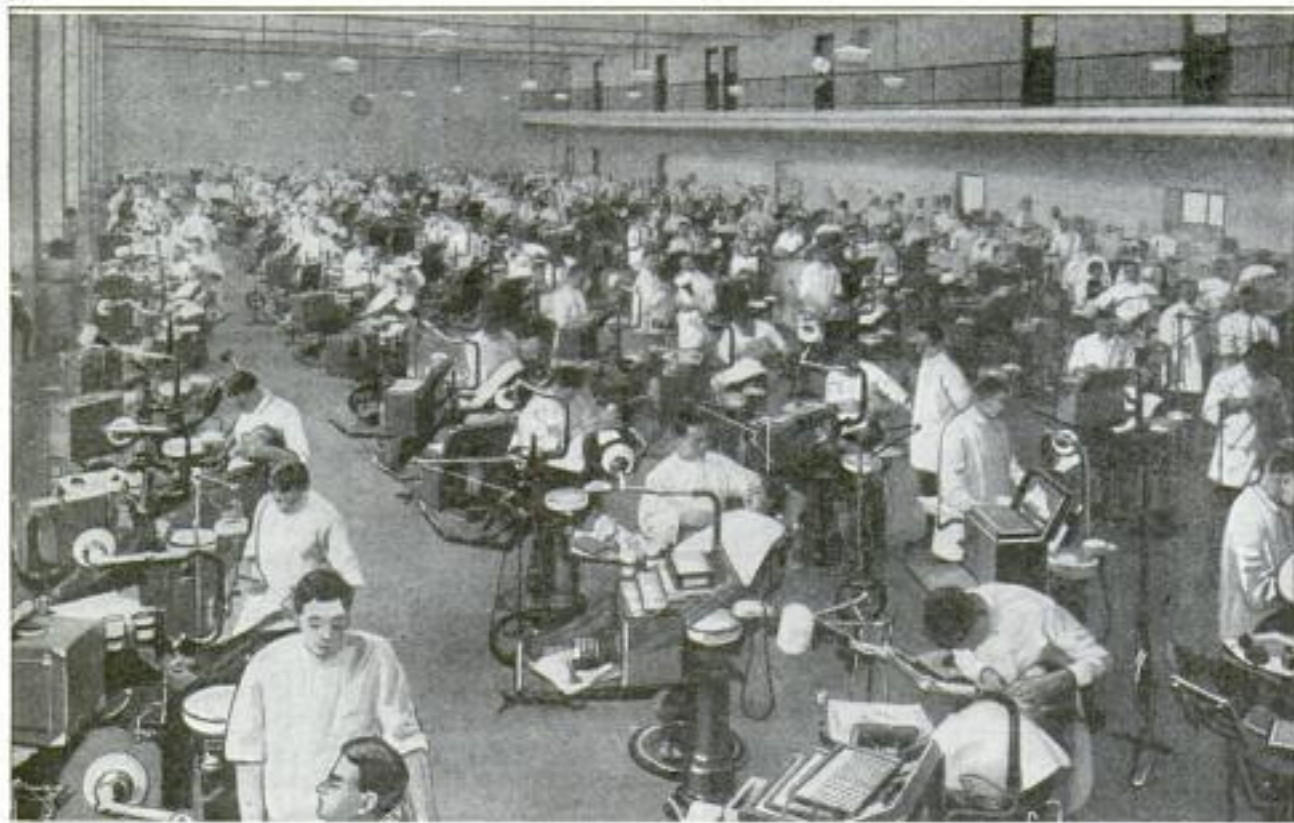
Hacksaw, Adjustable to Blades of Different Size, That Has Pistol-Grip Handle to Lessen Fatigue

that it can be turned sideways for horizontal cutting. Changes can be accomplished easily by a few simple adjustments.

Kansas City Star
 8/19/23

Albany Hardware Co.
 Specially Imported
 Albany, Wis.

688
 3465



Treating Nearly Two Hundred Patients at One Time in the Laboratory of a Dental College So Students May Combine Actual Practice with Their Technical Training

**TREATMENT OF TEETH TAUGHT
 IN ROOM OF HUNDRED CHAIRS**

3465
 So that large classes of students in dentistry may receive practical training at the same time, a college in the middle West has furnished a laboratory with 152 completely equipped dentist chairs. Every instrument needed in ordinary practice of the profession is furnished each pupil, and all work together under the direction of a single instructor. Assistants to the dental teacher pass among the scholars inspecting the results of their efforts, and cautioning and advising them as to the proper methods.

**CALICO MONEY AND BICYCLE
 HELP TO SUBDU JUNGLE**

3524
 Plans to connect Katanga, in the Belgian Kongo, by rail with a West Africa port, tend to emphasize the extreme range of civilization in this mid-continent colony. White men, who first went there used bicycles on their journey, for the tsetse fly is a bar to domestic animals. Now a network of paved motor roads covers the region; yet, along these highways, travelers still build fires at night to ward off lions and savage natives, who chant, "white man, white man, we'll dance tomorrow with your head on the end of a spear." Bantu tribesmen do

business with calico money. They produce great quantities of rubber, coconuts, palm oil, sugar, and ivory, but the country's chief asset, perhaps, is its copper mines. Tin, iron, and coal are mined also, and gold is found in some sections.

3481
**CINDER BLOCKS FOR BUILDING
 PRESSED ON SITE OF WORK**

By a recently invented chemical process ordinary coal cinders are turned into bricks for building purposes. It is claimed that these blocks are cheaper than clay brick or tile and, in addition



Latest Form of Cinder Building Blocks Being Laid in a Model Cottage

Chas. Frank Cordery
 Copyrighted material

*maker - John P. Hallis - arr. New Rochelle, N.Y.
 10 Rand old*

Utah Press 9/14/23

The Scott Corp.
72 W. Washington,
Chicago

POPULAR MECHANICS

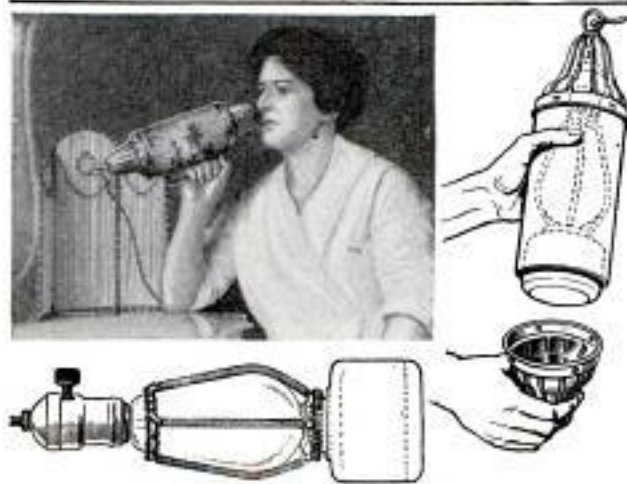
are nonconductors of heat, and cold. The press for making the bricks can be set up on the site of a building under construction and the blocks can be turned out ready for use within 24 hours after being molded.

HEAT IMPRISONED IN FLASKS IS RELEASED AT TOUCH

Metal flasks in which heat is stored are being made for use in homes and hospitals, and as foot warmers in automobiles. Richly nicked on alloy metal, they are filled with a harmless, odorless chemical compound that never has to be changed, and which is capable of absorbing and holding heat to be discharged by simply unscrewing a small knob stopper and replacing it. While the actual heat is bottled up, the outside of the container remains cool until the cork is removed for a few seconds and inserted again, when the outer surface becomes hot and remains so for several hours.

ELECTRIC BULB IN VAPORIZER GETS LIQUID THROUGH WICK

To insure an even and constant supply of medicated vapor for treatment of nose,



How Heat of Electric-Light Bulb Is Used to Provide Medicated Vapor

throat, and lung ailments, a western physician has invented an apparatus that by an electric light heats the medicine fed through a wick. The fluid is carried from a container to the lamp, where it vaporizes on the surface of the bulb. Filled with curative oils, the device can be placed in a water-soaked cylinder of gauze and by drawing from both sources mix the vapors together. By removing a plug the volume of healing steam can be increased.

International Newsreel

PRACTICE GOLF ON SHIP'S DECK PLAYED WITH SPIKED CLUBS

Spearing a ball with sharp prongs, a device that fits over the head of a golf club is being used by golfers aboard



Spikes Holding Ball to Head of Golf Club After Practice Drive on Shipboard

ocean liners for practicing the game. Instead of being knocked away by the impact of a "drive," the special soft sphere is held by the spikes. The attachment may also be used in large rooms without danger of sending the ball in flight. Thus, a player can perfect his strokes without going to the links. The cover is detached easily, and fastens firmly by clamps.

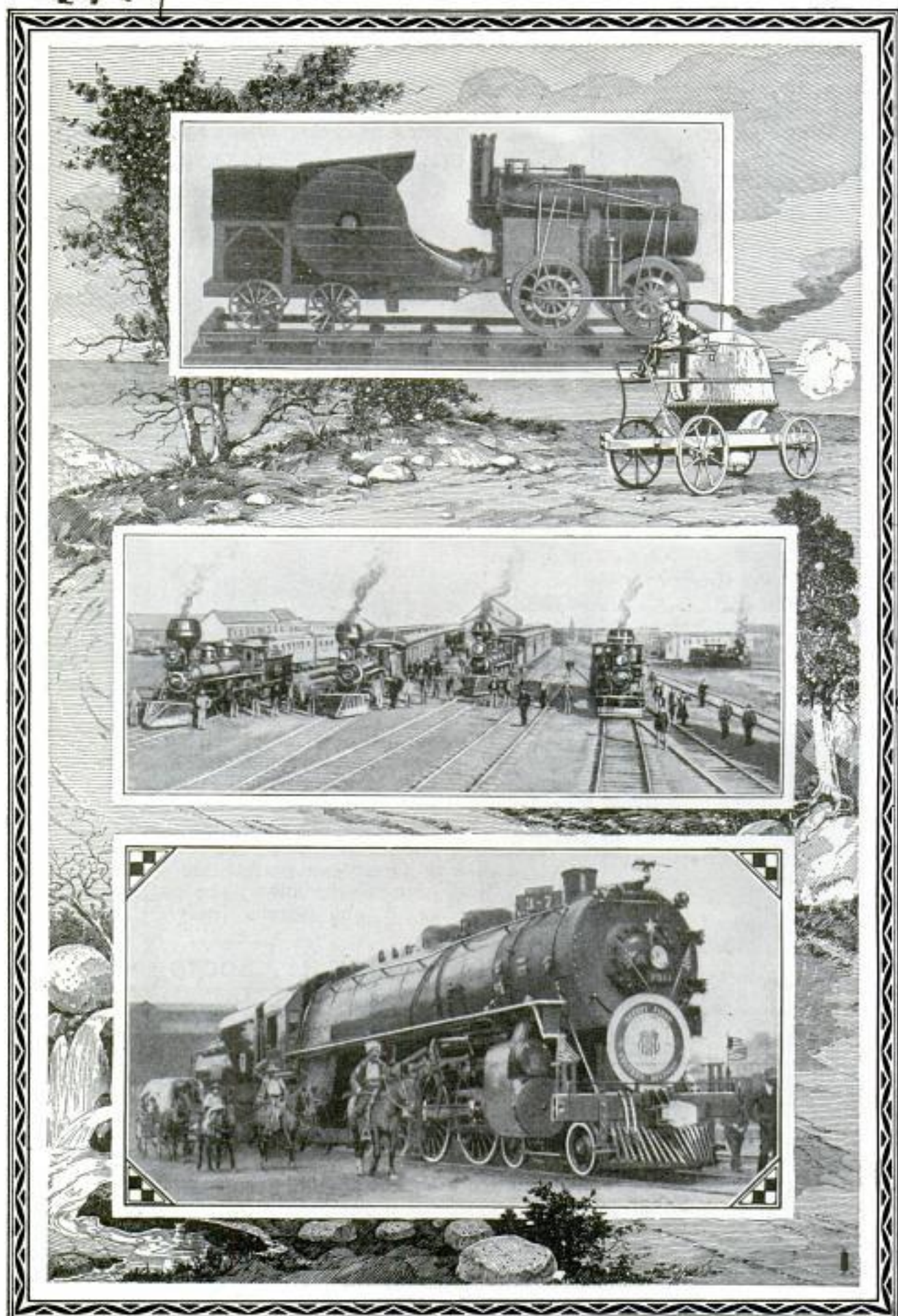
NUT THAT LOCKS ON BOLT CAN'T LOOSEN GRIP

Slotted through its side, a nut is being made designed to lock itself on a bolt. The two halves exert a pull on each other, binding it securely to the threads. Not requiring a washer, it often allows for a shorter bolt, resulting in a saving of material. Turned out in many different sizes, it can be used in the vital parts of automobiles and machinery, or employed in fastenings that are subject to great strains; also, it is not affected by excessive vibration.



The Radiator Co.,
240 Stockton St.
San Francisco.

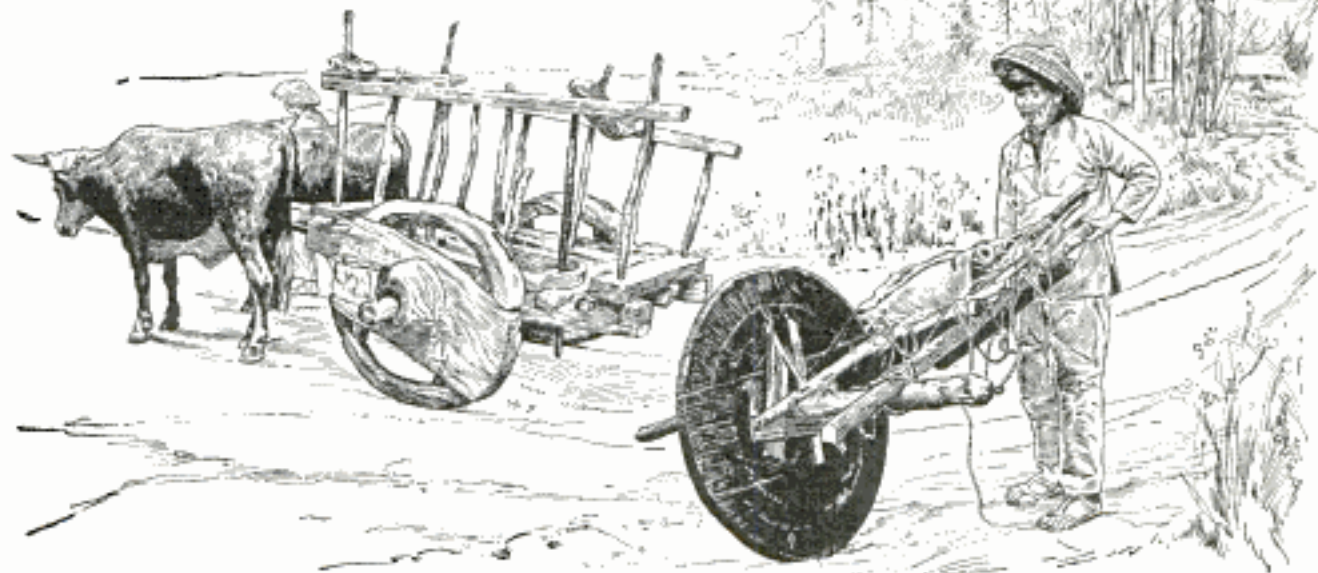
Chapman Self-Locking Nut
Continental
Bldg. Baltimore, Md.



From the Midget Locomotive of 1827 to the Giant Mogul of Today, Showing, in Center, a Group of Transcontinental Trains at Ogden, Utah, in 1884

2829

Untold Millions Being Spent by Railways to Meet Nation's Needs



From the Primitive Wheelbarrow to the Oxcart

TO meet the growing needs of the nation's business, the railways of the United States, it is estimated, are spending approximately \$1,000,000,000 for improvements and new equipment. This is said to be the largest expenditure of the kind ever made in a single year.

In all parts of the country, terminal facilities are being enlarged, switches lengthened to accommodate trains of 100 cars instead of 50, new tracks laid, costly curves and grades eliminated, and freight capacity greatly increased.

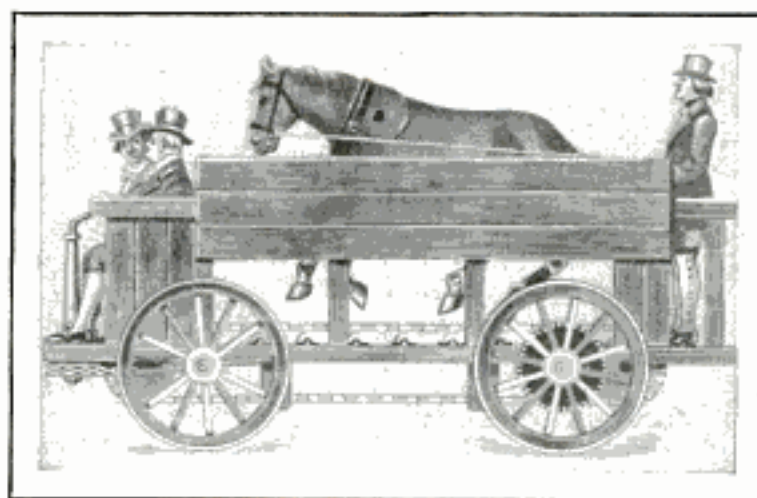
According to one executive, the present difficulties of the roads are due not so much to lack of cars and motive power as to the need of second, third, and fourth tracks in the main arteries of transportation, and larger facilities. Untold millions are needed to correct the sharp curves and steep grades built in the days of the pioneer rail-
roaders.

It was less

than 100 years ago that Baltimore merchants built a road with rails of scrap iron and operated nearly a year with horsepower. As late as 1858, the people of New York held meetings and resolved that the railroads had no right to carry freight in competition with the Erie Canal. Within the lifetime of men now living it was proved by algebraic formula that no locomotive could possibly climb a grade under its own power.

Fifty years ago the attention of the country was held by the proposal to build a railroad over the Rocky Mountains. Following the natural thoroughfare used by immense herds of buffalo,

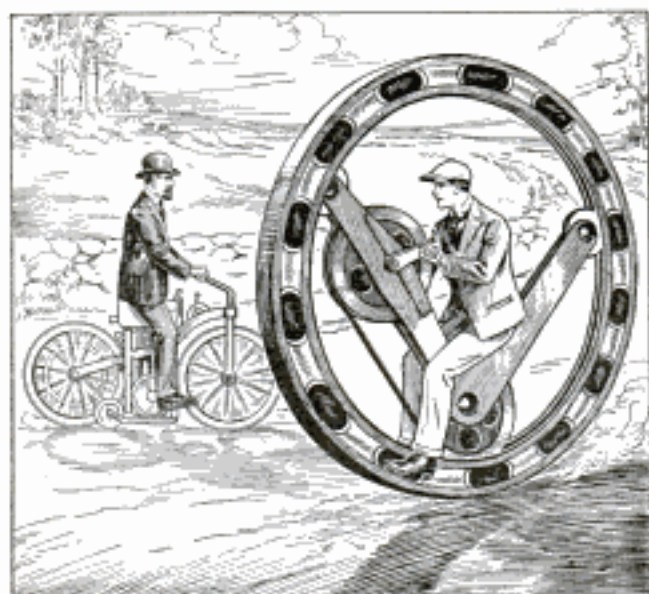
by the Indians, explorers, Mormons, gold-seekers, stage-coaches, and pony express, the march of the construction crews over the great divide did not begin until after the Civil War. And yet in 1860 the volume of vehicle traffic



Putting the Cart Before the Horse in the First Treadmill Carriage

Cont. Harry Levy Service Corp
130 W. 46th, New York

Copyrighted material



First Motorcycle and an Early Suggestion of a Bicycle Operated by Hand

along this route had grown to immense proportions, 500 freight wagons frequently passing Fort Kearney, Neb., in a day, and 888 westbound prairie schooners, drawn by 10,600 oxen, being counted between that post and Julesburg in 24 hours.

During 1861 Ben Holladay's famous stagecoach line was established, the journey from St. Joseph, Mo., to California requiring 18 days and costing more than \$225. Later, the pony express made the trip in ten days. With the opening of the first transcontinental railway, the journey to San Francisco from New York was cut down to about eight days, although now the trip may be made on fast trains in about 96 hours.

In some cities the streets are said to follow the old-time cow paths of the wilderness. This is literally true of the railroads, as the paths of the buffalo and deer led to the most accessible passes and, in many instances, determined the route taken by the surveyor's chain. Because of the constantly increasing demand for better and quicker transportation, the mistakes then made have now to be corrected.

Railroad profits are figured in fractions of a cent. The value of commodities constantly in transit is over \$1,500,000,000. If the average time could be reduced only one day a year, a saving of approximately

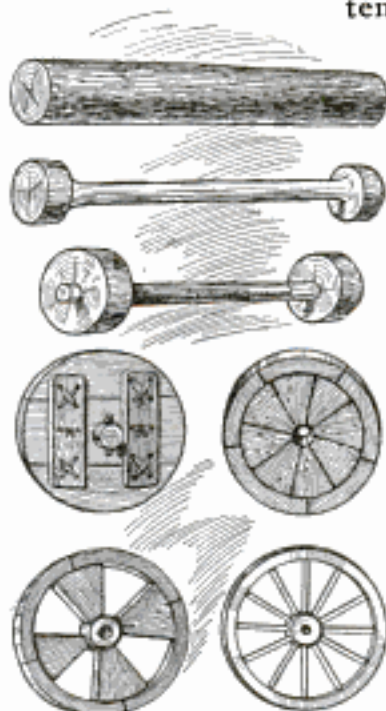
\$20,000,000 in interest charges alone would result. A half cent is a small sum in itself, but multiplied by the number of tons passing over a busy railroad every day, it shows why the roads are willing to spend millions in the reduction of curves and grades, and in speeding up travel generally.

Railways were not built "right" in the first place, owing to inadequate tools and lack of capital. It is said that the Chicago and Northwestern Railroad's first line was financed largely through the sale of potatoes and other contributed commodities. In those days it was cheaper to go around a hill than to go through it. Labor-saving devices were few. The wheeled scraper did not appear until 1877, when some one "put wheels on a dustpan and b'gosh, it ran," as a

contemporary remarks. Dynamite, an absolute essential of modern engineering, is a comparatively recent development.

Not so very long ago freight cars of 40,000 pounds were considered large. Now a capacity of 100,000 pounds is the standard. Larger and heavier locomotives have had to be made, 110-pound steel rails replaced those of 60 pounds, stronger bridges were necessary, and sidings had to be lengthened to care for longer trains. Ninety per cent of the sidings built prior to 1917 are now too short to take care of the larger freight trains.

At the present time the



Evolution of the Wheel, and, Below, a Primitive Bicycle and Steam Automobile

New York Central is spending \$15,000,000 because the city of Albany stands 135 feet lower than the highlands beyond. To avoid climbing this grade, a new line

is being constructed to allow through-freight trains to go around it without passing through Albany at all. To give Detroit a direct line into the coal fields of Pennsylvania, \$20,000,000 is being expended. Meanwhile the Illinois Central is at work on an \$80,000,000 building program in and around Chicago.

All of these activities give only a faint idea of the progress of transportation since prehistoric man first developed the

wheel from a log, attached it to a crude axle, and then built a cart in which to carry his possessions. Today, grades so slight that the human eye can barely detect them are being leveled at a cost of millions of dollars. A cut of an inch and two-tenths in 100 feet cannot seemingly do much to relieve freight congestion, but such a reduction will allow 500 tons to be added to the weight of freight trains passing over the line.

PESTS IN COTTON FIELDS BOOST ARSENIC MINES

Arsenic mines in the West are kept busy by demands for their products coming from the cotton growers of the South. When the boll weevils invade a section of the fields, there are hurried preparations made in the surrounding country to repel the pest. One of the most effective weapons is calcium arsenate, gathered from the residue of gold ore. After the yellow metal is removed the arsenic is burned out of the crushed rock.

Detroit Free Press 9/4/23

"AIRPLANE" SCENES FOR MOVIES "SHOT" FROM HIGH LADDER

Some aerial motion-pictures taken from the ladder mounted raises the camera feet in the air, said to be as retaken from air of signals the di touch with the er, informing "shooting" the camera is back of the climbs to his diz way scenes are



scenes in a west- ture studio are top of a high on a truck that man 80 to 100 The pictures are alistic as those planes. By a set rector keeps in photograph- him when to start scenes. The heavy strapped to the operator as he zy perch. In this easily filmed.



Perched High on a Ladder, This Motion-Picture Photographer Gets "Airplane" Views

International Newsreel

MODEL GOLF COURSE IN OFFICE BUILDING FOR INDOOR GAMES

Modeled after an outdoor nine-hole course, a golf links has been built on the ground floor of a large office building in



Indoor Golfing Amid Bark-Covered Pillars Has All the Thrills of Outdoor Game

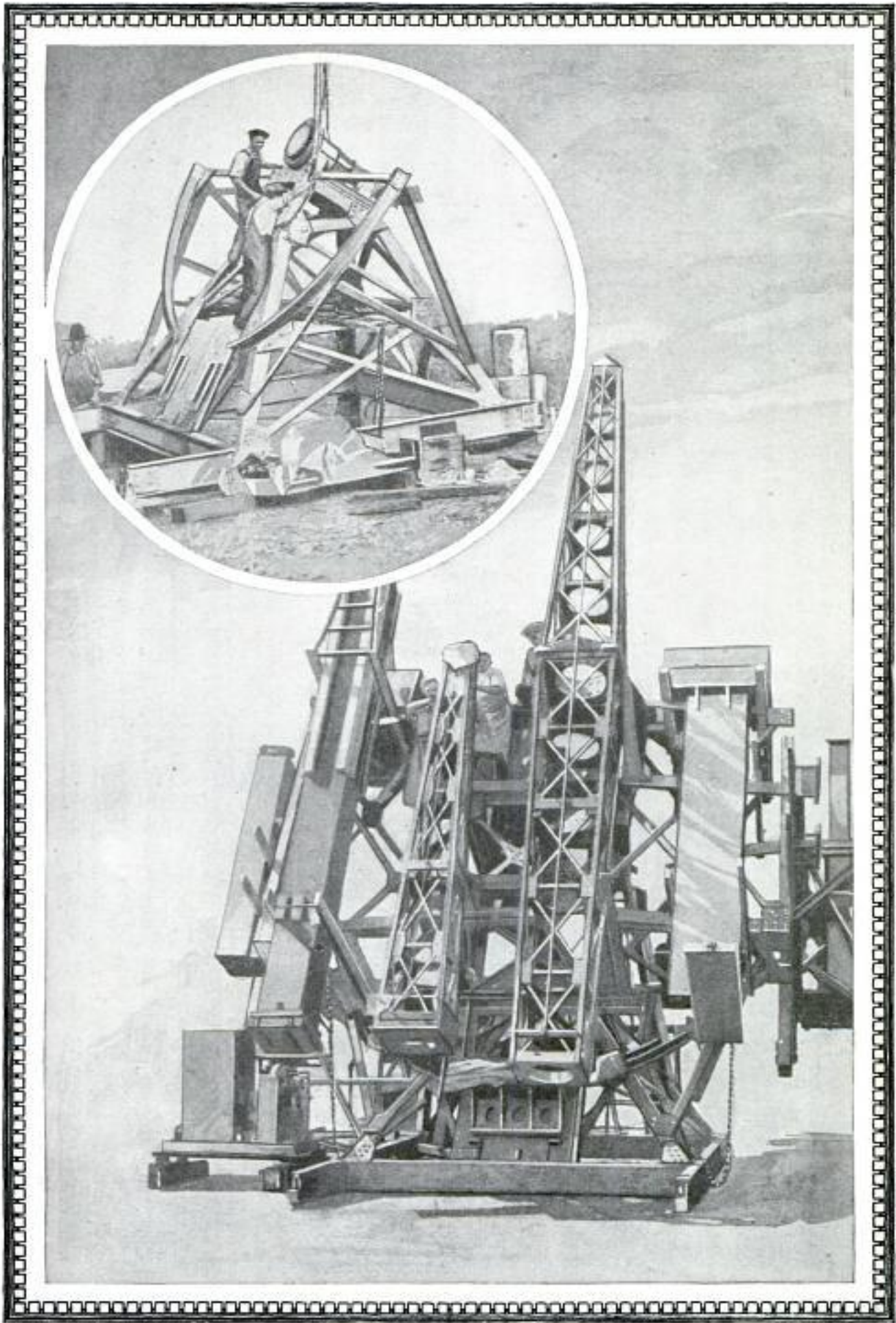
a Pacific-coast city. Sand-covered clay is substituted for grass, while the pillars of the structure are covered with huge strips of pine bark to represent trees. The walls are decorated with landscape scenes, and the ceiling, painted sky blue, is illuminated by electric lamps. One of the walls is covered by a picture of a clubhouse with a long framework veranda built in front of it where spectators, seated in wicker chairs, can watch the players. This indoor playground also has its hazards, such as hedges, a small, narrow tunnel, and bunkers of sand and clay. Nets are used to catch the drives.

Ships in East Prussia travel on dry land when going from Elbing, the seaport, to the lakes in the highlands. Special sluices have been built along the canal connecting the sea with those waterways. When a vessel has to "climb," it is loaded on wagons run over a double-track railway in the water.

3500

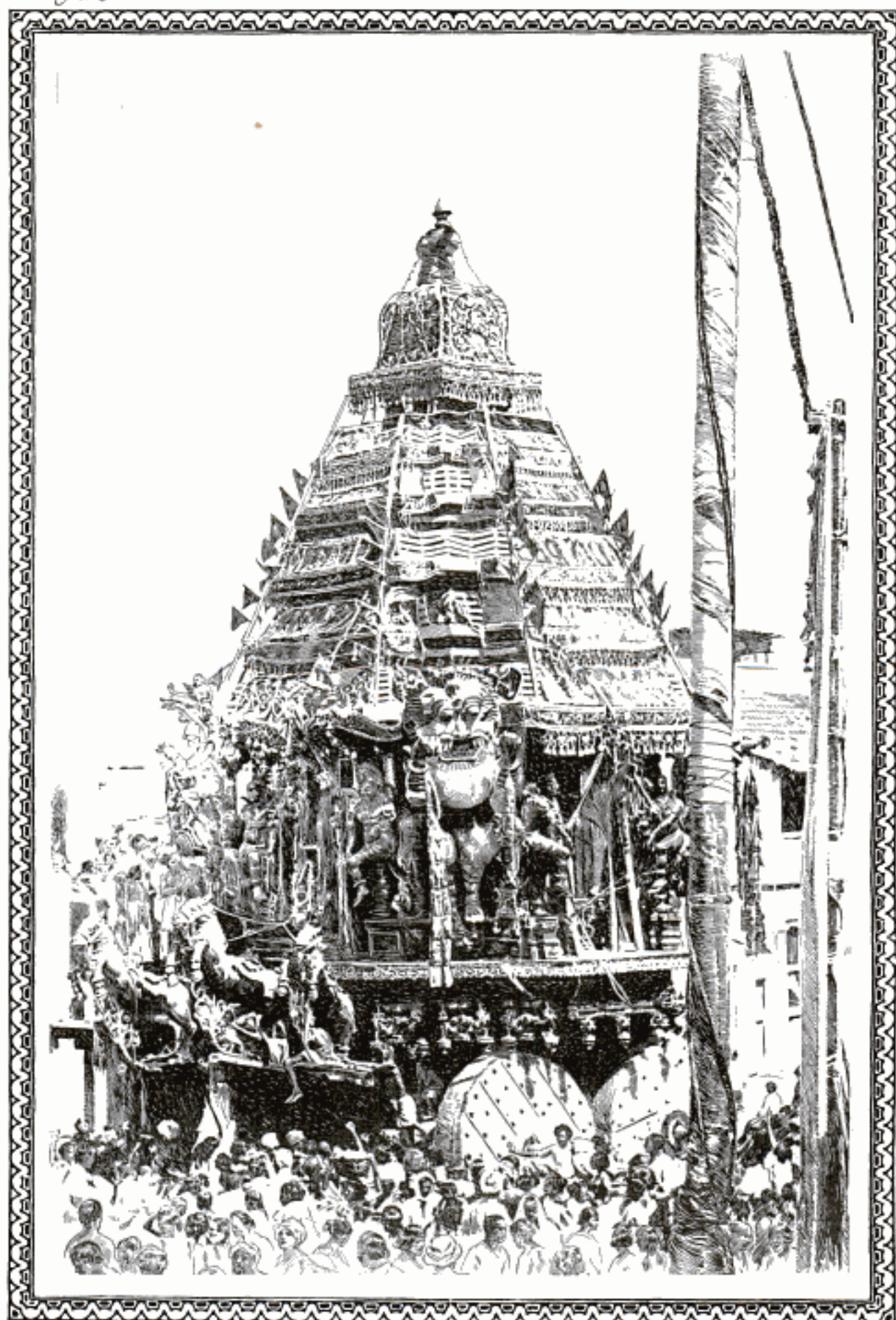
Emb. George S. Oliver, 104-17th Ave. Seattle 9/1/23

3396



COPYRIGHT, UNDERWOOD & UNDERWOOD
In Attempting to Make a "Movie" Record of the Recent Total Eclipse of the Sun Seen in America Huge Telescopes and Masses of Complicated Apparatus Were Required

3205



Eager Throng of Pilgrims Hauling "Car of Juggernaut" and Its Ornate Burden During Strange Ceremony That Has Been Solemnized for Centuries by a Certain Religious Sect in India

“JUGGERNAUT’S” WHEELS AGAIN MOVED BY PILGRIMS

Celebrated for centuries in India, the “Car Festival” of the Hindu god, Vishnu, attracts thousands of pilgrims each year. The ceremony derived its name from the huge car, 45 feet high, 35 feet square, and supported on 16 wooden wheels, 7 feet in diameter, on which the giant figure of the deity is moved through the streets. Often referred to as the “Juggernaut,” the vehicle is the center of many stories of natives being crushed to death under its massive wheels. The main temple where the image is stored for the greater part of the year is a colossal affair, 192 feet high, crowned with a mystic wheel. An immense inner in-

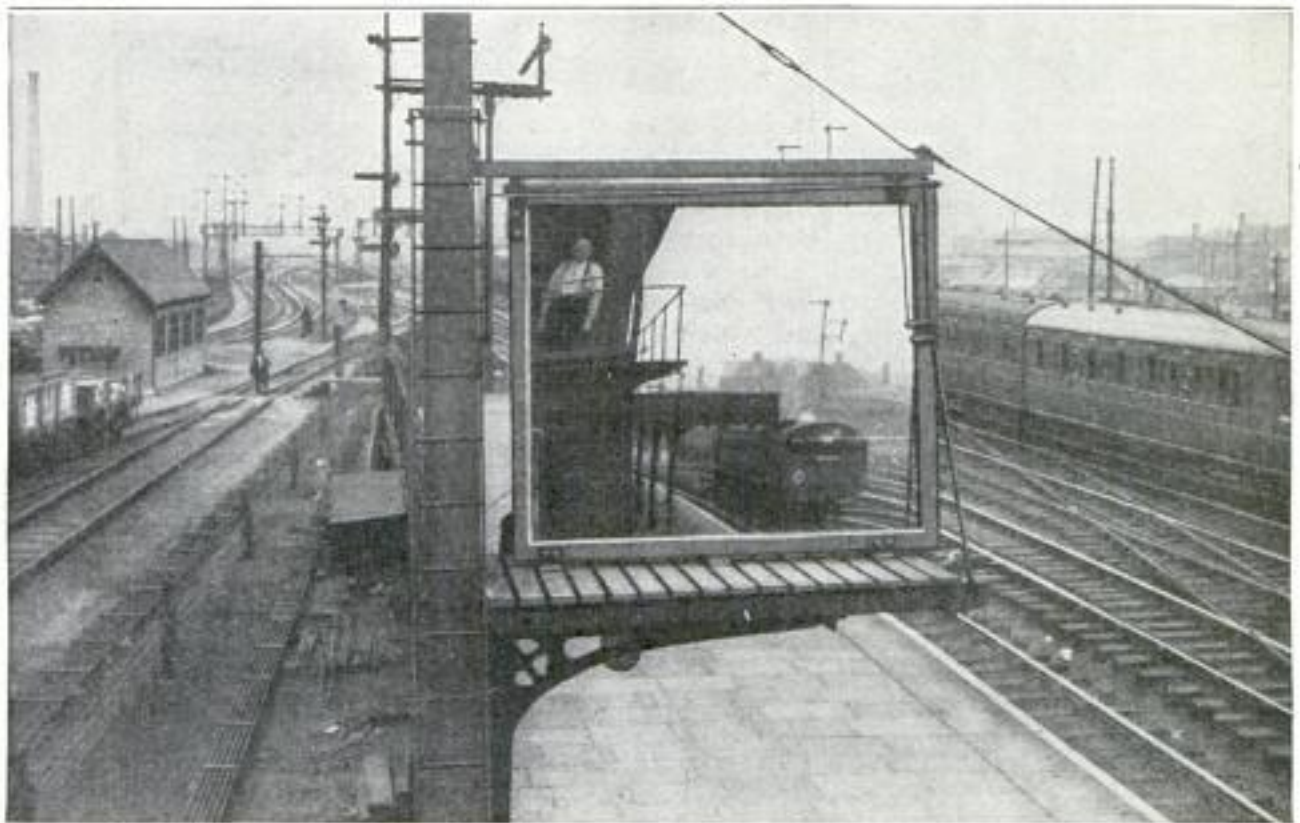
closure contains a number of small temples and shrines. It is divided into four principal rooms, the hall of offerings, the dancing hall, the audience chamber, and the shrine. Although the statue is hauled less than a mile, it takes several days to complete the trip, because of the deep sands along the route. Eager pilgrims vie with one another for the privilege of hauling at the ropes. The festival is the most important ceremony of the year, and elaborate services are held daily. The various images are dressed and redressed, and four meals a day served them. Special servants are assigned to the task of putting the idol, Vishnu, to bed.

International Newsreel

MIRROR IN SIGNAL TOWER “SEES” AROUND CURVE

As a safeguard against accidents, a huge mirror keeps silent vigil at a blind

hidden line by glancing at the mirror, placed on a level with his cage. This



Mirror over Railway Tracks That Enables Signalman to “See” Around a Blind Curve, Adding to the Safety of Passengers on Approaching Trains Which Otherwise Would Be Hidden from View

curve on an English railroad, permitting the signalman to see oncoming trains otherwise hidden from his view. From his position in the tower, the operator, upon whose watchfulness and care depends the safety of many passengers and employes, can obtain a clear view of the

“third eye” is effective at night, too, since it reflects the rays from headlights of approaching locomotives.

By swimming the Dardanelles, six British soldiers have performed the feat for which the Greek god, Hero, was famed.

*Anureat Stratford Station
L. N. R. R., England*

Ride "Pullman"
"PULLMAN" OF HIGHWAY HAS COMFORTS OF HOME

3348
 All conveniences of a modern home, from the kitchen to the living room, are included in a specially designed touring automobile recently built for a wealthy manufacturer. Trimmed throughout in mahogany, with decorations to match, the forward part has four revolving arm chairs, which can be made into beds at night, or, by another attachment, converted into dining tables. The rear is

Current for light and heat is supplied by an electric generating machine, water is stored in a 40-gallon tank having an air-pump attachment and fastened under the chassis at the rear, while extra gasoline is carried in another receptacle underneath the car.

A radio set is installed back of the chauffeur's seat, while a speaking tube permits the occupants to talk to the driver.



De Luxe Automobile Coach Containing All the Comforts of a Yacht or of the Home, Including Revolving Arm Chairs, Electric Light, Kitchen, and a Radio Set

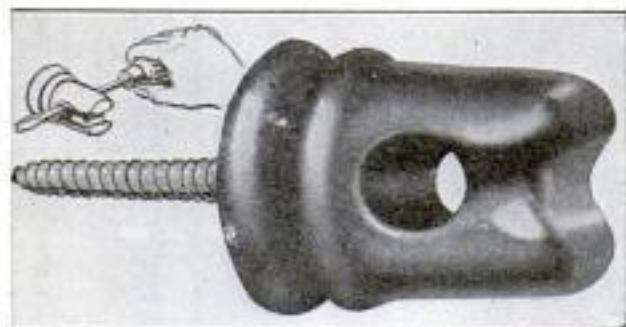
fitted as a kitchen, containing two oil stoves and an electric cooker, a folding table, a refrigerator equipped with an ice-making machine, cupboards for concealing the cooking utensils, and wash basin.

The interior is lighted by dome lamps and there are separate lighting fixtures for each chair. Roof ventilators provide fresh air, while two oscillating fans keep the car cool. Outside at the rear is an iron folding frame to carry light baggage.

3470

**INSULATORS FOR HEAVY WIRES
 SCREWED IN PLACE BY HAND**

Made of porcelain, an insulating knob for electric-transmission lines can be screwed in place without the use of tools



Insulator and How It May Be Screwed in Place with the Hands

or fasteners other than its own threaded pin. Inserting a screwdriver into a hole

gives a firm grip for turning, and it can be seated so close to a surface, that water cannot seep under the base. Strains up to 1,500 pounds can be put upon the holder without dislodging it from position.

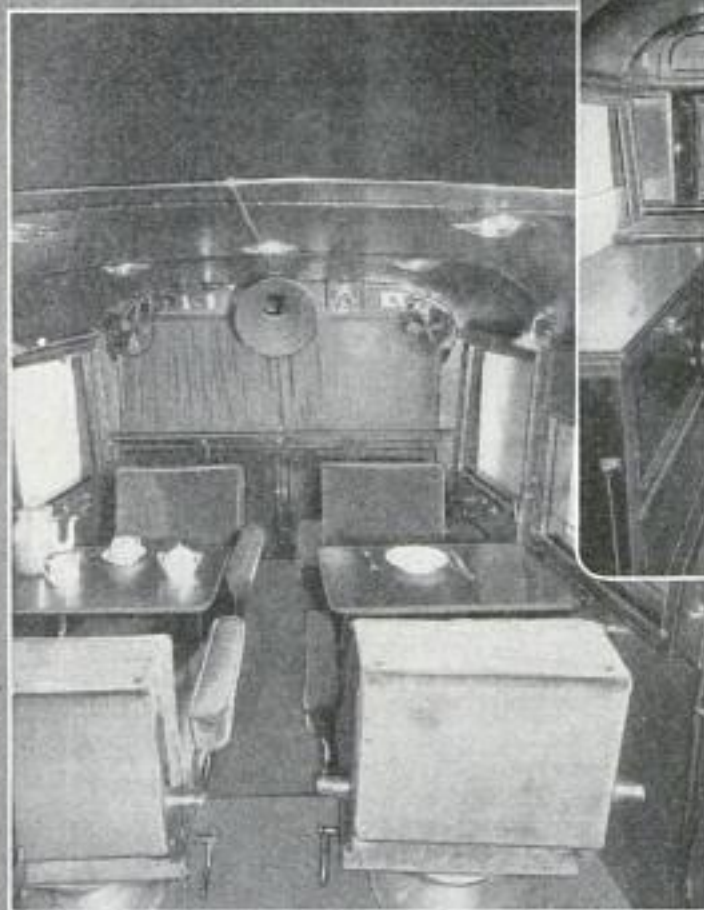
**PAGE GUESTS BY RADIOPHONES
 PLACED IN HOTEL'S HALLS**

3475
 Guests of an eastern hotel will be paged by radio from the telephone operator's desk through loud-speaking microphones scattered through the halls and lobbies. At whatever point he might be, the visitor may hear the speaker's voice. All of the sounders will send forth the call at the same time. During the day and evening, concerts, lectures, and musical programs will be rendered through the radio and telephone systems for the benefit of those who live at the hostelry.

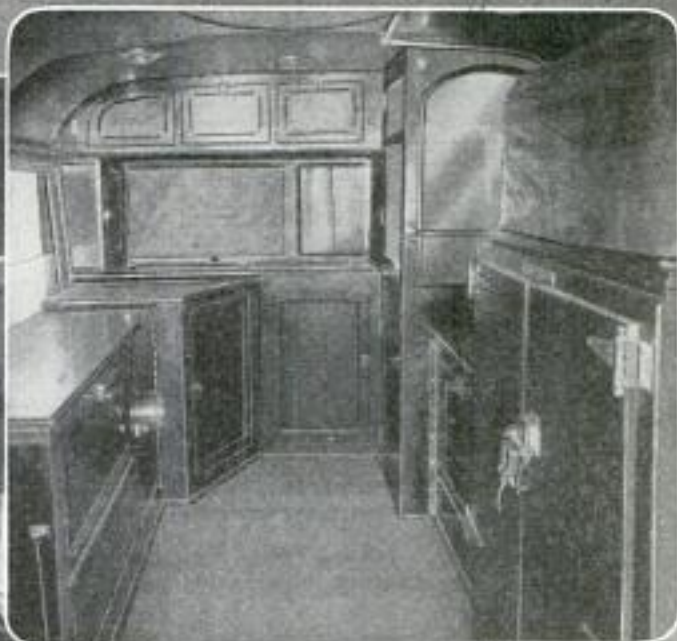
Lurham & Co. Inc.
 1936 Market St.
 Philadelphia Pa.

Build for W. J. Hadley, Fern Hall, 3348 Euclid Ave. Cleveland Ohio.
Line Material Co., South Milwaukee Wis.

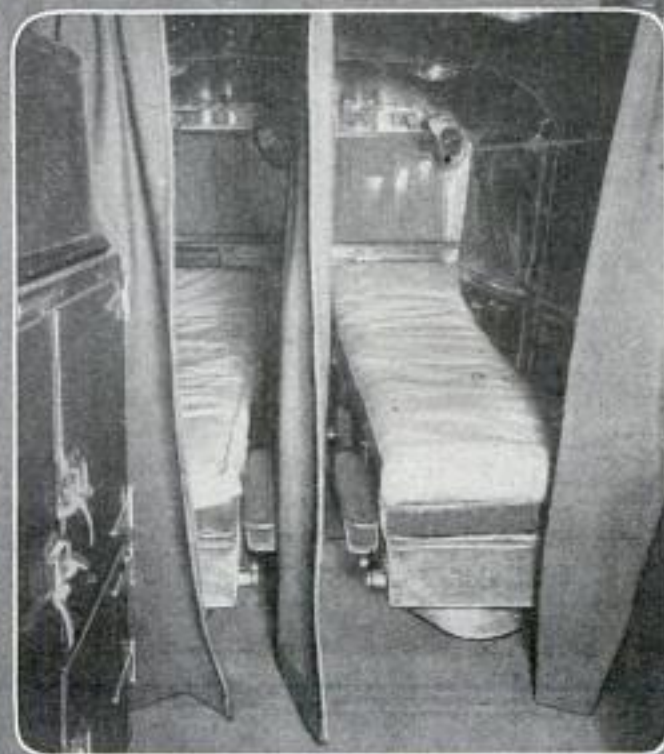
~~3475~~ ~~Sturham & Co, Inc.~~
~~1936~~ Market St.
POPULAR MECHANICS
8348 Philadelphia Pa. 698



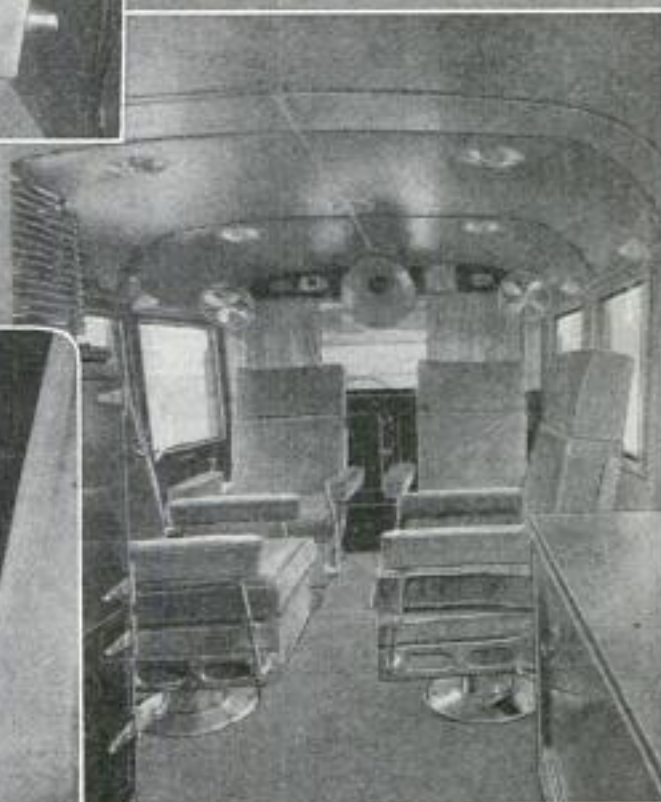
Luxurious Dining Room in Touring Automobile Where Meals May Be Served to Music Provided by the Radio Set in Top of Coach



Compact Kitchen Compartment with Everything Needed to Turn Out Full-Course Dinner While Touring Comfortably Across the Country

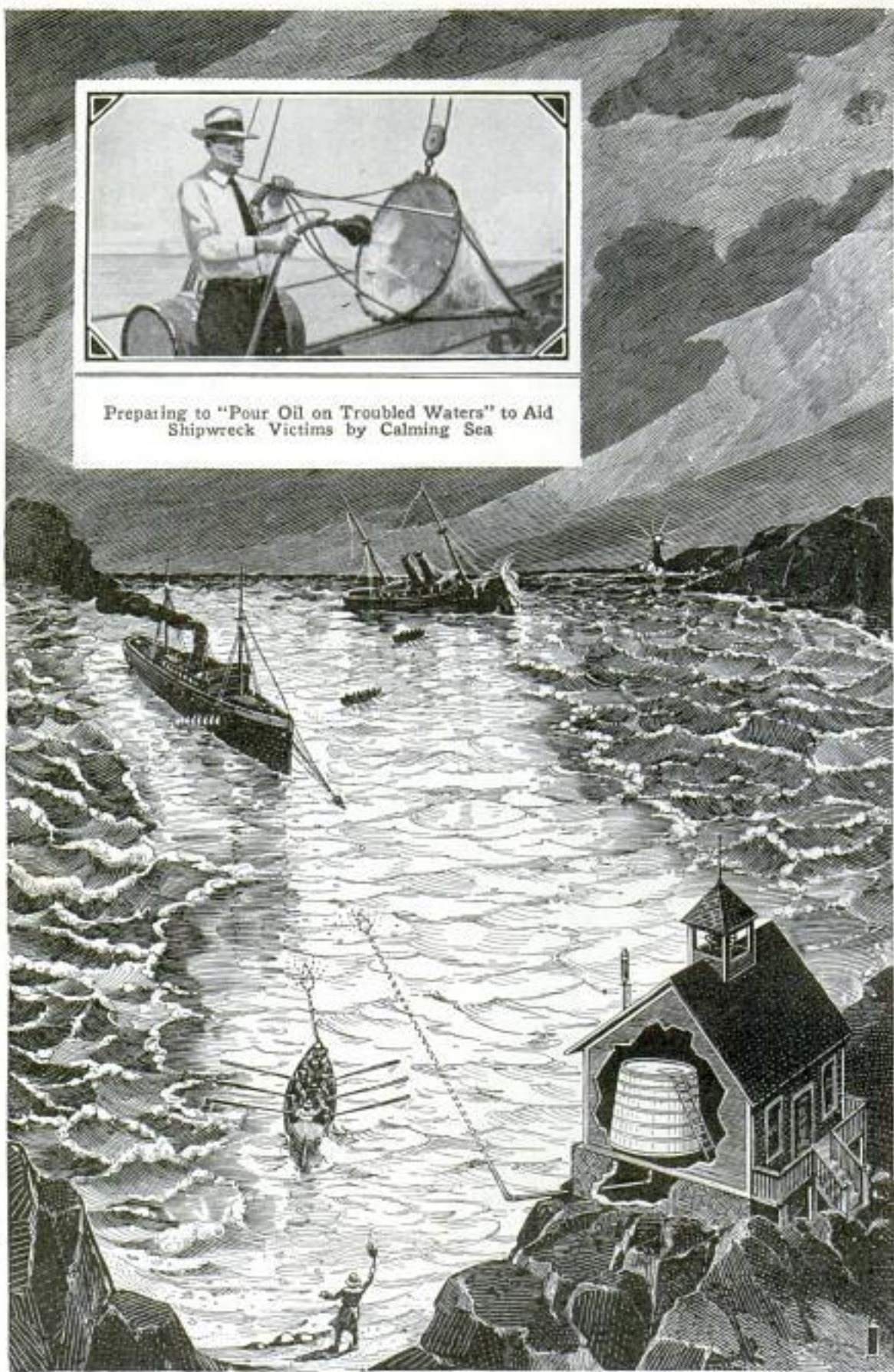


How Pullman Chairs Are Turned into Beds, and the Observation Compartment Lighted by Electricity and Cooled in Summer by Electric Fans: Broad Plate-Glass Windows Give an Unobstructed View of the Passing Scenery





Preparing to "Pour Oil on Troubled Waters" to Aid Shipwreck Victims by Calming Sea



Oil Spreader Being Used from Ships and Shore to Subdue Breakers and Protect Passengers, Crews, Vessels, and Breakwaters: Pumped from a Tank, the Lubricant Is Sprayed Over a Wide Area

creator, Harry W. S. Toberg, Galveston, Tex. as.

Chicago Evening Post
9/6/23
701

POPULAR MECHANICS

3533 3468

Emb. Edison, I prize arrangement Washington D. C.

OIL SPREADER FOR ROUGH SEAS TO HELP SHIPS IN STORMS

To calm rough waters around ships caught in storms, a southern man has invented a spreader that sprays oil over a large area around the vessel. Pumped from a tank on deck, the fluid passes far out from the boat to umbrellalike devices of canvas that are set floating in the sea. It can be used for large or small craft, or from lifeboats while making their way through heavy waves in the event of disaster.

3527

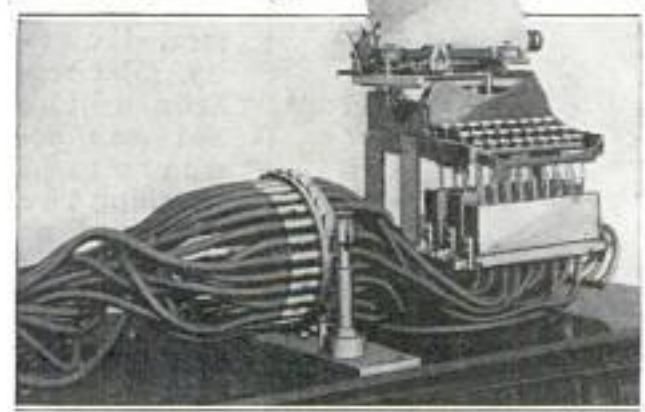
METALS AFFECTED BY ACIDS FOUND TO KILL GERMS

That certain metals are capable of destroying any germs that come in contact with them has been proved by recent experiments. Among these are copper, brass, zinc, and silver. Observations made during the tests showed that those which kill microbes are most readily attacked by chemicals. Pure gold, freshly cleaned and polished, nickel, and platinum failed to harm the germs.

3467

MESSAGES RECORDED IN CODE EXPLAINED BY TYPEWRITER

For sending telegraph messages in a code so that they will be received in translated form, a British inventor has made an electrical device that connects two widely separated typewriters.



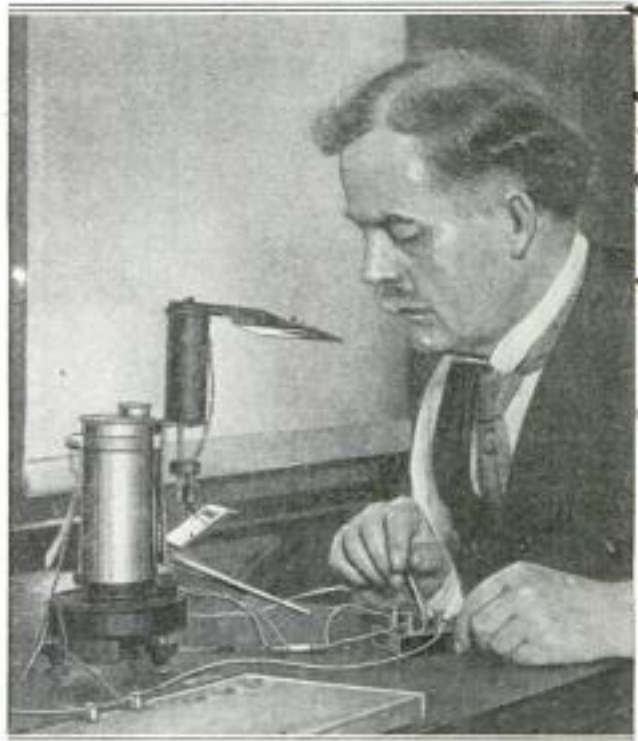
Typewriter Controlled by Coding Device That Sends Its Messages to Another Machine for Translation

An operator writes coded matter on one machine and it is immediately communicated to the other, which interprets the signs as fast as received through the attachment to its keys. Much of the time usually spent in decoding confidential information, it is said, can be saved by the apparatus.

International Show at exhibition of inventions at London.

"SOUL SEARCHER" GETS TRUTH FROM CRIMINAL MINDS

Persons suspected of crime may be betrayed or acquitted by a delicate instrument recently invented by a western uni-



Watching Changes in Blood Pressure Registered by a Machine That Detects Truth in a Criminal

versity professor. By changes in blood pressure, it is intended to show the working of the subject's mind during the time lapsing between an examiner's question and the suspect's reply. The offender is asked to pronounce the first word that comes to his mind after the questioner has suggested one dealing with the supposed crime. If guilty, it is said that his blood force will register a high mark. Communication with the machine, which is called a capillary electrometer, is furnished through the finger tips of the person undergoing the test.

CAT-TAILS YIELD FLOUR, SILK, STARCH, AND ALSO SUGAR

From the cat-tails found in almost every swamp, scientists have succeeded in making both food and cloth. Roots of the weed produce starch and sugar, the pollen has been used as a flour to make bread, the brown spikes make an excellent substitute for silk, and the fluffy down is valuable for stuffing pillows. The plant was first discovered by the Iroquois Indians and, during the Great War, it was extensively used in central Europe.

Chicago Evening Post
9/6/23

Dr. Alexander Hervey, Calif. Criminology Dept. Univ. of California

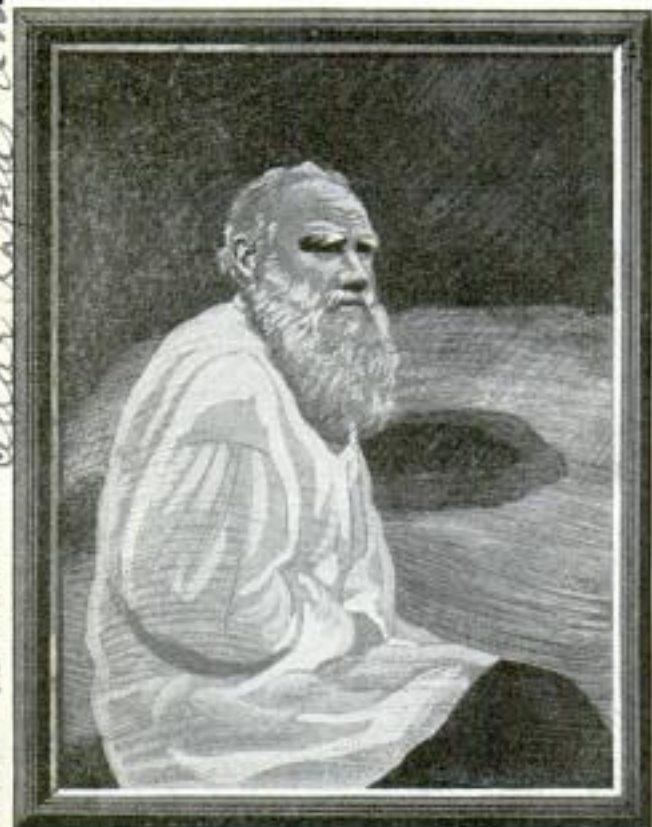
Copyright material

Pietro Kostenko
Russia

Korn Bell Feed
mills
Omaha, Neb.

WOODS COLORED BY SCORCHING "PAINT" MOSAIC PORTRAITS

3486 With 87 pieces of wood, taken from 16 kinds of trees, a Russian artist creates portraits of famous men. To produce the



Mosaic Painting in Which Different Kinds of Wood Give Character to the Portrait

tones necessary to give "life" and color to the mosaic, the tiles, some of them as small as a needle, are placed so that their natural tints form the shaded lines of the subject. The grain of the woods and sections of knots are used to give character to the picture, while deeper shadings are produced by scorching the materials with hot irons or heated sand. A special rubbing process is employed to produce black.

LAKE OF MIRACLE WATERS FOUND IN INDIA

3519 In a village of Bengal, India, a small lake that has existed for many years has been found to possess marvelous healing powers, it is reported. Persons afflicted with almost incurable maladies are said to have been permanently cured by bathing in it. Only on a certain day of the week are the baths of benefit. During the other six days the curative properties are claimed to be absent. Thousands of natives gather in the town for "miracle day."

FOWLS REACH POULTRY FEED THROUGH SLOTS IN PACKAGE

3499 For marketing chicken feed, a middle-western company has devised a container that automatically supplies the foodstuff to the fowls. Shaped like a can, the receptacle has slots at its base which permit the feed to flow out as fast as needed. Thus, it is claimed, poultry can be fed more economically than by scattering grain in troughs or pouring it on the ground. The openings are covered by strong paper, to prevent the contents from leaking until the buyer is ready to use the package, when the cardboard may be cut through to allow the preparation to pass out.



TREE'S TRUNK HARBORS INDIAN STATUE CAST IN CONCRETE

3416 In replacing the decayed portion of a large tree trunk, tree surgeons working in the parks of a mid-western city



molded the figure of an Indian warrior on the surface of the cement with which they filled the treated cavity. The replica of the red man appears to be watching the distance from the shelter of the hollow trunk. It is thought that by thus adding ornamental statuary to the un-

sightly fillings that preserve the lives of blighted shade trees their beauty will not be marred and an attraction will be furnished visitors.

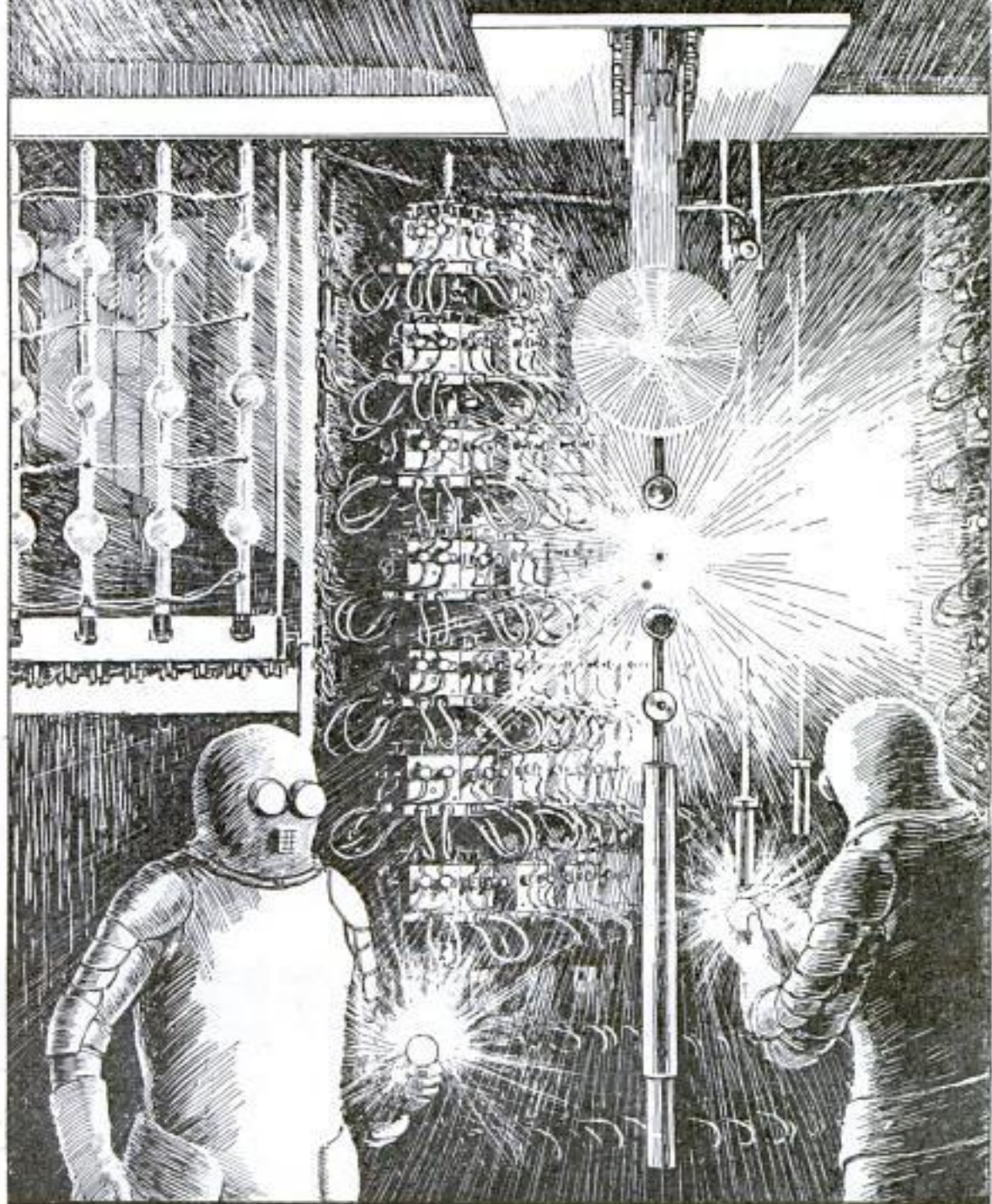
Using 113,540 pieces of wood, an eastern woodcarver recently completed a table that he started in 1915.

Emb. Frances Warren, 6098 Thurgate Lane

Emb. W. H. Dorned, 949 Lowry Ave. N.E.,
Munroe, Wis., Minn.

Emb. J. B. Raney, 11 Kasehatti,
Rose Lane Simla P. O., Calcutta,
India

Science Harnesses Atoms To Chariot of Light



Electricity Being Drawn from the Air in Laboratory to Light Bulbs That Are Then Said to Continue to Give One Hundred Candlepower for Three Years without Recharging, or the Use of Batteries or Renewals of Any Kind

Heatless Light to Chain Almost Limitless Flow of Power for Mankind's Use

Tube Like Ordinary Electric Bulb Will Glow for Three Years by Putting Atomic Energy to Work, Is Claim

AFTER two years of experimenting to develop bottled, heatless light, an eastern inventor has announced discoveries that may result in the harnessing of almost limitless power for the use of mankind.

Surrounded by strange instruments in a modest little laboratory at Harrison, N. J., he says that he has succeeded in inventing a tube, not unlike the ordinary electric bulb, that will give 100 candle-power continuously for three years without connecting wires, batteries, or need of renewals. For years it has been known that a few pounds of matter contain more power than can be extracted from millions of tons of coal. Every bit of rock, piece of steel, or even a penny is a colossal reservoir of energy imprisoned by the force that guides the destinies of the universe. If it could be released and controlled, the use of steam, electricity, and coal would be rendered obsolete.

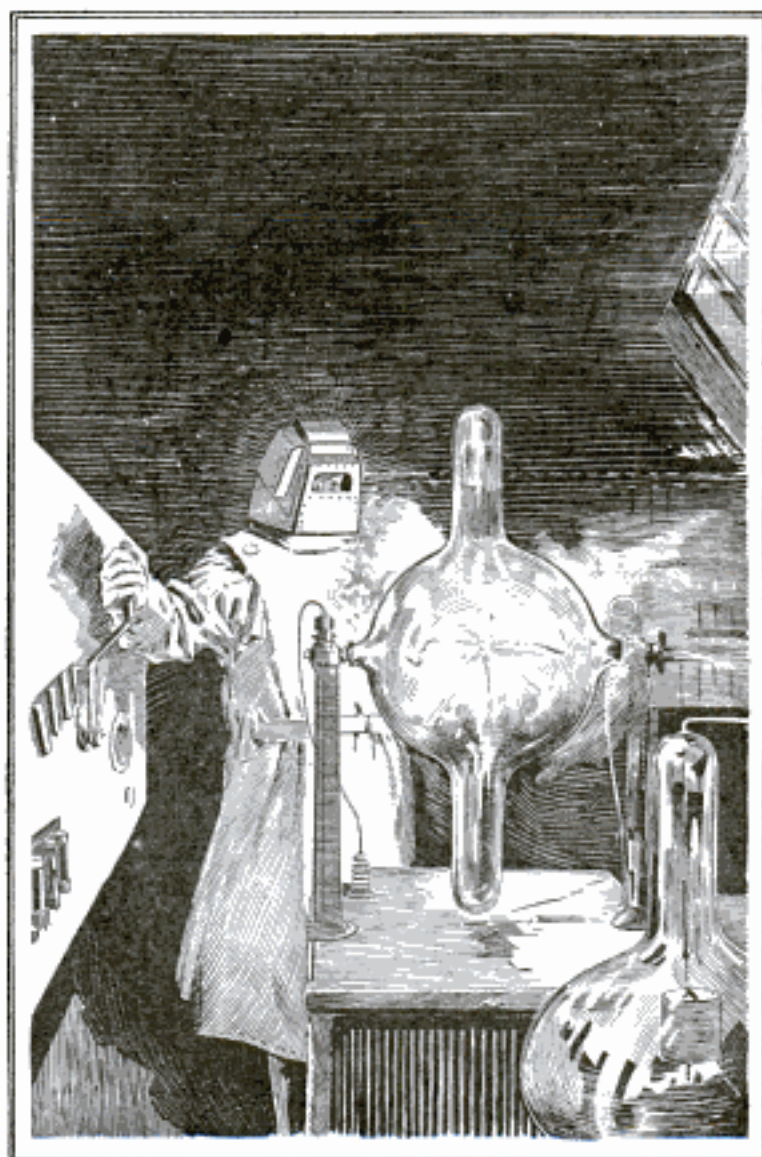
"I am of the opinion," Sir William Bragg, noted scientist, declared some time ago, "that this energy will supply our future needs. A thousand years may pass before we can

harness it, or tomorrow night may see us with the reins in our hands."

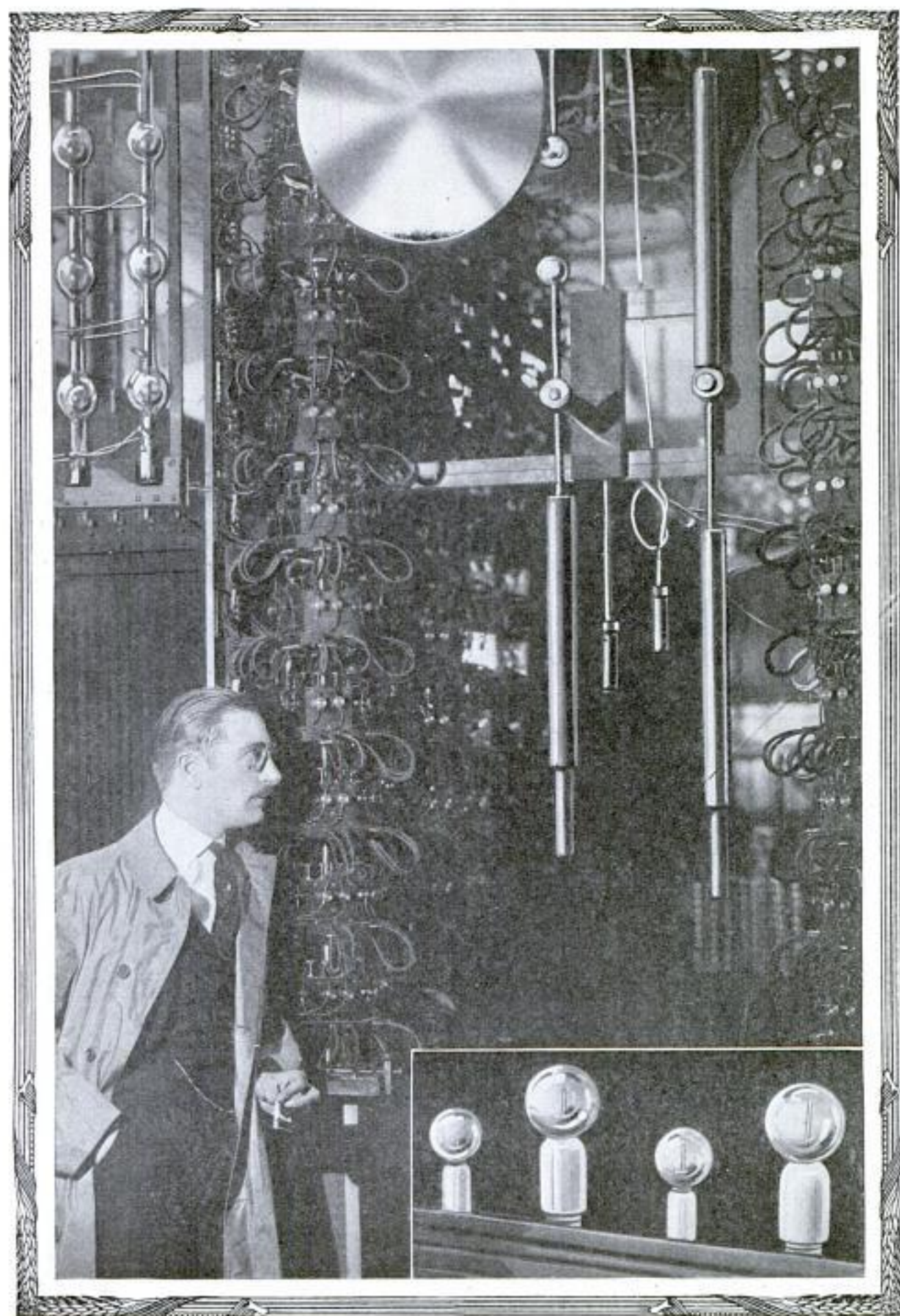
While the difficulties are tremendous, Sir Oliver Lodge remarked that there was just as much doubt at one time about the utilization of steam or electricity. "Is it to be supposed," he asked, "that there can be no fresh inventions, that all discoveries have been made?"

According to these scientists, all matter—steel, gold, wood, and gas—is composed of molecules. These are made up of atoms, which, in turn, are merely vast collections of electrons, all of them being in ceaseless motion.

While the atom is far too small to be seen, it is known that in a bubble of gas no larger than the letter "O" there are billions of them, and that the electron is more than a thousand times smaller than the tiniest atom. Electrons are constantly moving at a speed of from 10,000 to 160,000 miles a second, a rate sufficient to carry them around the world more than six times between the ticks of a clock. Over 1,340 barrels of powder would be required to move a rifle bullet as fast. In a copper cent, it is estimated, this



Most Terrific Heat Known, Estimated at 50,000 Degrees, Being Produced in Tests Seeking "Cold" Light



Inventor, "Cold" Light Bulbs, and Complicated Electrical Apparatus, Used in Setting Free Energy That May Provide World with Limitless Source of New Power

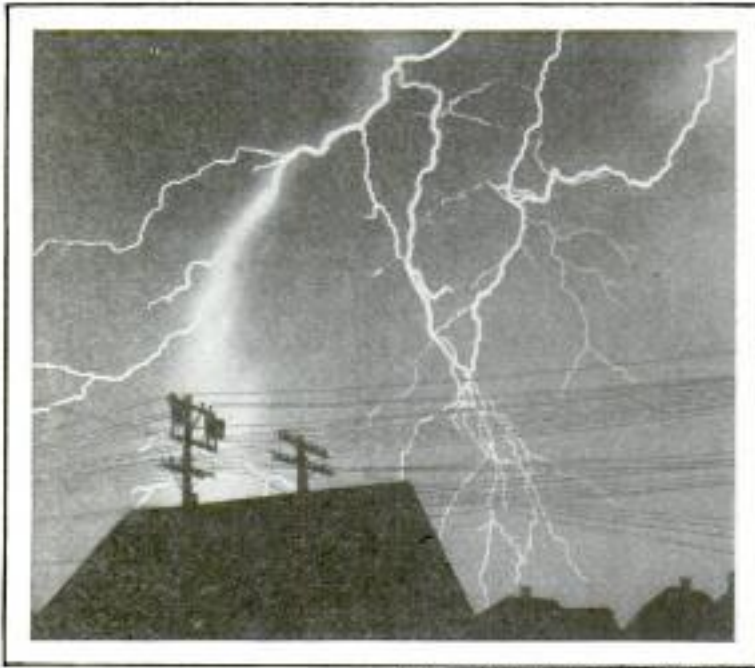


PHOTO COURTESY HI-VOLTAGE EQUIPMENT CO.

Symbol of Power Since Time Immemorial, Lightning Plays Queer Tricks with Telephone and Power Wires

energy, if it could be released, is equal to 80,000,000 horsepower, and the atomic force imprisoned in a hard-shelled crab is sufficient to blow up the largest skyscraper. The activity of the electrons can be stimulated in various ways, one being by the ultraviolet, or invisible, rays of the sun.

If most of this light was not absorbed in passing through the earth's atmosphere, metals would disintegrate under it and the present "steel civilization" would be impossible. By greatly increasing the movement of the atoms, massive buildings could be instantly dissolved into dust, and, if the rate of speed were made fast enough, a destructive explosion would result.

In his search for "cold" light, Juan J. Tomadelli first began experimenting with lightning, symbol of power since time immemorial. The voltage, or electrical pressure, of a bolt is estimated at about 50,000,000 volts. But as the flash is so quick that it is over in a one-thousandth part of a second, the energy involved is small, being estimated at 1.2 cents a bolt. During his tests, Mr. Tomadelli developed a 5,000,000-volt flash, a yard in diameter, which jumped a gap of 37 feet and was maintained for 31 seconds.

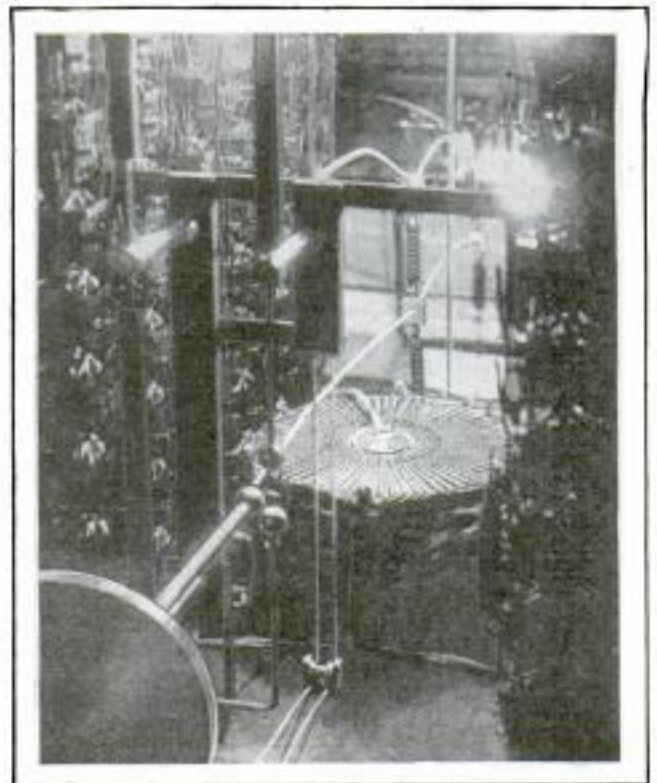
This was one step in his search for a force that would release the energy in the atom and at the same time control it. The jolt from the electricity, he says, started a series of "explosions" in the secret material composing the filaments of the lights. But, instead of occurring all at one time, the smash-ups are spread

over a period of years, according to the amount of substance used in the bulbs.

Ordinary electricity from the power house will not set this process in operation, according to the inventor. It requires current drawn from the air. This is not lightning and not the charge of the earth, but is said to have a sort of cousinly relationship with them. Special and highly complicated apparatus, some of which represents the most intricate and involved ever used for electrical experimentation, has been installed at the Harrison laboratory to capture and harness this current.

Outside the main building, a big metal disk has been set high in the air. It is said that the electricity is drawn from this through many heavily insulated wires to a magnetic revolving apparatus connected with metallic brushes.

In his experiments, Mr. Tomadelli said that he had made profound changes in the composition of the filaments inside the lights by rubbing the bulbs with green leaves. Also, he says, he was puffed up like a balloon and several pounds were added to his weight by the electrons that entered his system while experimenting in his laboratory.



Blinding Flashes of Man-Made Lightning Used in Experiments to Solve Mystery of Life

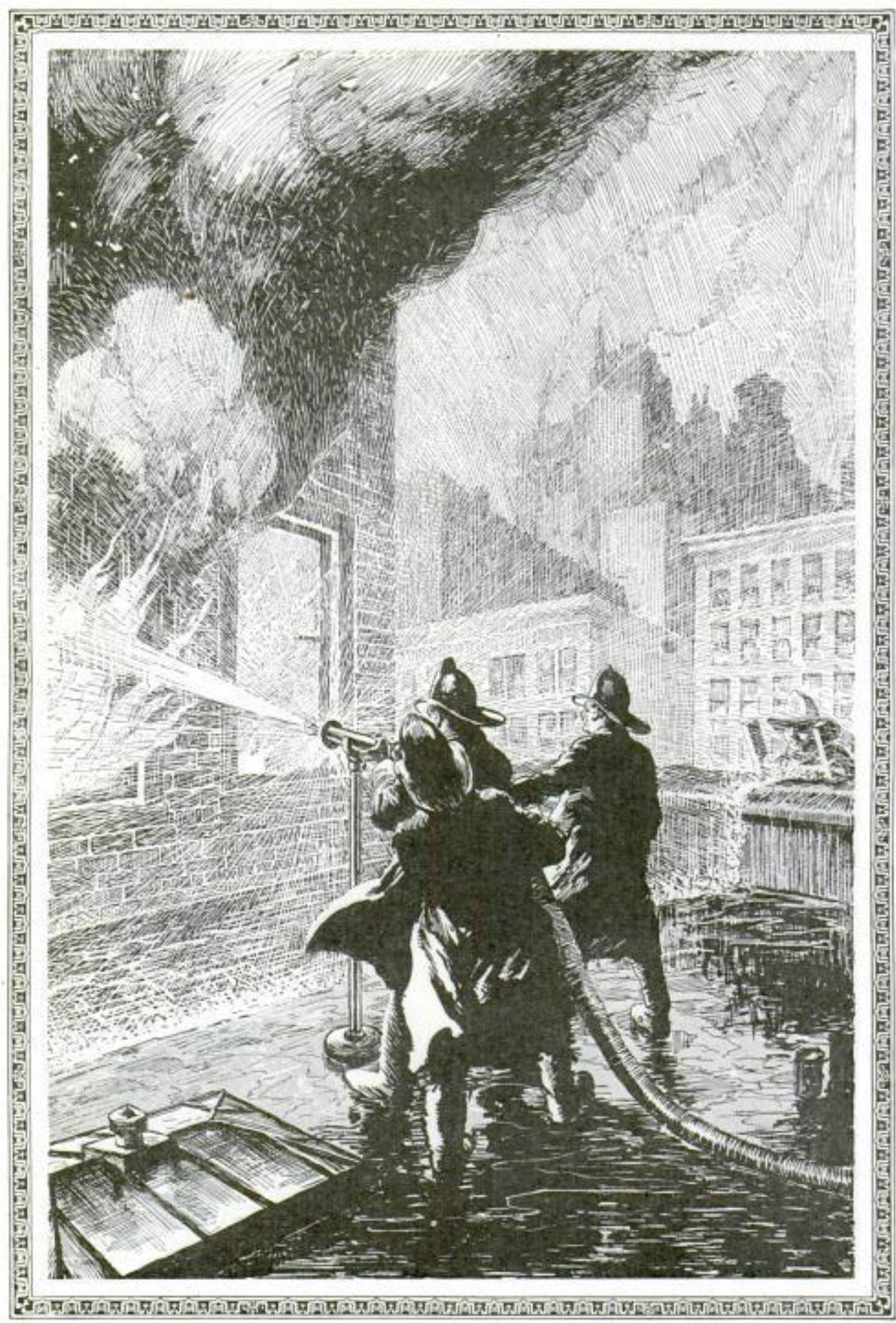


PHOTO COURTESY HI-VOLTAGE EQUIPMENT CO.

Although the Power of a Bolt of Lightning Is Estimated at 50,000,000 Volts, So Short Is Its Life That the Current Is Valued at only 1.2 Cents

3435

SHIELD OF WATER GUARDS FIREMEN FROM FLAMES



Screen of Water Sprayed at Right Angle by Hose Nozzle Protects Fire Fighters from Flames and Smoke and Permits Closer Approach to Blaze without Hampering Their Vision

Old Steel Lives Again in Huge Skyscrapers Built of Scrapped and Rusty Rails

Worn-Out Pathways of Commerce Not Allowed to Perish When Work Is Done, But Are Re-Rolled for Further Service

FROM the pathways of commerce to the towering skyscraper is the romantic progress of the steel rail, for, when its usefulness is ended, it does not perish, but is re-rolled for still another life of constructive purpose.

In the year 1830 there were but 23 miles of railway in the United States. Forty-three years later the rails of steel had carried civilization to the Mississippi and beyond, but the great Northwest was still an unsettled wilderness.

Today more than 300,000 miles of track carry mankind into every corner of the land. Along great railway systems have grown towns and villages, the centers of vast agricultural and industrial communities, dependent on the connecting roads for their every necessity.

From the flat strap-iron bolted to wooden beams of the early days, the steel rail of the present has been developed. To meet the constantly increasing requirements of weight, speed, and volume of traffic, its quality has been perfected by all the skill and genius of one of the nation's greatest industries.

Over it flows a gigantic commerce. Fruits of California and the South find rapid passage to the gateways of the North. Live stock of the prairies flows unceasingly to the central packing centers. Meat for a nation's need

emerges and is distributed in refrigerator cars, defying time and climate. In peace and war, the certainty of the steel rail has made national unity and progress possible.

But there is a step farther, a magical change, of equal romantic interest. When its usefulness is gone, the rail does not perish utterly, but, in a new form, lives again for still another life of constructive purpose. Re-rolled, it returns in skyscrapers to the cities, and in agricultural implements to the fields that it has opened to man.

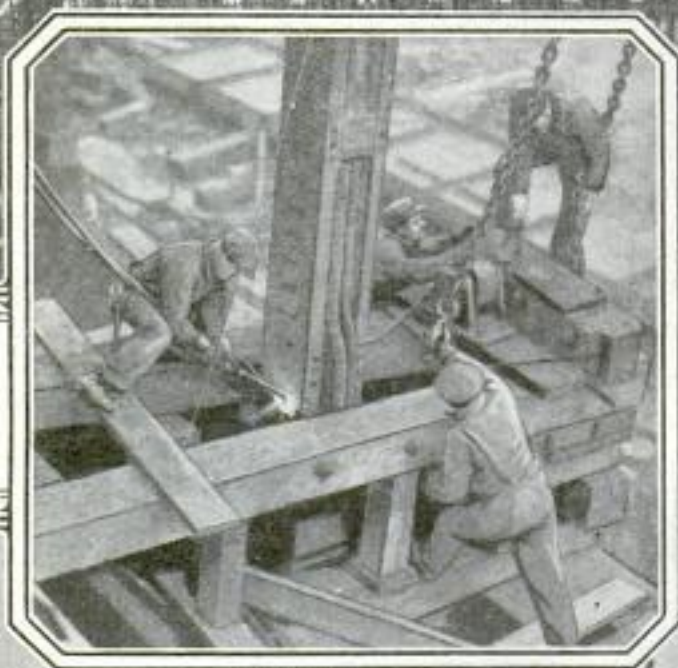
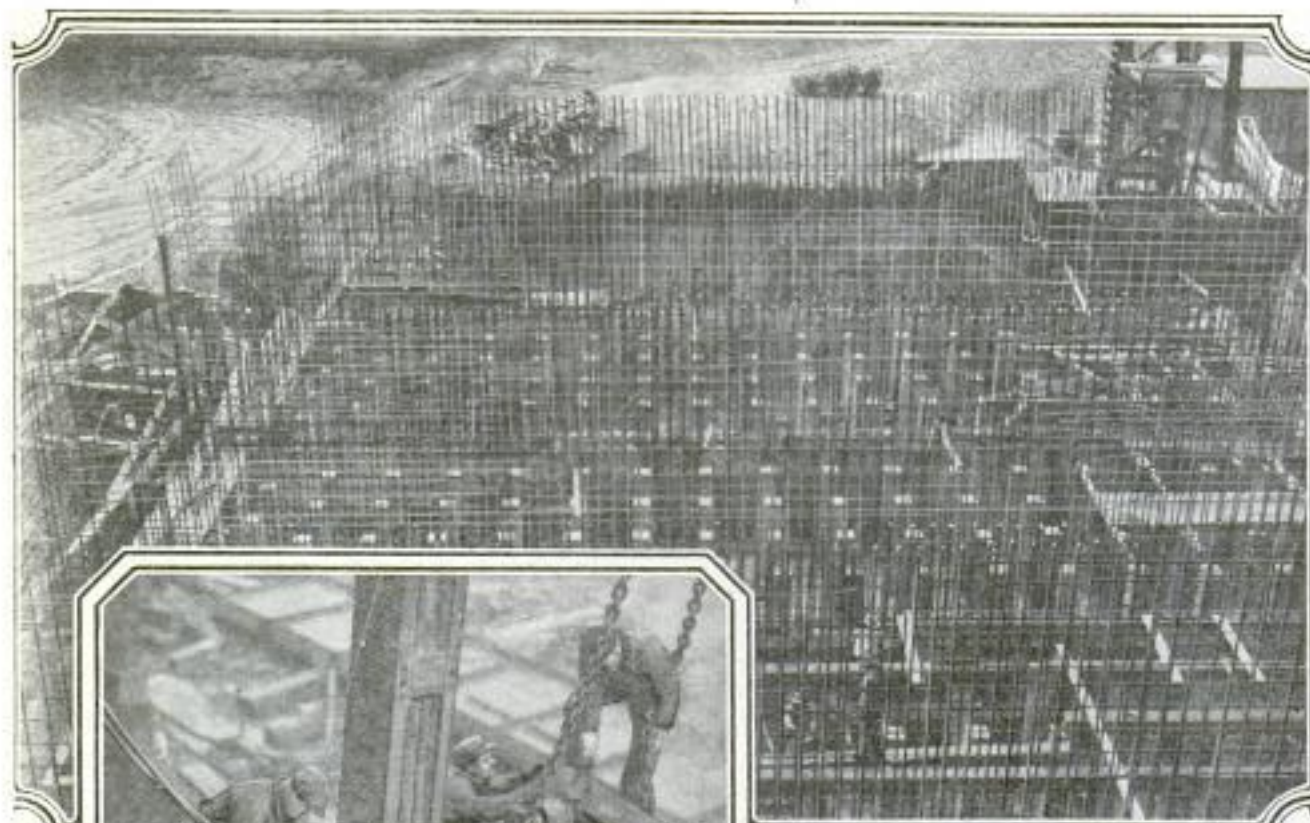
Reborn from the rails, sturdy teeth of harrows open the soil for planting. Rolled into tubes, it serves dairy communities in the fittings of sanitary barns. In lofty windmills the rejuvenated rails lift their circling arms to catch the power of wind, pumping water to quench the thirst of land and beast.

Throughout the nation the reinforcing bars of rail-steel knit to rigidity huge, concrete structures. In every section of the country, for every need of rest and labor, in new and changed form, the scrapped rails still carry on long after their work in the service of transportation has ended.

At the re-rolling mills, the worn rails are piled high in the storage yards. Inherently as sound as the first day they were

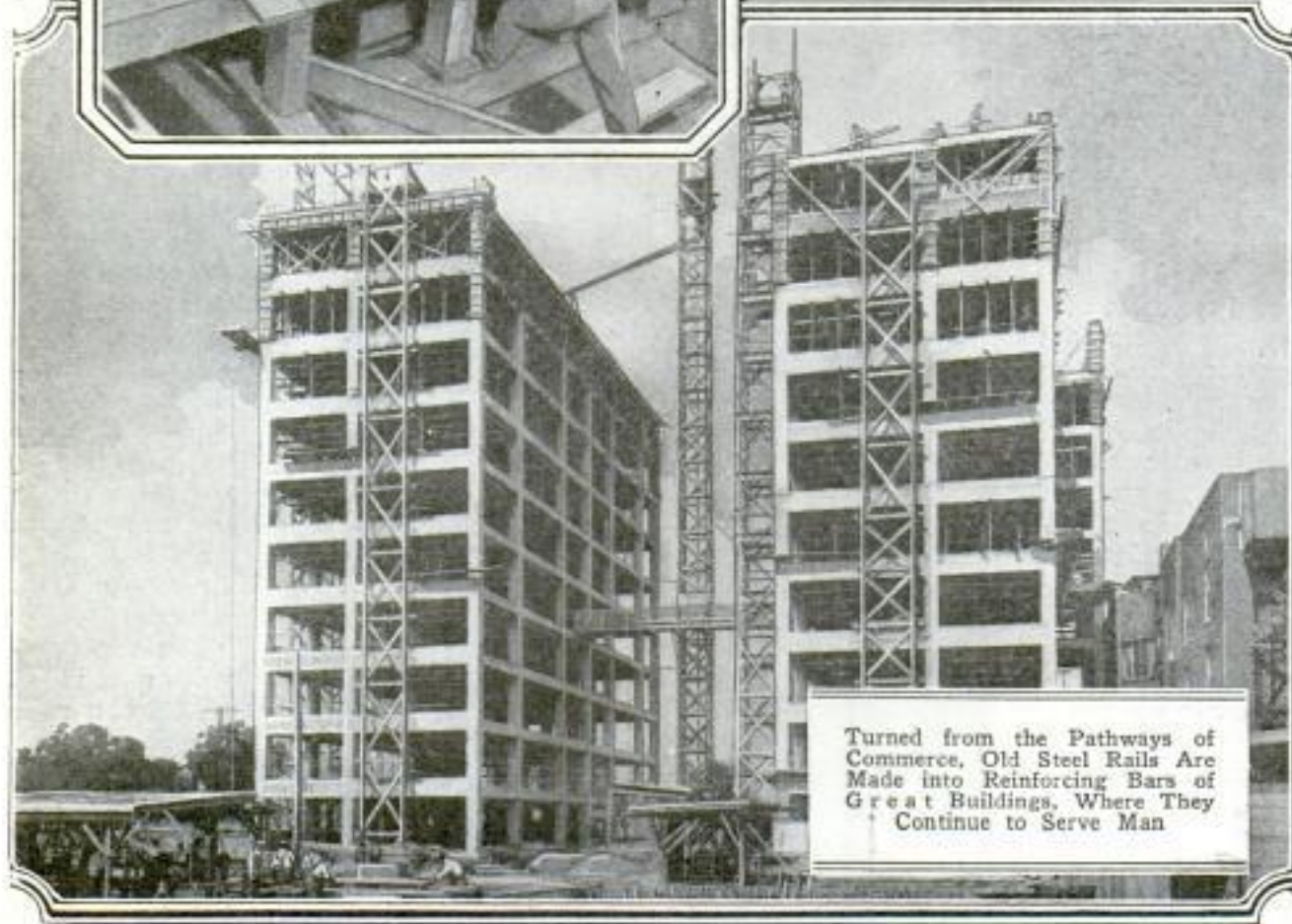


Seething Volcano of Flame and Smoke That Marks the Birth of Steel in a Modern Bessemer Converter

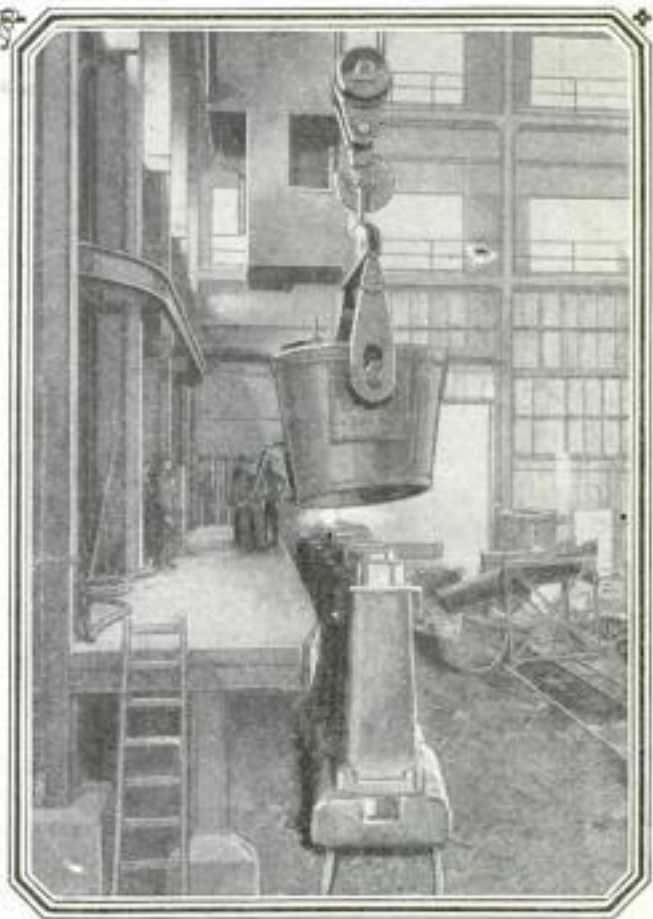


Skeleton of Steel Which Will Knit Together the Concrete Walls of a Mighty Skyscraper; and, at Left, the Acetylene Torch That Cuts Through Metal as Easily as a Saw Goes Through Wood

PHOTO AT LEFT, COPYRIGHT, UNDERWOOD & UNDERWOOD

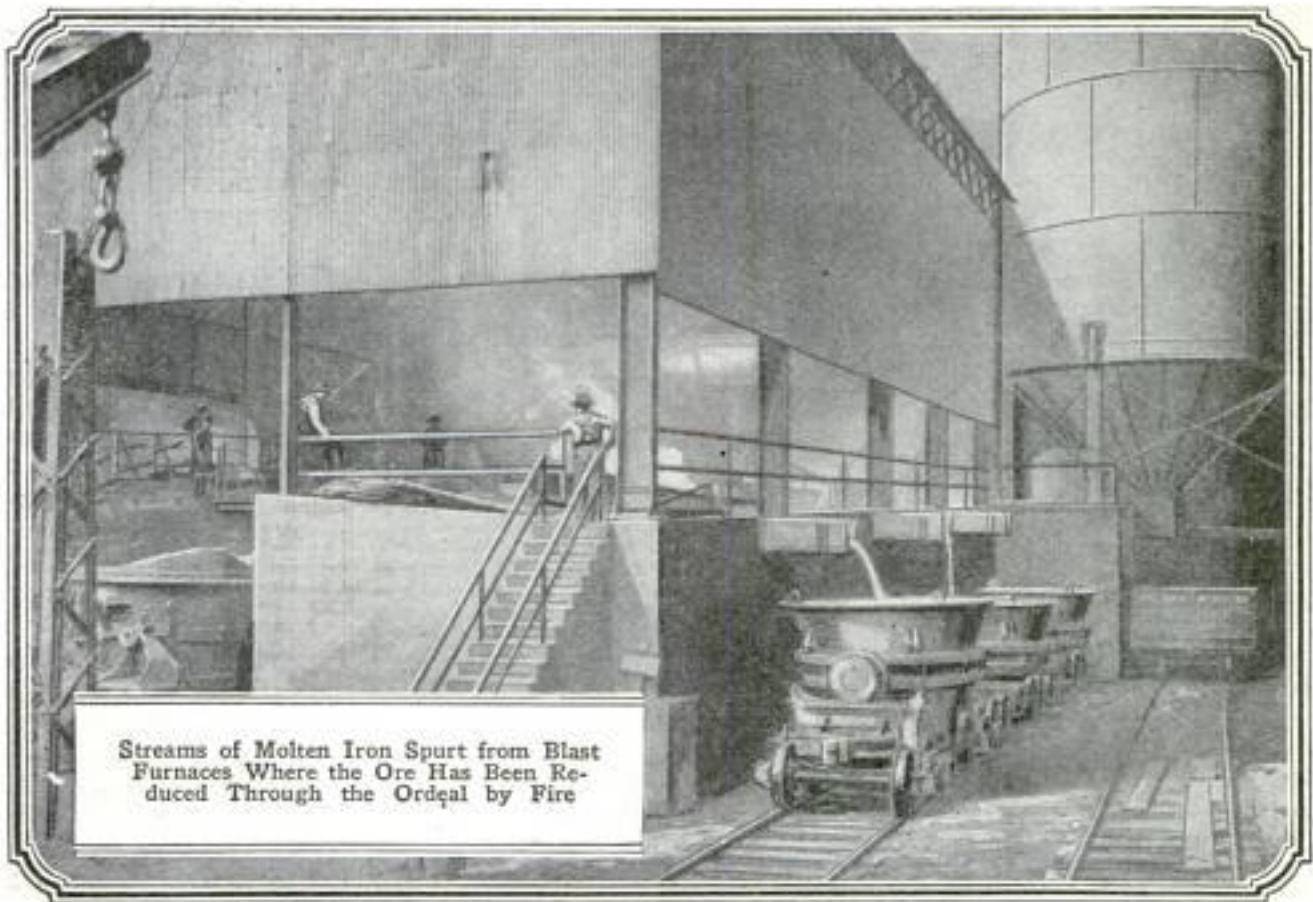


Turned from the Pathways of Commerce, Old Steel Rails Are Made into Reinforcing Bars of Great Buildings, Where They Continue to Serve Man



COPYRIGHT, UNDERWOOD & UNDERWOOD

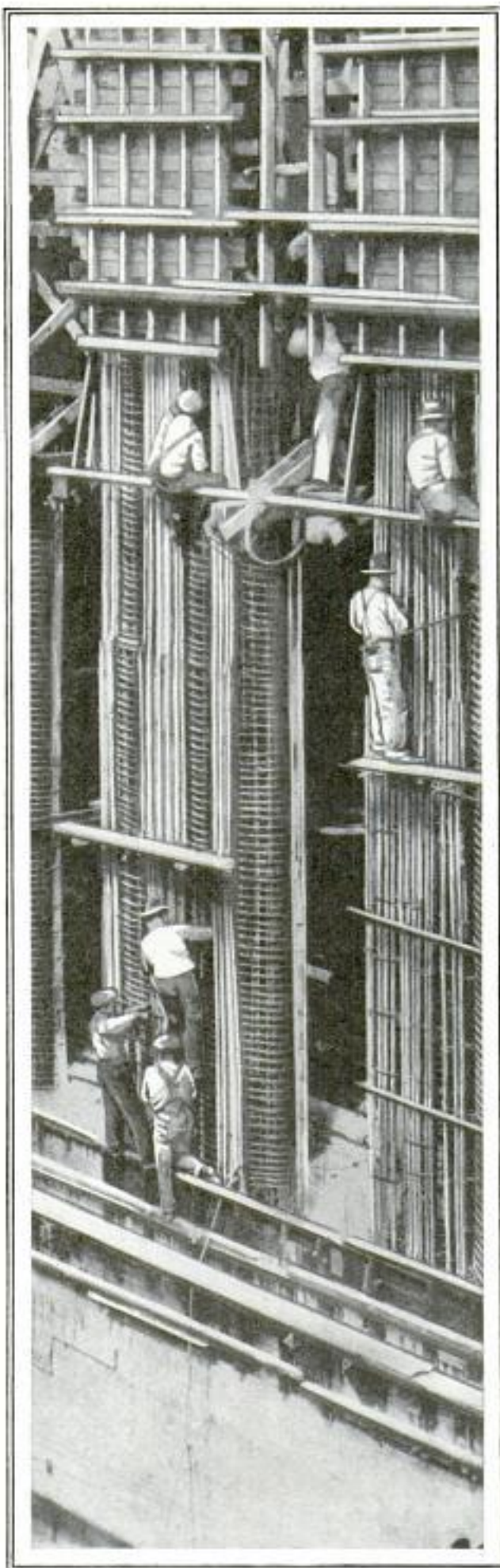
On the Right a "Crab Bucket," Swinging from a Powerful Traveling Crane Is Discharging Iron Ore into Constantly Moving Conveyors Leading to Roaring Blast Furnaces and, Left, Pouring Molten Steel into Ingot Molds Amid Showers of Sputtering Sparks



Streams of Molten Iron Spurt from Blast Furnaces Where the Ore Has Been Reduced Through the Ordeal by Fire

spiked to the ties, they are there only because of surface wear, of the grind of steel against steel. Broken into uniform lengths, with every section that might contain a flaw removed, the rails pass to the furnaces. It is the ordeal by fire. Under the terrific blasts of powdered coal or oil and air, the dingy ribbons of rust gleam incandescent as they pass slowly into the flame. Through the half-shut door of the furnace, the interior seems to glow with the brilliant white-yellow light. Heat atoms of fuel dance like snowflakes driven by a blizzard gale. And, in this purification of fire, the rails shimmer white hot.

With a clank of machinery and a blast of heat, a heated rail is discharged from the furnace and travels down the runway to the slitting roll. There is a crash as it enters and emerges beyond, cut into three twisting, gleaming yellow ribbons by the revolving blades. Workmen with huge tongs seize the ends and turn them back and they appear again like twisting, orange worms, writhing in sinuous curves over the smooth floor. Again they are snatched up and looped back for passage through



the roll stand. Returning finally from between the massive shapers, they have taken on new forms as light rails, angle bars, reinforcing beams, and other required models.

Down through the long building the glowing metal stretches in the gloom. Bright saffron is it, as it comes from the stands. Then, in the cool air, the saffron deepens to cherry red. A deeper blood color suffuses it, and finally the blue gray of cooling steel. The process, save for cutting into lengths, is completed. The re-rolled rails are ready for a new life of usefulness.

Steel, within the past few years, has become one of the most common products entering into everyday use. Without its wonderful strength, compared with its light bulk, many of the most important projects would fail of realization.

In one year there was dug from the great Lake Superior mines and shipped by steamers down the lakes, about 50,000,000 tons of iron ore, which was melted into more than 25,000,000 tons of pig iron. To convert this raw material required 38,500,000 tons of coal made into coke, and 6,096,000 tons of mined limestone.

Mysteries of "Invisible" World Are Portrayed on Movie Screen by Insect Actors

Dramas and Comedies Enacted in Drop of Water, Heart of Blossom,
or Beam of Sunlight, Are Magnified Thousands of Times

Louis H. Tolhurst

OPENING the marvels and mysteries of a new world to view on the motion-picture screen is the result of the discoveries and inventions of a western scientist after many years of tireless effort. As the result of his inventions, the "monsters" and "mammoths" to be found in a puddle of drainage, a square inch of earth, the heart of a blossom, a drop of water, or basking and disporting in a beam of sunlight, are revealed as clearly as the tragedies and comedies presented by any human actors.

Magnified thousands of times, a fly may be seen enjoying a promenade after its noonday meal, leaving a poisoned trail behind it—a squirming, colony of deadly germs, sufficient in number to supply more than one for every man, woman, and child in the state of New York.

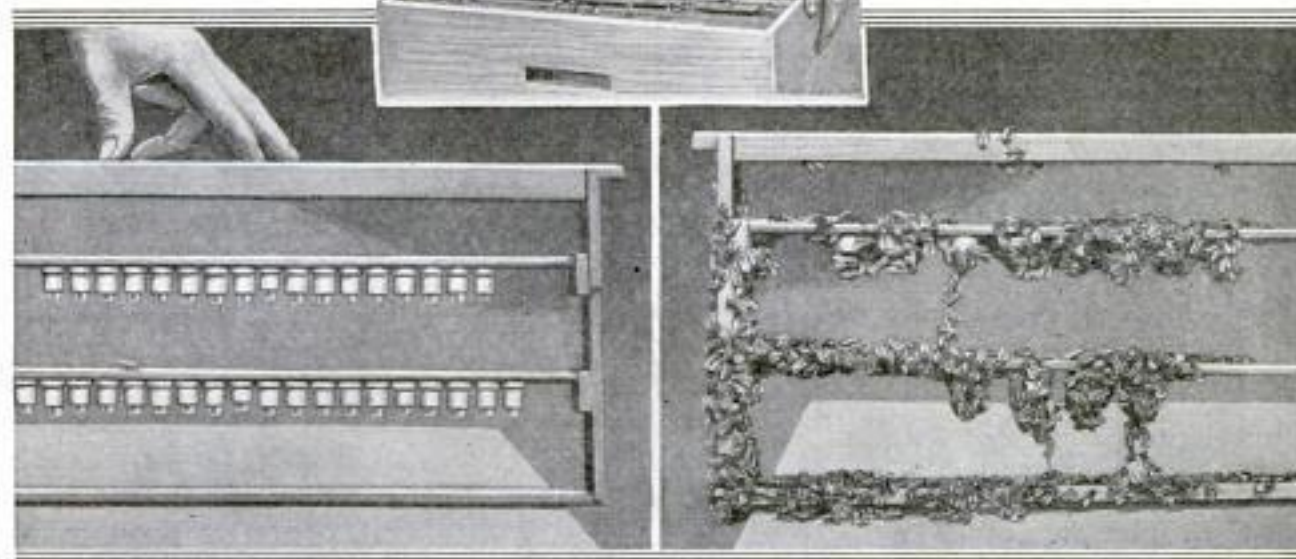
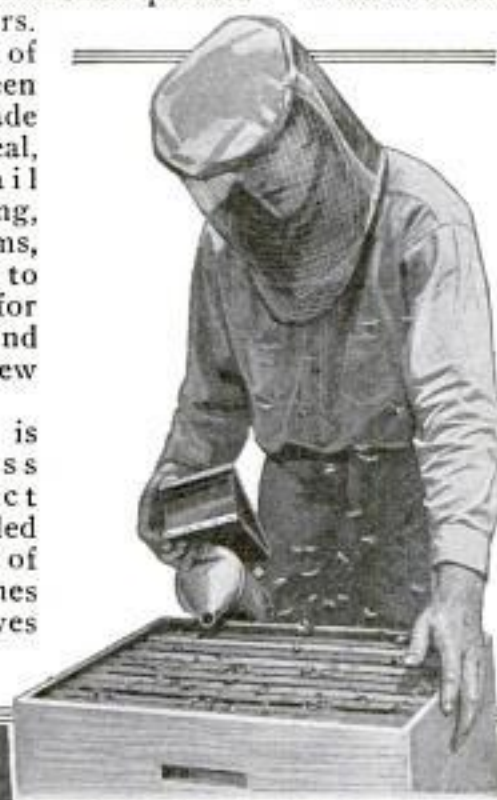
What swiftly follows is one of the nameless dramas of the insect world, for the fly is led into the webby house of Mr. Spider, who crouches in a corner, his eight eyes gleaming, his huge jaws

opening, and his legs gathered for a rush that will be more like a flight than a run. On the screen, he appears so monstrous as to belong in the realm of fables—too frightful to be believed and, therefore, perhaps, grotesque.

Hopelessly enmeshed in the cordage of the web, the intruder is permanently prevented from further unhealthy wandering. Likewise with the moths. They, too, fall victims to the spider, who otherwise is so timid a being as to scurry away

as rapidly as possible at the approach of man, and can hardly be forced under any circumstances to strike back at him. It is said that there is but one species in the United States whose bite is to be dreaded even as much as the sting of a bee.

In a film recently completed, the curious habits and instincts of bees have been registered from the tiny egg to the hatched larva, and, thence, through the cocoon stage. The workers, queens, and honey-bearers, together with the lazy drone and the industrious mason, are



Above: Beekeepers Work with Slow, Quiet Motion to Prevent Disturbance in Hives. Left: Man-Made Cells That Induce Bees to Cultivate Queens. Right: Beginning Hive for the Queen



*Furry Head
of the Industrious Bee*

shown in their natural surroundings with all the freedom of original movement and untrammelled liberty. Louis H. Tolhurst, the inventor, takes a drop of water containing a variety of germs, and places it on a piece of perfectly clear glass. Then another thin piece of glass is placed on top, and the two clamped together as tightly as possible without breaking them. This "slide" is put under a high-powered microscope and the specially made motion-picture camera set to work. On the screen, the result is as though a pond of water existed between the plates of glass, while swimming to and fro, like fish in a bowl, are thousands of queer, living things.

While these experimenters have long struggled with the microscope as an aid to the motion-picture art, they have encountered many perplexing difficulties. The fierce heat of the brilliant lights required for photographing

*Sting and
Poison Sac of the
Honey Worker*



*Folding
Tongue
of the
Bee*



*Queer Profile of the
Busy Red Ant*

either killed the tiny victims of man's curiosity, or affected them so as to render the screen result imperfect or valueless.

To make these latest pictures possible, strong lights have been devised that are almost entirely divested of heat—so "cool" indeed, that the spider crouching in his net, ready to pounce upon the entangled fly, is not disturbed in his ungentle occupation, nor bothered by his knowledge of an intruding witness to his brigand efforts.

Another obstacle lay in obtaining correct focus. In ordinary motion photography, the normal number of exposures a second is 16, resulting in that number of distinct and separate pictures registered on the sensitive film. These, when developed and run through a projecting machine, give the illusion of actual motion.

But to catch the fleeting movement of microscopic life greatly magnified and record it faithfully for study and laboratory work, as many as

32 exposures must be made a second, so that every act may be registered—or as nearly so as is possible for human hands and ingenuity. As the shutter operates twice as fast as that of the ordinary camera, the instant of opening is so brief that unless the lighting be exceedingly bright, the image will not be registered at all, even on the most sensitive film.

By bringing the great insect world closer to both the scientist and the people, it is expected that these "movies" will result in the greatest benefit to mankind. With a more perfect understanding of the spider, for instance, it will be realized that he is a much-maligned friend of the human race—a sturdy sword bearer and executioner of enemies of the peace, dignity, and health of man, and he will not be ruthlessly destroyed just because he is ugly.

It also will be realized that the insects generally do not live to themselves alone, and that they often show what would seem to be the most pronounced evidences of intelligence. Mutual help is practiced extensively among them and cooperation reaches a high level.

"If we knew no other facts from animal life than what we know about ants," says one scientist, "we might safely conclude that mutual aid and individual action are two factors far more important than greedy rivalry."

Close-Up of the Spider's Ugly Deep-Set Head



As the Watchful Spider Appears Through the Microscope

This is exemplified by two sayings of the French. One is that the astronomer, who deals with the telescope, lives in a small world, while the scientist who handles the microscope dwells in a majestic, mighty universe. The other is that all animosities are but the result of imperfect understandings.

With a clearer comprehension of the insect world, many of the present prejudices against some of its dwellers would vanish, it is contended by the inventor of this new type of movies.

Vicious Jaws That End the Victim of the Web

Emb. A. N. Merzoff, c/o International
Newsreel Corp., 326 W. Madison
Tragedies and Romances of World History
Chicago
3/10 * Revealed by Coins of All Nations

Rise and Fall of Dynasties That Have Long Since Vanished, and the
Overthrow of Rulers Are Depicted by Money Tokens

IN searching for new metals to defy counterfeiters, scientists have turned their attention to the study of the money tokens of every age and nation.

From the golden, beautifully wrought coins of the Greeks and Romans, thin, cuplike waiers of the Byzantines, Louis d'ors of France, and doubloons of the Spanish Main, to the shinplasters and promises to pay of the early United States, the course of history has been traced.

Silver and golden bits from ancient Athens, fanciful things, sculptured with the heads of gods and goddesses, or with the symbols of some almost forgotten city, seem rare indeed, but they made them as they are turned out today, with a steel die, in issues of thousands at a time, and there were millions in circulation, for the Greeks never degenerated into paper.

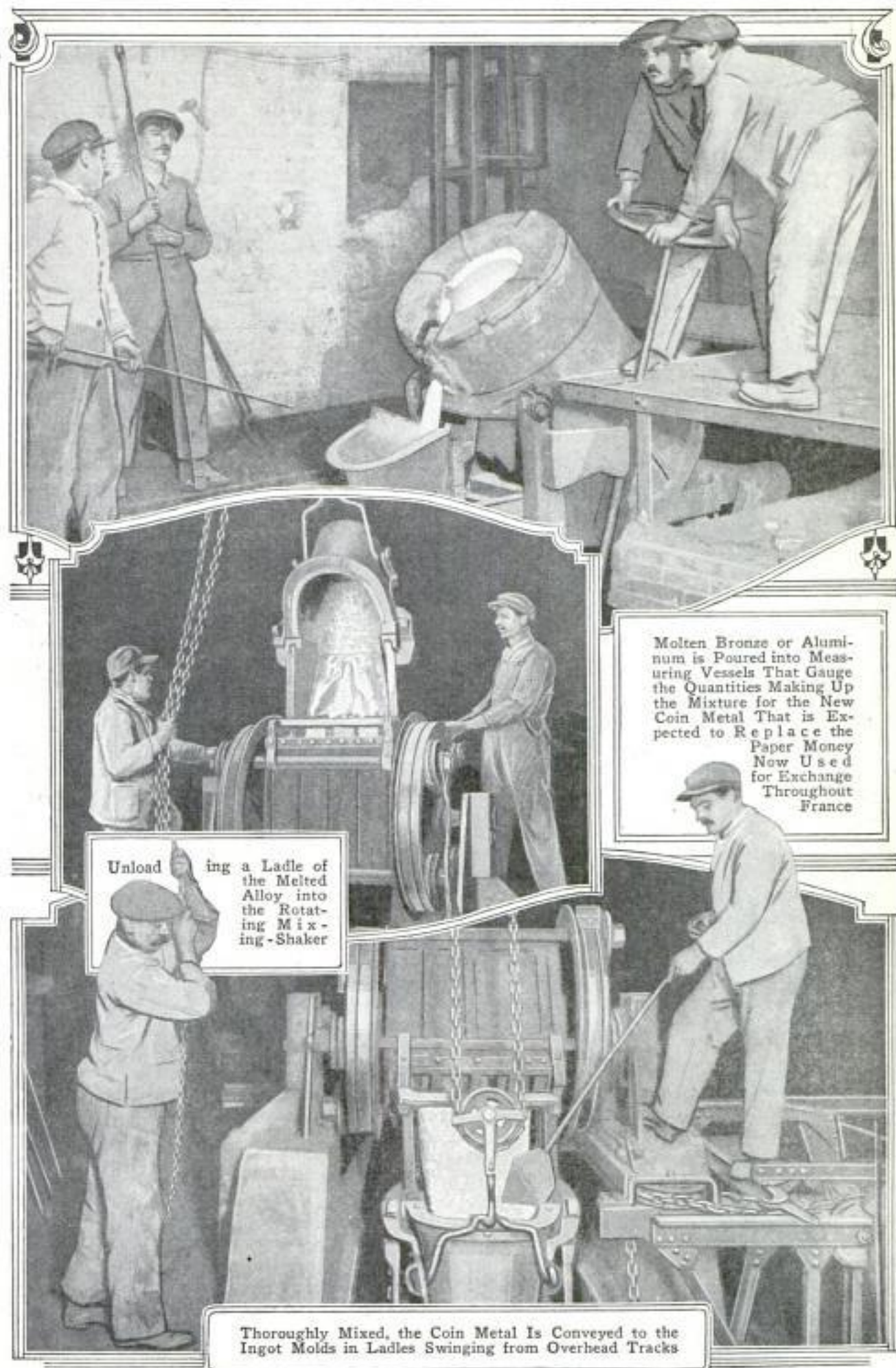
More prosaic and less imaginative, the Romans impressed their coins with the heads of proconsuls and of emperors oftener than with gods. Modern-looking pieces, easy to handle, their money seems far less quaint than the coin of Elizabeth's time. Among the early English tokens is the "Rose Noble" of Edward

III—Edward rolling along across a wiggly ocean in a little boat, crown awry, scepter slanted over his shoulder, an obvious lack of leg, and under the boat in the middle of the ocean, the rose of Lancaster. And then there is the great 5-guinea piece of "Queen Bess," on which the august monarch sits, her heavy crown well to the back of her head. It is thin and wide, this coin, so thin that people used to clip off the gold about the edge with the scissors until a little row of dots was put about the rim.

Bright pieces, the Louis d'ors of France, are marked on one side with 24 livres and on the other with the head of Louis XVI. "By the Grace of God, King of France and of Navarre." Then, when Louis had been shorn of some of his royal power by the assembly, just "King of the French." Later the revolution put an end to livres, to Louis d'ors, with all other signs of nobility, and instituted the franc. Napoleon, the first consul, later the emperor, next left his mark on the coins of his day, the gold pieces of his brothers, Louis, king of Holland, of Joseph in Spain, Jerome in Naples and Westphalia, and of Marie Louise, grand duchess of Parma, changing from



Where Calico Is Money and Ivory Will Buy Every Necessity of Life, a Native Trader in the Heart of Africa



Molten Bronze or Aluminum is Poured into Measuring Vessels That Gauge the Quantities Making Up the Mixture for the New Coin Metal That is Expected to Replace the Paper Money Now Used for Exchange Throughout France

Unloading a Ladle of the Melted Alloy into the Rotating Mixing-Shaker

Thoroughly Mixed, the Coin Metal Is Conveyed to the Ingot Molds in Ladles Swinging from Overhead Tracks

the ancient pieces to those called "napoleons," after the conqueror.

In the wake of the revolutions that followed the passing of the tragic figure of "the man of destiny" from the stage of history, sprang up many young republics, all with coins of their own. There was the Venetian republic, the Roman, the Neopolitan, the Principality of Lucca, and a dozen others. Among the tokens of this time—pathetic relic of vanished splendor—is the Louis d'or of Louis XVI with the arms of the republic of Berne stamped ruthlessly into the waving curls of the wig of that fat, genial monarch, in an age when it was "down with wigs and up with democracy."

With the coins of about 1800, of Napoleon in France and of the third George in England, they began to look like the modern, machine-made article and lose the quaintness, the uneven edge of the older sovereigns. German pieces in the middle ages were marked in thalers by the hundred-and-one towns and principalities into which that country was divided until the empire united them in 1870 and established the mark as a unit. Pictures of the monarchs were conspicuously absent on these, which had pretty designs of the cities themselves.

In the United States there have been many hundreds of paper notes and substitutes. In grandfather's day they used shinplasters; incased stamps in isinglass and tin; towns made 5-cent notes. Stores of New York made stamp inclosures as advertisements. At one time colonial New York issued thin sheets of engraved paper worth "5 shillings and 4 pence." A dollar in those days was the Spanish milled coin which was well-nigh the only money token in the colonies. It was good because it was gold. The paper money was good because of the integrity of James de Peyster, Robert Livingston, Peter Schuyler, Oliver de Lancey, and other colonial notables.

Paper issued in New York was scorned in Massachusetts, whose people demanded Spanish dollars or English gold. They had their own mint, where were coined the "Pine Tree," "Oak Tree," and the "Good Samaritan" shillings. There also were the notes of the Republic of Texas, which was independent for four years, and of the Confederate States. Farther west were the woodpecker scalps, used for 50 cents by the settlers among the Indians, or the great eight-sided gold plug, used in the gold days in California.

Satirical money, issued in the days of

Andrew Jackson, who was trying to smash the United States Bank, controlled by private individuals, shows the figure of Jackson with the words, "My Experiment, My Currency, My Glory." In addition there were pennies issued by "Tom Cullen, Seller of Liquors," and even "J. J. Diehl, Undertaker."

During all ages, too, there have been counterfeiters. In one recent exhibit were coins from the days of the ancient Greeks down to the work of the modern swindlers. How could the Greek who carefully molded the coin with core of copper, cleverly plastered with silver, have known that after 2,000 years some one would dig it up and find bits of the silver corroded off and copper showing underneath?

Besides the precious metals, many others have been used in the making of money. Following years of tests, French experts recently found a way to mix aluminum and bronze which cannot be readily imitated by experts. This secret had been lost for 60 years because its discoverer died without revealing the formula.

In the United States, one of the most interesting contrivances found in the mints, is a machine that weighs coins of all denominations. Formerly each of these pieces was weighed by hand. Those that were too heavy were reduced with a file. Those that were too light were put aside to be sent again to the melting pot.

The weighing machines now used each have ten balances, which are set at the required weight of the coins that are to be tested. Each machine weighs ten coins at a time. If any be too light, the scale beam moves up and the coin is dropped into a chute that carries it to the "lights." If it is too heavy, it falls into another chute that leads to the "heavies."

There is some slight "tolerance" in the matter of weight. For example, the gold double eagle should weigh just 516 grains, but a coin of this denomination may weigh as little as 515½ grains, or as much as 516½ grains and still be passed as "good."

The standard fineness of all gold and silver coins is 900. If the gold deviates by only one-thousandth from this, it is rejected. In silver coins a variation of three one-thousandths is permitted. The so-called five-cent nickel is really only 25 per cent nickel and the rest is copper. One-cent pieces are 95 per cent copper and five per cent tin and zinc.



Accurate Glass - Inclosed Devices Equip the Rooms Where Coins are Weighed on Delicate, Automatic Scales as Rapidly as Men can Feed the Pieces into Electrically Operated Machines. When Rejected, They are Placed in Stacks Labeled "Lights" and "Heavies"



Blank Metal Slugs are Weighed, Hundreds at a Time. Those Passing the Test are Sent to a Stamping Room to be Formed into Coins



Making a Final Count of the Coins and Inspecting Each One Before It Goes into Circulation



Golden
Tobacco Leaves
on Way to Cutters

When a King's Wrath, Whipping, and Death Failed to Halt Tobacco's Spread

Formerly Known as the "Miraculous Herb," the Crop in the United States Alone Is Now Valued at Over \$300,000,000

WITH the value of the tobacco produced yearly in the United States alone estimated at more than \$300,000,000, attention has been called to the almost miraculous rapidity with which its use has spread over the world.

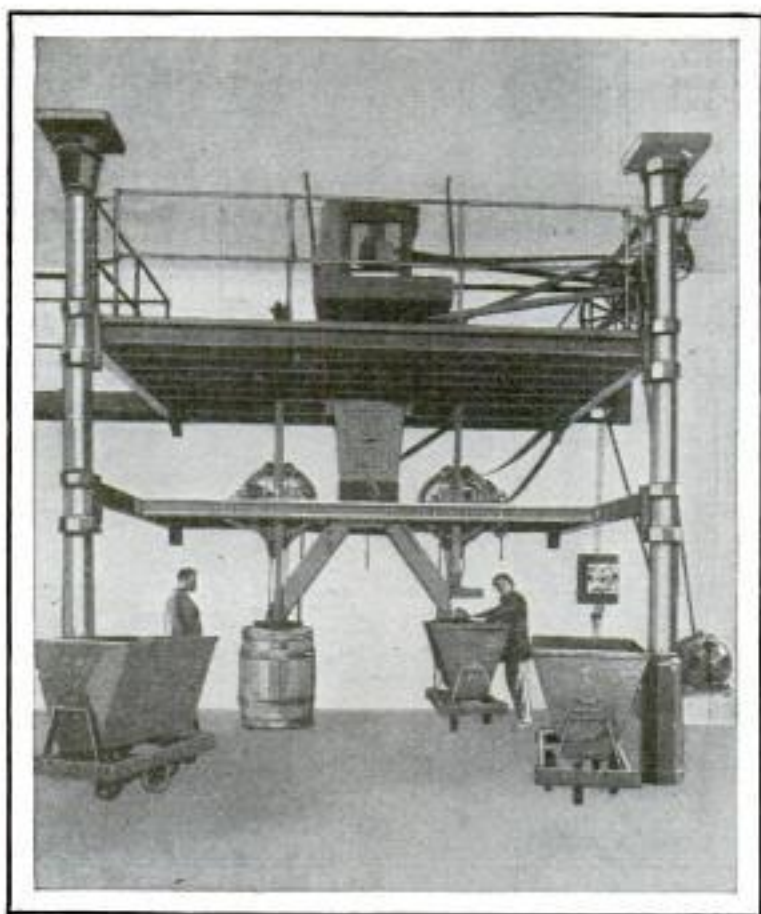
When Christopher Columbus, Americus Vesputius, Cortez, and other celebrated navigators of the fifteenth century first reached the American continents, they carried back reports that they had seen people who carried lighted firebrands of certain herbs and perfumed themselves with smoke.

When the plant was first brought to

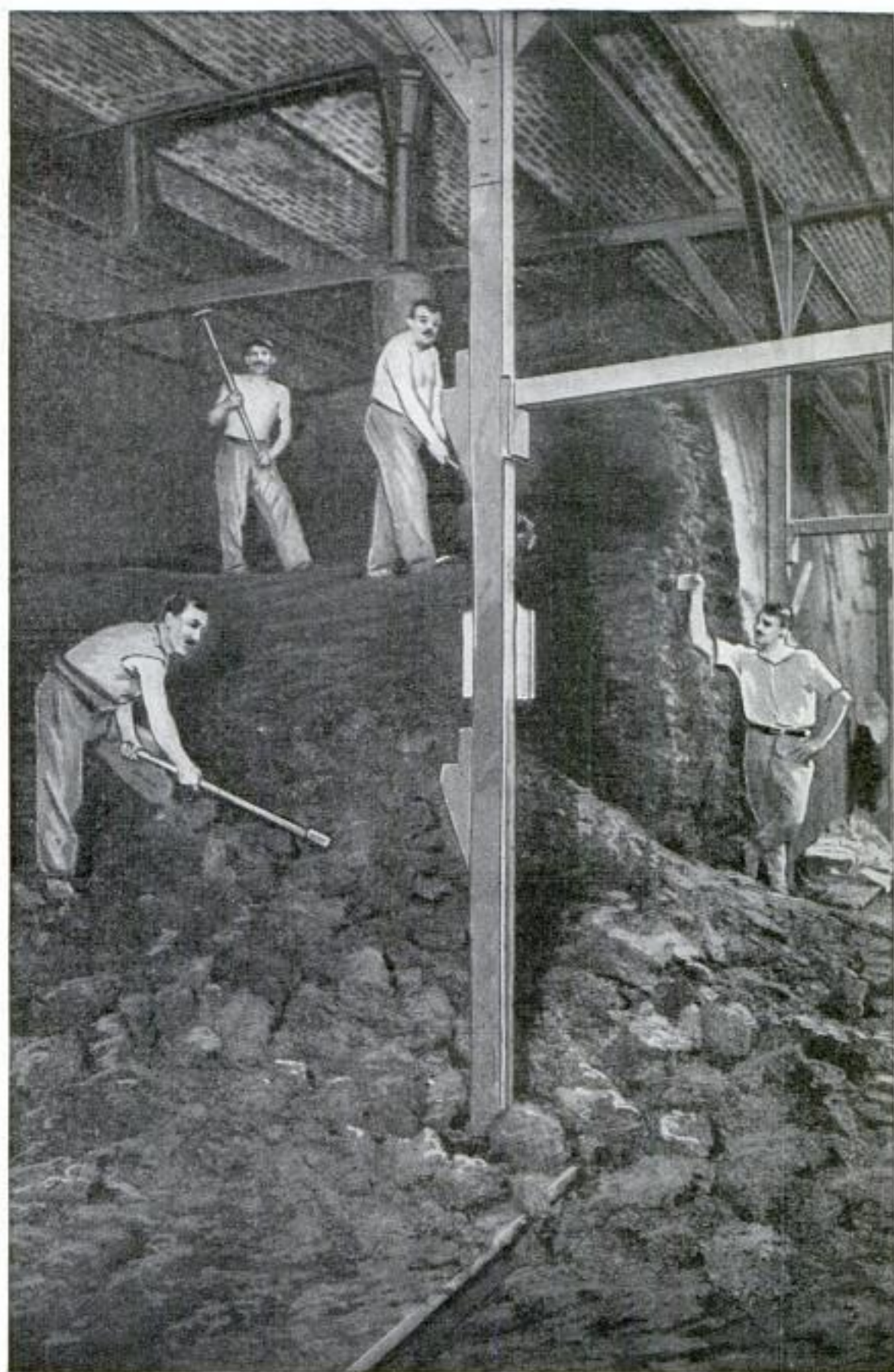
Europe in 1558 by Francisco Fernandes, a physician who had been sent by Philip II, of Spain, to investigate the products of Mexico, it was supposed to possess

wonderful healing powers and was named "herba panacea." "Divine tobacco" it was called by Spencer, and "our holy herb nicotine," by Sir William Lilly.

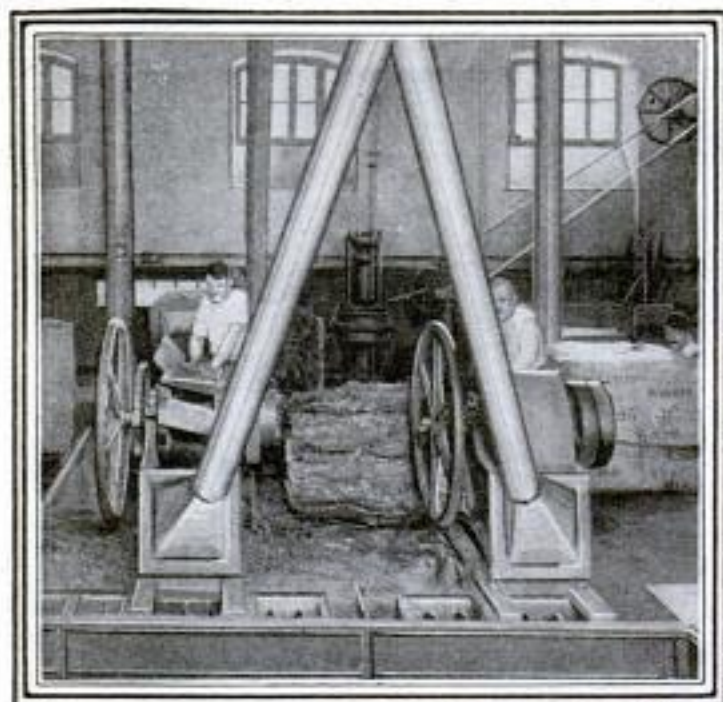
In France, the adoption of tobacco in the form of snuff came about during the reign of Catherine de Medici. This queen was troubled constantly with headaches, and when her ambassador to Portugal, Jean Nicot, reported that the Portuguese were



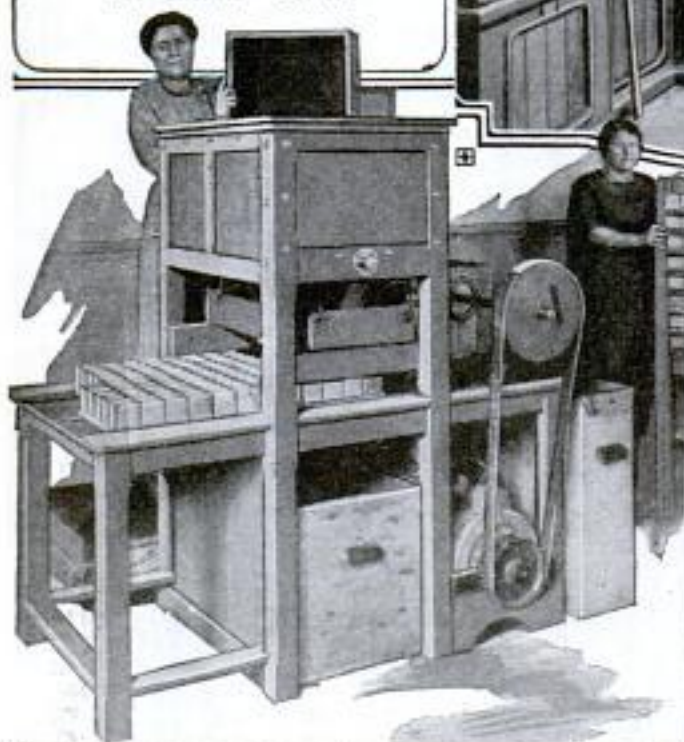
Loading Shredded Herb for Sorting



Taking Down Piles of Tobacco That Has Fermented in Huge Storage Rooms Where the Air Is Heavily Charged with Vapors Harmful to the Workers



Whirring Knives on Steel Drums Cut the Tobacco Leaves into Pieces, While Long Flues Carry Away the Dust to Prevent Injury to the Workers' Health



Heavy Powdering Machines Reduce the Dried Leaves to Six Grades of Fineness to Meet the Needs of Users of Snuff, for Which a Big Demand Still Exists in Europe



From the Time It Is Picked until It Reaches the User, Tobacco Is Put Through Many Processes. At the Right Is Shown the Chambers in Which It Is Aged for One or Two Months, and, Above, Snuff Being Packed in the Boxes in Which It Is Sold

using tobacco as a cure for the malady, she ordered him to bring her some. The cure proved a good one, and, because the queen used it, all her court adopted snuff. The name "Nicotine" is derived from the name of the French ambassador.

After a great many years the manufacture and sale of tobacco in France became a government monopoly, and so it is today. Tobacco is now grown in thirty-two departments of France by private growers, but the state maintains a constant supervision, fixes the price and decides as to the grades. During the growth of the plant, government inspectors keep a rather close watch and make reports on its progress, much as the crop reports are handled in the United States. At the time of harvest the growers assemble their tobacco in packets of 25 or 50 leaves. A number of these are bundled together in the form of balls, and in this shape they are sent to the government factories. There they are put through the process of manufacture into snuff, chewing and pipe tobacco, as well as products suitable for the making of cigarettes and cigars.

Snuff was formerly used in large quantities in the United States, the habit arising from the custom in European countries, which was brought over to the New World by the early settlers. Fashion has now decreed that the use of snuff is a custom not admired in public, and the practice in the United States is largely confined to more recent arrivals in America and old-fashioned people. In France, however, where this form of tobacco is called "tabac a priser," it is still in wide

use. The manner of making snuff is quite intricate and laborious. Recently, labor-saving machinery has been invented, which greatly simplifies the process and which holds great interest for the mechanical mind.

The balls of tobacco, having arrived at the manufacturing plant, are first taken to the cutting room. A most intricate machine has been devised to cut them into fine shreds. In the main cutter, a moving drum, with many sharp blades, pulls the tobacco leaves along under a number of other blades attached above the drum, which move up and down, and thus literally chop up the leaves. Having passed through the cutter, the tobacco is deposited on a moving belt and conveyed to a reservoir, which is kept filled to a constant level with salty water. An idea of the care that must be taken in all operations that are involved in the manufacture of good tobacco, is gained when it is noted that the amount of salt in the water in this reservoir is determined to the fraction of an ounce, for if the mixture is not just right the tobacco will be spoiled.

After remaining in this vat for some time, a chain of buckets is set in motion which scoops up the tobacco from the vat and carries it to the storage room. In this vast chamber the wet and partly cut-up leaves are piled as high as the ceiling, where the mass remains to ferment. For four and a half months this fermentation is allowed to continue, accomplished by the working of germs. Again, great care must be taken, that the tobacco not only be kept from spoiling, but



Packing the Tobacco Ready for Shipment

that spontaneous combustion does not take place and a fire result. The room is kept quite warm. This is necessary, because the work of the germs in this vegetable material produces heat. This becomes greater day by day, the hottest point being in the center of the mass. If the room is chilly, this heat would be prevented from escaping, and it would soon reach the point where the leaves would catch fire. The principal object of allowing the tobacco to ferment is to permit the germs to release the carbonic acid and ammonia, which is part of the plant. This would be harmful if left in the tobacco, for it would be drawn into the lungs of the smoker. There are other acids produced, such as citric and acetic. The piles of tobacco are tested after ten or twelve days with thermometers, this work being done by men who are forced to labor in a hot atmosphere which is saturated with irritating vapors, that have a harmful effect on their health.

When the fermentation has gone as far as necessary, the piles of tobacco are torn down with picks and put into sacks to be carried to the powdering room. Here, in a great chamber, are a number of monumental machines. Some perform chopping operations, others mix different grades together, some bake the tobacco to dry it out, and others grade

it. Following these operations the tobacco is placed in huge magazines, maintained at a certain temperature and degree of moisture, for one or two months. A number of other processes are gone through, and eventually the snuff reaches the salesroom in appropriate boxes.

The entire process takes eighteen months, and during this time the services of machinists, bacteriologists, botanists, and other scientists are required to constantly watch the material in its various stages. The French government has not only exercised great care in the manufacture, but has extended its experiments into the question of containers for the finished product. A number of years have been spent in perfecting the snuffboxes, which must be, among other things, waterproof and incapable of allowing dangerous fumes or germs to get at the contents.

During the 17th century the indulgence in tobacco spread with marvelous rapidity throughout all nations, and that in the face of the most resolute opposition, including the "counterblaste" of a great monarch, penal enactments of the most severe description, the lash, excommunication, and capital punishment.

Nevertheless, the success of tobacco was not impaired, and day by day its use has grown, up to the present.

LOCK TO SECURE KEY IN DOOR IS BURGLAR SAFEGUARD

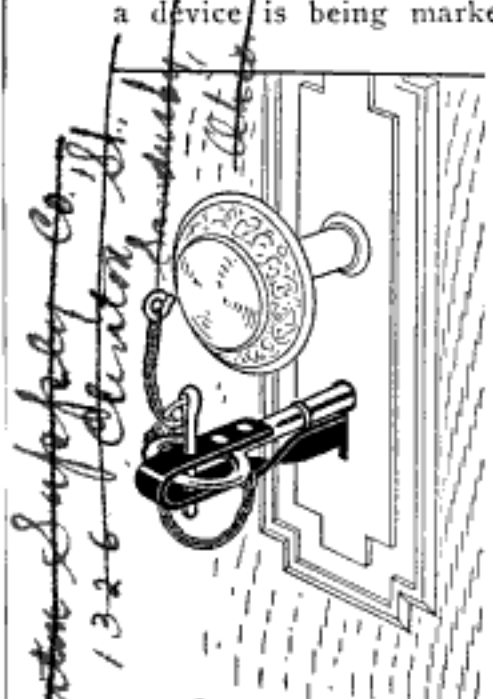
Inserted in a keyhole under the key, a device is being marketed that is intended to make a door-lock burglar proof. Fastened by a chain and screw to the door jam, the instrument prevents the key from being turned or pushed out of the lock from the outside, securing the bolt so that it cannot be "jimmied." When the door is open

or unfastened, the key can be attached to the instrument to prevent its being lost. The device is installed easily without the use of any tools and is enameled as a protection from rust.

PRINTING ART TURNS WORLD INTO MIGHTY BOOKSHOP

Since the invention of printing, it is estimated that 60 million books have been turned from the world's presses, while the amount of labor, time, paper, and ink consumed in their making is regarded as incalculable. On the average 200,000 volumes are published each year. In the last century over eight and a half million books appeared. The three largest libraries in existence are the British Museum Library, with four million volumes; the Bibliotheque Nationale, Paris, with three million; and the Congressional Library at Washington with two and a half million.

There are 170,000,000 cells in the lungs of an ordinary adult.



*Clinton Safety Co. 181
1326 Canton St.
Cleveland, Ohio*

*Keylock Co., 5713 Euclid Ave.
Cleveland, Ohio*

*9/21/23
Kansas City Times*

*Plan. American Place Brixh Association
1727 Brixh Ave
Life Bldg
Chicago*

*International Park of Commonwealth
Edison Exhibition*

3449

POPULAR MECHANICS

725

GARAGE WITH SLIDING DOORS IS PART OF HOME

In a model electric home erected for exhibition recently, the garage was built at the side of the house opposite an artistic sun parlor so that it would act as an ornament to the surroundings. Its

large sliding doors are so arranged that when closed they resemble a row of windows that appear as part of the home. Flower boxes, vines, and other trimmings were added to conceal the true purpose of the garage and to blend it with the rest of the house. An electric attachment makes it possible to open the doors from the seat of an automobile standing near them. Lights can be turned on from the house.

The Garage at the Left Has Sliding Doors That, When Closed, Resemble a Row of Neat Windows in a Concrete Wall



*Garage door - Street - Amer
Washington - Recording Co. 4101 Bannockburn*

English method.

MIRRORS COATED WITH GOLD RIVAL THOSE OF SILVER

Through recent tests, gold has been proved more efficient than silver as a coating for light reflectors. For almost 700 years silver has been used for that purpose. In the latest searchlights, copper reflectors coated with pure gold are being employed. These have been found to reflect more light than those covered with silver, since the former throw off a higher percentage of red and yellow rays. It is also claimed that fine color distinctions can be made more easily with the former. *Edison Jarrett*

SEAWEED IS MADE INTO FOOD

In Lower California great quantities of seaweed are being treated and reduced to a very clear and nearly tasteless food gelatin. It grows at varying depths, from one to ten fathoms, in the ocean and is gathered by divers. First dried in the sun, the weed is then boiled and exposed to a freezing temperature. When the water is evaporated, a high-quality vegetable jelly is left.

*Carruel Lighton Hope
Ensenada, Mexico*

WORN BY FIVE GENERATIONS, SHOES ARE STILL GOOD

Claims to the title of the longest wearing baby shoes, are made for a pair 150 years old. Made of heavy leather, with thick soles, clumsy in comparison with the baby's footwear of today, they have been handed down in a family ever since



Baby Shoes

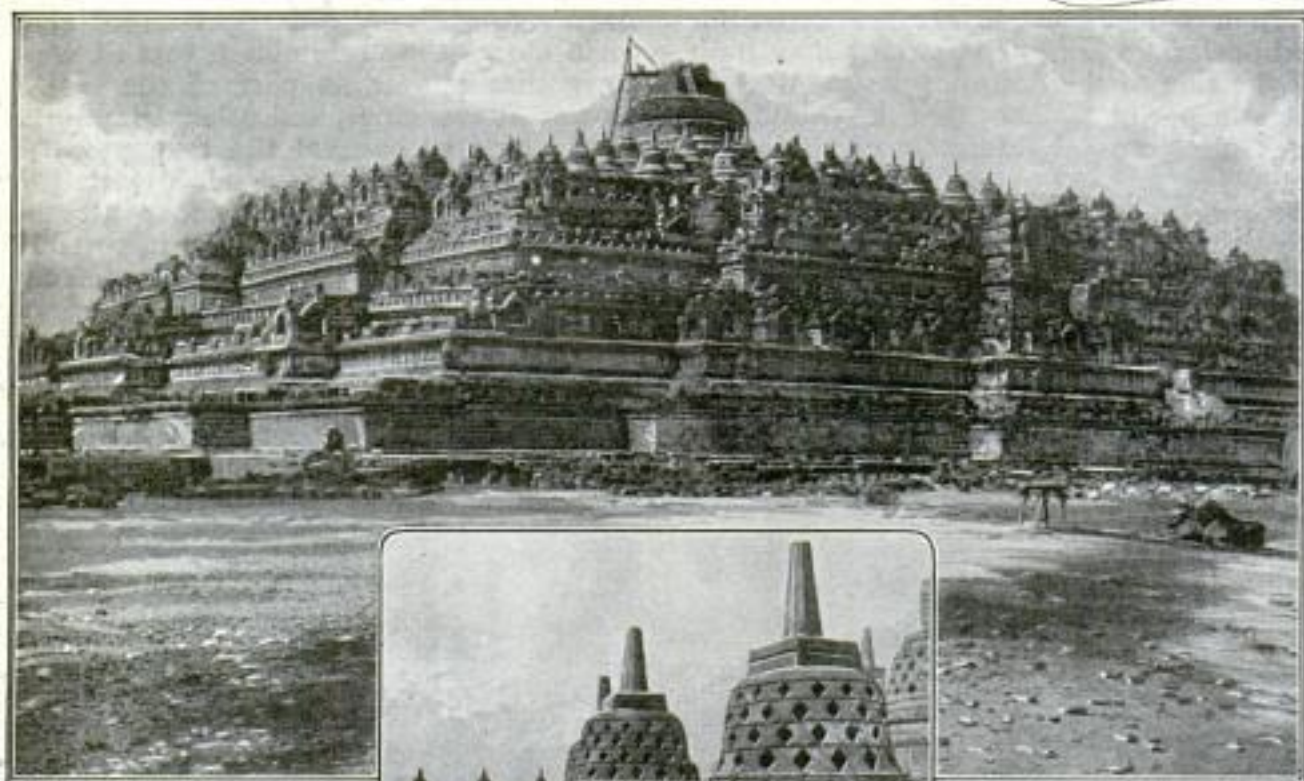


That Have Been Worn by Five Generations

they were bought in Scotland in 1770. Although many children have used them, they show little marks of wear and promise many more years of usefulness.

Clinton National

WORLD TO VIEW WONDERS OF ANCIENT TEMPLE



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One of the Greatest Temples of the Ancients,
a Buddhist Shrine in Java

MONSTROUS and magnificent is Boro-Budur, an old Buddhist shrine in central Java, said to be among the greatest of ancient temples. Believed to have required more labor to build than was used on the great Pyramids of Egypt, yet, it is a curious fact that this edifice has been overlooked by the majority of world travelers. This may be changed, however, with the opening of a proposed airplane service throughout the Malay archipelago, which will make the temple accessible, and attractive, to tourists.

Begun in the seventh century to hold some of the supposed ashes of Buddha brought by missionaries from India, the temple is notable for its beauty. The ashes were originally divided among eight towns, but later King Osaka, of India, had them taken from the tombs and redivided into 84,000 parcels, which were distributed over the Asiatic countries by missionaries.

Nearing completion in the 15th cen-

of the sword. It was then left to the encroaching jungle. Trees and shrubbery surrounded it. Lava dust from the many volcanoes on the islands gathered upon it and filled its galleries. Earthquakes cracked some of its walls. Yet, despite all this, it was in a fairly good state of preservation when it was discovered in 1814 by Sir Stamford Raffles, then in charge of the island for the British government. He

at once began the work of restoring it, which was continued by the Dutch when they took possession of that territory at the close of the Napoleonic wars.

Built in the midst of a vast plain it is an artificial, many-sided mound, made up of a series of galleries, cupolas, and spires,

topped by an enormous dome 52 feet in diameter, and surrounded by wide terraces. Formerly, a square parapet of



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Magnificent Temple Carvings Hidden in Wilderness
for Hundreds of Years

heavy stone enclosed the plain. In each of the four sides was an opening leading to a flight of steps protected by smiling lions of stone, which still remain grinning sardonically after 1,200 years. From the plain, similar stairs go up to irregularly shaped galleries, and on to the great circular one surrounding the dome. The terraces are well drained by carved gargoyles representing mythical monsters, the water being carried off through their mouths.

At each angle in the galleries sits a Buddha in a niche covered by a cupola. The figures, almost nude, are seated on lotus



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Carvings That Have Defied Time to Bear Witness to the Skill of Long Forgotten Race



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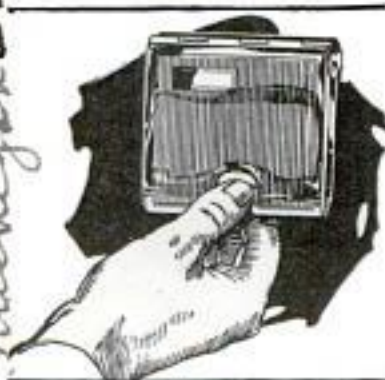
Although Cracked by Earthquakes, Walls of Old Temple Still Lure the Traveler

leaves. The entire wall space is covered with carvings having some bearing on the story of Buddha's life. Every incident of his existence from the time he left his lotus-leaf throne and came to earth, until he attained Nirvana, the spiritual haven of the Buddhist religion, is wonderfully pictured in carved stone. Near the top, rise three circular terraces, one above the other, and upon these, 72 bell-shaped shrines made of latticed stone, each of which has a slender spire. In every one sits a statue of Buddha faced toward the great central dome.

3482

CIGARETTE CASE FOR MOTORISTS KEEPS "SMOKES" HANDY 3353

For convenience of auto drivers, a neat nickel-plated cigarette case is being made

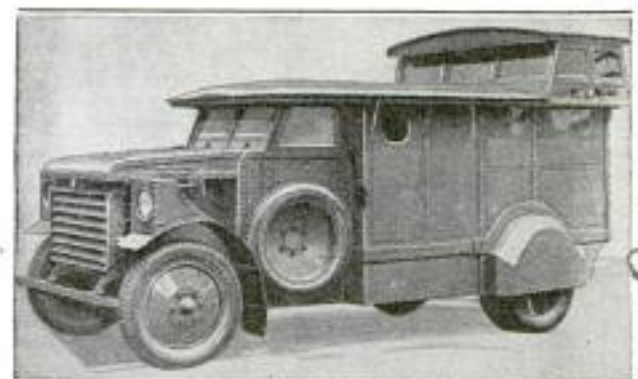


for attaching to the instrument board of the car or at the side of the rear compartment. "Smokes" are withdrawn from an opening in the bottom. When one is taken, another automatically drops into place, ready for the fingers. To refill the container, the front is raised after unfastening a catch with the thumb.

To improve London's position as an ocean port, work has been started at Tilbury on what is said will be the largest dock in the world when completed. It is to have a water area 6,550 feet long and 750 feet wide, with an entrance lock 1,150 feet in length and 130 feet in width.

AUTO WITH ARMORED TURRET TRANSPORTS BANK FUNDS

Covered with armor steel a quarter of an inch thick, an automobile, specially built to resist the attacks of payroll robbers, is being used by a western bank for transporting money. Weighing 5,000 pounds, the car is said to be bullet-proof and impregnable to onslaughts of bandits. Guns are carried for defense, and loopholes permit the occupants to fire in any direction. From a turret at the rear, a



Armored Automobile with Turret Used to Carry Bank Funds and Eliminate Danger of Bandits

guard, who has an unobstructed view on all sides, can control the movements of the automobile.

Banner Tire Co. 1356 E. Michigan Ave. Chicago

Hollman Commercial & Trust Co. Los Angeles, Calif. & Irving Branch.



Explorer, Disguised as Native for Journey Through Mysterious Tibet to Lhasa, Is Victim of Night Attack and of Thieves and Is Finally Turned Back by Death Threats

Further Adventures In Asiatic Paths

BY SVEN HEDIN, *Stockholm Sweden*

Sven Anders Hedin, noted authority on those little-known lands, Tibet, Turkestan, Mongolia, and central Asia in general, has spent a great part of his life—he is now 58 years of age—in exploring these strange lands. These journeys, performed at times amid extraordinary hardships and always at the immediate risk of lingering and terrible death at the hands of savages or by starvation, have won for him high honors and a world-wide reputation and fame. A noted scientist, a daring adventurer, a fluent writer—he is author of numerous valuable and weighty books. Doctor Hedin is an honorary or active member of nearly every scientific society in the world; is a member of the nobility of Sweden, to which he was raised in recognition of his work by the king; is the bearer of honorary degrees from most of the famous universities of the civilized world; is the personal friend of potentates and rulers, and is now on his way to Asia for another daring journey through the wild interior where he has found strange buried cities, grotesque and terrible customs, and where he has several times been forced to travel long distances on foot without water or food.—Editor's Note.

ONCE I rode on horseback with two servants and some packhorses from the interior of Persia over Mount Elburs to the coast of the Caspian Sea. We were to camp in the midst of the mountains, in a small town. But when I learned that its caravan Sarai was notorious for its poisonous bedbugs, I decided to sleep in a garden outside the village. This was surrounded by a very low brick wall. I took my supper, which consisted of bread, milk, tea, honey, and apples. What was left was loaded in a box, and I wrapped myself in my blankets and fell asleep. My men had already gone into the village.

At dead of night I was awakened by a rattling and scratching sound around the boxes. Something pulled and tore at the straps. I sprang up and perceived half a dozen jackals disappearing between the poplar trees, but soon they came back. I struck at them with the horsewhip and pelted them with the remaining apples, but they became accustomed to my way of fighting, and their boldness increased. I had to keep watching constantly.

The jackals must not be looked down upon. In 1882 not less than 359 human beings were killed in Bengal by these minor animals of prey.

I felt as if the night would never come to an end. At last the dawn appeared and with a feeling of relief I saw the last one of the enemies with-

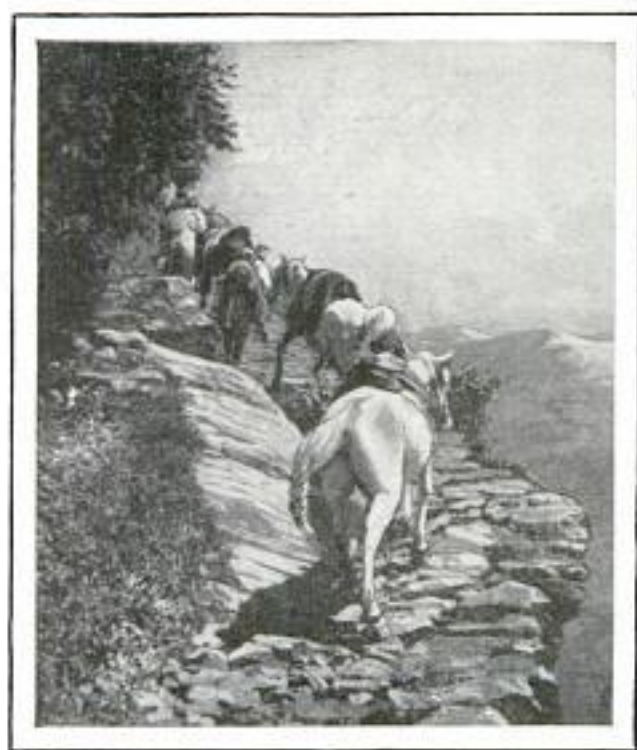
draw over the garden wall. Then finally I could enjoy a few hours' rest.

A singular trail is the one which goes through Baluchistan, from Seistan to Nushki, between Persia and India. This can hardly be called a road. It is a trail through nothing but desert, hard and excellent to ride. The traveler passes by rocks eaten through by the sun, and past sand dunes over arid furrows, which sometimes are filled to their very edges by torrential rains. Time and again there are seen sand spouts—yellow pillars formed by cyclones, sweeping over the barren ground like spirits of the infernal regions.

Here the traveler is transported by "jambaz," a noble race of quick-footed dromedaries. Long-continued breeding of the Baluchis has imparted to these animals their extraordinary running qualities. Ordinarily the natives use double saddles with one placed in front, the other behind the hump of the dromedary. When

I rode this way, however, I wanted to be alone with the racer. He ran with a frightful speed! The rider must be quite immune from seasickness. You are swayed from right to left and thrown forward and backward. You imagine that you are flying over the country.

Along the way, there are, in very wide distances from each other, station houses erected by the Indian government. The travelers may rest, drink, bathe, dine in them, let the dromedaries



Even Sure-Footed Pack Animals Find Trails Hazardous

rest, and then continue their journey. Baluchis are always there acting as watchmen. They are looking out over the road to be at hand and aid the travelers. Some "jambaz" dromedaries must almost be forced to stop. They like to run, and would go on even over the next stretch of road as far as the next station house if they were not held back.

A few noxious minor animals against which the traveler must be on his guard, not only in Baluchistan but also in Persia and Central Asia, are the scorpions and the black shaggy spiders called tarantulas. Both are poisonous. I have often found scorpions under my bed or pillow, but have always escaped being stung. In Turkestan, the natives are positive in claiming that the scorpion, when in a desperate situation, will commit suicide, but I do not believe this. I was told that if he was inclosed in a ring of glowing coal, he would set his sting in his own back, thus causing his death. However, when I once made such an attempt, the scorpion toured several times around the coal ring and then placed himself in the center in a watchful position.

When, on my first large journey in Asia thirty years ago, I came from Moscow by the way of Samara to Orenburg, before starting out for Tashkent through the Kirghiz steppe. No other course was open for me but to buy in Orenburg a "tarantass," which is a clumsy vehicle on four low wheels, and then drive southeast on the postroad along the eastern shore of Lake Aral. The way was 1,200 miles long; it took 19 days. Horses were exchanged

every 18 miles, on an average. The station houses were in charge of Russian peasants, but the drivers were Kirghiz. When the road was hard and even, a troika was enough to pull the "tarantass," but when we reached passages that were soft and heavy with sand or mud, there was hitched on a "chetvorka" or "piatorka," that is, a four- or five-horse team. Through the sand dunes on the eastern

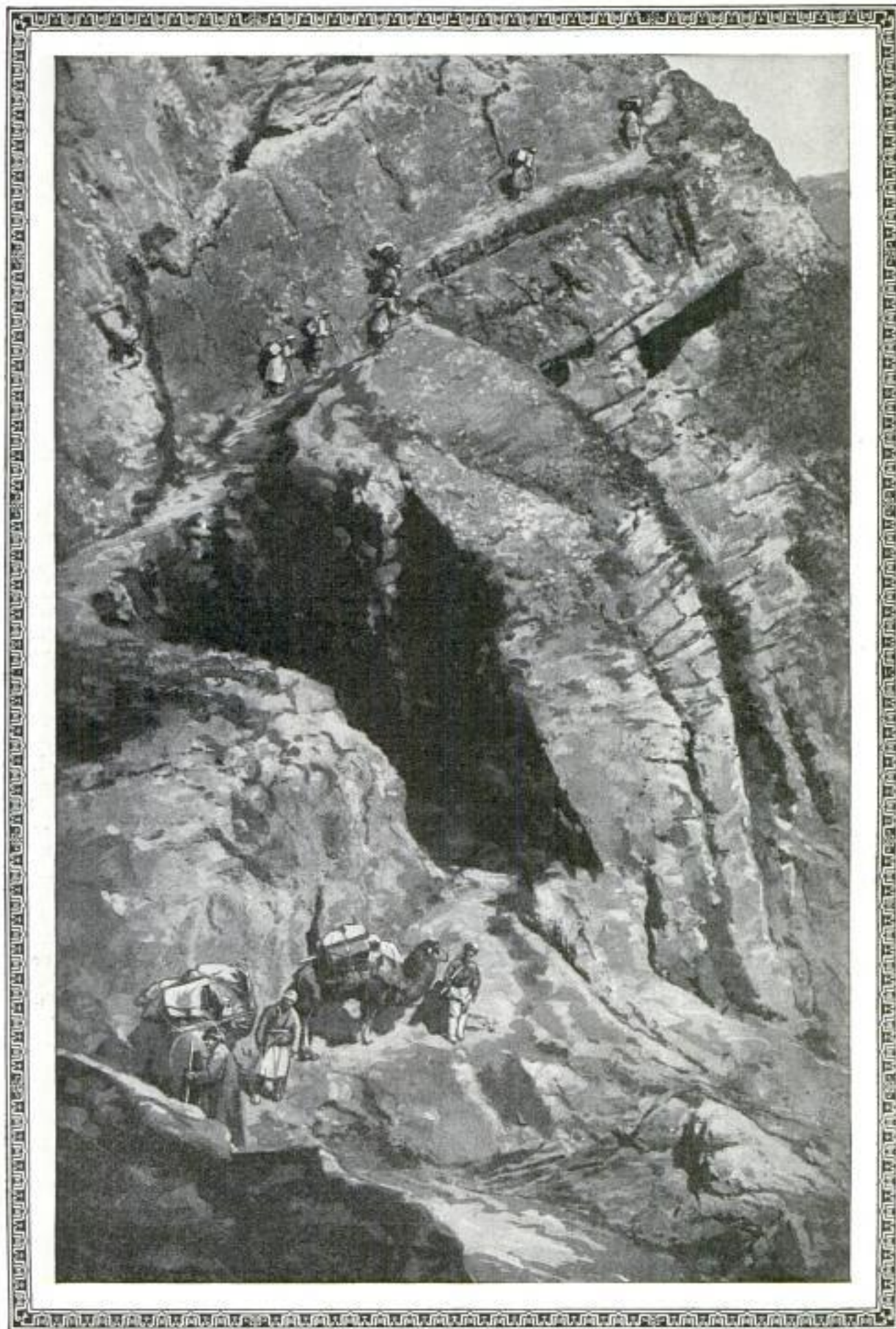
shore of Lake Aral, no horses succeeded at all in pulling my heavily laden wagon, so it was necessary to hitch three camels in front of the "tarantass." A glorious sight indeed it was to behold the tall animals, carrying between their humps the Kirghiz riders, and the Kimming with their broomstick legs over the light sand, which was dashing like water around their broad feet.

It was at the end of October and early in November, 1917, when I made this journey. In the northerly part of the desert, snow was lying. During the snow storm, when the road disappeared without any trace being left, the telegraph poles were a valuable guide. But the Kirghiz reported that during severe winter storms and impenetrable snowfalls, even drivers well accustomed to the road might lose

the way in the short distance between two telegraph poles. The only thing they could do then was to stop and wait until the storm had passed. In clear weather, on the contrary, it would never happen that they drove the wrong way, not even during the night. I often had occasion to wonder at their incredible instinct for localities and their phenomenally sharp eyesight. My coachman, for instance,



Descending into Tibet after Crossing the Lipu Lekh Pass Between Snow-Capped Mountain Peaks



When Nature Has Endowed Animals with Ability to Pass over Trails of the Centuries, Why Should the Sons of the Heather Build Roads, the Natives Ask



Over Trails too Rough and Steep for Animals, Men Act as Beasts of Burden

could point at the way and say that a wagon was visible at the southern horizon. He could distinguish whether it was coming to meet us or was going in our own direction; whether it was a "tarantass," a "telega," or some other kind of vehicle, by how many horses it was driven, and what color they were. His eye was thus a finer instrument than my field glass, for even with it I could discover nothing, or merely a small black speck that appeared to move.

A few years later, the Russians built the Samara-Orenburg Railroad through the entire steppe as far as Tashkent, and the old drive lost all its poetry and significance. To call it old is, indeed, stretching the word a little, when we look at such a matter from the Asiatic point of view. The fact is that this drive did not exist in 1865, when General Cherniaieff marched on Tashkent with his detachment of 600 Cossacks.

In April, 1897, while approaching the end of the same great journey, I made a drive of the same kind through a tract of deserts and steppes, situated 2,500 miles farther to the east.

This journey carried me across the Gobi desert from Kalgan to Kiakhta on the Russian border, south of Lake Kaikal. The length of the way was the same as in the Kirghiz steppe, 1,200 miles. The Siberian Railroad had at that time been completed only as far as Kamsk, hence I used Russian sleighs to drive the entire way from Kiakhta over the Baikal ice, and also over Irkutsk to Kamsk.

But the drive through Gobi belongs to

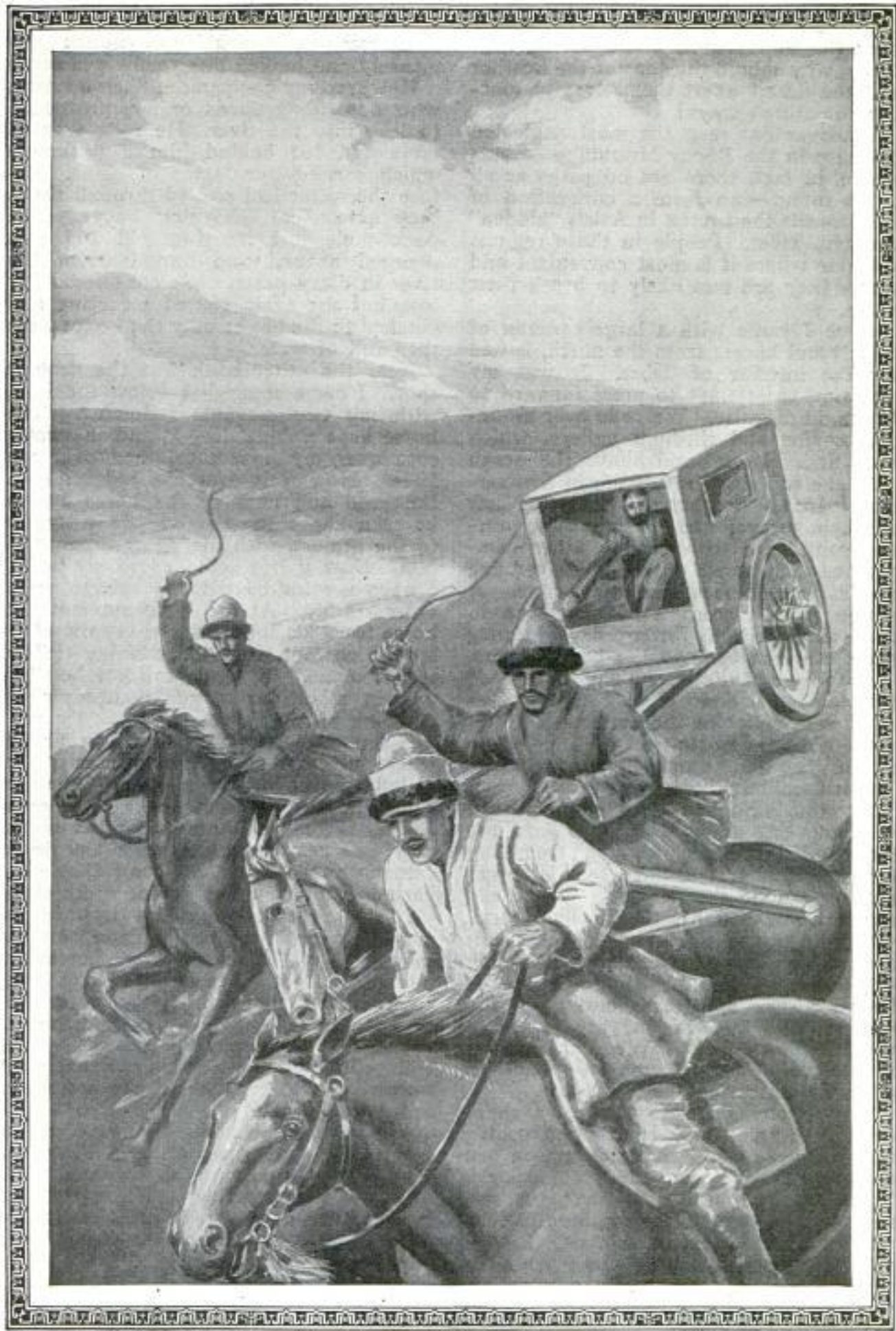
my most picturesque remembrances. The Mongol way of transporting a wagon with horses is likely to be unequaled anywhere on earth. The wagon is a tiny Chinese cart, "mapu," without springs; it affords room for one passenger. There is no bench or seat; the inmate has to sit on hay, blankets, and cushions. The horses are not hitched in front of the wagon, and the space between the shafts is vacant, but at the end of the shafts there is a long crossbeam, which two mounted Mongol horsemen lay across their knees. At the ends of the beam, soft ropes are bound, whose free ends are strung around their bodies by a couple of other horsemen.

When everything is ready, the riding whips crack and the horsemen start galloping over the steppe. The distance between the stations is from 15 to 20 miles, hence the horses will get tired. Other horsemen, who are following along the sides of the wagon, will then speed forth and take over the beam or rope without any stopping of the gallop.

The stretch of land which I covered in this doubtful pastime equals the distance from Chicago to the southernmost point of Florida but the contrast between the two routes is strange, indeed.

Everything is so widely different in Asia; then why not also the "roads"? The Asiatics have no idea of road construction. In steppes and deserts they have their camels, in mountainous districts their mules and yaks. As long as the Creator has endowed these animals

3450



Strange Vehicle in Which Explorer Was Forced to Ride over Uncharted Wastes of Asia on His Way to "the Seat of the Gods," the Citadel of the Grand Lama

with the ability to pass along just safely over the unimproved paths of the centuries, why should the sons of the heather and the desert exert themselves to ameliorate nature's ways?

Whoever has seen the most neglected passages in the Rocky Mountains—tracts where, in fact, there are no paths at all to be found—can form a conception of what awaits the tourist in Asia's "hidden" country, Tibet. People in those regions will ride where it is most convenient and where they are less likely to break their necks.

Once I came with a large caravan of camels and horses from the north, bound for the interior of Tibet. It was my intention to attempt to press forward to Lhasa, in disguise. We rode over mountain chains and through valleys, which were at a higher level above the ocean than the top of Mont Blanc in Switzerland. In an uninhabited district I left the main caravan and continued the journey southward without any other companions than two Mongols. We had five mules, four horses, and two dogs. A native from eastern Turkestan was to come along with us for two days' journey and then turn back to the headquarters.

At the end of the second day we camped between two lakes. Here I finished disguising myself. In the evening a storm gathered in the north, and we huddled up in our little tent at an early hour to sleep. Toward midnight the man from east Turkestan, who had been charged with watching our animals, sneaked into the tent and whispered with a trembling voice: "Robbers! I have seen a figure moving around the horses!" We rushed out with our men into the howling storm, with the moon shedding a pale light around us. We were too late. Straining our eyes, we could distinguish at the border of the hills three horsemen who were driving two of our horses before them in hasty flight. We sent a bullet after them, but the shot only had the effect of increasing their speed.

The following nights we kept a sharp eye on the animals, and nothing alarming turned up. But now the rainy season had commenced, and the man from eastern Turkestan had been sent back. It was necessary for we remaining three to take turns at watching the animals. I shall never forget the dreary nights when I for three hours had to sit in the rain that was pouring down, with my eyes fixed on these mules and horses. In the meantime, the incessant rain kept on swelling all watercourses. The worst came when

our path was threatened by a river, called Sachutsangpo, which had swollen immensely and looked like yellow pea soup.

However, my companion, Shereb Lama, who was riding ahead of me, proceeded to leap into the river. He rode a small mule and led behind him a packmule which carried our boxes of skins. Before the water had soaked through them, they acted like lifesaving buoys. The pack mule lost her foothold and was dragged around and hurled down the river in dizzy haste. We considered her lost, but she again gained a footing and climbed to the bank; only the boxes were then full of water.

Near the other bank was the deepest spot. I came somewhat below the ford, with my two servants following. The horse kept sinking deeper, and the water rose over my boot tops, then over my knees. Now it is over the saddle; only the head and neck of the horse are to be seen above the floods! He struggles to the utmost, with the water tugging at him. Now it has come up to my waist. I open my fur coat, to be able to swim more readily. At the same moment the horse loses his foothold and is torn away by the current, with me clinging tightly to his mane. He again touches bottom, and in a furious struggle succeeds in climbing up the shore.

A few days later we camped in a spot where we could count twelve tents in the distance. In the dawn, three Tibetans came to our tent and spoke to Shereb Lama. From yak hunters farther north they had heard about a large European caravan approaching, and now they suspected that one of us was a white man.

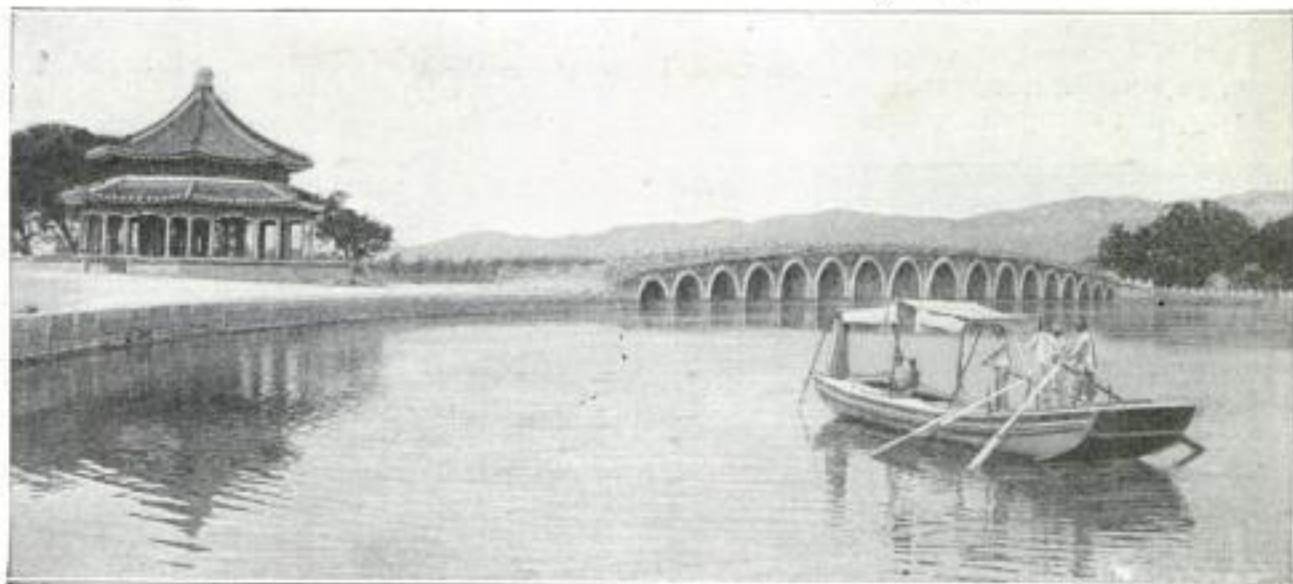
In the night they lighted a ring of fires around our tent, to keep us from running away. Next morning the horsemen poured in from different directions. We counted 53 of them closely drawn up and riding around our tent on the soaked ground. They brandished their swords and yelled at us. It was clear that they wanted to frighten us, but we preserved a defiant attitude.

For several days we thus were, so to speak, the prisoners of the Tibetans. Finally the governor of the province, Kamba Bombo, arrived. He started an investigation and announced his decision: "If you take another step toward Lhasa, your throats will be cut."

Against an enemy so superior in number we had to give up the thought of resistance. We turned back north and after many vicissitudes arrived again at the headquarters.

Tribune Bldg. Quay 3321

COOLIES STAND AS THEY ROW ANCIENT CRAFT



Ancient River Boat Used in China, Propelled by Coolies Who Stand at Their Oars: The Low Price of Native Labor Has Prevented the Adoption of Gasoline Motors

River boats of ancient days, long, flat, crudely made craft, propelled by men who stand as they row, still ply quiet waters of China. For a traveler to go 1,500 miles on such a barge, taking months to reach an inland point, is not an uncommon event. Often this is quicker and less expensive than a land

route, which might be rough and perilous. The cabin, the only place of comfort, is covered with a canopy of cloth. On the deck near the stern, coolies work the primitive oars made of long poles attached to flat boards. There is no rudder. Steering is done by the rowers or, in shallow water, by a long, heavy pole.

BUGS DRAWN TO BRIGHT LIGHTS BECOME FOOD FOR FISHES

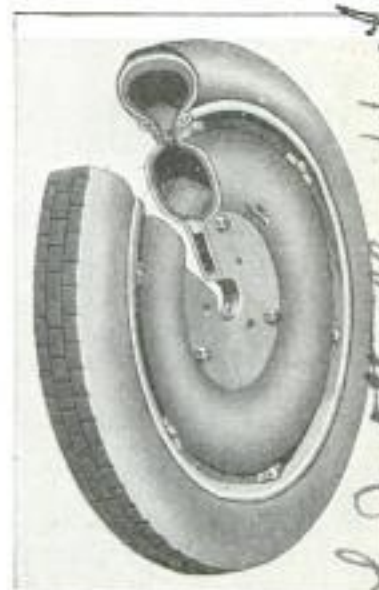
Feeding fish by electric light is an experiment being tried at a hatchery in a mid-western state. It was discovered that an incandescent bulb at the edge of one of the ponds for young channel catfish attracted various night-flying bugs and that the fishes caught them whenever they ventured close to the water. More lights were strung around the tanks and now the finny creatures are furnished with thousands of insects that swarm about the bright rays on summer nights.

SEAPLANES AT ANCHOR GET FUEL THROUGH AIR PUMP

Refueling seaplanes while they are at anchor in the water has been accomplished by United States marines stationed on an island in the Pacific. By pumping air into an opening in the gasoline drum the liquid is forced out through another hole and carried by a hose to the tank of the flier. Formerly it required a half hour to empty one barrel of fuel into the aircraft's reservoir, but now only seven minutes are needed.

AIR CUSHION IN DISK WHEELS MAKES RIDING SMOOTHER

Forming a double air cushion, and thus increasing the resistance to road shocks, steel-disk automobile wheels have been invented by an Englishman that are claimed to make riding easier and lessen the wear on tires. By extending the inner tubes, shaped like a figure eight, into circular hollow spaces around the wheels, the air capacity of the tires is practically doubled. This, it is said, makes possible the use of lighter material. Casings can be removed for repairs without displacing the inner tubes.



England
L. H. Stoll, High Road,
Leeds, England
C.M.

3388
New York City Star 8/16/3
3418
Emb. S. R. Winters
District National
Bank Bldg
Washington D.C.

340 MODERN STORE "ADS" REACH HUT OF MONGOL WORKER

Carried by some traveler in his wanderings, an English newspaper recently found its way into Mongolia, where modern cus-



NEUMAN TRAVEL TALKS
Clothed in European Garments, This Mongolian Weaver Still Follows Ancient Methods of Her Art

toms have only begun to find favor with the inhabitants, and there fell into the hands of a native weaver. Unaware that its pages displayed household-furniture advertisements, perhaps offering for sale some product of her own art or that of her coworkers, the Mongolian woman used it as a protecting wrapper for the strands of yarn from which she made cloth. A few years ago, the printed pages would probably have been the object of excited comment in the village, but now newspapers are accepted as part of the white man's presence. Mongolia, once the home of savage, warlike tribes, is becoming modernized, as is indicated by the garb of the workers, many of whom wear European clothing. Despite this, the processes of weaving developed by the race's early ancestors long before civilization appeared in the western world, have undergone little change.

With a staff of eight assistants and many internationally famous scholars, a midwest college professor has undertaken a 10-year task of compiling a dictionary of the Babylonian-Assyrian language, dead for 2,000 years. When completed there will be more than 200,000 different word forms and 30,000 words, it is estimated.

3280 DEADLY GAS BOMBS SOUGHT FOR AIRPLANE ATTACKS

With the development of aerial torpedoes powerful enough to sink or disable the largest warship, army and navy engineers have turned their attention to gas bombs for airplane attacks. Chemicals have been successfully used for throwing up smoke screens to hide maneuvers on land and sea, and efforts are being made to find some compound that will produce temporary unconsciousness without giving any warning of its presence by taste or smell. It is now believed possible that some compound will be found which will enable large areas of a battle field to be blocked off and rendered unusable for days, the chemical converting whole districts into a permanently infected "No-Man's Land."

3402 CAMERA WITH TWO LENSES GIVES DEPTH TO MOVIES

Motion pictures with a natural appearance of depth as well as width and height have been created by a middle-western inventor, who recently demonstrated his discovery. He has developed films, cameras, projection machines, and screens that apply the theory of the stereopticon to the reproduction of scenes. It is claimed that the eyes will not be strained, nor the three-dimension effect be spoiled, by sitting to one side or close to the screen, which is about four times the size of those now used. The camera, much larger than the standard, has two lenses and takes two pictures, one on top of the other.

3362 WATER FOR ENVELOPE SEALER SUPPLIED FROM ITS HANDLE



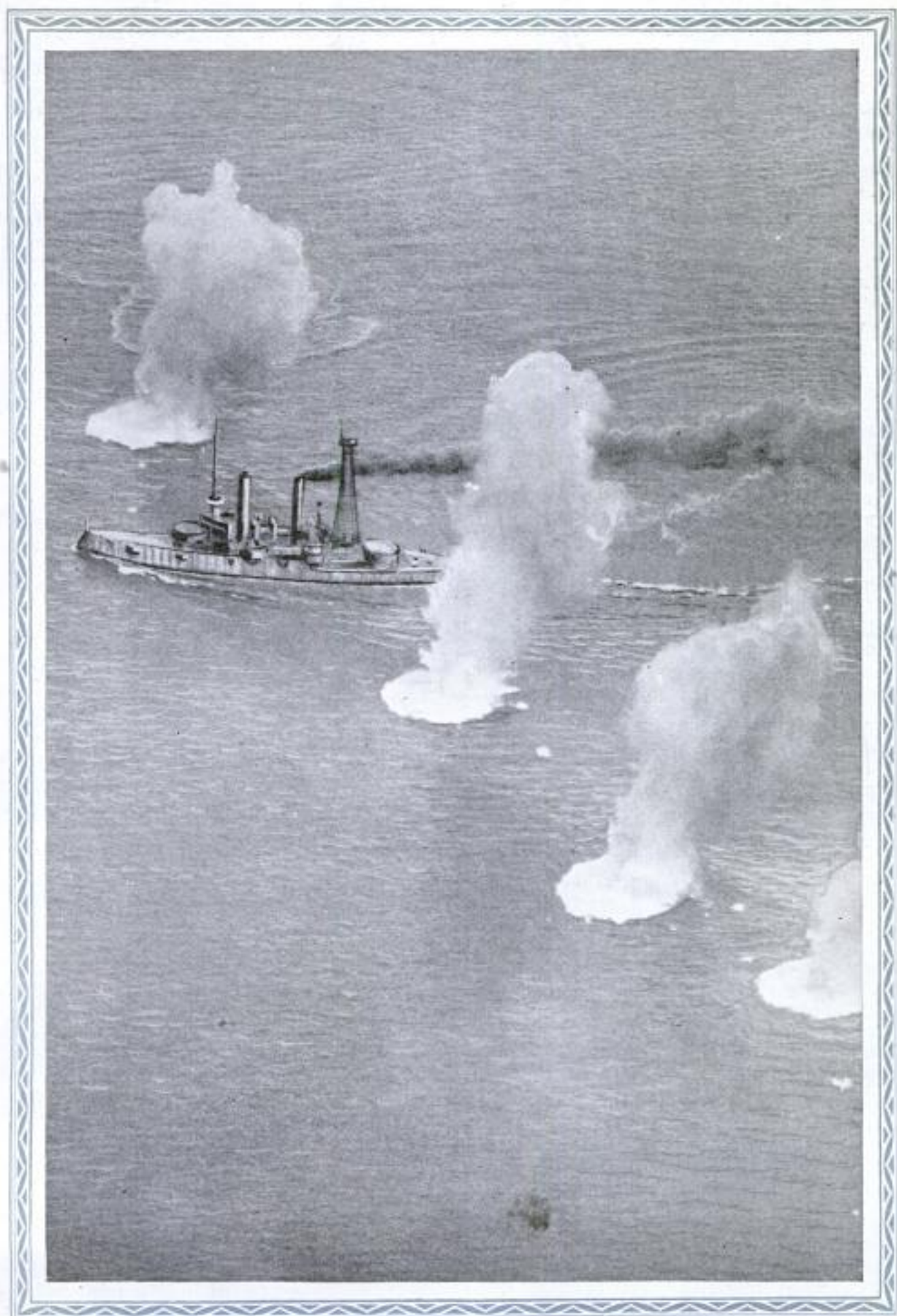
For sealing envelopes, a device, that feeds moisture from its hollow handle, stores sufficient water for 1,000 operations. Sealing at the rate of 60 per minute,

this small apparatus moistens the glue and closes the flap at the same time. It is sanitary and nonleaking, and all parts are made of brass.

The Consolidated Co.,
100 Boylston St.
Boston, Mass.

Chicago
Argyle St. Chicago
Hilton Co., 1345 Argyle St. Chicago
Edsall Redaway

SEA CRAFT BECOMES TARGET FOR AIR WARRIOR

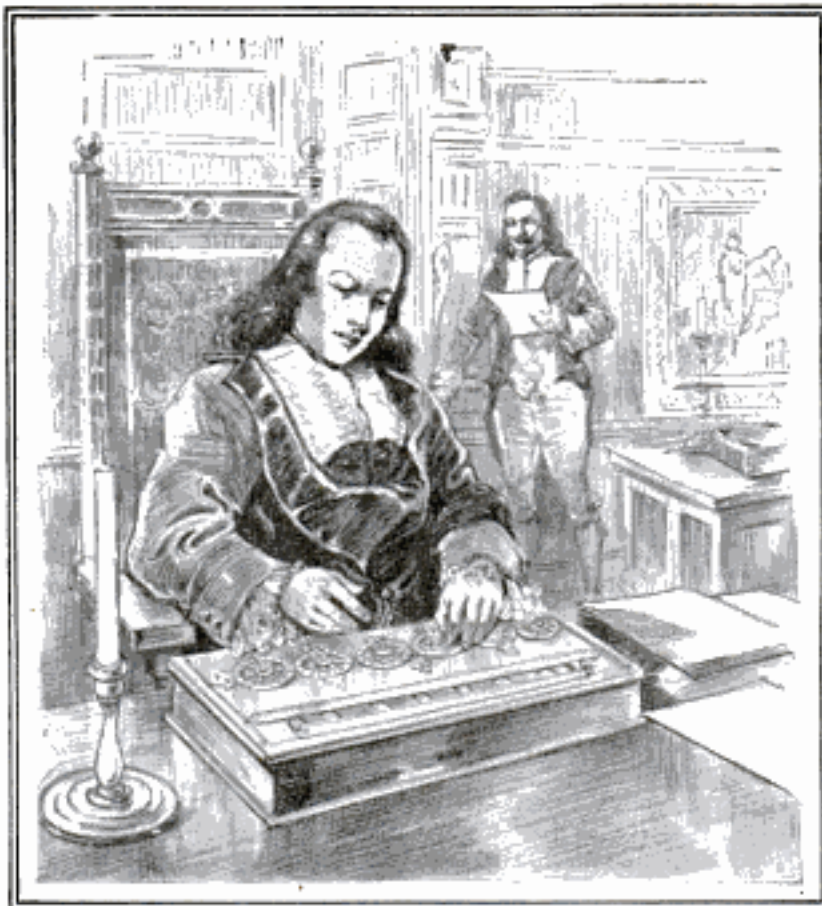


Warship Fleeing from Airplane, the Course of the Latter being Marked by Geysers Thrown Up by Its Bombs, Which Are Powerful Enough to Sink or Disable the Vessel

CELEBRATE BIRTH OF PASCAL, THREE CENTURIES AGO

3290

This year marks the 300th anniversary of the birth of Blaise Pascal, famous French religious philosopher and mathematician, and is the occasion of numerous services in his honor. He died in 1662, and is chiefly noted for his geometrical calculations. Although it is not widely known, he also invented a famous device to perform



arithmetic problems. He made the first one about the year 1642 to simplify accounting for his father. Later, he turned out several similar devices, one of which is displayed in a French museum. It is a rectangular box with a series of numbered wheels, and works sums in addition or subtraction, the results appearing in slots at the top.

Air Motors Supercharged
AIR MOTORS SUPERCHARGED TO REACH HIGH LEVELS

3409

Flights 50,000 feet or more above the earth, where the atmosphere is so thin pilots cannot live unless equipped with oxygen tanks and bundled in warm clothing, are predicted as the result of the recent development of a supercharger for airplane engines. Plans are being made with a motor which, experts believe, will carry to undreamed-of altitudes. The flier taking this journey will be supplied with appliances to protect him from the intense cold, and special oxygen tanks will be provided with safeguards against explosion and freezing of tubes through which the gas is breathed.

WINDS CARRY SAND OF SAHARA ACROSS SEA TO ALPS

In a recent storm, sand from the Sahara Desert is believed to have been blown across the Mediterranean Sea and beyond the Alps Mountains, finally settling in Switzerland. At first, it was thought that the dust came from a volcanic eruption, but scientists disproved the theory. In the past, storms of the

desert caused dust falls in southern Italy, but this is held to be the only time in many years where the sand appeared so far north. Twenty years ago, after severe weather disturbances in northern Africa, it was found in Denmark.

FORTUNE IN STAMPS PROVED FORGERIES BY EXPERTS

3426

After a lengthy legal battle, 43 stamps composing a collection of rare "Hawaiian numerals" valued at more than \$200,000, recently were declared to be forgeries. By comparison with real "missionaries," an expert showed that certain characters were too artistically drawn, and finally that the stamps were produced by photogravure, and not by printing, as were the genuine articles. First printed in 1851, the stamps later became known as "missionaries," because the Christian teachers in Hawaii pasted them on their letters to friends and relatives in New England and California. Originally the imitation group was bought for \$65,000. Later the purchaser sold part of it to a millionaire collector for \$75,000. There are said to be not more than ten of the real ones now in existence.

Photo. Pub. Ledger 8/19/23

*Emb. Edmund Tarrone
 The Harriet,
 Washington, D.C.*

*Emb. Milton Carlson
 306 International
 Bank Bldg.*

Field Museum of
Natural History Chicago

Secrets of World's ^{Fossils} Youth Revealed by Million-Year-Old Game

HUNTING million-year-old game is the sport of scientists who journey to the remotest outposts of civilization in pursuit of the horned giants, flying dragons, hairy mammoths, and other weird inhabitants of the world when it was young.

Although the saber-toothed tiger can no longer bite, and the huge dinosaurs with three-horned skulls and armored collars of bone protecting their necks, have long since fallen under rock and vanished from the surface of the earth, the quest is as full of thrills as any journey to the wilds of today.

From fragments of bone buried deep in rock formations of North and South America have been pieced together the romantic story of prehistoric times. Long before the coming of man, the crust of the earth was elevated into continents, depressed into ocean troughs, and the land was buckled up into mountain ranges and folded in gentler hills and valleys.

Worn by air and water, many of the high places had been borne away by rivers and seas, to be laid down again elsewhere as deposits which eventually formed sandstones, mudstones, and similar rocks. Much of the material of the original crust has thus been broken down and worked up again many times over, so that in places this layer, it is estimated, is 67 miles deep.

When the sediments were accumulating, the remains of plants, birds, and animals living on the earth at the time were

buried. These form the fossils by the aid of which scientists now read the story of the past. The skeletons, when found, are not always real, but are composed of silica from nature's own laboratory. This is the result of the action of underground streams of water, which, when they touched the bones of dead beasts, snatched up an atom of the lime of which they were composed and in its place deposited a bit of silica. It was, naturally, a slow process, but, after a period of





Scientists Uncovering Fossils of Million-Year-Old Beasts That Roamed the World When It Was Young, but Which have Long Since Vanished, and, at Right, "Bones" being Brought Back to Civilization for Study After being Wrapped in Plaster-of-Paris Bandages for Protection



Prehistoric Giants and Dragons being Restored to Shapes They Assumed in Life for Museum Exhibit. Any Missing Parts are Molded from Plaster

PHOTOGRAPHS COURTESY FIELD MUSEUM, CHICAGO

30,000,000 to 40,000,000 years, it was fairly complete, until now the "bones" are exact reproductions in silica.

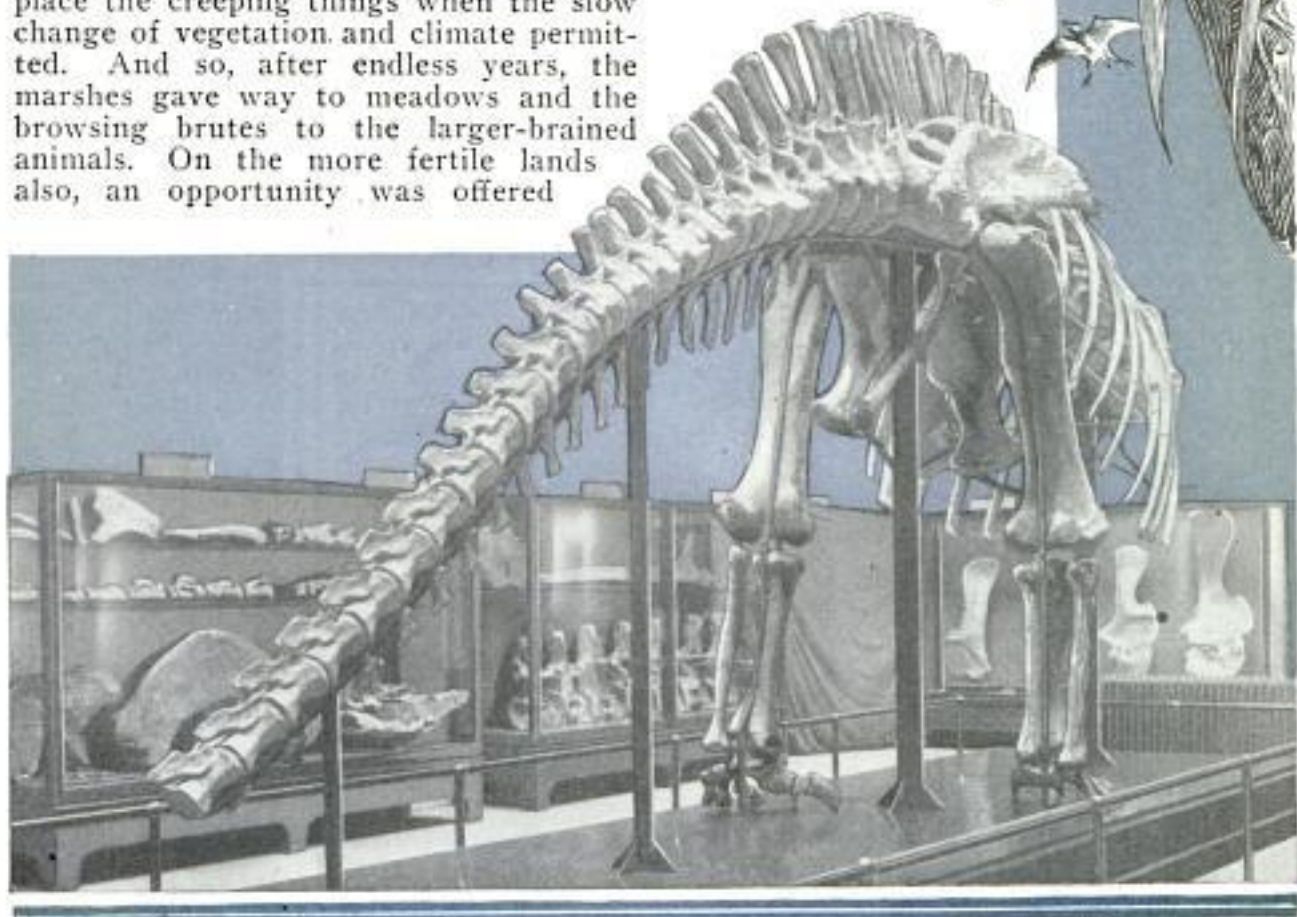
This chemical action is one of the methods used to determine the age of the sea, since all of its salt was dissolved out of the rocks after rain began to fall on the earth. Dividing the total amount of saline matter by what is contributed every year in modern times, it is estimated that the oceans are about 100,000,000 years old. But as the present rate of salt accumulation is probably much greater than it was during prehistoric periods, this figure may be far too low.

From the rock records, scientists also have drawn a picture of the appearance of the earth in those early ages. There were no trees of the types we see now, they say, but there were forests of club mosses and horsetails which grew to gigantic sizes compared with their pigmy representatives of today. In these forests the joint-footed invaders of the dry land ran riot in the form of centipedes, spiders, scorpions, and other insects, and on these and the herbage the strange beasts of the time fed. The climate was mild and very much like a long summer.

Although most of the earth's inhabitants were then reptiles, the little animals and the toothed birds were storing up the intelligence and strength to replace the creeping things when the slow change of vegetation and climate permitted. And so, after endless years, the marshes gave way to meadows and the browsing brutes to the larger-brained animals. On the more fertile lands also, an opportunity was offered

for a richer evolution of insects and birds, the climate became less moist, and the grazing herds extended their range.

Flying bats, climbers in trees, like sloths and squirrels, quickly moving hooped animals, burrowers like the moles, and shore-frequenting seals, took the place of the reptiles. Due to the climatic changes, it was a more strenuous period, with exacting rivalry among the creatures—a time of great unrest. Many migrations took place from hot lands to cold and the weaker stocks began to vanish as old land bridges were broken and new ones made. With the coming of the ice age, many types, like the mammoth, the woolly



rhinoceros, the saber-toothed tiger, the cave lion and the cave bear, became extinct. As one scientist described it:

"The lands began to bloom with more and more flowering plants and grand hardwood forests, the atmosphere is scented with sweet odors, a vast crowd of new kinds of insects appear, and the places of the once dominant reptiles of the lands and seas are taken by the mammals. Out of these struggles there rises a greater intelligence, seen in nearly all the mammal stocks, but particularly in one, the monkey-ape-man. Brute man appears on the scene with the introduction of the last glacial climate, a most trying time for all things endowed with life, and finally there results the dominance of reasoning man over all of his brute associates."

To locate the fossils of this period, members of the scientific expeditions must be possessed of keen eyes. A stray "bone," a strange projection from a rock, meaningless to the average person, are sometimes their only clues. Wherever the sea has washed away the cliffs, or rivers or floods have dug deep into the earth's crust, there the hunters will seek diligently for their long-dead prey. Once found, the remains are treated with even more care than was bestowed on the modern furniture of King Tut's tomb. The most elaborate precautions are taken to excavate the skeleton, and the rock immediately incasing it, intact. When the bones are scattered, a wide and labori-

ous search is made for the missing parts. Any crumbling bits are soaked in a solution of gum arabic. The ancient bones, and the rocks in which they are bedded, are then swathed in plaster-of-paris bandages for safe transportation. This often includes hauling for long distances across wild and roadless country—an extremely difficult task, as these antediluvian monsters count their weights, plus bedding, not in pounds, but in tons.

Arrived at the museum workshops, the plaster coverings are taken off and each separate bone subjected to a most careful scrutiny. The bedrock is removed by means of specially designed chisels driven by compressed air, and the skeleton is then laid out to show whether any of the smaller parts are missing. If so, a restoration of the piece is made in plaster of a different color from the rest of the fossil. Then the whole is mounted on a steel framework to which the bones are fastened, or wired together in the position the animal is supposed to have assumed in the dim ages of the world's dawn. This is difficult, as no one knows, for instance, in what graceful attitude a dinosaur squatted at ease in a prehistoric swamp, or what figure it cut when out for its evening stroll. Its footmarks on some lonely promenade, it is true, are still to be found, but the fleshy parts disappeared shortly after its death, and it is only by a close study of the bones that the position it carried itself in can be determined.

STONE LAMP OF ANCIENT ASIA FOUND IN ALASKA ³⁴⁰⁷

Believed to have been made by the Mongolians of Asia several thousands of years ago, a queer stone lamp was recently found in Alaska. Shaped much like a shallow bowl, it has a small figure of a squatting god sitting near the rim, which may



have aided in gripping the lamp when carried about. Students interested in the study of early tribes inhabiting North America, believe it was brought by Asiatic tribes said to have visited this continent long before white men arrived. Whether they used ships or traveled over connecting land has never been determined.

PEACE COMES FOR WARSHIPS, GO TO JUNK YARD ³⁴¹⁰

As a sacrifice at the altar of peace, the United States has ordered the junking of eight great vessels of war, six of which have proudly carried the Stars and Stripes through the seven seas. Three of the monsters, scrapped in accordance with the terms of the recent disarmament treaty, have never had salt water wash against their prows. They are the "Constitution" and the "United States," whose construction was halted months ago, and the superdreadnaught "Washington," which has been lying in the wet basin of a shipyard for more than a year, waiting its call to doom. The other five are the "Louisiana," the "Minnesota," the "Michigan," the "New Hampshire," and the "South Carolina," the latter being perhaps the only one to go to the end with colors flying. It probably will be used in tests for underwater and deck attacks.

Philadelphia Public Ledger 8/19/23

326 W. Madison Chicago

WOOD SUBSTITUTE FOR CORK FOUND IN SOUTH AMERICA

34/14 Extremely light in weight, wood of the balsa tree has recently been imported from South America to be used as a sub-



Balsa-Wood Log Balanced by a Piece of Other Timber One-Tenth Its Size

On account of its exceptional buoyancy, it is quite popular among the coast peoples of Brazil and Peru, who employ it in the construction of rafts and small boats to which it has given the name of "balsa." A log of the wood weighs but a small fraction of an equal amount of most any other lumber. While the tropical forests hold what is said to be an unlimited supply of hardwoods, experts assert that the fate of the world's lumber supply rests in the softwoods of the northern hemisphere, which are being rapidly used up. More than three-fourths of the world's lumber is supplied from these timber lands, but whether the forests will be able to meet the demands of the future depends upon the steps taken to replant them. Only 80 per cent of spruce, pine, and other soft timbers cut annually, is being replaced by growth. In one year, it is estimated that 56 billion cubic feet of timber are used for lumber and firewood, the latter equalling in heating value one-fifth of the world's coal consumption.

New York City American Balsa Co., 50 E. 42nd St.

SPECIAL

OX WITH EIGHT LEGS STUDIED BY JAPANESE SCIENTISTS

Man, disease, experts, complet plant s1 growing, ington, those of, with rhis, grow bec, while the, ington win, tens. A, nese ca, Missouri, goni. T, month ago, yellow dat, county osors. How, Jersey, Per, h, cording to, just about, ne to get, caused, ka, om the owners hand, and already returned it back.

HOGS RECEIVE SHOWER BATHS WHILE ON WAY TO MARKET

Along the tracks of railroads carrying cattle to market, standpipes have been erected so that carloads of hogs may be given shower baths during hot weather. Livestock, crowded closely together in cars, must be watered at frequent inter-



GIVING A COOLING SHOWER BATH TO CARLOAD OF HOGS ON THEIR WAY TO MARKET

vals. This precaution not only cools the cars but keeps the animals from losing weight. An entire trainload of hogs or cattle can be sprayed in considerably less time than when ordinary hose is used.



Ships of the Sea Employ a Universal Language of Lights to Inform Neighboring Craft of Their Size and Type, and Direction of Travel During Fog or Darkness

8/4/23
"RULE OF THE ROAD" AT SEA
GOVERNS SHIP LIGHTS ³³⁴⁴

Ships that pass in the night talk to each other in the silent language of sea lights understood by every seasoned sailor. In darkness or in hazy fog, sailing masters are directed through neighboring shipping by the positions of colored lights in the rigging of the other craft. Where there is no other control over sea traffic, the "rules of the road" are based on signal beacons, and seldom violated. Power-driven ships must give way to sailing vessels which are identified in the darkness by their port and starboard lamps. From the arrangement of the lights, the craft's course is readily noted.

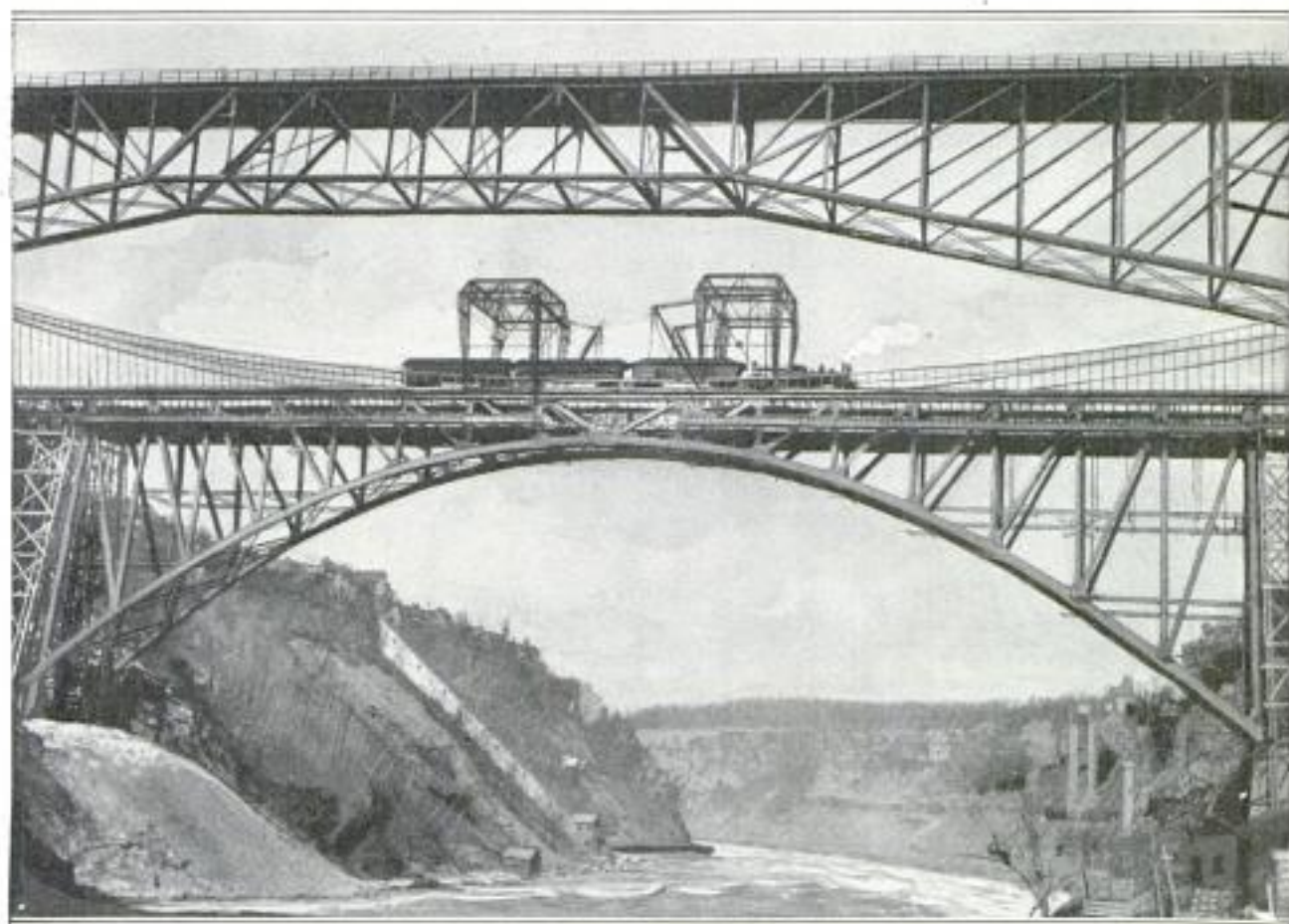
SURGEON OF PREHISTORIC AGE
WORKED WITH FLINT KNIFE ³⁴⁶¹

Showing evidence of an attempt at surgery, during an age when man's sharpest instrument was the flint knife, a skull of a prehistoric man has been found in New Mexico, which had been trepanned. An oval section two inches long and an inch wide had been removed from the frontal bone. Although the operation was neatly done, the bone did not heal, and it is believed that the patient died soon after. The skull is that of a short-headed man. A race having such a characteristic lived in the San Juan valley long before the Cliff Dwellers took up their residence in that section.

3394
ARCH ADDED TO BRIDGE AS TRAFFIC CONTINUES

While railroad traffic flowed uninterrupted, a steel arch was placed beneath a suspension bridge over the Niagara Gorge, transforming it into an altogether different type of structure. Faced with

could be properly strengthened at a saving, and without rerouting trains or delaying them to any extent. Huge traveling cranes, large enough to permit the passage of locomotives and cars, carried



Suspension Bridge over Niagara Gorge. That, by Singular Engineering Skill, was Strengthened by the Addition of a Steel Arch without Interruption or Delays to Traffic

the necessity of erecting a new crossing at considerable expense, experts worked out this novel plan whereby the bridge

the heavy steel girders out to position, where workmen, perched high above the gorge, riveted them in place.

Com. Arvin E. Dunlap
Niagara Falls, N.Y.



NEWMAN TRAVEL TALKS

In Jerusalem, Men and Women Alike Help to Rid the Narrow Streets of the Heaps of Snow That Banks Against Walls and Piles High on the Roofs of Houses

Located at
Arlington, N.J. 747

**RARE SNOWFALLS IN HOLY CITY
BRING THREATS OF FLOODS**

In Jerusalem, where snow falls rarely, it is looked upon by the residents as something little less than disaster. In a climate that seldom grows colder than six degrees below freezing, the Holy City does not often experience freezing temperatures, but to allow the snow to lie in the narrow streets and on the roofs of houses, until it melts, would cause overflow of the drainage system. To prevent this, the watchful inhabitants, armed with shovels and scrapers, and all kinds of baskets and buckets, quickly convey it to hillsides and vacant lands where the dry ground soaks it up.

3325

**ANIMALS ON EDENLIKE ISLES
DO NOT FEAR MAN**

3433

On the Galapagos Islands, 600 miles off the coast of Ecuador, a party of scientists recently found animals that have long been extinct in other parts of the world. As there are no human inhabitants except members of a penal colony, the creatures have never been hunted or disturbed, and are as tame as their domesticated relatives. Left to themselves for ages, they have not followed the lines of development noted elsewhere. Reptiles are still in the majority, many of them heretofore unknown. Among the strange specimens are lizards four feet long and turtles that bite like dogs. So fearless are they, that birds permitted the explorers to lift them from their nest to obtain their eggs, penguins stood quietly while being captured, and a mother sea lion, without even a struggle, surrendered her young for examination. Small wild dogs, thought to be descendants of pets brought by the buccaneers of the Spanish Main, were seen running about.

**BRICK-LAYING MACHINE SETS
PACE FOR WORKMEN**

3400

Laying bricks at the rate of 500 to 600 an hour is said to be possible with a machine recently invented in England. Operated by one man, the apparatus adjusts the bricks in proper position and presses them firmly in their beds of mortar just as skillfully as workmen. Although the contrivance performs speedily and automatically, two workers must spread the mortar and place the bricks before it is set in motion. As the work progresses, the machine moves upward.

Ans. J. H. Knight
Barfield, England.

**MUSHROOM GARDEN IN MINE
PRODUCE ABUNDANT CROPS**

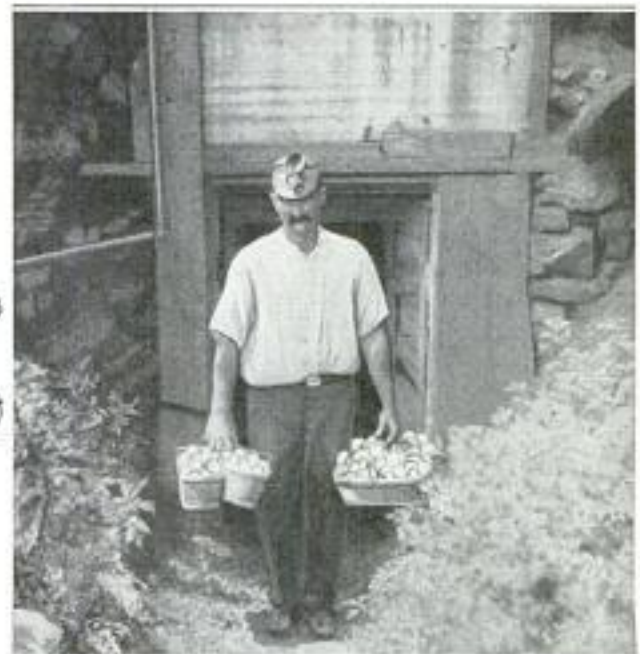
Far below the earth's surface, in the dark shafts of an abandoned copper mine

3374



Harvesting Daily Crop of Mushrooms in Dark Shaft of an Abandoned Mine

untouched by the sun's rays, an eastern miner has established a mushroom garden that is a profitable source of income. Nourished by the finely pulverized soil of these unlighted caverns, the plants grow with such speed that daily crops are harvested. The plot needs no care whatever, and the nearly constant temperature of the pits favors rapid growth. Raising mushrooms in cellars has been a practice of gardeners for a long time, since the



One Day's Yield of Highly Prized Vegetable Brought from Underground Garden Ready for Market

condition of the air below the level of the ground seems to be suitable to them.

2351

FLIGHTLESS BIRDS INHABIT ANTARCTIC SEAS

Keepers of the bird section in the London Zoo are proud of a rookery of trained males fight among themselves, the vic-



Thousands of Penguins, Flightless Seabirds of the Antarctic Region, Gathered on the Desolate, Ice-Covered Shores of an Island Far to the South, During the Breeding Season.

penguins, which have been a source of much delight to the large crowds of visitors that view them. The little colony of polar birds is a favorite center of attraction for youngsters, and the antics of the group never fail to arouse interest. These flightless seabirds live only south of the equator. In the breeding season great flocks of them gather on the rock-strewn coasts of desolate islands



These Plump Penguins at the London Zoo Were Photographed While Waiting for Their Dinner

tors mating with the females when the warfare has so taxed the strength of the weaker birds that they respond only feebly to the urge to battle. Young penguins are born blind and fed by their parents for a long time before taking to the water. Then, suddenly, the flocks, as one bird, rise to their feet, walk down to the sea, and swim away, not to return until the next mating season.

Tribune Bldg Chicago

TRAIN LIKE PACKSADDLE RIDES SINGLE RAIL

3404



Passengers Enter the Coaches from Both Sides of This Monorail Train in Operation in Ireland. Several Classes of Accommodations Are Available as on the Standard Railroads

Similar in appearance to a packsaddle are the coaches of a train that requires but a single rail, in operation on a railroad in Ireland. Each coach consists of two cars, hanging, one on each side of the "trucks" that travel on a track suspended above the ground on a truss-

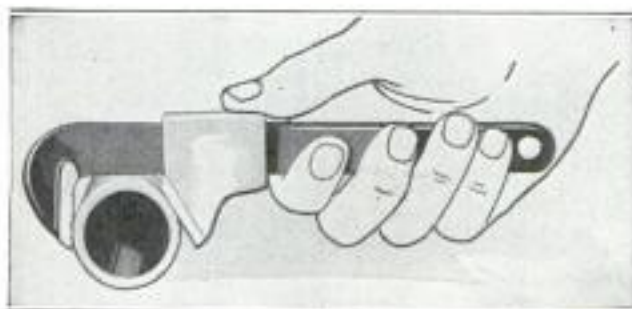
work. The locomotive that hauls the train is also balanced on the one rail which seems to run through its center. Regular compartments are formed by dividing the coaches. Station platforms are brought much nearer the steps by this arrangement.

Ballyvaughan Railroad, runs to a resort on Western Coast of Ireland.

THUMB PRESSURE ON WRENCH GIVES GRIP TO JAWS

3434

Pressure of the thumb on the smooth jaw of a wrench recently marketed, firmly holds objects, regardless of shape, while



Wrench Made to Take Grip by Exerting Pressure of Thumb Against Movable Smooth Jaw

being turned or twisted. Whether against a wall or along a floor, a pipe or nut can be moved with a ratchetlike motion, by applying pressure in one direction, and

Albany Hardware Specialty Mfg. Co. Albany, N.Y.

releasing it as the handle is drawn back for each grip. The adjustable part of the tool slides on the stem and forces the work against teeth in the head.

3411

CEDAR LOGS FLOATING IN LAKE FORECAST RAINY WEATHER

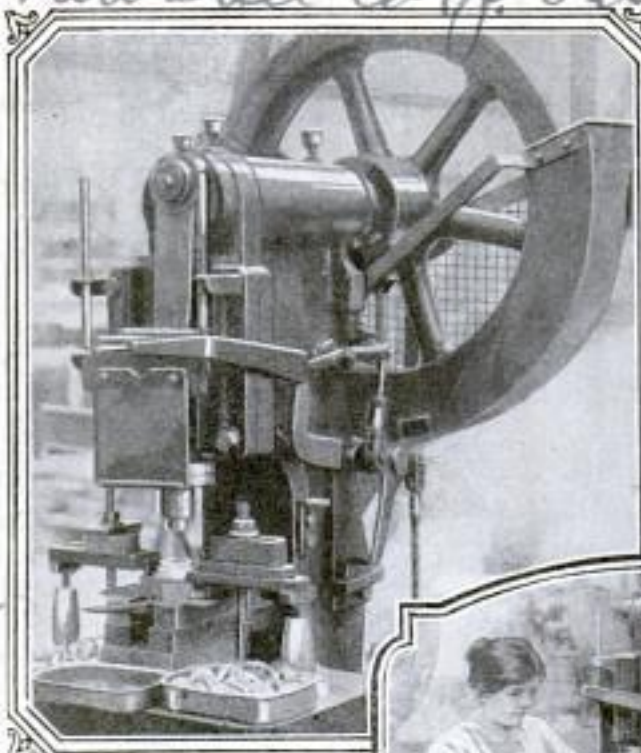
Floating cedar logs in a small lake have been the "weather prophet" for residents of a northern Michigan city for 15 years. In all that time, observers say, their "forecaster" has never failed. Awaiting the great saws of the city's lumber mills, huge rafts of the timber lie close inshore, but about 14 hours before a rain, it is said the mass breaks apart and single logs move slowly out to the center of the lake. There is no current in the water and the movements occur on windy or calm days prior to a storm. When fair weather appears they gather again packed closely at the water's edge.

Detroit News

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PARISIAN MACHINE MAKERS SOLVE PROBLEMS

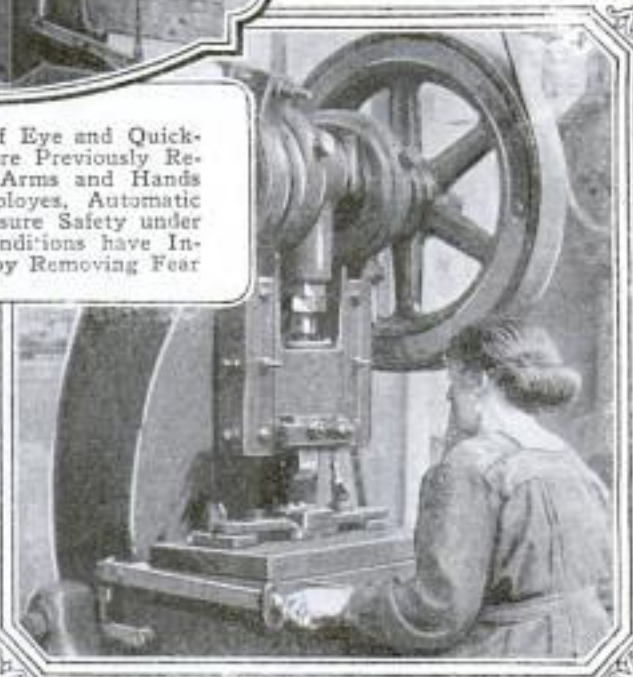
3246 Cont. A. N. Mergaoff & Co. International
 Newsreel Corp. 826 N. Madison Chicago



One of the Safeguards Adopted in Switzerland to Protect Workers is Seen Above. When a Pedal is Pressed, the Punch Comes Down Only Once. As It Goes Up, It Lifts the Shield That Prevents Injury to the Operator's Fingers

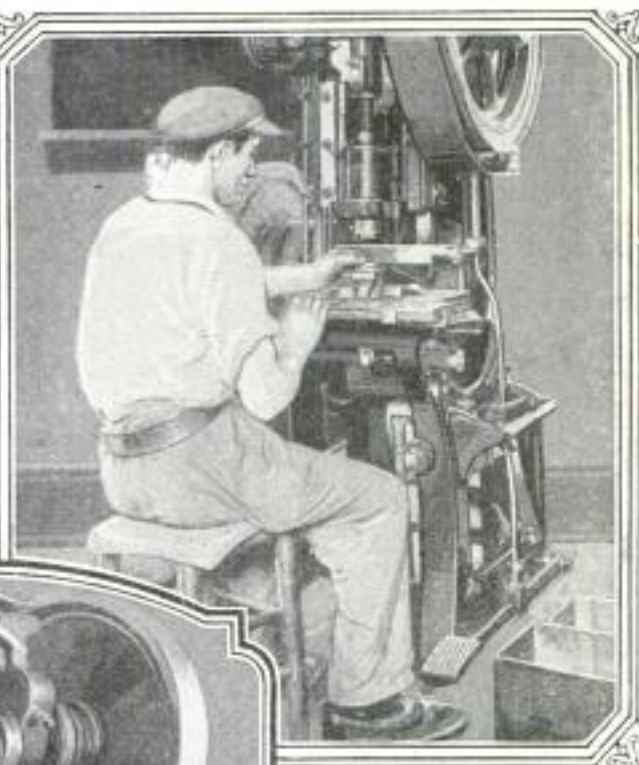
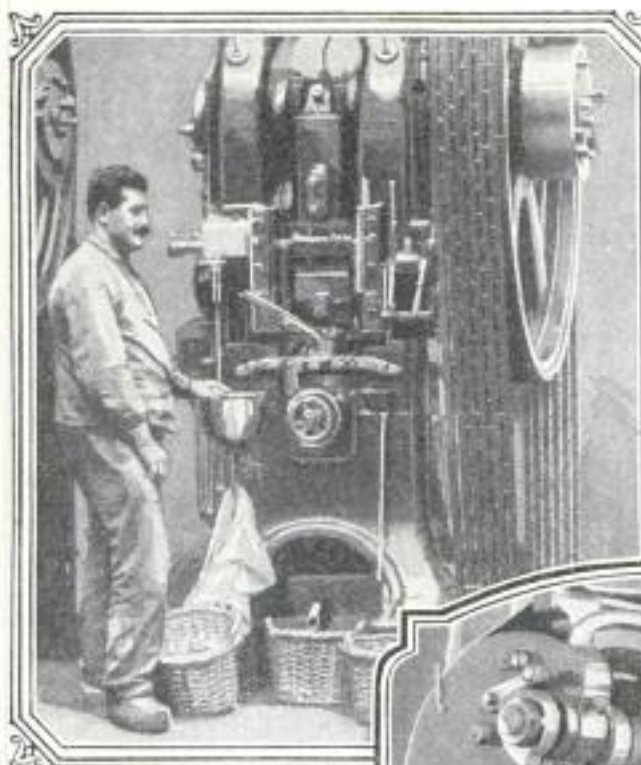
Why Protective Devices are Needed, Especially for Direct-Feed Presses, is Shown Above. Here the Operator must Feed with His Hand and Then Press Down the Pedal with His Foot. He Also must Remove the Finished Pieces

Where Keeness of Eye and Quickness of Motion were Previously Required to Protect Arms and Hands of Women Employees, Automatic Devices Which Assure Safety under Practically All Conditions have Increased Efficiency by Removing Fear

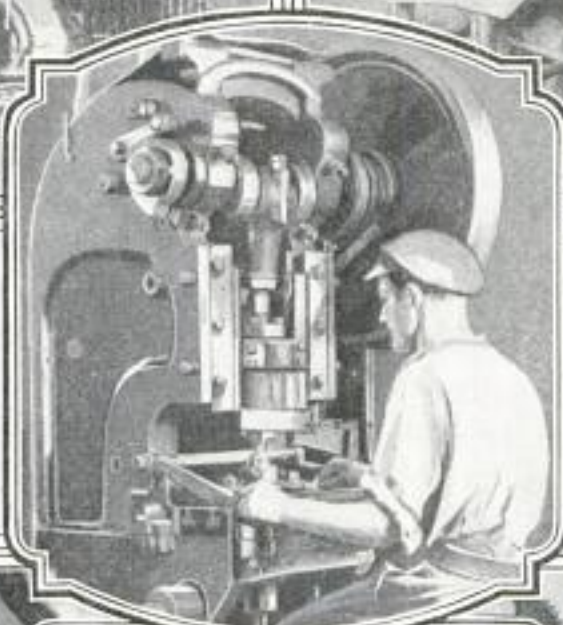


To Prevent Injury to Workers in Machine Shops, Engineers in France have United in Designing New Safeguards Against Accidents, Which Occur Frequently When Operators are Required to Feed Presses and Punches with Unprotected Hands, Regardless of How Expert or Careful They may Be. As a Result, There have Been Many Inventions for Handling the Work Automatically. So That the Attendants can Keep Their Fingers Out of the Danger Zone, Separate Attachments have been Built for Each Unit, Protecting Workers, Reducing Costs, and Increasing Efficiency

FOR SAFEGUARDING WORKERS IN FACTORIES



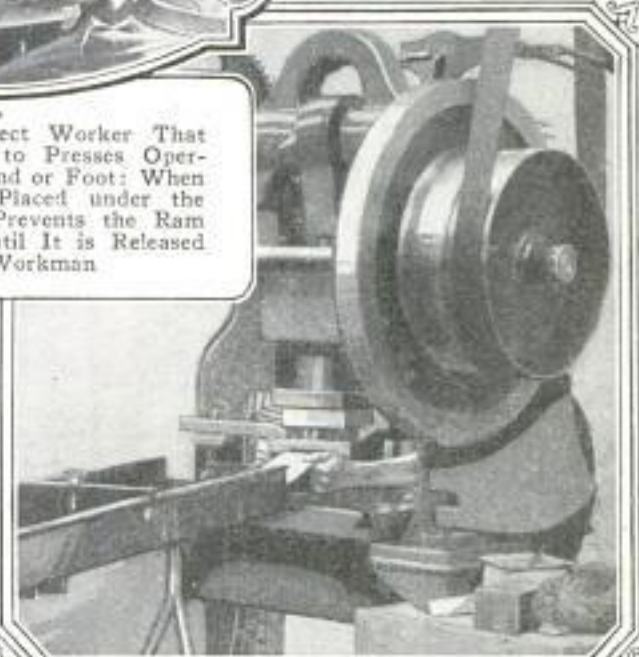
Stamping Machines in Mints That Formerly were Operated by Hand, the Blank Coins being Fed into Them by the Attendants at Considerable Risk: Now the Coins are Stacked in a Copper Cup and Placed under the Die with a Pair of Long Tongs



One of the Most Simple and Practical Devices for the Protection of Machine-Shop Toolers Is the Invention of a Worker in a French Plant. It can be Adapted to All Kinds of Presses with Only Slight Modification, and is Widely Used Abroad



Coupling to Protect Worker That can be Attached to Presses Operated Either by Hand or Foot: When the Material is Placed under the Punch, a Lever Prevents the Ram from Dropping until It is Released by the Workman



Danger Contrasted with Safety: In the Punch Press Shown at the Left, the Operator's Hands Are Entirely Outside the Danger Zone, Since the Die is Protected and Covered by Fixed Steel Blocks. The Picture at the Right Shows the Hazardous Position in Which the Worker's Arm has to be Placed in Holding a Sheet of Material to be Cut into Small Sizes. Protective Devices on This Press, However, Enable It to be Fed Automatically Now, a Sliding Board Pushing the Material Directly under the Cutter, Which is Covered So That the Hands of the Worker are Kept Out of Danger

Emt. Robert S. Pond
Larva Mont.

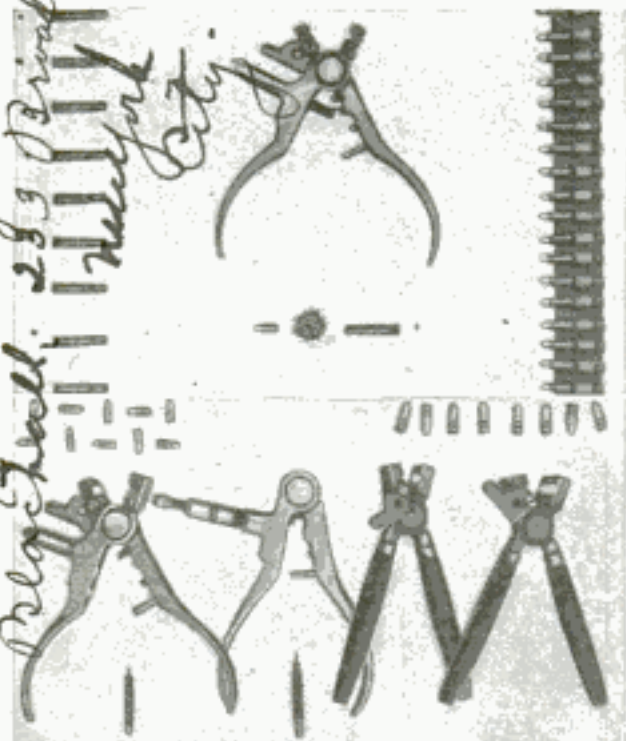
3368 BULLETS MADE IN HOME RECALL FRONTIER DAYS

As in the days of the old frontiersmen, when muzzle-loading rifle, powder horn, and shot bag hung beside the cabin door within easy reach for emergencies, and the bullet mold had an important place among the kitchen utensils, hunters and

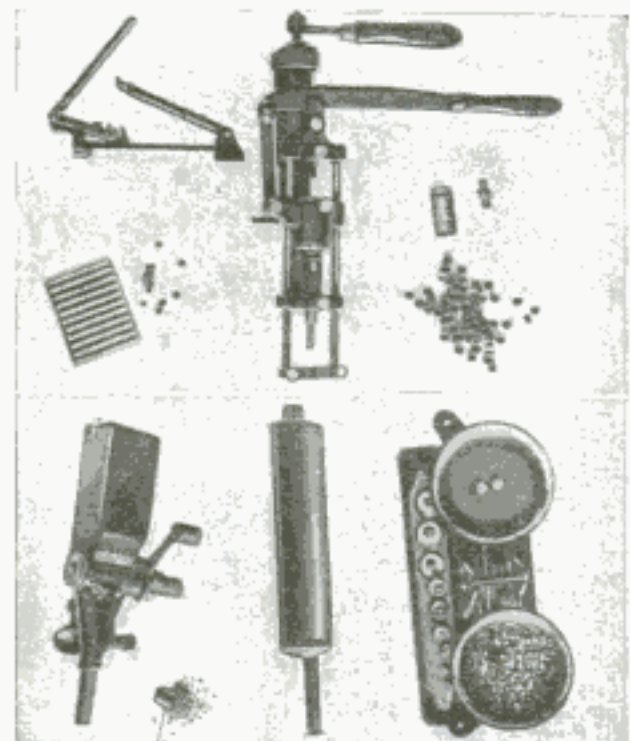
may be in keeping with that of the empty shell. A bullet is first cut out of alloy by hand, and then a gauge fitted over it from which a mold, or "cherry," is made. In this the leaden missiles are cast. They are then run through a machine that

Reloading tools of Modern-Pond Co. Frederick of Wilmington, Del.

Anacapa Standard 8/26/23



Above: Empty Shells, Crimping Tool, and Finished Bullets. Below: Bullet Molds, Reloading Tools, and Cap Extractors



Above: Cap Seater, Bullet Greaser, Primers, and Gas Checks. Below: Powder Measures and Scales for Weighing Charge

those who do target shooting can now supply much of their own ammunition. This is possible by refilling old shells with hand tools that can be used in the home. Molds, cutting devices, and cap seaters are provided, making it possible to renew any cartridge for small arms. Apparently a simple thing, the casting of the ball requires great care in order that the size

forms a gas check at the base, and at the same time fills the grooves with lubricant. Powder measured in tiny dippers is placed in the shell after the old cap has been removed and a new one inserted. Following this the bullet is put into place and the cartridge "crimped" in the reloading tool, where the mouth of the shell is squeezed into the ball.

BOTTLE OF MYSTERY MIXTURE FORECASTS WEATHER 3478

Known to be at least three centuries old, a bottle filled with what appears to be a mixture of red sand and yellow liquid, and said to be a never-failing weather prophet, is attracting the attention of French scientists. Owned by an aged Brittany farmer, whose family has handed it down from father to son for ten generations, the prophecies of this "forecaster" are so highly regarded by peasants for miles around that they will not start harvesting until the bottle has been consulted. When rain is imminent, the solid

particles gather in round clusters. White flakes appear when snow is near, and if hail is on the way, it is said the entire mixture becomes cloudy and thick. A similar bottle possessed by the man's grandfather is claimed to have burst with a loud explosion 40 years ago, when a hailstorm was followed by a snowfall that turned into a light drizzle, but its contents were not examined by experts.

Having wound 25 miles of string into a ball almost half his height, a 77-year-old man now lays claim to the title of world's champion string-winder.

Detroit Free Press
9/2/23

Ackerman Johnson Co.
625 W Jackson Blvd.
Chicago
753

POPULAR MECHANICS

**OLD GOLD PITS ARE REOPENED
TO SUPPLY GERMAN NEED** *3509*

In dire need of gold to stabilize her finances, Germany has turned to the re-opening of mines closed for many years. One of the principal fields now being worked is in the Waldeck region. Back in 1586 prospectors gave up the idea of finding sufficient precious metal in this region, but now it is yielding as much as 40 grams to the ton. Spurred by hope, the miners are rewarded with an occasional valuable nugget.

**HOLDER FOR JELLY STRAINER
FITS RIM OF DRIP PAN** *3454*

Equipped with hook-shaped legs made to fit pots and pans of various sizes by



clamping to their rims, a jelly-bag holder supports the strainer firmly in place while dripping. The cloth, which is fastened securely to the upper part of the frame by its four corners, can be removed

quickly. The device folds into a flat package for storing.

**CONE-SHAPED KNOBS SPREAD
HEAT UNDER TOASTER** *3379*

With cone-shaped projections on the base, that serve to distribute heat evenly through the flat wire-netted top, a toaster is being made that is less than a foot in diameter. It is large enough for four



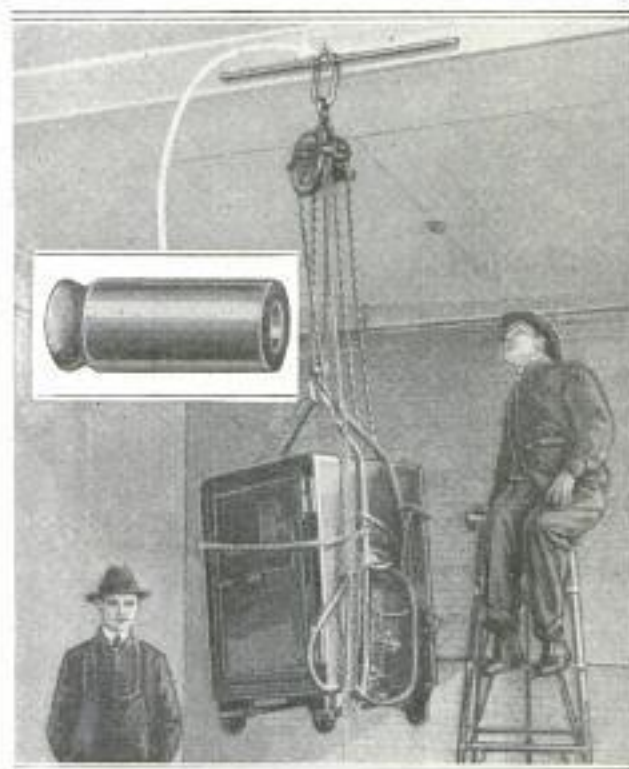
Toaster with Disappearing Handle and Cone-Shaped Knobs to Distribute Heat over the Bottom

slices of an ordinary loaf of bread, and when the loop wire handle is pushed in for storing away, takes little space.

The Washburn Co.,
Andrew's Division
Rockford Ill.

**ANCHOR FOR BOLTS IN STONE
GETS STRENGTH FROM PULL** *3421*

Getting most of its strength from expansion caused by the pull of the load put upon it, an anchor for fastening bolts



Bolt That Gains Strength from Pull, Being Used in Lifting Heavy Safe

in stone or concrete spreads by pressing a brass, cone-shaped wedge threaded for the screw, into a lead cylinder as the burden draws on it. The compression in the hole thus becomes tighter, and the metal is forced into the tiny pits and grains caused by the drill in making the opening. A special tool is furnished for setting the anchor in position, a few taps of a hammer being enough to tighten it.

**AIR SERVICE LINKS ARCTIC
TO THE OUTER WORLD** *3508*

To keep the workers on a waterpower project in touch with the outer world, the Swedish government began the first arctic air service, using two planes. In two years, 721 passengers were carried, together with great quantities of supplies. Before the air line was opened, about 500 or 600 workers were almost isolated from the outside world, the overland journey back to civilization requiring at least two days under the most favorable conditions. The time taken for the round trip by airplane is only about two hours.

Christian Science
Monitor 9/2/23
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New York

POPULAR MECHANICS
U. S. TRAINING PIGEONS TO FLY
3042 AT NIGHT

GOLD WASHED FROM ROCK BY ROTARY ORE MILL 3447

Removing practically all of the gold from ore-laden rock, a rotary washing mill made by a western inventor re-



Rotary Washing Mill for Extracting Gold from Metal Bearing Rock without Requiring Outside Labor

cently completed tests to learn its capacity. Extraction of the precious metal is done by the machine without the aid of any outside labor. The mineral bearing quartz is put into the mill where the ore is separated and washed out of the crushed stone. After the operation it is claimed that no part of the gold is left to be thrown on the dump.

SIRUP FROM SWEET POTATOES SERVES TABLE OR COOK 3504

After several years' labor, government experts announce the production of a sirup from sweet potatoes that can be used for table or cooking purposes. Although it may not prove acceptable for general baking because of its dark color, it is said to be valuable in the preparation of gingersnaps and cookies and in the making of candies, such as taffies and caramels. While the cost of extracting the sirup is placed at 64 cents a gallon, based on the results obtained at the small test station, the federal chemists believe that this figure can be lowered by quantity manufacture.

☉Cairo, Egypt, now has more newspapers than any other city of its size in the world.

In teaching pigeons to fly at night, army officers claim to be developing a necessary factor in national defense and the maintenance of communications when other methods fail.

A band of night fliers in the Canal Zone has been trained with remarkable success, the birds, released at any point in the region, finding their way home on the darkest nights as speedily as in daylight. Unaffected by weather conditions, the pigeons make flights through thick haze and heavy tropical rains to a loft having its interior illuminated by electric lights.

"These birds were put to a useful purpose recently," said an officer, "when a small army vessel was in distress 40 miles at sea. Soon after dusk a pair of night-flying pigeons was released with messages asking for aid. In two hours, the birds were at the home loft, and relief was on its way."

In another instance, a tug carrying army officers and their families was not heard from for two days after it had started on a trip, causing great uneasiness among friends ashore. Its radio apparatus failing to work, some pigeons that were on board were liberated with reports of the craft's location, which were received by the post early the morning following.

Homing pigeons, it is said, fly with remarkable speed, often covering distances of 300 miles in a single night, where weather conditions are at best. To protect its eyes during flight, nature has equipped the pigeon with a kind of transparent lid that it closes at will. That memory and sense of direction are among its strongest faculties, is shown by the fact that even when carried long distances in covered baskets, these birds will immediately strike for home when released in the darkness.

During the late war, Great Britain alone, is said to have used more than 80,000 pigeons, whose life-saving value was demonstrated in rescues of wrecked aviators, and relief of troops isolated from the main armies, through receipt of messages carried by these feathered creatures.

Many ships and aircraft are now being equipped with pigeons before they start upon their trips, to be used as a means of communicating with their stations in the event that mishaps make wireless messages impossible to send.

Unable to locate maker or inventor.

Dept. of Agriculture, Washington, D.C.



OFFICIAL PHOTOGRAPH, U. S. NAVY

Pigeons being Trained by the United States Navy to Fly at Night So That They may Carry Messages, Regardless of Weather Conditions, When Other Means of Communication Fail

Pacific + Atlantic Photos
25 Park Place
New York

756

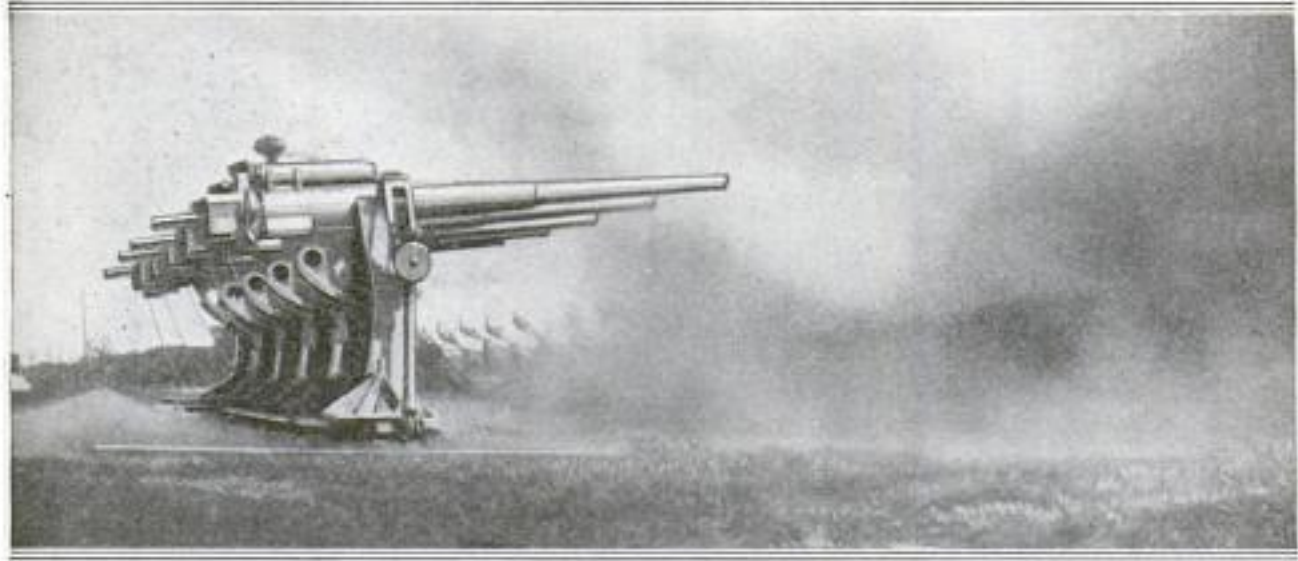
POPULAR MECHANICS

3446

ANTI-AIRCRAFT GUNS FIRED BY ELECTRICITY

In recent tests of anti-aircraft guns, the government mounted four of the great tubes in a straight line on a concrete base, and equipped the firing mechanisms with electric control. After they

ward one point and struck so near together that a wide area was affected by the explosions. As the guns come out of recoil the empty shells are automatically thrown out of the breech, and the



Battery of Anti-Aircraft Guns Being Set Off by Push of Distant Button, All of the Projectiles Traveling Toward One Point: The Shells Are Automatically Ejected

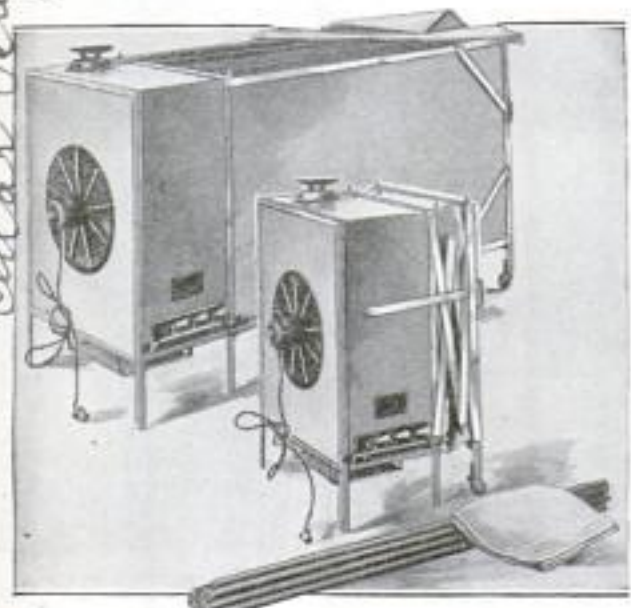
had been properly aimed for the trial, a slight touch on a push button, located at a distance, set them off at the same time. All of the projectiles traveled to-

ward one point and struck so near together that a wide area was affected by the explosions. As the guns come out of recoil the empty shells are automatically thrown out of the breech, and the

FOLDING CLOTHES DRIER GETS HEAT FROM GAS AND FAN

Using gas for heat and an electric fan for ventilation, a clothes drier that can be folded up when not in use, has been

patented, to conserve space. It provides sufficient room for a number of pieces suspended on sash cord so that the hot air may circulate freely, removing the moisture within a short time and eliminating the use of stretching clotheslines.



Clothes Drier, Using Gas for Heat and Fan for Ventilation, Open and Folded

RAIN MACHINE FOR GARDENS SPRINKLES LARGE AREAS

To create showers of varying intensity over many acres, a novel system of irrigation has been devised by a French inventor. The downpour may be changed from a slight drizzle to a cloudburst at will. Every square foot of area is covered by the artificial showers, the fall being controlled by a single valve. Simple in design, a long steel girder serves as a runway for the arm that distributes the water. To irrigate an area of fifteen acres, a runway is built some 300 feet in length. The sprinkling device consists of two metal arms, which roll up and down the runway, extending at right angles. The water is sprayed from a series of jets along the arms which move back and forth across the entire field.

E.W. Richard Co. Rapids, Iowa
Cedar Rapids, Iowa

Edmond Colliard - address unknown

New York Times
9/2/23

**WAR-ENGINES OF FUTURE
TO BE ELECTRIC**

3499

Electricity is to be a strong factor in future wars according to statements made by British experts who see in the discoveries of science a terrible power of destruction from mysterious waves of electric current sent through the air from hidden sources. Motors of airplanes and seacraft will be halted by special waves of wireless broadcast for thousands of miles, and even infantry and cavalry might be thrown into confusion or utterly destroyed by strong jets of water charged with electricity and mixed with acids. Machine guns and monster naval cannon, it is said, may be noiseless, and the projectiles will be "fired" by electric force. Sound made by electrically operated instruments will roar out over the battle fields with such a racket as to wreck the minds of opposing armies that dare to remain within hearing. Heat generated wirelessly will shoot out unseen over wide areas, destroying property and life without warning.

**DISH-HOLDING RACK IN PAN
SAVES TIME IN KITCHEN**

3352

To save time and labor in the kitchen and make dishwashing easier, a large pan containing a wire rack to hold china and cooking utensils while being rinsed with hot water, is being made. At one end is a receptacle to hold cutlery. After the



Pan with Wire Rack That Holds Dishes for Rinsing and Drying. Saves Much Time in Kitchen

dishes are washed, they may be stacked upright in the drier and hot water poured over them, which quickly drains off.

Just a tiny particle of dust, hardly as large as a pinhead, is blamed for a recent railroad wreck in Europe. The engineer of an express train, it is said, was temporarily blinded when dirt lodged in his eye and he failed to see stop signals.

The Washburn Co. and
Wire & Iron Works
Newford, Del.

**PAINTED LEATHER ON WALLS
TAKES PLACE OF PAPER**

3471

Making leather paintings to replace wall paper is a recently established industry in Europe. The completed work



Thin Leather Covered with Painted and Waterproofed Designs Made to Replace Wall Paper

is covered with a waterproofing preparation, so that the painting can be cleaned by washing. The designs are made of a special paint put on by ordinary camel's-hair brushes. Linen daubs are used for spreading ground colors over the greater areas.

**ENGINE CREWS IN TUNNELS
TO GET BRAKE-TANK AIR**

3425

Fresh air from tanks of the brake system, supplied to locomotive crews through a tube with a rubber funnel, is regarded by government experts as the best way to protect them from hot, choking smoke and damp, gas-laden air that often fill the tunnels through which they must pass. Poisonous fumes from hot exhaust of the engines are claimed to be sources of danger and the causes of many accidents. Tests held under conditions similar to those met with in tunnels have indicated that the men might be completely overcome in 20 minutes if a locomotive should become stalled.

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8/21/23

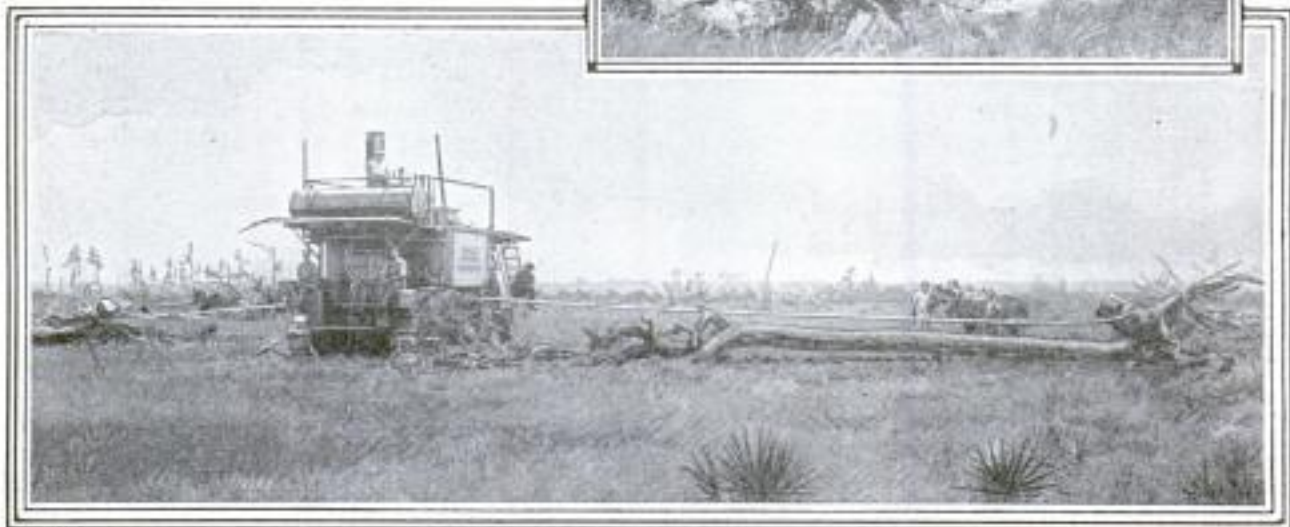
3159 *Bissell Stump Harvester Co.,
Fort Meyers, Florida*
HUGE MACHINE MAKES PLAY OF STUMP PULLING

machines



and burning. By means of a drum mounted on each side, the machine can pull from two directions at the same time, thus automatically bracing itself, while handling more work. In a day, according to reports, it clears four times as much land as one man can in a year.

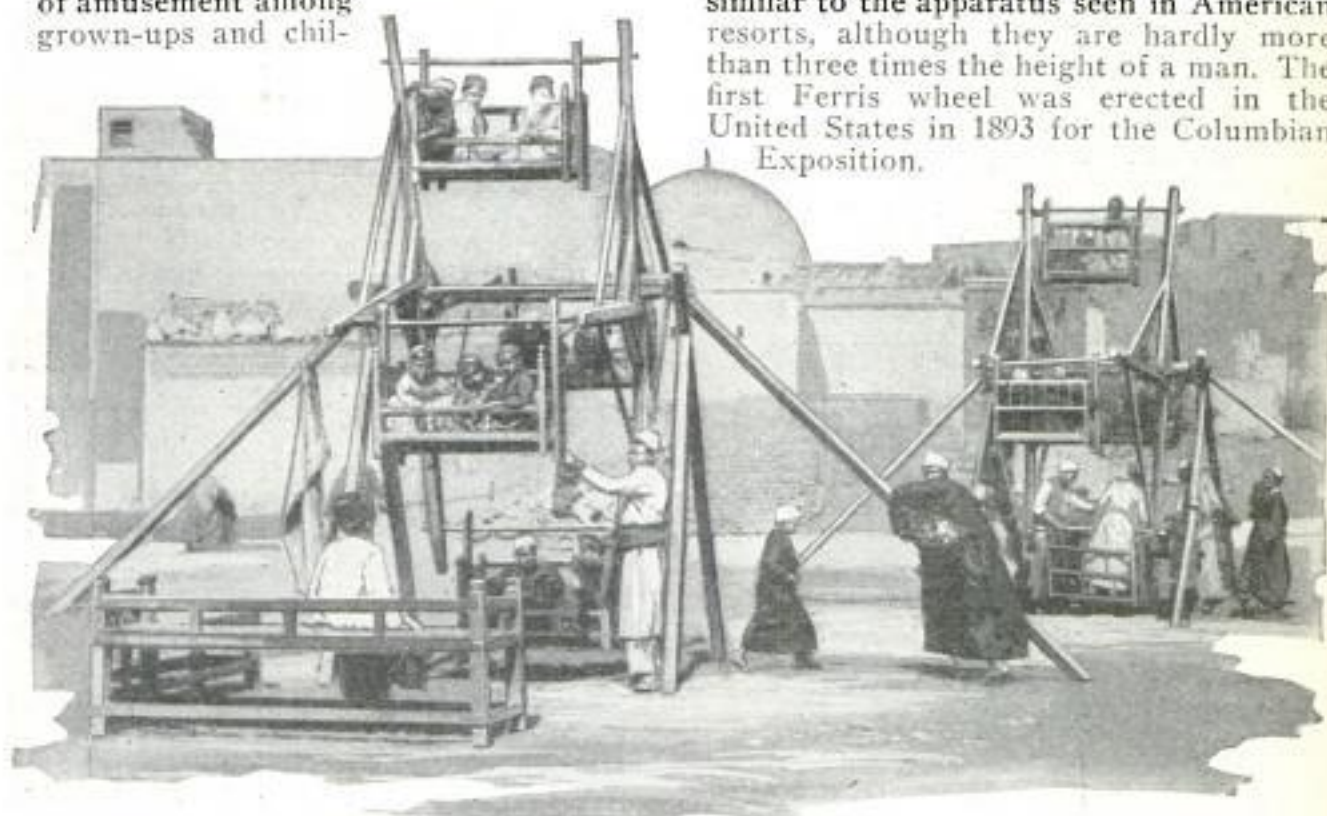
Acres of wild lands in Florida, rendered worthless by thousands of stumps of giant pines, are being made suitable for farming by a powerful tractor that not only pulls the stumps out of the ground, but bores holes in them to take charges of explosive for splitting



FERRIS WHEELS POPULAR IN NILE VALLEY

In the sunburned valley of the Nile in Egypt, Ferris wheels are a popular form of amusement among grown-ups and chil-

dren alike. Although made entirely of wood and propelled by hand, they are similar to the apparatus seen in American resorts, although they are hardly more than three times the height of a man. The first Ferris wheel was erected in the United States in 1893 for the Columbian Exposition.



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In Egypt Crude Wooden Models of the Modern Ferris Wheels That Grace American Parks Are Operated by Hand but Attract Many Amusement Seekers from Among Both Young and Old

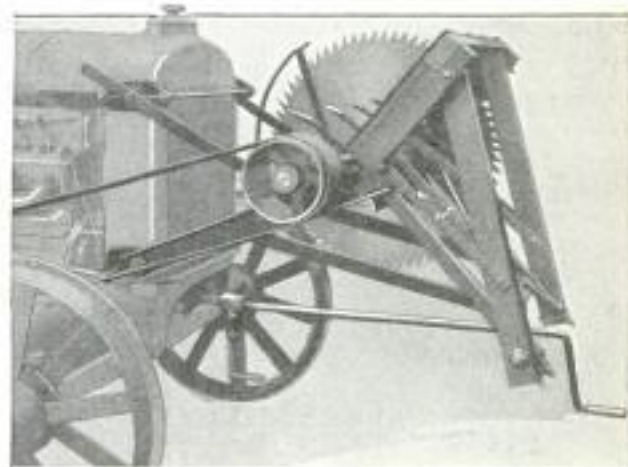
WATER IN SUBMARINE'S HULL TRAPS MEN AT SEA 3464

With their only avenue of escape blocked by 57 tons of water, the crew of a giant United States submarine recently was rescued after being 14 hours beneath the ice and water. Within the shadow of the arctic circle, where the craft was cruising, the ice laden waves tore off the sea valves. Tons of water rushed in so fast that all, except three men on deck, were trapped in the compartments. The submersible sank to the bottom, 102 feet below, her stern resting on the ocean floor with her nose above the sea. Ships summoned to the scene attached lines to the submarine's bow, divers cut a hole in the hull for the air pumps, and the boat was floated out.

SAW ATTACHED TO TRACTOR SAVES HAULING LOGS 3415

Much of the hard labor of wood-cutting is eliminated by attaching a saw frame to a tractor, so the farmer can ride

to the wood lot, instead of hauling heavy logs to a centrally located pile for cutting. The saw frame can be fastened by castings on the upper and lower sides of the radiator. Wood to be sawed is placed on



Attached to a Tractor the Saw can be Moved About, Saving Labor of Hauling Logs

steel strips that carry all the strain. The tractor can be prepared for moving in less than a minute.

Stover Mfg. & Engine Co., Freeport, N. Y. Copyrighted material

Phila delphia Public Ledger

How Nation's Crop Estimates Are Gathered and Sent Out to Waiting Millions

Army of Two Hundred Thousand Persons Used in Gathering Information of Vital Interest to Producers and Consumers

BY ROBERT H. MOULTON, *Room 2,
Board of Trade, Chicago*

"READY—Get set—Go!"

As the words ring out, there comes the rush of feet over a tiled floor, the clatter of telegraph instruments, and the latest crop bulletins are clicking over the wires to the four quarters of the United States.

Every month this drama is enacted in the corridor of the staid, old Agricultural Building in Washington. It is a twenty-yard dash by newspaper correspondents from a table on which the copies of the report are placed face down, to the nearest and quickest means of outside communication.

The reason for it is the government's determination to play absolutely fair, to see that the report is released to all interested parties simultaneously, and that no biased information is put out before the fixed time. No matter on what day the estimates are issued, the hour is exactly the same—2:15 o'clock, eastern time, to the second, as the western grain exchanges are then closed.

If the reports reached the traders during the midst of a session, they might create unwarranted changes in prices, it is felt. Naturally, the quotations often are affected, but coming after the close of a session, there is ample time to consider the figures before the boards reopen the next day. Farmers also are keenly interested, as the estimates may indicate whether the wheat, corn, or oats crop of the country will be large or small, and, consequently, whether they will be able to market their crops at a high or low price.

Indeed, the information is of interest to almost everyone. Ignorance of crop conditions is said to encourage speculation, which, while benefiting the consumer not at all, injures business, and often prevents the farmer from obtaining just prices for his products. If there were no tabulation by the government, and speculators, by misleading reports, should depress the price of cotton a single cent a pound, the growers might lose \$60,000,000 or more. On the other hand, if the price was improperly raised, manufacturers and allied interests would be harmfully affected in a proportionate degree and retail prices would suffer.

To the railway companies, it is important to know the probable size of crops in order that they may be enabled to provide the number of cars required. Merchants in small towns and manufacturers also are vitally affected, for, if

the crop outlook is good, they know that they can order or produce liberal amounts of goods to be handled by them several months later.

As issued by the government, the reports are, to a considerable extent, a composite of thousands of individual estimates. In the central office of the government bureau, there are about 135 employes, the majority of whom are clerks, computers, and trained statisticians experienced in handling and interpreting agricultural facts. In addition there are 42 salaried field agents, each of whom is required to travel over his state systematically during the crop season, and to personally inspect crops, interview



Dramatic Race Enacted Monthly by Newspaper Men Here Seen Waiting Word to Dash to the Telegraph with Crop Reports

GOVERNMENT REPORTS									
TOTAL PRODUCTION			CONSUMPTION				RESERVE		
OCT. 1917	SEPT. 1917	(000)	1917	1916	1915	1914	1913	1912	1911
102,000	71,624	WHEAT	100	100	100	100	100	100	100
110,000	70,000	SPRING WHEAT	100	100	100	100	100	100	100
120,000	70,000	FALL WHEAT	100	100	100	100	100	100	100
130,000	70,000	BARLEY	100	100	100	100	100	100	100
140,000	70,000	RYE	100	100	100	100	100	100	100
150,000	70,000	FLAX	100	100	100	100	100	100	100
160,000	70,000	OTHER	100	100	100	100	100	100	100

SEE FRONT, OCT. 1, 1917 P. 7.



In Every Seething Grain "Pit," Where a Change of a Single Cent in Prices Means Fortunes Won or Lost, the Traders Watch the Government's Estimates as an Almost Certain Guide in Handling Their Deals

From the Moment the Crops Burst Through the Soil, an Army of Government Investigators Watch the Slow Development of the Plants to Obtain Accurate Estimates of the Final Yield



Only after the Shrill Whine of the Threshing Machines, That Rises in Kansas and Ends in a Mighty Symphony on the Canadian Border, Has Ended, and the Harvest Is Complete, Does the Government Issue Its Last Figures on the Total Yield



When the Yellow Harvest Moon Looks Down on the Completed Results of the Farmers' Labor, Statisticians Complete the Figures Which Are So Vital to the Agricultural and Business Interests of the Country in Forecasting the Future Range of Prices

farmers, representatives of commercial houses, elevators, buying and selling agencies, and state and local authorities.

In all, there are approximately 200,000 volunteer correspondents, including 50,000 individual farmers. When the returns are all in, they are sorted by states and districts, the totals being tabulated on sheets which are identified by number only, so that the work of adding up and averaging the figures is purely mechanical and there can be no possibility of a "leak." Later the crop-reporting board is called into session and the figures placed in its possession. From this moment until the report is issued, it is impossible for anyone but the secretary or acting secretary of agriculture to enter the room, and even he cannot leave until the estimate is given to the press. Guards are stationed at the locked doors leading into the bureau, and all telephone and telegraph wires are disconnected, the switchboards being locked and the key retained by the chairman of the board, who is also locked in.

During the meeting the members of the board figure out crop conditions, yield and acreage, from the reports or

estimates sent in by field agents, county correspondents, and township representatives. the thousands of reports from the two latter sources having previously been reduced to percentages. Thus the members may be confronted, for instance, with the condition of winter wheat in Kansas at a certain time, somewhat like this: Field agent, 94; county correspondent, 91; township representative, 93. After taking into consideration weather conditions and reports from adjoining states, an average of the three estimates is then made.

Farmers benefit both directly and indirectly by the reports. What they learn from them about the condition and prospect helps them in their business, and, in addition, this knowledge is highly advantageous to the individual agriculturist. The more certainty there is as to the supply and demand, the less hazard of speculation—to the benefit, in the long run, of both producer and consumer.

The first work of gathering crop statistics in this country began in 1863. At present, this branch of the government costs about \$250,000 a year.

3429

SPAIN FINDS IMPORTED COTTON CHEAPER THAN NATIVE BRAND

Though the Spanish government encourages cotton-raising among native planters, irrigation and wages are so

the country, but the industry died out. Buyers from the mills meet the ships bearing the raw material at the wharves and set up strenuous arguments concerning weights and prices. Each bale must be tested on the scales and inspected by the purchaser before he closes the sale.

LANGUAGE OF CHINESE SET ON TYPE MACHINES

3458

As a result of the formation of a system of 40 characters, Chinese language is being set on type-casting machines and reproduced in print. Until recently little was known of the script, but it is now taught in native schools under control of the government and foreign missionaries. To each of the symbols have been assigned syllabic sounds that are identified by small dots and strokes. While the written words remained the same through the centuries, the spoken language has undergone many changes. Often the inhabitants of one province in China cannot understand the speech of those residing in other sections.



Weighing Cotton on Spanish Dock. Where Each Bale Undergoes a Rigid Inspection by the Purchaser

costly as to make the imported article cheaper. At one time cotton was extensively grown in the southern section of

(Cows only four feet high, the smallest in the world, are to be found in the South Sea Islands.

The Williams Service, 33 Union Square, New York City

Mergenthaler Linotype Co. 290 Myerson St. Brooklyn, N.Y.

**"DIVINING ROD" FINDS GOLD
BURIED IN SUNKEN SHIP**

3451

Whet.
as ir
ship
diver
left
of iron
hand
contact
carats
admira.

Divers have recovered practically all of \$30,000,000 in gold bullion and \$5,000,000 in silver coins carried by the liner "Laurentic," sunk off the Irish coast in 1917 by a German submarine. With spearlike instruments, that showed the presence of precious metals, connected to dials on the ships above them, they prodded through the wreckage. A needle on the scale indicated the kind of metal the rod touched. More than 2,100 bars of bullion have been taken from the hulk, each valued at from \$5,000 to \$10,000. Monster dogfish and other denizens of the deep hampered the work by vicious attacks on the men, which the divers repelled with long knives. Each undersea worker received one-thirty-second of the amount he salvaged.

3420

**WHIRLING WHEEL OF BLADES
DOES PIPE CARVER'S WORK**

Turning out a completed bowl for a tobacco pipe in one operation, a machine invented by a western man carves the bowl, bores the hole in the stem, and polishes the finished article. Blocks of wood



Above: Knife Wheel for Carving Pipes. Below: Right, Machined Bowl, and, Left, Hand-Chipped Article

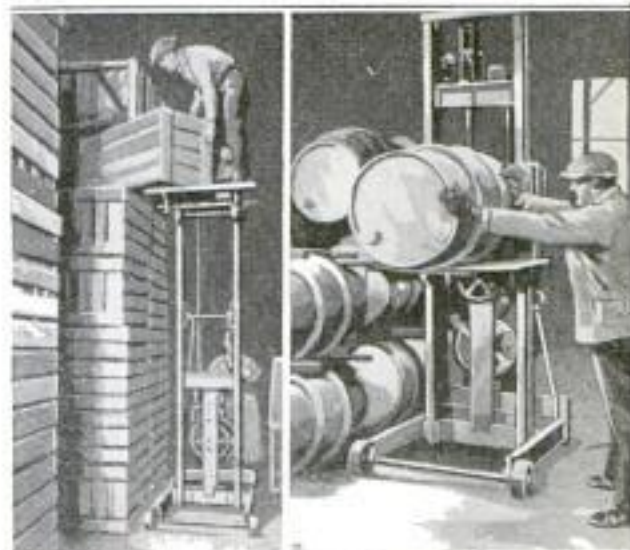
are placed against the grinding wheel of 14 blades, that revolves 1,400 times a minute. Without being touched by hand, various sizes and shapes can be made by adjusting the cutting edges. By the old method, the bowl is chipped by hand tools, in a turning lathe, and the stem is hollowed out in a separate operation and the surface smoothed for the gloss.

Friend Electric Co.
625 W. Jackson

**AIR SPACE MADE TO PAY RENT
WITH TRUCK ELEVATOR**

3284

To utilize waste space in factories or warehouses, a truck has been patented that is equipped with a platform which



Two Men, Using Portable Elevator, Performing a Task That Ordinarily Requires Several Workers

may be raised or lowered by hand. The device stacks barrels, boxes, or bales in out-of-the-way, overhead places, where it would be extremely difficult for men to work. For instance, in a low-studded basement, one man using the apparatus can pile boxes to the ceiling, a task that otherwise would require several workers and take much longer. It also can be used as a permanent elevator between two floors, as a lift for handling bulky and heavy pieces of steel weighing a half ton or more, or as a ladder for hanging and cleaning motors and shafting, installing lights, or for any purpose where an elevation of medium height is necessary.

**GROWTH OF PLANTS INCREASED
BY ELECTRIC LIGHTS**

With the aid of electric lights, larger and better crops of vegetables can be produced, recent experiments have indicated. In one test, five incandescents were arranged over a bed of lettuce and lighted each day for 6 hours, beginning at dusk. After 12 days, the illuminated plants had two and a half times as many fresh leaves as those exposed only to the sun's rays. The forced heads also developed in two weeks—one-half the time required by the others—and were firmer and heavier. Thus, with the use of electricity, it is said two crops can be raised in the time required for one under ordinary conditions.

Blvd
Chicago

Lewis Shepard Co., 566 E. Third St., Boston, Mass.

Emt. N. Sakata #10, Geochome, Tidamachi
 Kojimachi-Ku. Tokyo, Japan.

764

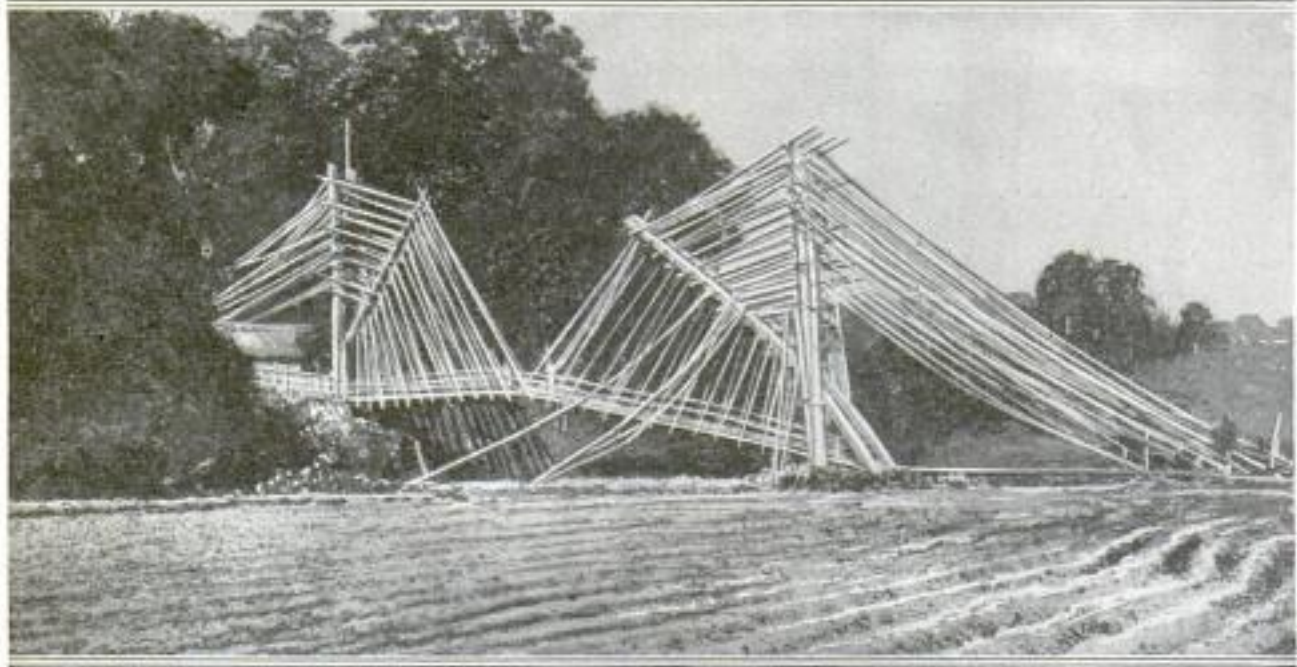
POPULAR MECHANICS

3395

BRIDGE BUILT OF BAMBOO SPANS RIVER IN JAPAN

More than 100 feet in length, a bridge, made entirely of bamboo, spans a Japanese river. Long poles notched and

ing to sprout and are prepared and eaten like asparagus. They are also salted and served with rice, and prepared as pickles,



Built Entirely of Bamboo Poles Fastened Together with Leather Thongs and Metal Straps, This Suspension Bridge over a Wide River in Japan Carries Traffic without Much Need of Repair

strapped together with rawhide or metal, make a strong, light structure that can be built in a short time. In the orient, the bamboo tree is regarded as one of nature's most precious gifts to man. The young shoots are cut off when just start-

or candied in sugar. Joints of large stems are used as water buckets, and smaller ones as bottles. Houses are frequently built entirely of the wood. Masts of boats, furniture, and many other valuable products are also made of bamboo.

FISH CLEANER ROLLS SCALES UNDER TOOTHED BLADES

For cleaning fish, a scraper has been designed to roll the scales from under its blades instead of throwing them into

RATS HITCHED TO STRING PULL WIRES THROUGH CONDUIT

Four large rats are reported to have been trained by a foreman of an eastern construction company to draw wires through conduit pipes. They are said to perform tasks that usually were accomplished slowly and often with great difficulty by a system of jointed rods and pulleys. The owner of the little animals first taught them to crawl through stovepipes in answer to his whistle, always rewarding them with bits of cheese. Later he tried them in underground pipes, tying strings to their tails, to which were attached thin wires. Heavy cables are fastened to the wires and hauled through long stretches of tiling after the rodents have done their work.



Scraper for Cleaning Fish That Prevents the Scales from Flying into the Air

the air. Instead of being arranged in straight rows, the teeth of this tool are staggered and flattened at the points to prevent cutting into the meat. The task can be accomplished in a fraction of the time that it takes with a knife. As there are no sharp edges, the possibility of scratching the fingers is eliminated.

That New York City and its suburbs will have a population of 29,000,000 in A. D. 2000 is a prediction of an official city-plan committee.

E. W. R. Co. Inc. 1000
 3453
 Frederick Md.

Edw. J. Payne
 c/o The Washington, D.C.

Auto
Accidents

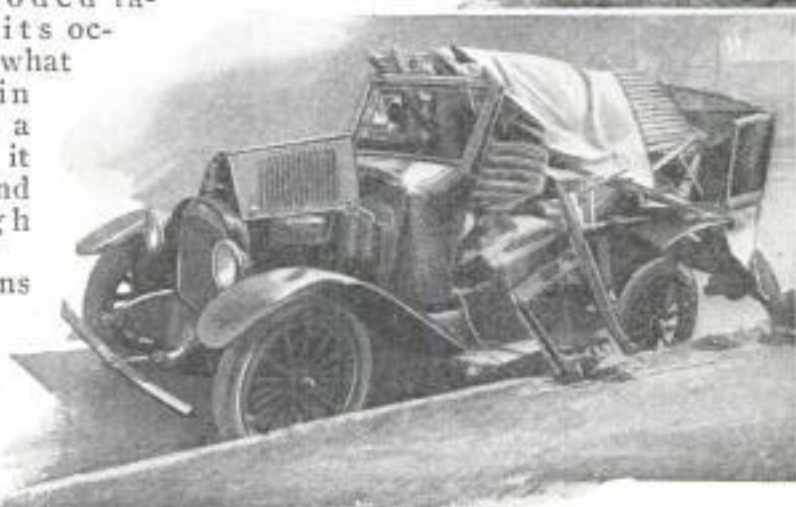
3277

DEATH-DEALING JUGGERNAUT'S TOLL INCREASING

With more than 12,000 deaths reported in the past year as a result of motor-car accidents, the constantly increasing list of tragedies has resulted in a nation-wide search for preventive measures. Speeding, joy-riding, dangerous curves, grade crossings, and collisions claimed the greatest number of victims, although defects in steering apparatus and carelessness were blamed in many cases.

When its steering gear failed to work, the car shown in the top picture leaped off the road and plunged through a wooded ravine, carrying its occupants to what seemed certain death over a precipice, but it was caught and held in a high wire fence.

What happens when a machine speeding at 60 miles an hour in the early morning hours strikes a truck, is seen below. Of the passengers, one was killed and six seriously injured. "Just another



case of joy-riding," the police reported after a lengthy investigation.

Blinded by the headlights of an approaching car, the

driver of the machine shown in the third picture from the top, plunged from the narrow road at a curve. Although the automobile, which was going at an excessive rate of speed, was wrecked, the passengers escaped injury.

That some accidents are unavoidable, is proved by the bottom picture. Here an empty train missed the switch points at a station, and crashed into a motor car containing four persons, only one of whom managed to jump in time. Although a heavy coach completely covered the auto, none of the other occupants was injured.

As a result of these and the many other accidents taking place daily in all parts of the country, the regulation of automobile traffic has become stricter, and the examination of applicants for drivers' licenses is more severe than ever before.

Wilder Mfg Co, 211 Pacific St
 Brooklyn, N.Y.

766

POPULAR MECHANICS

CAMPING OUTFIT FOR AUTO RUNNING BOARD



Complete Camping Outfit, Light in Weight and Strongly Built, for Autoists, That Folds into Case on the Running Board of Car When Not in Use

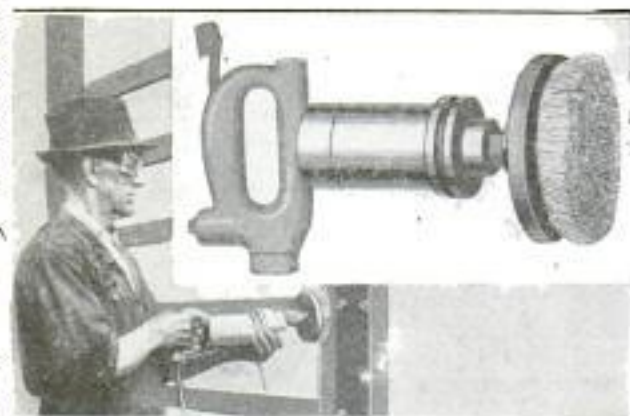
For storing campers' equipment, a trunklike chest, light in weight but strongly built, is being made that is carried on the running board of the automobile. In its numerous compartments are dishes, forks and knives, folding chairs, and a small gasoline stove. When

set up, an inner section pulls outward and becomes a table top, supported on collapsible legs. So closely packed are the various utensils that the case holds enough for a party of several persons. Containers for uncooked food are provided.

WIRE-BRUSH WHEEL CLEANS LIKE SANDPAPER

For cleaning flat surfaces, a rotating brush with wire bristles, operated by a small electric motor, is being made. It

ally employed. Gripped in the hand like a saw, the instrument can be handled easily. Run by a specially adapted motor, using power from a lamp socket, it cleans quickly and thoroughly.



Wire-Brush Wheel Attached to Electric Motor for Cleaning Flat Surfaces

is for such uses as removing rust and paint from steel and iron, scouring stone or cement, scraping varnish from wood, and other tasks where sandpaper is usu-

AIRPLANES WITH RADIO GUIDE FISHING BOATS TO PREY

Encouraged by the government, owners of French fishing schooners are equipping their craft with wireless to assist them in locating and marketing the catches. Fishermen are guided to the regions where fish are plentiful by naval aviators scouting the sea in planes fitted with radio. By the same means home-bound trawlers keep in touch with the markets and steer clear of ports where the need for fish has been oversupplied. Thus, the skippers are aided in finding buyers at the highest prices. Messages exchanged with brokers ashore are followed by advance sales to dealers, and often fish caught thousands of miles away are sold before taken from the water.

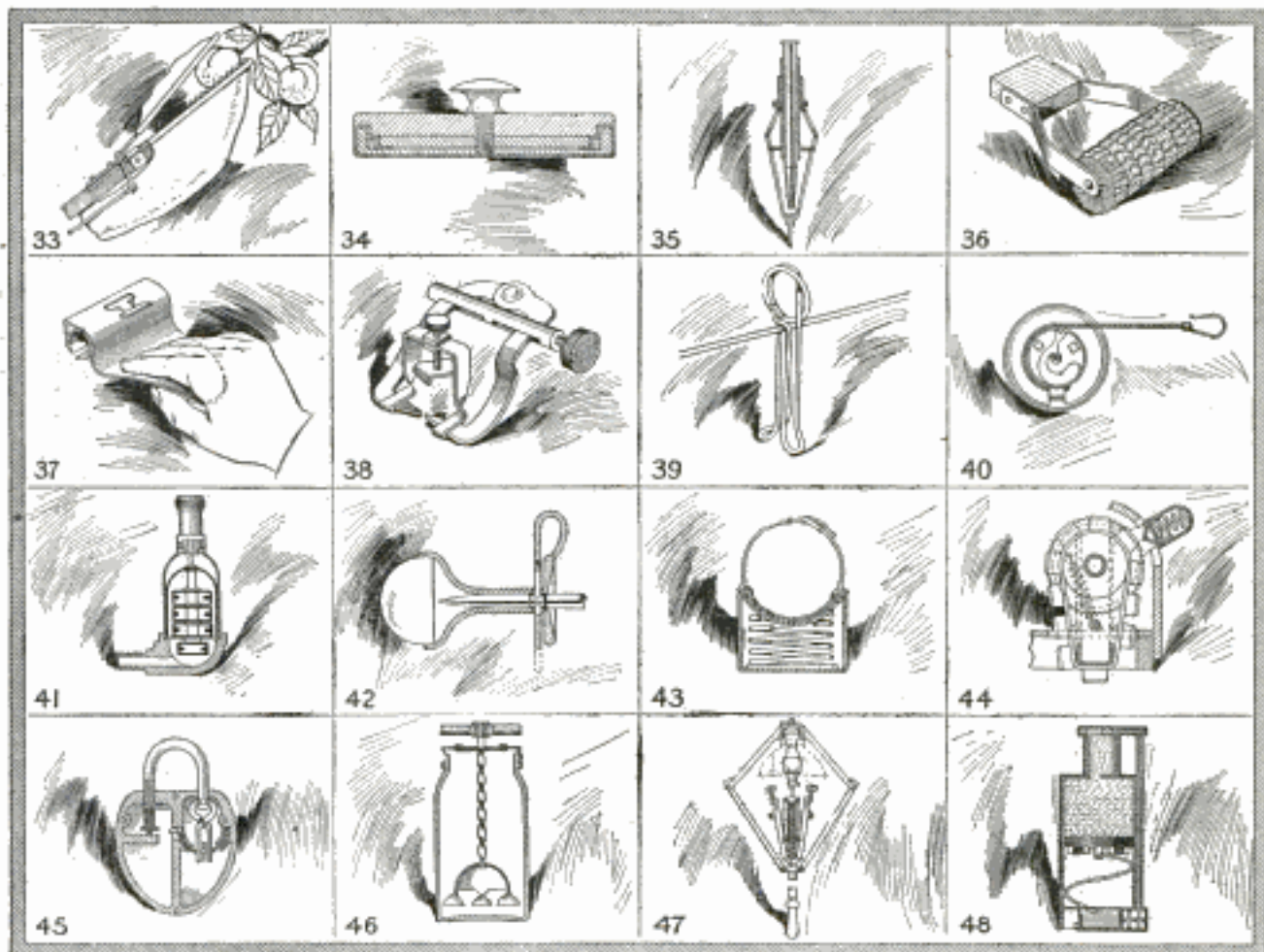
New York Times
 9/12/23

J. W. Parson Co., Nicetown Lane & D. St., Phila.

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These Articles Are for Everyday Use
But—
Can You Name Them?

3674



JUST to help you, the use for which the articles are intended is as follows:

No. 33 on the farm. No. 34 by women. No. 35 in a trade or in the workshop. No. 36 in a trade. No. 37 by men. No. 38 in a profession for painful work. No. 39 by the housewife. No. 40 by anybody. No. 41 in the home. No. 42 by women. No. 43 for men at work and in sport. No. 44 in the office. No. 45 anywhere for protection. No. 46 in the home. No. 47 in buildings and homes. No. 48 for business purposes.

Popular Mechanics Magazine offers no prizes for correct answers to these problems, but presents them for the interest it believes its readers will find in attempting to determine the nature of the various articles shown.

If you think you have the right answers you can find out by comparing them with the correct list which will appear in Popular Mechanics Magazine for December.

In October the following articles were shown. No. 17, can opener. No. 18, holder for baby's bottle. No. 19, pipe. No. 20, stand for rural mail box. No. 21, tumbler washer. No. 22, animal trap. No. 23, fly-paper and holder. No. 24, burglar alarm (tampering with doors releases water on sleeper). No. 25, cover for child's crib. No. 26, cigarette saver. No. 27, metal fence post. No. 28, match scratcher. No. 29, lemon squeezer. No. 30, wing-clip to prevent fowl's flying. No. 31, fish bait. No. 32, hair cutter.

3328

3328 VASES MADE OF WAR SHELLS SHOW WORKERS' SKILL

From big brass shells left by troops in the Holy Land, during the late war, skilled workers in brass create beauti-



Skilled Brass Workers with Objects of Art Made by Engraving Discarded Cartridge Shells

fully carved vases, goblets, and other ornaments. All work in this ancient craft is done by hand in a rude wooden vise. With sharp knives, the designs are drawn and the shells are cut to desired forms without the use of machinery. Though the metal takes a glossy polish, it tarnishes easily when exposed to the air. The bright surface is preserved by a bath of nitric acid, followed by a coating of varnish. It is believed that natives of this region acquired their craftsmanship from India, where it is an old and honored art.

CARS BOARDED WHILE MOVING TO AID TRAFFIC 3360

Perpetual motion in transportation, in so far as possible, is the aim of an experimental railroad built in England, that keeps cars moving even while discharging and loading passengers. Although only 300 yards long, with "up" and "down" tracks about 6 feet apart from center to center, this "never stop" road is estimated as capable of carrying 18,000 persons an hour in each direction. To permit patrons to leave or enter with ease, the cars are slowed down to 1 1/2 or 3 miles an hour while passing platforms. The train may be speeded up to 24 miles an hour between stations. The coaches are propelled and their speed controlled by endless screwlike spiral tubes laid between the rails of each track, in which an arm from the underside of each vehicle engages. This produces an interesting condition. While at a platform, the

cars are practically in contact with one another, but as the first coach moves out it runs away from the second, the latter leaves the third, and so on. Yet at the next loading point, since the lead coaches are slowed down first, they are once more in close formation. Each car is equipped with rubber-tired, flangeless wheels.

3327 BODY OF COLUMBUS IS MOVED TO FINAL RESTING PLACE

After having been moved three times during the four centuries since his death, the body of Christopher Columbus, discoverer of America, is at last in its final resting place in Seville Cathedral, Spain. Here every year thousands of travelers pay their respects to the Spanish admiral. After his death, the body was taken from Valladolid to a monastery at Seville, where the bones of his son, Diego, the second admiral, were also laid. Thirty-six years later the remains were trans-



NEWMAN TRAVEL TALKS Tomb in Seville, Spain, Where Body of Columbus Rests After having been Moved Three Times

ported across the Atlantic to the Cathedral of San Domingo. When that island was ceded to the French in 1795, the relics were re-exhumed and transferred to the Cathedral of Havana. Later they were returned to Seville, where they rest in a tomb.

Esquimo dogs of the arctic region are capable of hauling a sled over 20 to 40 miles of snow and ice in a single day.

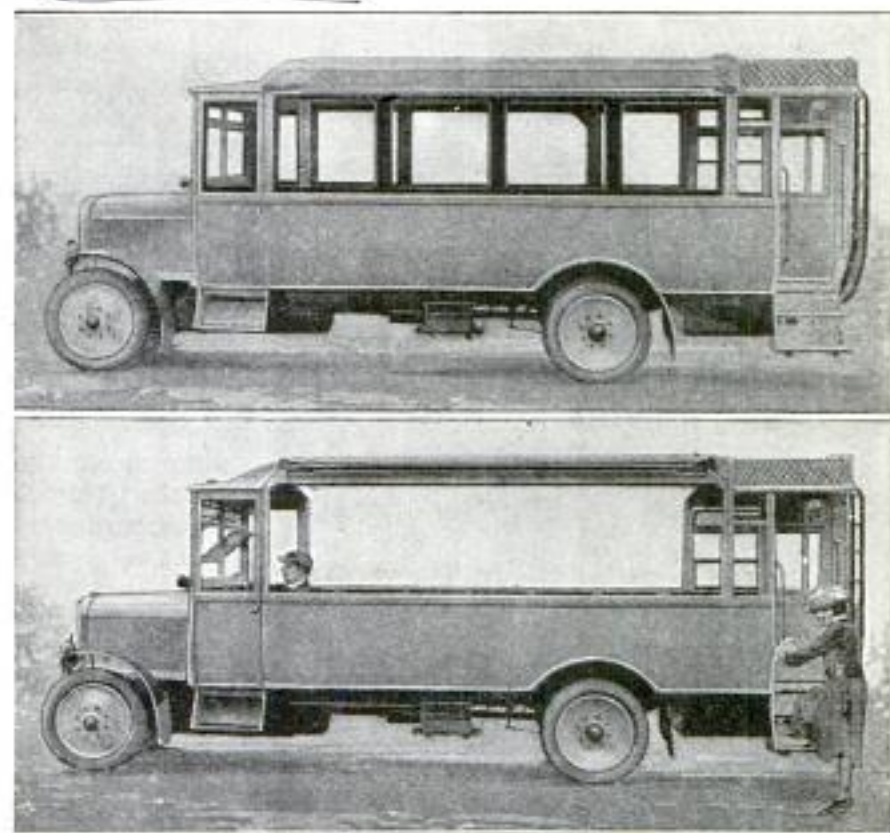
The Engineer 7/27/23

Newman Travel Talks Tribune City Chicago

9101

SIGHT-SEEING MOTOR BUS WITH FOLDING TOP

To give passengers the enjoyment of touring in an open bus and yet provide for protection in case of a sudden shower, an English body builder has designed a motor-bus body with a folding top and drop windows. When the top is folded it occupies only a small space along the center of the bus, and the side windows drop out of sight in the sides of the body. When closed, the body insures complete protection from bad weather. The car is transformed from an open to a closed model in a few minutes. Since the roof occupies little space when not in use, the bus is convenient for sight-seeing, as it affords the occupants a view on all sides. Seats unfold for emergencies.



In Good Weather the Top of This Bus can be Folded into a Small Space in the Center, While the Windows are Dropped into the Sides

CANNIBALS HOLD TO EARLY "LAW" 3357

Many natives of the Solomon Islands, noted for their cannibalism and ferocity, are firm believers in the ancient "law"—"an eye for an eye and a tooth for a tooth." Recently three savages from the Malaita Island, the home of an exceedingly wild tribe, who were working on plantations, were killed by white men. Their relatives, to avenge their death, started on a hunt for the heads of three Europeans and, in an attempt to obtain the first, attacked and severely wounded a French captain employed in recruiting.

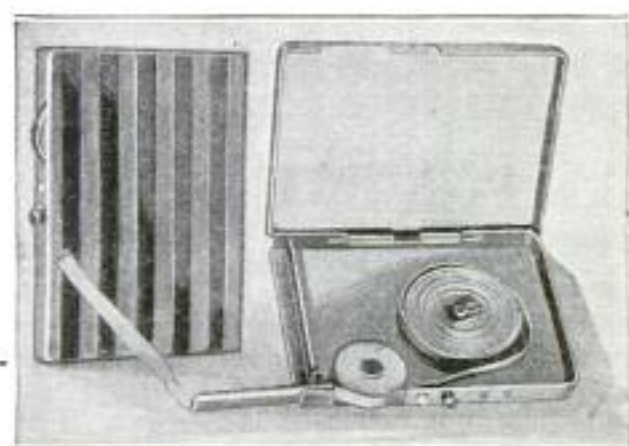
MACHINE FOR STAMPING SEAL OF STATE SAVES LABOR 3844

What is believed to be the first electrically operated machine made for affixing the seal of a state or any of its departments to documents is now being used by Arizona. Owing to a recently enacted law, the work was so increased that one man had to be assigned to the duty of stamping the official seal on all papers that passed through his hands. Now a touch of a button makes 500 impressions in an hour.

H. W. Wilson, Pres.
Phoenix, Ariz.

PHOTO FLASH LAMP AVOIDS USE OF LOOSE POWDER 3291

With a small metal lamp, shaped like a cigarette case, a flash for making photographs in the dark is obtained without



Photographer's Flash Lamp, Size of Cigarette Case, That Does Away with Handling of Powder

handling powder. A narrow strip of magnesium, which pulls out of the case like a wick, provides an intense flare, equaling that of the flash gun. Ignited by a match, the duration of the light is set by the length of the strip that is pulled out of the case.

Hugo Epstein, 212 W. Monroe, Chicago
Dealer.

R. H. Allwork
169 W. 152nd St.

Kansas City Star

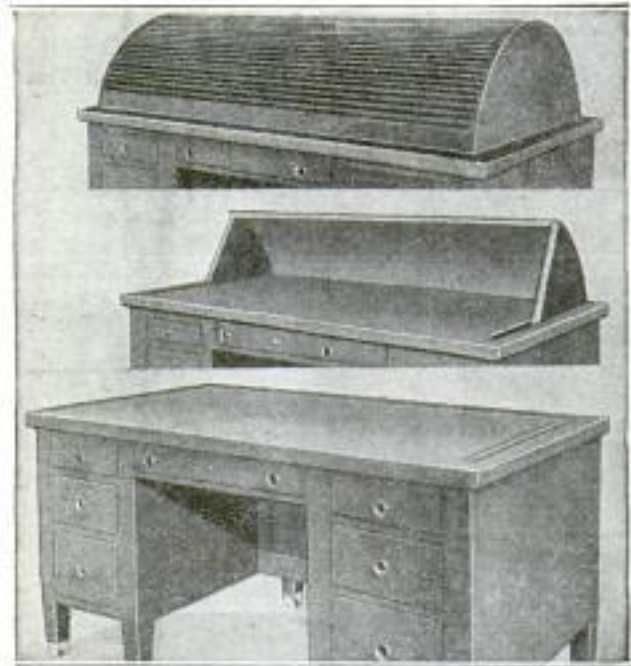
8/18/23

POPULAR MECHANICS

COVER FOR FLAT-TOP DESK
ROLLS UP OUT OF SIGHT

OCEAN KEEPS TRAGIC SECRET
OF LONG-LOST OIL TANKER

33 45 Features of both flat and roll-top office desks are combined in office furniture recently patented by an eastern inventor.



Flat-Top Office Desk Fitted with Roll Cover That Folds into Concealed Receptacle

Similar in appearance to a stenographer's table, it is fitted with a semicircular cover that extends over its upper surface, thus preventing the loss of important papers or letters. Only a slight tug is needed to draw it from a concealed receptacle at the rear, where it is kept while the desk is in service. A lock holds it firmly in a slot at the front when closed.

THIRTEEN THOUSAND LAWS
ARE ENACTED IN YEAR

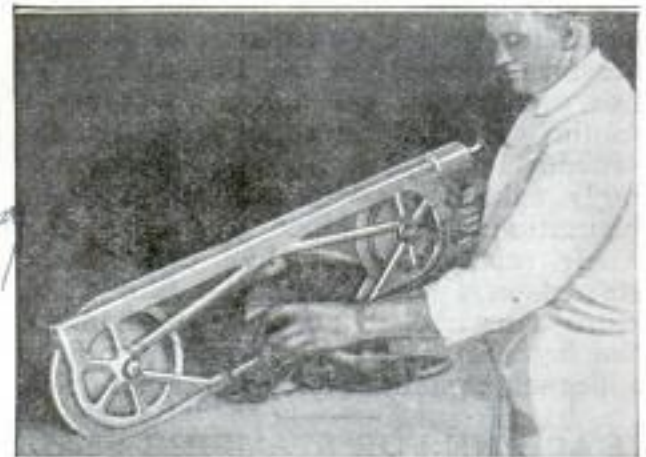
Although there is said to be no exact record of the number of laws on the statute books of the nation, experts have calculated that in one year, 13,000 of 40,000 bills presented in the legislatures of 35 states, were passed at a cost of about \$900 each. Congress handles from 10,000 to 20,000 bills each session, and, it is estimated, passed 930 before its last adjournment. Estimators figure that there are between 50,000 and 100,000 state and federal laws.

More than 59,000,000 farmers, with their families, till the soil of China. The figures were given after a survey by a United States government bureau.

Disappearing in the Broadway of the Atlantic Ocean, extending from the eastern end of the Panama Canal toward New York City, the 7,000-ton oil tanker, "Swiftstar," added to maritime history another incident of mystery. Loaded with 77,000 barrels of oil and manned by a crew of 28 officers and men, it recently left Los Angeles bound for a Massachusetts port. It was last heard from when entering the sea lane along the east coast, but no vessel sighted it there, and no word came from its wireless. In those same waters the collier, "Cyclops," vanished some time ago as completely as if a giant monster of the deep had stretched forth a huge hand and pulled the craft beneath the water. Evidence that disaster befell the "Swiftstar" was found by a schooner captain after several electric storms. The sea all about was littered with splintered wood, a floating chest yielded the charred, unidentified body of a man, and for miles the surface was covered with a heavy film of oil.

MEAT SAW DRIVEN BY MOTOR
CONTROLLED BY TRIGGER

For cutting meat and bones in butcher shops or packing houses, an electrically driven bandsaw, operating on a frame



Electrically Operated Saw, Weighing Less than 14 Pounds, Cuts Meat or Bones Rapidly

resembling that of the ordinary hand tool, has been invented by a western man. Power is supplied to the device by a flexible shaft, or directly, by a motor. Its speed is regulated by a trigger on the handle. Light in weight, it can be handled with ease, performing the work quickly. By twisting the blade, the apparatus has been made small and compact without lessening its strength.

Kansas City Times
8/14/23

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Portland, Ore.

3326

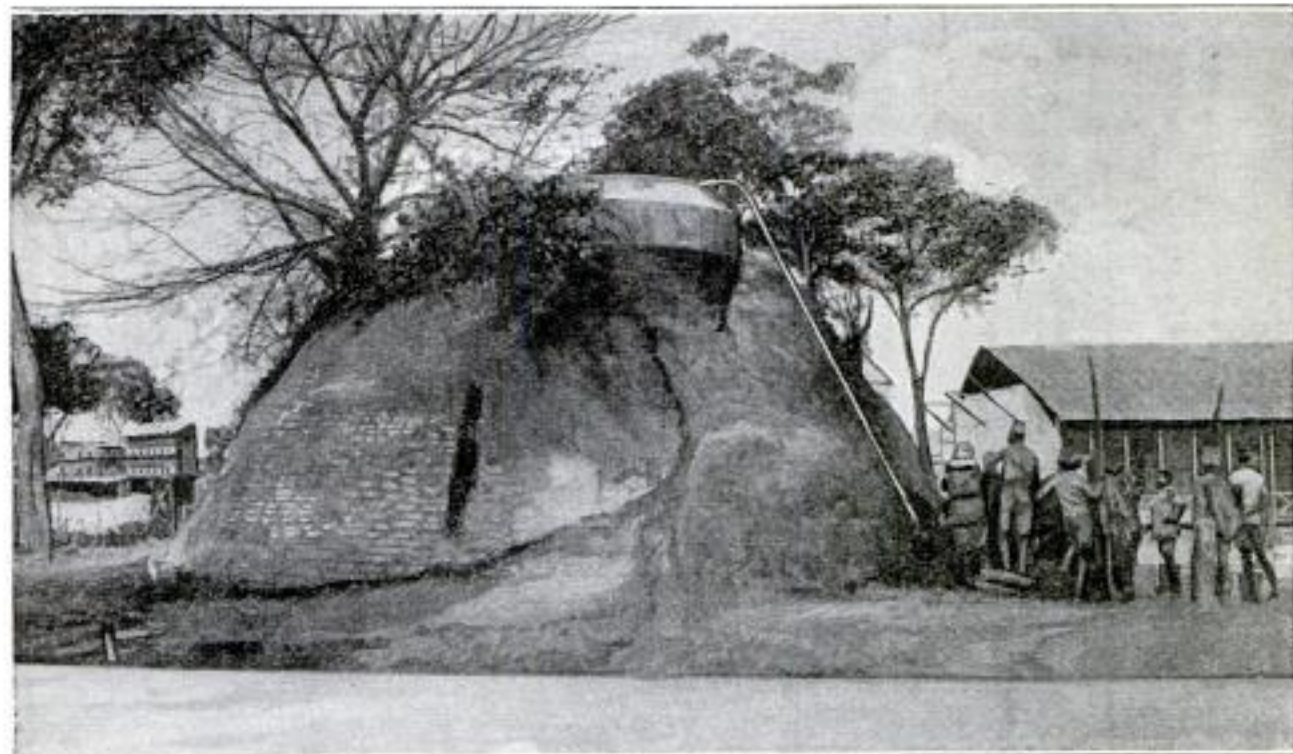
Newman Travel Tales
Tribune Bldg.
Chicago

POPULAR MECHANICS

TANK IN AN ANTHILL KEEPS WATER COOL

To keep water cool, a concrete tank has been built into the side of a large ant-hill in a South African village. There

is no conduit system in the place, the water being obtained from galvanized-iron or concrete reservoirs.



Water Tank Built in Ant Hill in South African Village Where There Is No Conduit System

NEWLY BORN BABY POSSUMS CLIMB TO PARENT'S POUCH

3390

Newly born opossums crawl unaided into their mother's pouch, which serves as an "incubator" during their first two-months' growth, scientists have determined. Many theories had been held by old woodsmen and nature students to explain how the little ones get there. Some believed that the young were born in the bag, while others thought they were placed there by the parent. Recently, the birth of a litter of 18 was witnessed. Guided by instinct, the small creatures climbed "hand over hand" into the haven of food and shelter.

mountains and woods, each one operated by two men. Across the crotch at the top of a dead tree, a long pole is balanced. From each end a heavy weight hangs by a chain, and below are metal



NEWMAN TRAVEL TALKS
Natives in African Wilderness Stamp Ore with Weights Raised and Lowered by Hand

ORE STILL STAMPED BY HAND IN AFRICAN WILDERNESS

3322

While steam and electricity have long been harnessed to operate huge machines for crushing ore, there are places in South Africa where the stamping of rock into powder still is done by the primitive method of raising and dropping weights by hand. Many of such crude mills are to be seen along the railroads, in the

troughs into which the rocks are put. With a seesaw motion of the beam, the weights are pulled up and down.

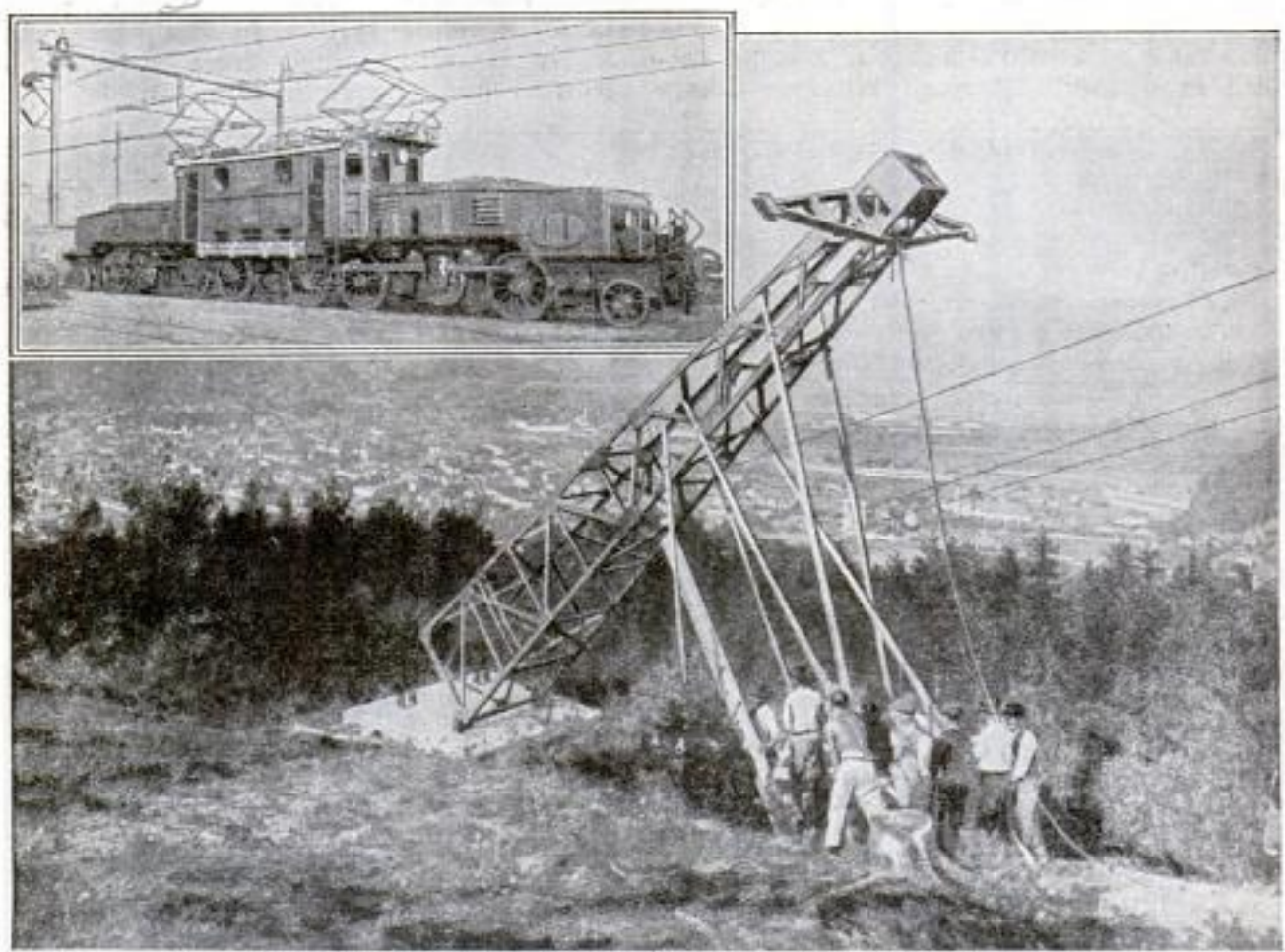
International Newsreel Corp

3269 326 W. Madison, Chicago

772

POPULAR MECHANICS

ELECTRIFICATION BRINGS NEW ERA TO AUSTRIA



Workmen Placing Heavy Steel Transmission Pole on Concrete Base Set on Steep Mountain Side: Above, One of Giant Electric Locomotives Used in Express Service

Electrification of all lines of the Austrian state railways, regarded as marking an epoch in transportation in Europe, is meeting with success. Already one road, the Innsbruck-Telfis, has been changed from steam to electric power. It runs through the picturesque, yet exceedingly rugged, region of the Austrian Alps in Tyrol, where engineers solved many difficult problems in providing steel trans-

mission poles for the heavy-power wires. In some instances, the supports were erected on bases of concrete laid on the steep slopes of the towering peaks. On one section of the Arlberg system, now, a huge electric locomotive is pulling express trains, while others are being operated in the passenger service. It is said some time will elapse before all the systems are completely electrified.

TUNING FORK UNLOCKS SAFE WITHOUT COMBINATION

Lacking both a time lock and combination, a safe that opens to the vibrations of a tuning fork has been perfected by an English electrical expert. Attached to the tumblers of the concealed lock are electromagnets connected with a series of dry batteries, and a scale over which is stretched a steel wire. Set to the note of the tuning fork, this wire vibrates and causes electric currents that drop the bolts when the instrument is struck and touched to the top of the safe. As no two tuning forks have exactly the same

pitch, none but the one fitted to the vault can open it. Either banjo or violin strings may be used. They can be fixed to respond to the throbbings of other tuning forks, permitting the owner to change the "combination" when desired.

Smoking of meats may now be done in homes or meat markets in a galvanized-iron smoker that cools smoke passing through a long pipe entering the bottom of a chamber. Safe and fireproof, the smokehouse may be connected to any chimney, or moved about and used for storing the cured provisions. Space is provided for three to five dressed hogs.

Performed by Thomas Parker, an English electrical expert.

Chas. W. Ser. Engle,
Mess. Vogt & Masolle

International

Berlin Germany

POPULAR MECHANICS

MICA CLEARS RADIO TONES
OF METALLIC SOUNDS

2993

Using mica instead of metal disks to transform the sound waves and electric impulses in a radio has resulted in producing a clear tone, free from any metallic sound, in transmitting the voice, violin, piano, horn, flute, and even an entire orchestra. Tests recently conducted in Europe showed that with the mica plate high or deep sounds from any source were distinctly heard in all parts of a big hall and that there was no buzzing vibration so often present in a telephone or radio. Wire and radio have proved equally good for transmitting the current.

Three-watt power, the amount in a small flashlight, was used to give a concert in a hall to 3,000 persons, in all cases the sounds being clear and entirely free from metallic vibration. It is believed that these experiments will be helpful in improving other instruments transmitting musical sounds.

3359

CIGAR LIGHTER ON DESK HEATS
FROM HIDDEN BATTERY

Heated by electricity, a cigar lighter that requires no more space than a pocket tray, has been invented by a western man.



Light is obtained by touching a small push button that turns current into a coil set in a frame mounted on a metal base. A battery, which supplies it, can be kept out of the way under the desk or in a drawer. Models are also

made for attachment to the instrument board of automobiles.

CLOCK STOPS WASTE OF GAS,
PREVENTS EXPLOSIONS

3382

By setting a small clock, that can be attached to any coil or tank water-heater, it will shut off the gas when the contents have been heated. No matches are needed, when this control is used, for the timer lights the burner from a pilot flame. Saving steps and fuel, it also prevents accidents that might happen if the gas continued to burn after the water boils. The device also can be used on any other gas-fired appliances to cut off the fuel supply at required intervals.

LETTER BOXES FOR AIR MAIL
PUT ON BERLIN STREETS

3206

Boxes for mail intended for the air routes have been introduced in Germany. A number of them have been put on



One of Berlin's Letter Boxes Installed to Aid Patrons

the principal streets of Berlin to keep step with the growing popularity of the aerial service. The contents are collected shortly before the departure of each plane. Formerly, those who desired to send mail by airplane were forced to carry it to the post office.

WHITE PAINT ON SHIP'S BOTTOM
KEEPS BARNACLES AWAY

3392

Ships' hulls are being painted white, because recent tests have shown that this color is least attractive to barnacles, shelled animals that attach themselves to objects in the sea. Heretofore it has been thought that because red could easily be mixed with various poisons, one of them was sure to kill off the pest, but experience did not confirm the belief. Government men noticed that more barnacles were found on red-bottomed ships than on those of other colors. Tests were made by lowering glass plates painted red, yellow, green, and white, into the water, where they remained for three months. When taken up, the red plate was swarming with the creatures; the green had a large number, a few crusts were on the yellow, and only three were attached to the white glass.

The name, President Harding, has been suggested for a new geyser that has erupted in Yellowstone National Park.

Sold by Western Specialty Co.
690 Hollam St.
San Francisco, Calif.

New York James 8/19/23

Sentinel Mfg. Co.
New Haven, Conn.



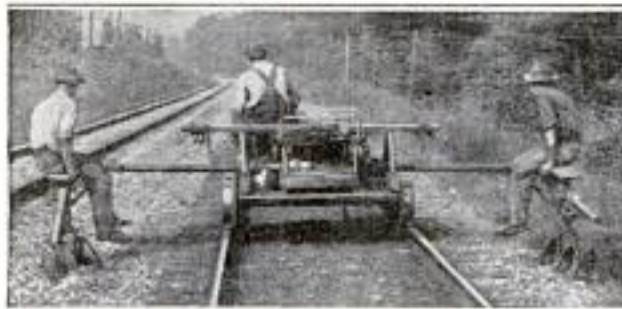
Ready for the Plunge Down the Incline Which Catapults the Two Cars into Space:
One Machine Somersaults in the Air, the Other Leaps under It. Insert, Land-
ing, a Vital Danger Point, Where Miscalculation may Mean Death

GIRLS FACE DEATH IN "LOOPING THE LOOP" STUNT 3271

In automobiles traveling at a speed of 130 miles an hour down a steep incline, two girls perform leaps and somersaults in the air for the amusement of patrons of an eastern park. Crouching low, and gripping handholds, the riders keep themselves from being hurled out, as the cars are released and rush down the grooved track almost together. At the bottom they are catapulted into space by the curved end of the runway. While one "loops the loop" three times, the other, barely escaping the revolving car, dives underneath it to a landing platform, equipped with springs to absorb the shock as the machines drop on it and roll to the ground.

LABOR OF EIGHTY MEN SAVED BY RAILROAD WEED CUTTER 3372

Labor of about 80 men is saved by a motor plow recently made by a western railroad to cut the weeds and level the ballast along its right of way. One machine, built by fitting ordinary farm disks to a section hand's motor car, saves the railroad \$240 daily, it is estimated. Three men clear 24 miles of track with this mower in a day. A cutter, costing a few hundred dollars, saves almost \$100,000 a year in wages formerly paid track gangs working with picks and hoes. The plows are constantly in operation, eliminating fire hazard, preventing decay of



COPYRIGHT, UNDERWOOD & UNDERWOOD
Plows Attached to Railroad Motor Car That Save \$240 a Day, Cutting Weeds and Leveling Ballast

ties, and improving appearances by uprooting grass and weeds. Digging through the rocky surface, they maintain a solid roadbed by permitting thorough drainage.

☛Rivaling Jack's beanstalk, a corn plant on an Indiana farm during a period of extremely hot weather was reported to have grown 13 inches in five days.

WAR MINE IS NOW MAIL BOX ON BIG PACIFIC LINER

What was once a deadly mine, planted in the North Sea during the World War, is now being used in the peaceful mission of carrying



Mail Box on Pacific Liner That was Made from Deadly Mine

rying mail on a Pacific Ocean liner. The steel sphere is an object of great interest to the passengers. On one side may be seen an indentation that is probably evidence of the narrow escape of some unidentified ship during the conflict. The letter slot is cut through one of the plates that leads to the firing mechanism, where acids were held in glass tubes, ready to bring about an explosion when broken by the impact of a vessel. It is supported on a heavy iron framework bolted in position. 3363

FOG BELLS FOR LIGHTHOUSES CONTROLLED BY WEATHER

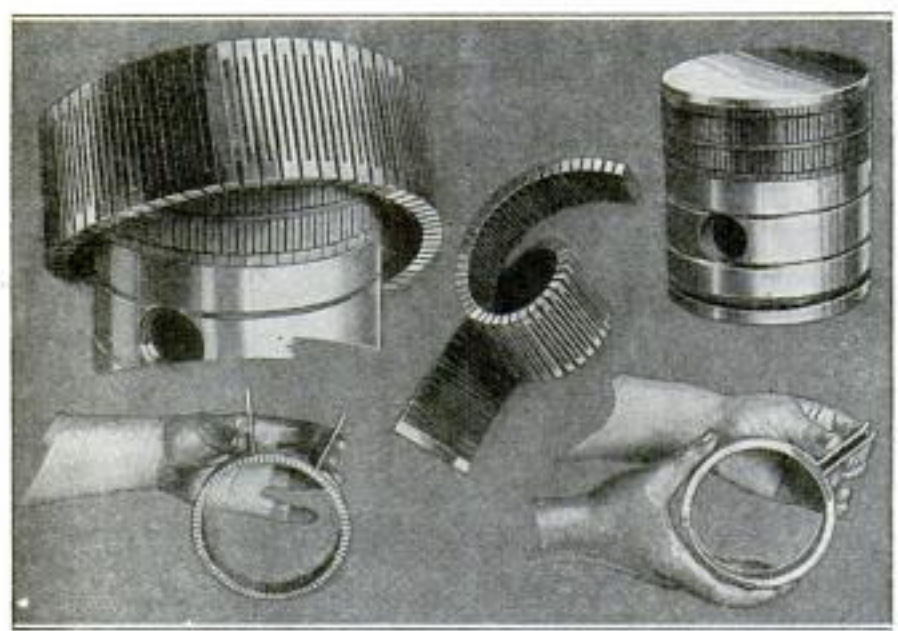
Lighthouses without attendants have been equipped with automatic fog bells that ring at regular intervals during damp or thick weather. A delicate instrument, called a "hair hygrometer," affected by moisture in the air, expands when damp atmosphere surrounds strands of hair by which it is controlled, causing the bell to ring. Dry air contracts it, and stops the ringing. Occasionally the device is deceived by clear air which has taken up moisture, but its mistakes are always on the side of safety.

Cont. Edwin Jarvis
The Paragon, Washington
20 26

PISTON RING HAS UNUSUAL FLEXIBILITY

Absolute conformity to the cylinder wall, whether the latter is perfectly round, or egg-shaped through long wear, is one of the claims, and a just one, advanced for

and with less liability of leakage or oil pumping. The principle of construction is a clever one, and imparts to the cast iron a flexibility akin to that of tempered spring steel, as a complete ring can be twisted into the form of a figure 8 without distortion. There is no gap in the rings, as they are cast in ring form and the subsequent machining leaves them in the form of complete circles.



Upper Left, Close-Up of Ring; Upper Right, Ring on Piston; Center, Broken Ring, Twisted; Below, Ring Before and After Compression

The principle may be used not only for piston rings, but also for expansion reamers, cast-iron liners for aluminum cylinders, bearings, and complete pistons.

The use of the idea in connection with aluminum cylinders is especially interesting, as the difference in expansion between the aluminum and iron is perfectly

an unusual piston ring now in course of development.

One of the new rings will take the place of three or four of the present type,

counteracted. When the piston idea is fully developed, it will cause a revolution in gasoline-engine practice, as piston-ring troubles will be banished for good.

TOOL COMBINES SNAP GAUGE AND MICROMETER

Combining the functions of the micrometer and limit snap gauge, an automatic instrument forms part of a new system for controlling production to specified precision. The size of a reference standard is transferred to the product without any intermediate means, such as the snap gauge. The instrument has an operating range of .05 inch, an adjustable range of 1/2 inch, and an interchangeable tolerance

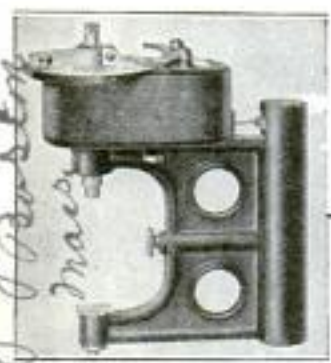


plate. The spindle is automatically centered on the work, released, set to a definite pressure, and locked to retain the reading as it is withdrawn. It follows up successive reductions, but is set back by hand for each piece. For production use,

the tool is set to read zero at the finish size; it then reads directly on its dial the amount that the work must be reduced, and the reading is retained. No skill or training is required in the use of the instrument, and its adoption will greatly extend the field for employment of special-machine operators of common ability.

ELECTRIC STEEL FURNACES OF HIGH EFFICIENCY

Electric steel furnaces of exceptional efficiency have recently been installed in an Italian automobile factory. As demonstrated by tests extending over a long period, these furnaces insure considerably higher outputs and a reduction of electrical losses, as well as in consumption of electrodes, a saving of deoxidizing agents, and less strain on the lad masonry.

The three electrodes rest with the whole armature on a special bridge, at right angles to the bath, as usual, but each electrode with its controlling mech-

Designed by Messrs. Pennington

Microgauge Co. Dept 112.6, 52 M

Lewisburg, Holland.

anism, including the motor, can be withdrawn as a unit and changed in half an hour, even during operation. A water-cooled casing, connected with the door frame, enables the furnace to stand up to 150 tappings without interruption. The successful and economical operation of the furnaces is due mainly to the special cooling and tightening arrangement adopted for the electrodes. The absence of any flames around the electrodes prevents any combustion of the latter at the point of admission.

Special transformers are used, with two voltage stages; the first, of 130 volts, is used to melt the solid charge, while the second, of only 75 volts, is sufficient to refine the bath and to raise it to a casting temperature of 1,750° C. (3,182° F.). Four large furnaces, each of 15 to 20 tons capacity, and two of 3 to 6 tons capacity have been installed.

24)u
**MOTOR-DRIVEN TOOL CUTS
 COMMUTATOR V-SLOTS**

Commutator slotting has been generally adopted, with the exception of a few industries, such as coal mining and foundry work, where short circuits occurred with the U-shaped slots produced by motor-driven slotting machines and other tools. A new machine, which cuts V-shaped slots, eliminates this objection, as the shape of the slot, with the centrifugal force exerted when the commutator is running, keeps it clean under all conditions.

The milling cutter is driven by an electric motor with a nearly constant speed, or may be driven by any electric drill rated at 1/4 inch or larger. One end of the handle is hollow and carries compressed air, which is deflected to the edge of the

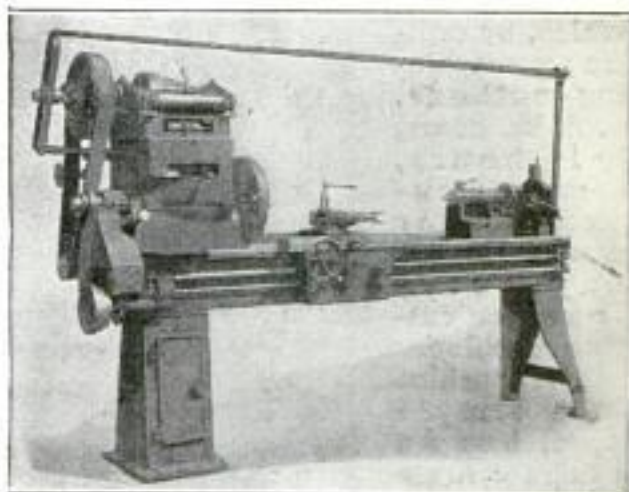


Motor-Driven Tool That Cuts V-Slots in Commutators Quickly and Cleanly

cutter and blows the mica away, enabling the operator to see the work clearly at all times. The tool is furnished with a micrometer adjustment to enable the cutter to be set in the exact center of the mica, and with an adjustable guide to regulate the depth of cut.

20)u
**MOTOR DRIVE FOR CONE-
 HEADSTOCK LATHES**

To meet the demand for motor-driven lathes, a motor drive has been devised that can be attached directly to the com-



A Belt-Driven Lathe Converted to Motor Drive by Means of a Self-Contained Attachment

mon cone-headstock lathe. The arrangement can be attached with very little machine work, aside from the drilling and tapping of a few holes.

The countershaft unit is bolted directly over the cone pulley of the lathe, and is provided with a clutch so that the motor can be engaged and disengaged at will; the countershaft cone pulley may be adjusted so as to tighten the cone belt. The motor is placed on a bracket mounted on the rear of the lathe.

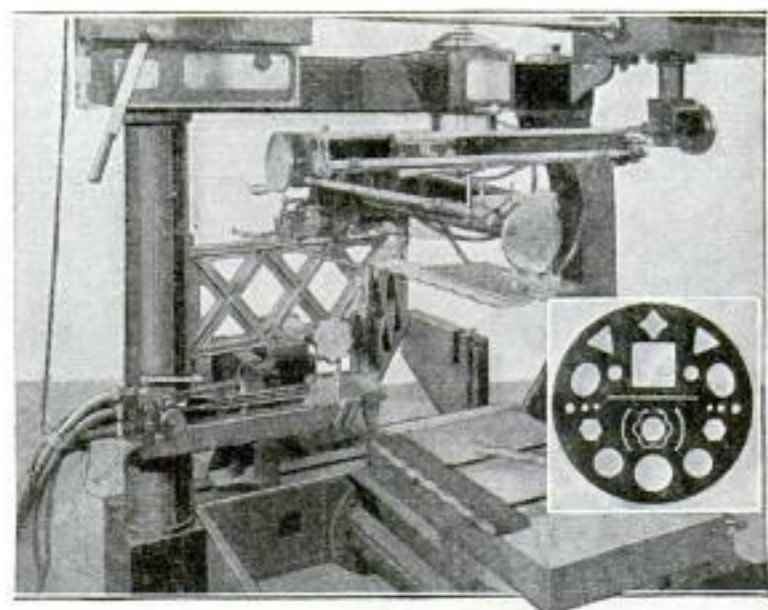
38)u
**LOW-GRADE MOLASSES YIELDS
 FUEL AND POTASH**

Low-grade or "blackstrap" molasses, at present regarded purely as waste, may be treated so as not only to yield a liquid fuel of commercial value, but also potash. Patents on the process have recently been granted to Dr. Paul G. Hildebrand, of Swarthmore College, Pa. It is claimed that from each ton of molasses is obtained a quantity of liquid fuel equivalent in heating value to 1 ton of coal, and, as a by-product, 150 pounds of potash.

The importance of this will be seen when it is realized that Cuba alone produces 1,000,000 gallons of blackstrap molasses yearly, which, when treated, would yield fuel equal to 4,000 tons of coal, and 600,000 pounds of potash. In Cuba, and all other Latin-American sugar-producing countries, fuel for power purposes, as well as potash for fertilizer, must now be imported, so the new process holds vast possibilities for them.

Isodrey Engineering Works.
Boundary Road,
POPULAR MECHANICS
39 M Westbury Ave, Wood Green, London
ACETYLENE-JET MACHINE CUTS INTRICATE SHAPES *Eng.*

778
 Cutting a plate in 8 minutes, where formerly a day was required for the job, and shaping turbine diaphragms, which, by ordinary machining methods, took 160 hours, in 1½ hours, are commonplace jobs for a new English oxyacetylene-jet cutting machine.



An Oxyacetylene-Jet Machine That Handles an Immense Variety of Work: Insert, Plate Showing a Few of the Patterns Cut

The machine is a simple one, but an immense variety of work can be handled on it; cuts may be made at any angle to the axis of the machine, and holes of any radius up to the length of the jet arm may also be cut, at speeds ranging from ½ to 20 in. per minute. Due to the constant feed, the machine

produces an exceptionally good finish on the work; the character of the jet employed also aids in this, as it does not melt the edges of the cut.

Templates may be used with the machine to reproduce intricate parts, and, as a demonstration of what the machine can do in this respect, gearing has been produced with but a few thousandths of an inch left on the teeth for finish; gears

of 2-in. circular pitch mesh together and run properly, 16 teeth being cut in 16 minutes, from ½-in. plate. Cuts as small as ⅓ in. wide have been made with the machine.

Benson Engineering Co., London, Eng.

NEW STEAM BOILER CARRIES ENORMOUS PRESSURE

If the claims made for a steam boiler now in course of erection in England are fulfilled, a revolution in steam generation will be constituted. The pressure to be carried is 3,200 lb.—enormous in comparison with the 150 to 200-lb. pressure normally used. In some instances steam is generated at 350-lb. gauge pressure, but this has been considered a high pressure heretofore.

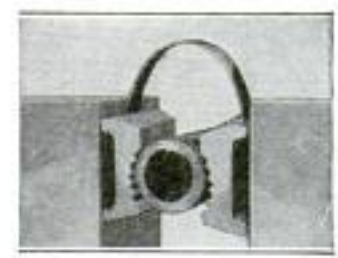
High pressures mean increased efficiency in a steam boiler, and the need for increased efficiency is evident when it is realized that even at 200-lb. pressure, and with a high superheat, approximately 60 per cent of the heat value of the coal is wasted.

The principle underlying the design of the new boiler is the generation of steam at the "critical point," where no latent heat is required, and where the whole mass of water at 706° F. is suddenly and bodily converted into steam, without any priming troubles whatever. After passing through the boiler, the steam will be superheated to about 785° F., and then

throttled down to 1,500-lb. pressure to drive a 400-kw. turbine. The steam will then pass, at 200-lb. pressure, to another turbine, which will furnish another 600 kilowatts. The plant is expected to be in operation before the end of the year.

ATTACHMENT HOLDS ROUND STOCK IN VISE

Where the purchase of a regular pipe vise is not advisable, an attachment that makes any vise suitable for pipe or other round stock will be found exceedingly useful. The attachment consists of a pair of auxiliary jaws, joined by a strip of spring steel, which keeps them together while



permitting them to follow the jaws of the vise. This tool will be found useful not only by the mechanic, but by the tinkerer around the home, who can convert his plain vise into a reliable pipe vise at a moment's notice.

Elgin, Ill. Co., Don mfg. Co.

Credited at: English Electric Co., Rugby, Eng. Elgin, Ill. Copyrighted material



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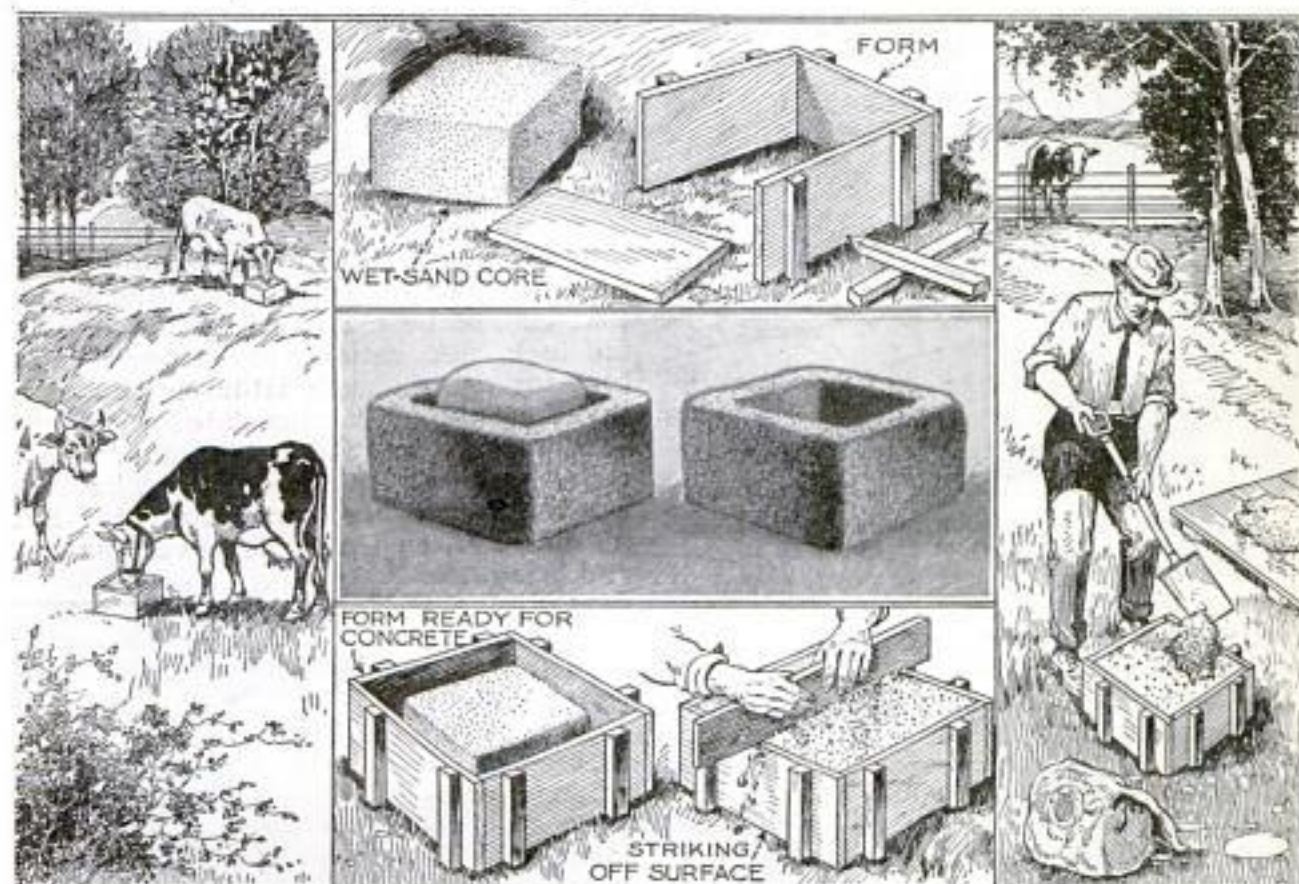
A Practical Salt Box for Stock

BY J. R. KOONTZ

TO have healthy live stock one must see that they have plenty of salt at all times. To feed salt to hogs, cattle, and sheep, and, at the same time to keep it clean and from being trampled into dirt, has been a problem for many stock raisers and farmers. If placed in a wooden box it is no time until the box is upset,

larger inside than the regular salt block, and deep enough so that about three-quarters of the block is below the edge of the box. The boxes are easily made, and cost only about 25 cents each.

First wet some sand, and from this form a block or core the same size the hole is to be in the block; saw four boards



Concrete Salt Boxes are Easily Made with Improvised Forms, and will Prove of Great Help to the Stock Raiser, as They cannot be Upset and will Last for Years

and besides, a wooden box does not last long under the rough usage it receives.

Salt boxes made of concrete are the answer to the problem. They cannot be broken, and are heavy enough to prevent the stock from upsetting them, so that the salt will remain in place until it is all used up.

The boxes should be made a little

about 10 in. wide, and long enough so that, when assembled around the core as shown in the illustration, there will be a space of 3 in. between each board and the core. The boards should also extend 3 in. above the core. Place the boards around the core, driving stakes into the ground to hold them as shown; do not nail the boards, as the stakes are quite

sufficient to hold them firmly, and they can be taken apart easily.

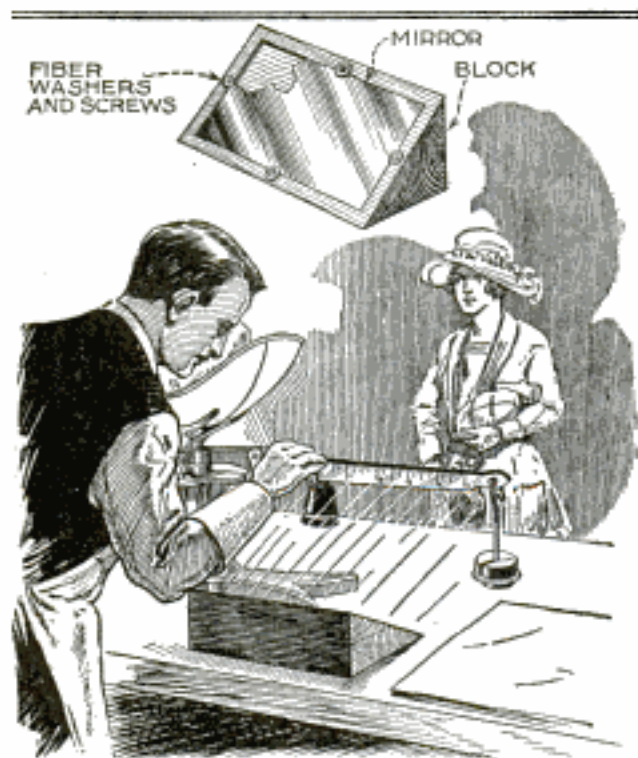
Fill the space around the core with concrete mixed in the proportion of 1 part cement to 3 of clean, sharp sand, prodding the concrete down well with an iron rod to insure its filling all corners

of the form. When the concrete has set, remove the form boards, turn the box over, and dig out the sand.

Place the box in a cool spot, and keep it wet for about a week, when it can be placed in service with the assurance that it will last for years.

Illuminating the Scale Beam

The difficulty in properly adjusting the weight on the beam of a scale in a small



The Dark Side of a Scale Beam Illuminated by Means of a Mirror Reflecting Light on It

store, due to insufficient light, was remedied by providing a mirror set in the position shown, to reflect the light on the scale beam, the mirror being mounted on a triangular block. The light from the window opposite the scale was reflected so that the graduations could be seen distinctly, and at night the store lights were similarly reflected on the beam. The use of an electric light was first suggested but the mirror was found to serve the purpose just as well, and without the cost of burning an extra light.

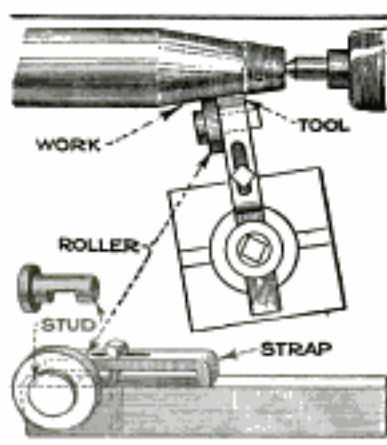
Simple Whitening Process for Metals

A simple and inexpensive method of whitening small copper or brass articles, such as hooks and eyes, pins, buttons, etc., in quantities, is to immerse the articles in a solution made as follows: 2 oz. of fine silver in grain form are dissolved in

a little nitric acid, and this solution mixed in 1 gal. of distilled water, after which a strong solution of salt and water is added, which will precipitate the silver in the form of chloride. This precipitate is washed thoroughly to remove all traces of acid, and the last rinse water should be tested with blue litmus paper to make sure that all the acid is removed. The chloride of silver thus formed is next mixed with an equal amount of cream of tartar (potassium bitartrate) and sufficient water to form a mass of the consistency of cream. After the articles are thoroughly cleaned, they are immersed and stirred until sufficiently white, when they are rinsed in hot water and shaken up in sawdust to dry.

Taper-Turning Tool

When a lathe has no compound slide, there is some difficulty in turning tapers that cannot be machined by moving the tailstock. A satisfactory taper-turning tool for use on such lathes is shown in the illustration. It consists of a straight, solid tool ground flat on the end, with a roller attached as indicated. The stud carrying the roller is cut away for half its diameter, so that it fits over the tool and brings the



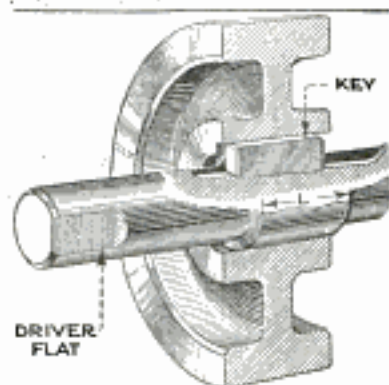
center of the roller in line with the edge of the tool. A slotted heel strap and screw complete the attachment. In use, the work is first roughed out, and the tool is then set at the correct angle to turn the required taper. Starting at the large end, the tool is fed in to cut the full width of its face. Then it is moved forward a distance about equal to its width, and it is again fed in until the roller touches the part already finished, and so on to the end of the taper.

Cement for Closing Leaks in Iron Pipe

The following formula is good for making a cement for closing leaks in iron pipe: 5 lb. of coarsely powdered iron borings, 2 oz. of powdered sal ammoniac, 1 oz. of sulphur, and enough water to make a paste of a thick consistency. By leaving the sulphur out the cement will set more firmly, but will require a longer time. The cement is tamped tightly into the leak.

Keyed Mandrel Aids Production

The speed of production and accuracy of work can often be improved greatly by a little thought applied to the arrangement of machining operations. For example, the gear blank shown in the drawing was formerly chucked, faced on one side, and bored and reamed, then forced on a plain mandrel, or expansion mandrel and turned all over; after this, the blank was keyseated and the teeth cut. When



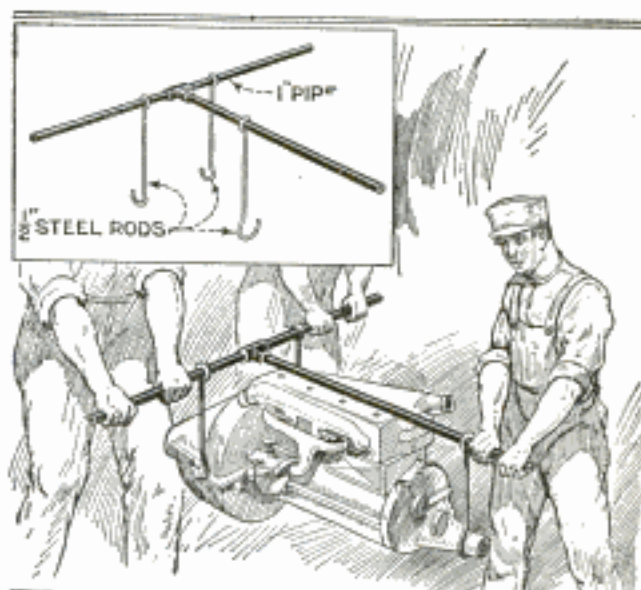
turning in this manner, it was necessary to take light cuts, to prevent the blank from slipping on the arbor. When the operations were rearranged, keyseating followed the boring and reaming; the blank was then placed on the mandrel shown, and tightened by means of the taper key. This drew the bottom of the bore against the mandrel in exactly the same way as it would be drawn on its own shaft, and, in addition to permitting heavy roughing cuts to be taken, insured accuracy in the circumference. The top half of the mandrel was drawfiled to permit easy entry into the bore, and the key used had a taper of $\frac{1}{4}$ in. per foot.

The gears turned and cut on these mandrels were much quieter than those previously made, as any possibility of eccentricity in the teeth was avoided.

When a one-piece rim is sprung, and will not go together when using a block and jack or a rim-mounting tool, put it on the wheel, tighten up the lugs, and hammer it. Many badly sprung rims can be very easily mounted in this way.

Lifting Bar for Auto Engine

Automobile engines are easily carried by means of the three-arm lifting bar shown in the drawing. It consists of

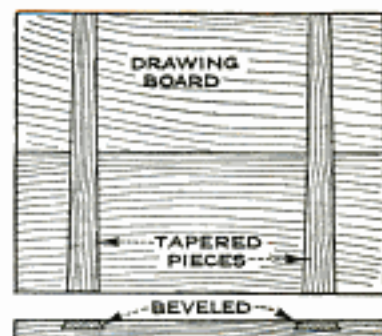


A Handy Lifting Bar with Which Automobile Engines can Easily be Lifted and Carried

three lengths of pipe screwed into a tee, and three hooks, made of $\frac{1}{2}$ -in. steel rods about 1 ft. long. The hooks are attached to the front end of the crankshaft and to the two rear engine brackets. Three men can readily lift the engine and carry it, as the lifting bar distributes the weight and keeps the workmen away from each other, thus preventing interference.

Portable Drawing Board

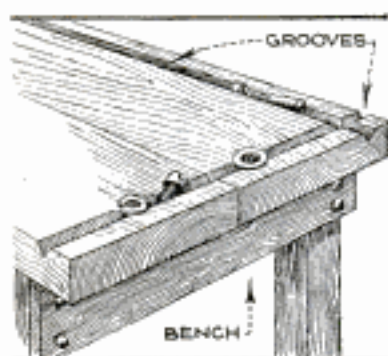
The illustration shows a drawing board that is very convenient for traveling, as it can readily be put into a suitcase. It consists of two smooth boards each 10 by 23 in. in dimensions, and two removable wooden strips that are slightly tapered in their length and are beveled on their edges to fit snugly into dovetailed grooves cut across the back of the boards. These strips hold the two parts of the drawing board together when pushed tightly into the grooves, no nails or glue being required to hold them.



Stanley Dusdieker, Cedar Rapids, Ia.

Groove in Bench Prevents Parts from Rolling Off

The usual method of preventing small parts from rolling off a workbench is to nail a strip of wood on the bench top,

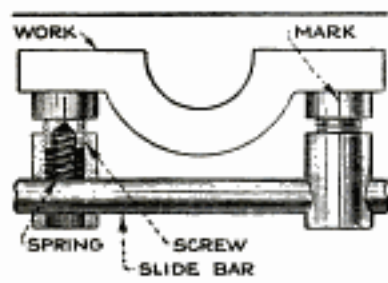


near the edges. However, it is not always desirable to have such a strip on the bench, as it often proves to be a hindrance in working, and therefore a V-shaped

groove cut along the edges as shown in the illustration has been found much more satisfactory. The groove is about 1 in. wide and about 2 in. from the edge of the bench top. It takes only a few minutes to cut the groove by means of a carpenter's grooving plane.

Supporting Irregular Work in Machine Vises

Ordinary parallels are not of much use as supports for irregular work held in machine vises, unless the surface of the work touching them is flat. Very often a job can be done more conveniently by using an adjustable support of the type shown in the drawing. This support consists of a length of round rod, forming a slide bar, on which two short lengths of tubing are fitted, the latter being drilled crosswise and threaded inside to receive the work-support screws. The support screws are countersunk, as



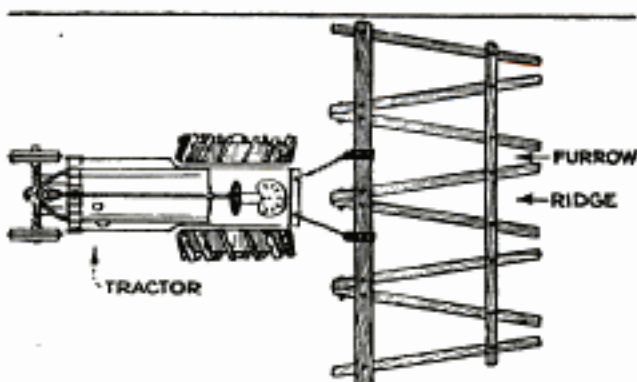
shown, to receive the ends of small coil springs, which keep the parts together, prevent the screws from turning too easily, and hold the tube pieces in the position set. After assembly, both screws are turned down close to the tube, and while in this position, a mark is cut on each screw head as shown.

Many kinds of work can be supported by machine vises fitted with this adjustable support, the tube pieces being moved in or out to avoid irregularities in

the form. The screws are used to suit work of various heights by turning them equally, using the marks as guides. By making the slide bar long enough, work extending beyond the vise jaws can be supported by means of a thin parallel resting on the vise bottom.—Harry Moore, Montreal, Can.

Filling Listed Furrows

The practice of listing out the soil was formerly confined to corn planting only, but has now become one of the principal methods of crop production, especially in dry territories. The ridges and furrows made by listing must be leveled down again and various implements have been made to do this. Of these a simple and effective one, which can readily be made on the farm, is shown in the illustration. The crosspieces, which are made of 2 by 10-in. material, should be long enough to cross five ridges from center to center. Lengths of 2 by 6-in. hard pine are attached edgewise to the



An Easily Made and Effective Drag for Leveling the Ridges and Filling the Furrows on Listed Land

crosspieces with nails and bolts in the position shown, so that the points where two adjacent pieces come together at the front will be located over the center of a ridge. The weight necessary to use on the implement depends on the hardness of the soil. In leveling the field, it is best to cover the surface twice, by half overlapping at each round. This leaves one furrow for the tractor wheel to run in, making it self-guiding, while the other wheel runs in the partly filled furrow. In this way four rows are covered at once, and at each round two rows are finished.—G. G. McVicker, North Bend, Neb.

☛ A little kerosene added to enamel will make it easier to apply. Stir in, very thoroughly, about one tablespoonful to the gallon of enamel.

A Homemade Refrigerating Machine

By JOHN GORRELL

THE household refrigerating machine described in this article has been in successful operation for some time, and, although a vast amount of time and experiment was necessary before the machine would work well, the problems have all been solved, and the reader who builds one is assured of a satisfactory machine.

A brief outline of the principle of operation is essential, in order that the builder may construct and operate the machine intelligently. In Fig. 1 is seen a condenser that contains a liquid gas under pressure, an expansion valve, cooling coils in the ice chamber, and a motor-driven compressor. If, when the compressor is running, the expansion valve is opened slightly, some of the liquid passes into the cooling coils, where the pressure is greatly reduced. The liquid now boils or evaporates rapidly, at a low temperature, and, in

doing so, absorbs a certain amount of heat from the pipes and the surrounding air. As the gas boils off the liquid, it is drawn into the compressor, compressed and passed into the condenser, where it is robbed of the heat of compression, and liquefies again,

ready to go through the cycle once more, as long as the compressor is running. Sulphur dioxide is the gas used in this case.

The compressor is the most important part of the system; it is the one that costs most in time and money, wherein the greatest trouble is encountered, and that must receive the best care and workmanship. The compressor must hold the gas both when in operation and when idle, hence the difficulty. It is not possible to buy a small compressor on the market that will satisfy the requirements, as none is gastight. It is possible, of course, to build a special compressor, but this is very expensive. It is also possible to make an ordinary air compressor gastight, but a good job is almost impossible, and would cost too much.

The only successful method for the ex-

perimenter is to inclose the whole compressor, and provide an oil-sealed, oil-displacement stuffing box. Fig. 4 shows the pattern for the compressor-inclosing tank or casing; this is quite large enough for a 1 $\frac{5}{8}$ by 2-in. vertical garage air compressor, which is the type used; a larger compressor is not advisable.

The lumber used for the pattern is $\frac{1}{2}$ by 16-in. material, and about 8 ft. will be required, both sides to be planed. The pattern may be fairly roughly made, and still serve the requirements, but care should be taken to allow $\frac{1}{2}$ in. of draft. The flange is $\frac{5}{8}$ -in. thick, to allow for machining. The inside corners should be filleted, and the pattern sandpapered smooth all over and shellacked. While the shellac is drying, the top cover can be made. This cover is shown in Fig. 5: it is simply a flat piece of material, cut

to dimensions, and with an extra piece nailed to it where the shaft of the compressor comes through. This piece is also filleted. Don't forget that the casting will be about $\frac{1}{8}$ in. per foot smaller than the pattern; use a shrink rule if possible.

The casting is made in gray iron, and will cost about \$7.00. The flange and part of the plain side of the cover are planed true and smooth, and the compressor may then be placed in the casing and holes marked for the bolts to hold it in place. After drilling, the compressor is shimmed up until the shaft is at right angles with the machined flange, then bolted in place, using leather washers and gaskets, well covered with a paste made of litharge and glycerin, under the nuts and washers.

On the right-hand side of the casing two holes are drilled and tapped for gauge-glass fittings, and care should be taken to get these in line, or it will be difficult to fit the glass without breaking. If a street elbow is used in each hole, any mistakes can be easily corrected. There is a hole drilled and tapped for $\frac{3}{8}$ -in. pipe on either side of the casting, as

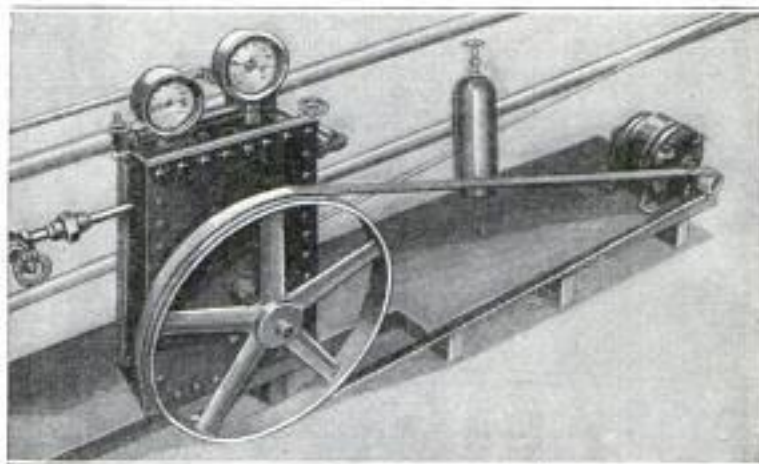


Photo Showing Compressor and Condenser Installed in Basement; The Ice Box Is on the Third Floor

shown in Fig. 6. The right-hand one merely leads inside the casing, and is the intake. That on the right is the outlet, and is fitted with a tee; the pipes leaving the casing have a long thread, so that a leather washer, coated with paste, can be tightened against the casting on each side with locknuts.

Two gauges are needed; one reads to 100 lb. per sq. in., and is used on the high-pressure side; the other reads to 100 lb., and also to 30-in. vacuum.

Careful measurements will show where the shaft will pass through the cover plate. At this point, a hole is bored and tapped for a 2-in. pipe. The stuffing box, which may be of iron or brass, is then made as in Fig. 7, the outside being threaded 8 threads per inch to fit the casting. A ring and nut are also made to the dimensions given, and the stuffing box screwed home, and packed with a good $\frac{1}{4}$ -in. graphite packing.

When the compressor is in the box, the cover bolted on, using a good gasket material for the joint, and all joints tight, the casing is filled with enough paraffin oil to bring the level 1 in. higher than the shaft.

The compressor should have an 18-in. pulley, and the motor a $2\frac{1}{2}$ -in.; a 1-in. belt is used,

and the motor should not be placed too near the compressor. A $\frac{1}{4}$ -hp. motor, operating at 1,750 r.p.m. is satisfactory, unless of the split-phase type, in which case a larger one will be found necessary to make the machine self-starting.

The condenser shown in Fig. 1 has been found to answer all requirements. It consists merely of two 10-ft. lengths of $1\frac{1}{2}$ -in. galvanized-iron pipe, connected by two elbows and a 12-in. nipple. If space is available, it would be desirable to make the pipes 15 ft. long, especially if the box is very large, or more than 50 ft. from the condenser. All threads in the condenser should be coated with plenty of the litharge and glycerin paste, and the joints made up at once. This paste should not be used more than half an hour after it is made, even should it still appear fairly soft, and must not be softened with glycerin, when once hard.

To insure proper drainage of the liquid the pipes should slant 10° or more as shown. Notice that the fittings do not form pockets that retain the liquid. If space is limited the condenser may be made of shorter lengths, but using more of them, and keeping the cooling surface the same.

The condenser may be placed anywhere, but the basement is usually a good place, as the temperature there is lower than anywhere else. In the installation shown in the photo, the compressor and condenser are in the basement and the ice box on the third floor.

As there is a liquid under high pressure on one side, and a gas under low pressure on the other, the expansion valve must be capable of fine adjustment. A good $\frac{1}{4}$ -in. or $\frac{3}{8}$ -in. brass needle valve will serve the purpose, or a regular expansion valve may be obtained. It should be connected so that the liquid will pass up against and around the point when leaving the condenser. If this is done, there will be less chance of the gas leaking around the stem. When installing or making adjustments, the point must never be screwed down too hard on the seat, as both are easily ruined. The author

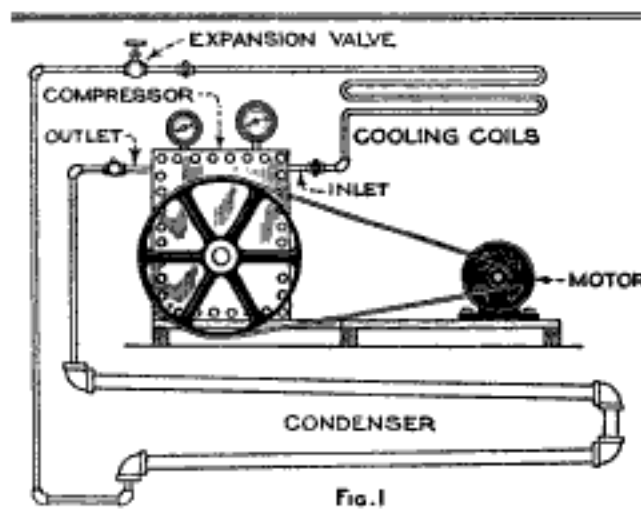


Diagram to Illustrate the Action of the Homemade Refrigerating Plant

has found it advisable to place an ordinary steam valve, with a composition seat, between the condenser and the needle valve, about 6 in. from the latter. This makes it unnecessary to touch the expansion valve except to adjust it, as the steam valve can be closed when there is any reason for shutting off the liquid.

As refrigeration starts on the low-pressure or suction side of the expansion valve, this valve is best placed just inside the chamber that holds the refrigerating coil. This coil is made of from 30 to 50 ft. of lead pipe, of $\frac{1}{2}$ -in. inside diameter. The pipe can be placed in any desired manner, but a vertical helix, 10 to 15 in. in diameter, with the adjacent turns held slightly apart, has been found satisfactory. The needle valve is placed at the top and the suction pipe consequently goes at the bottom. This is known as the "downfeed" method, and prevents

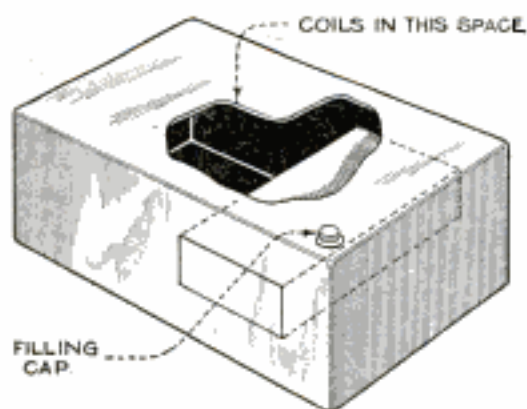


Fig. 2

BRINE TANK WITH FREEZING COMPARTMENT

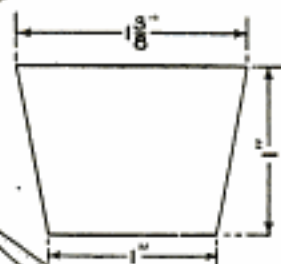
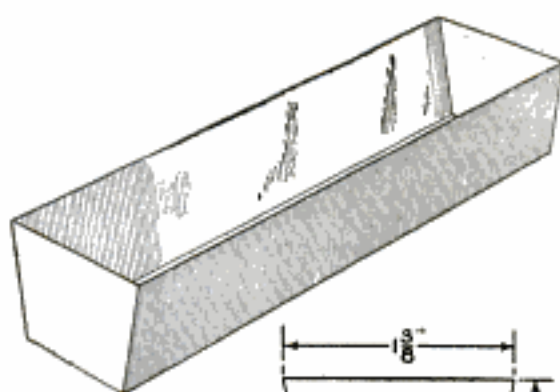


Fig. 3

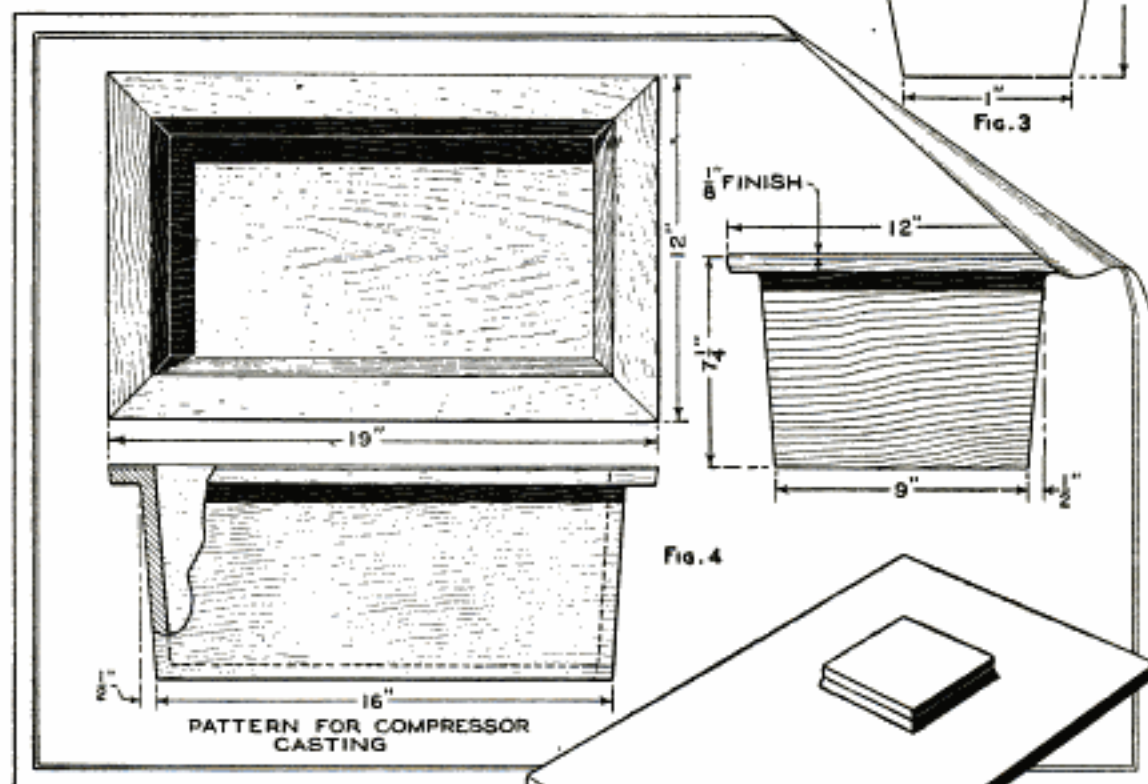


Fig. 4

PATTERN FOR COMPRESSOR CASTING

COMPRESSOR-TANK COVER, 12" X 19"

Fig. 5

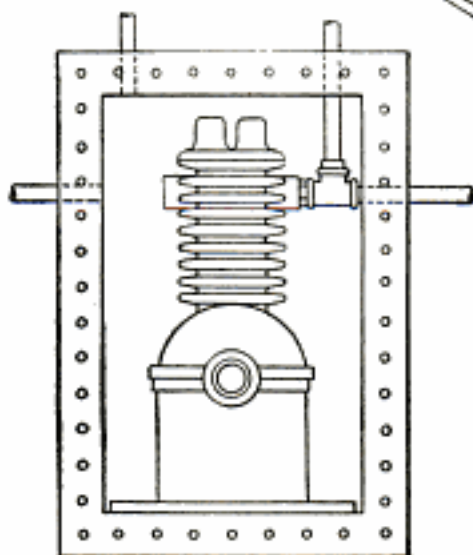
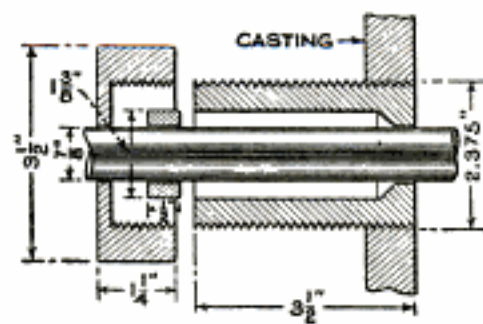


Fig. 6

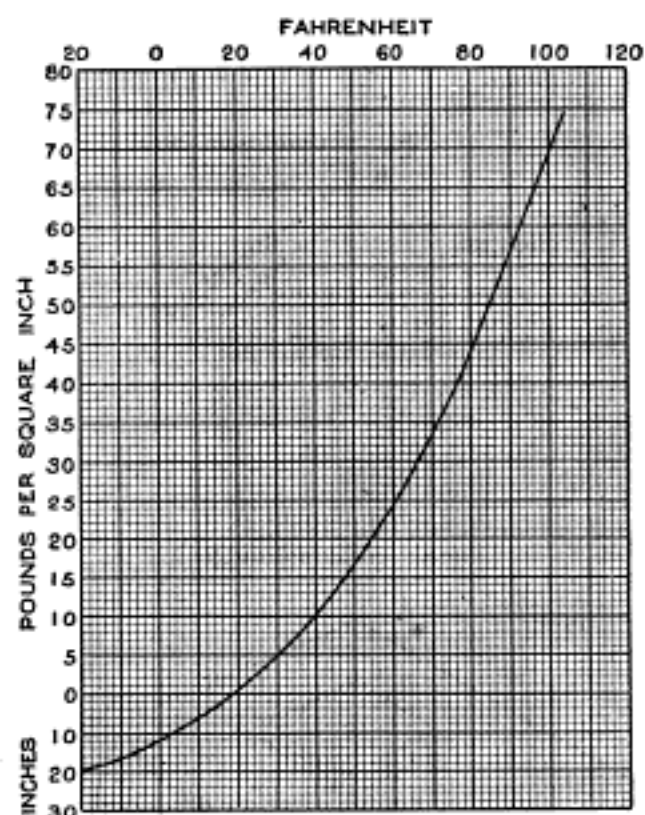


CROSS SECTION OF STUFFING-BOX ASSEMBLY

Fig. 7

Figures 2 and 3, Brine Tank and Water Tray; Figures 4 and 5, Pattern for Compressor Tank or Casing and Tank Cover; Figure 6, Assembly of Compressor in Casing; Figure 7, Method of Making Stuffing Box

flooding of the system. On each end of the pipe a $\frac{1}{4}$ -in. galvanized nipple is placed, by simply screwing it into the pipe, and allowing the nipple to cut its own threads. When into the pipe about $1\frac{1}{2}$ in., nipple and pipe should be soldered together. On each nipple a union is placed; ordinary gasket unions are unsuitable, and only those known to the trade as railroad unions can be used. These have an iron projection that fits into a brass recess, and a gastight joint is



Graph Showing Relation between Pressure in Casing and Temperature in Ice Chamber

easily obtained by simply tightening the union firmly.

There has always been discussion as to whether the direct system of refrigeration, or the indirect, is the better. The former is the one described above, and the latter is the same, except that the cooling coils are placed in brine. The brine is cooled by the coils, and, in turn, cools the air in the ice chamber.

The direct system takes up less space, weighs less, costs less to install, and is easier to build. On the other hand, it does not keep the ice box at nearly as even a temperature, starts and stops frequently, requires thermostatic control, and is not completely satisfactory, as, when the machine is not running, the ice and snow on the coils melt, and the water is objectionable, and finally, if for any reason the machine stops work, the temperature in the ice box rises rapidly.

The brine system occupies more space, is heavier, adds about \$12.00 to the cost, and is supposed to be a few per cent less efficient than the direct. However, it requires little attention, starts and stops but once or twice a day, does not require a thermostat, and the brine acts as a reservoir of cold. If the electricity were off, or it were impossible to operate the machine, the brine would probably keep the contents of the box from spoiling for a day or more; so, for our purposes, the indirect system is the better.

The brine tank is made of heavy galvanized sheet iron, and fits inside the ice chamber, with a space of 3 in. between it and the walls. The lead pipe is placed within it, the ends being brought through holes drilled to receive them. A small opening is made at the top of the tank and fitted with a screw cover, for filling with brine. The brine is made by dissolving calcium chloride, which can be obtained from any ice plant or chemical-supply house, in water.

Enough clean, soft water is used almost to fill the tank; the water is boiled, and then the calcium is mixed with it in the proportion of 3.3 lb. to the gallon, if the calcium is anhydrous (water free), or 4.2 lb. to the gallon if the calcium contains water. A scum will come to the top; this is removed, and the brine allowed to cool before pouring into the tank. Do not use salt brine, as it will eat the galvanized-iron tank.

If it is desired to freeze water for table use, a rectangular tube is soldered horizontally through the tank, as in Fig. 2. The back end is closed, and a small door made for the front. If sherbets, ices, etc., are not to be frozen, a number of shelves can be put in this space, to carry the water trays shown in Fig. 2. When the water freezes in these trays it is forced up and does not burst them, as it would if the sides were straight. The length of the trays is optional and partitions may be soldered across them, to make the ice in small cubes. When frozen, the trays are inverted, and hot water poured over the bottom, loosening the ice.

The sulphur dioxide can be purchased in 6-lb. cylinders for about \$5.00, and in many cases the cylinder can be returned for refilling. The gas is admitted through a valve, tee, and nipple placed on the suction side, near the compressor, after the air has been driven out of the system as completely as possible. When all the gas has been drawn from the cylinder by

running the compressor, the valve is closed, and the system is charged, as the compressor has placed the gas in the condenser. With the compressor still running, the expansion valve is opened until the pressure in the casing is about zero. By adjusting the expansion valve to keep this pressure constant, the temperature in the brine tank will become about 14° above 0° F. The accompanying graph will give enough information to enable the user to regulate the temperature of the brine tank.

When the machine is idle, and the expansion valve left open, the pressure in the casing will be the same as that in the condenser. There will be very little oil displacement if the stuffing box is properly made, and all that is necessary to

restart is to turn on the motor. If the machine is run several hours a day, to run the temperature well down, there is no need for any thermostatic control.

If all the work has been carefully done, the machine will operate with complete success, and give much better service than ice. The food chamber will be drier, and thus the possibility of molding and spoiling is lessened. The cost of operation is dependent upon the cost of power, size of motor, insulating qualities of the box, and the difference in temperature between the ice box and the outside air.

The only attention required is the oiling of the motor, replacing of oil in the casing, and occasional recharging. A material list, exclusive of pipe, fittings, oil, belting, etc., is given below.

MATERIAL LIST

Condenser	\$ 6.00 to \$12.00	Compressor	\$25.00 to \$35.00
Lead pipe	4.00 to 8.00	Gauges	3.00 up
Brine tank	6.00 to 8.00	Castings	5.00 to 7.50
Calcium chloride, per lb.04 to .10	Machining castings	15.00 to 30.00
Expansion valve	2.00 to 4.00	Motor	18.00 to 30.00
Steam valve	1.00 to 1.50	Gauge glass	1.50 to 2.00

Improving Tripods

The tripods used by contractors, surveyors, and photographers can be greatly improved, and the risk of slipping almost eliminated by the application of the idea shown in the drawing. This consists in nothing more than bending the metal points at the end of the legs toward the center so that the weight of the tripod and instrument

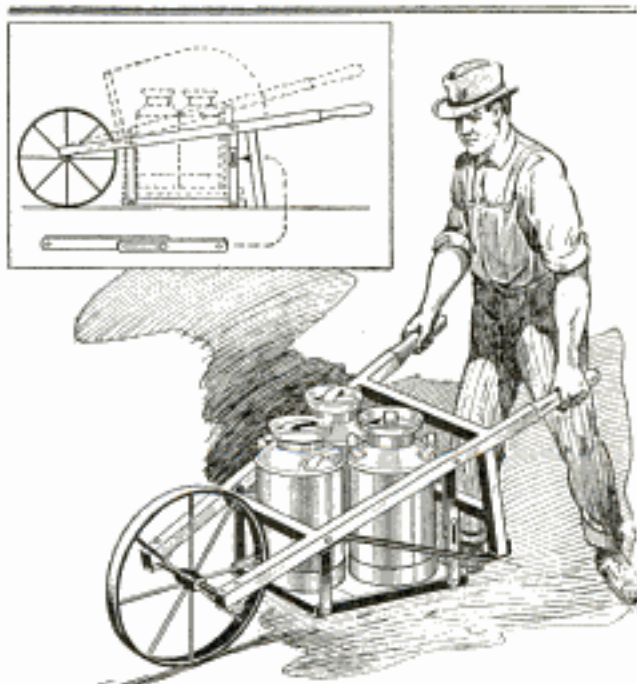
will push the points down vertically instead of outwardly. This will effectively prevent the tendency to slip, which is more pronounced when the legs are spread far apart.

Underslung Wheelbarrow for Carrying Milk Cans

Anyone who has tried to carry a large filled milk can or to push it in an ordinary wheelbarrow, will appreciate the usefulness of the underslung wheelbarrow shown in the drawing.

The frame of an ordinary wheelbarrow is used, but the regular body is removed. A platform is suspended under the frame, by means of flat brackets, so that it comes to within a few inches of the ground.

The rear brackets are made in two pieces, and slotted as indicated, so that the plat-



An Underslung Wheelbarrow That Enables Filled Milk Cans to be Transported Easily

form can be adjusted to suit the height of the user. The platform itself is made of 1-in. boards held on each side by lengths of angle iron. The center of gravity is so low that the load can be easily balanced to prevent spilling.

Homemade Preheater for Small Castings

The efficient furnace shown in the drawing was built to enable small shock-absorber parts to be preheated quickly for welding.

A 15-in. length of 3½-in. iron pipe is

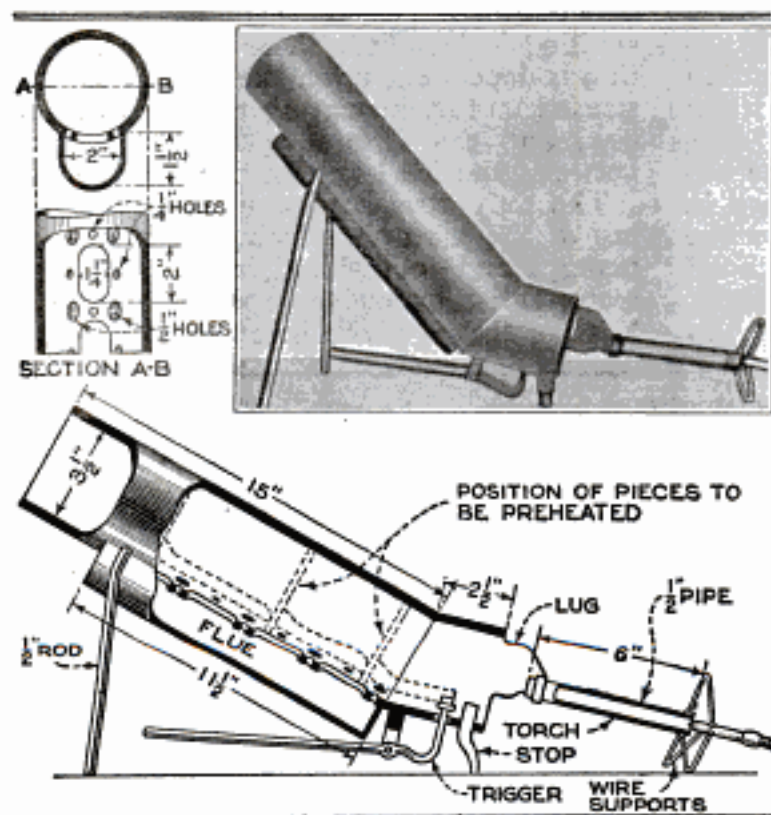
pipe forming the mixing chamber, and a tip made from ½-in. pipe, swaged down at one end to ⅛-in. opening. To permit proper adjustment of the tip relative to the mixing chamber, the tip is attached to the latter by means of three heavy-wire supports, welded to chamber and tip; these support the tip central with the chamber, and at the proper distance from the end.

As the castings fitted rather closely within the 3½-in. pipe, a metal troughlike flue, 1¾ in. wide by 11½ in. long, was welded under the pipe, after vent holes had been cut in the latter to allow the heat to reach the parts, as illustrated, and a pair of legs, made of heavy rod, welded on.

A stop is filled in the lower end of the elbow, and a trigger provided to lift the end of the castings over the stop when it is desired to remove them.

In practice, the parts are fed into the top of the preheater and the burner lit. While the lowest casting is quickly raised to the desired temperature, those above are gradually warmed by the heat supplied through the flue, so that, as quickly as one part is welded another is heated ready for welding.

While this particular design is especially suitable for the parts treated, a modification of shape would allow it to be adapted to many varieties of work; moreover, it is also useful as an annealing furnace.—E. M. Love, Alhambra, Calif.



A Preheating Furnace for Small Parts That Is Easy to Make and Efficient in Operation

cut at one end at a slight angle, and a short piece welded on to form an elbow. At one side of the short piece, near the top, a lug is formed, to which the burner is attached by means of a ring. The burner consists of a 6-in. length of ½-in.

Working Aluminum

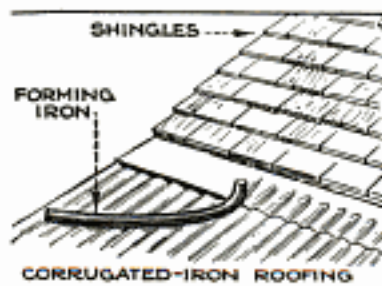
Apart from its light weight, which is, roughly speaking, about one-third that of copper, brass, or steel, aluminum possesses an outstanding property in its resistance to chemical action; practically the only substances that attack it appreciably are caustic alkalis, the halogens, and certain salts of mercury. Exposed to moisture, it oxidizes very gradually and regularly, and the thin film of oxide, when formed, protects the surface from further oxidation. This film is the cause of the comparative immunity of the metal from attack by chemicals, and explains why it can be used for the manufacture and storage of highly corrosive liquids, such

as concentrated nitric acid. Like many other metals it is hardened by cold working and softened by annealing. It is usually supplied in five different grades of temper, and the correct temper to be used in any particular case depends on the amount of work which will be done upon it, and the degree of hardness required in the final product. Hardening under working does not take place with the same rapidity as with brass, and if the finished article is to be dead-hard, it is generally necessary to start with a medium temper, unless the final shape is very complicated. The softest tempers are used for deep press drawing, but medium-soft or even medium-hard tempers give the best results for shallow stamping. A similar

range of temper is used for spinning, and for a spun cup with a diameter not less than two-thirds of the depth, a medium-soft temper gives an excellent finished hardness. Dead-soft tempers are, however, often used for deep spinning. Intermediate annealing is rarely needed, and even in drawing a very deep shell, annealing is unnecessary, unless more than six or seven redrawing operations are needed. Another method of working to which aluminum lends itself, is that in which flat sheets are worked up into the desired shapes by heating, with a mallet upon a leather sandbag. In this way contours which are impossible in steel, or can be obtained only by making a number of shaped sections and welding them together, are readily formed in one piece. For jointing aluminum sheets four methods are available—seaming, riveting, soldering, and welding, and many different surface finishes can be obtained by polishing, frosting, burnishing, scratch-brushing, plating, coloring by chemical action, and the application of paint or enamel.

Joining Shingles to Corrugated-Iron Roofing

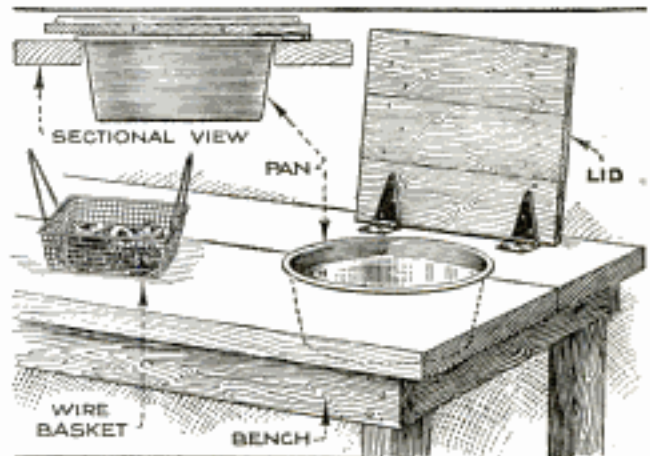
It is seemingly a difficult matter to make a weatherproof joint when shingles and corrugated-iron roofing meet. However, the work is more simple than it appears. Lengths of valley tin are forced under the shingles and over the metal roof, the tin being securely nailed under



the shingles to the roof boards. Then by means of an iron forming iron the portion of tin extending over the metal roofing is pounded down into the grooves, the forming iron being placed on the tin and blows applied with a common hammer. If desirable the tin can also be sweated on the metal roofing, thus making it impossible for water to enter the seam. The best results are obtained with roofing having narrow corrugations. The forming iron is made from a length of iron bar that fits snugly in the corrugations; one end is bent upward as shown in the drawing and the remainder is slightly curved, so that it may be grasped without the knuckles being bruised while hammering. —Louis Schneider, Clinton, Mo.

Bench Trough for Washing Automobile Parts

A practical method of washing automobile parts is shown in the drawing. A large 5-gal. bread or dish pan is inserted



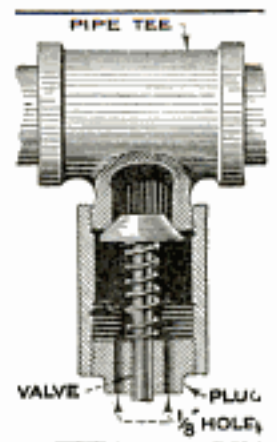
Convenient Bench Trough for Washing Automobile Parts, Which are Held in a Wire Basket

in a circular hole cut in the top of the workbench. The pan is not fastened down, but is simply held by its rim, which rests on the edge of the opening. A wire basket that fits in the pan nicely is used to hold the parts to be cleaned; two wire handles are provided on the basket so that it can be lowered into or raised from the pan. A wooden lid, hinged to the bench top and closing over the pan, is also desirable to prevent tools from falling into the liquid.

Relief Valve Prevents Water Hammer

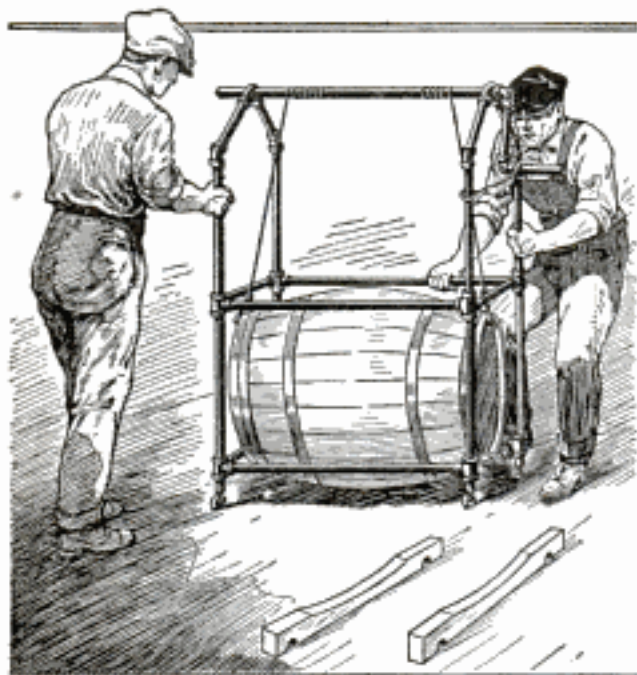
A simple method of making a relief valve to prevent water hammer in pipes is shown in the drawing. The side outlet of a tee is turned down and threaded to fit the length of $\frac{3}{4}$ -in. pipe that forms the body of the valve, and a seat is turned in the outlet for the poppet valve, which is made of hard brass.

In the lower end of the pipe, a $\frac{3}{4}$ -in. plug is fitted; this is drilled for the valve stem, and with four $\frac{1}{8}$ -in. holes. The thread in the lower end is cut twice as long as the plug, so that the $\frac{3}{16}$ -in. brass-wire spring that holds the valve on its seat may be compressed to provide the necessary pressure. The valve can be set to release at any pressure, and practically eliminates water hammer.



Rack for Handling Heavy Barrels

The rack illustrated has been found to be a time and labor-saving device for moving heavy barrels and casks. It is made of 1-in. pipe and fittings, with the



A Time and Labor-Saving Device for Conveniently Handling Heavy Barrels and Casks

exception of the windlass, which is made of $\frac{3}{4}$ -in. pipe. Two stout ropes are suspended from the windlass as shown, hooks being provided at the lower ends to engage with the barrel. By revolving the crank the ropes wind on the windlass, which raises the barrel a few inches above the floor, permitting it to be moved to any desired location, this being facilitated by casters that are provided under the legs of the rack. A short rope or chain with a ring at the end is fastened to the frame, to keep the crank from unwinding when under the strain of the load.—G. E. Hendrickson, Argyle, Wis.

Satin-Finishing Aluminum

To satin-finish aluminum, buff the article if necessary in order to obtain a good surface, and clean off the grease in benzine. Then dip it in a scalding solution of hot potash, not too strong, until the surface is dull and white. Rinse in cold water and soak for 5 or 6 minutes in a 5-per-cent solution of hydrofluoric acid to soften the surface. Then rinse again and dip into a mixture of equal parts of nitric acid and sulphuric acid to remove the discoloration. After this rinse again in cold water and in clean hot water; dirty water will leave stains on

the surface. Dry the article in sawdust of good quality and which is free from pitch or gum. Boxwood or birch sawdust should be used if possible. Care must be taken not to touch the aluminum at this stage with the bare hands, as this makes stains.

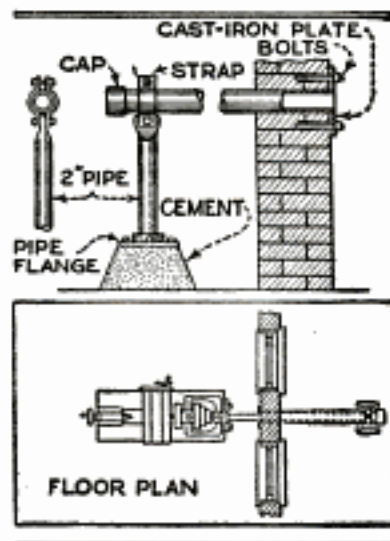
The frosting is accomplished with a fine, soft, steel-wire scratchbrush, about 6 in. in diameter, and running 2,500 revolutions per minute. New brushes should be broken in on coarse work or by running them against a file.

A Durable Floor Paint

A durable floor paint is made by adding a quantity of cement to the paint, and using benzine instead of turpentine, with some raw oil and driers. Never use boiled oil in a floor paint. Yellow ochre is very good to use for a base, as it is harder than lead. Zinc is also added in sufficient quantities to make the paint full bodied.

Setting Machines to Conserve Space

In order to conserve space without setting a number of bar-stock machines obliquely as is common practice, one concern has placed them at right angles to the wall and between the windows, the heads being next to the wall so that the operator gets the best possible light. This



was accomplished by drilling the factory wall and supporting suitable lengths of pipe on standards on the outside; the pipes contained the bar stock, which was loaded through the headstocks from the inside. The pipes projected outside into space that would otherwise not be used. The same idea could be adapted to similar machines on an upper floor by supporting the pipes on the outside of the building by knee braces or suitable brackets. Aside from the economy of space effected, the shafts that drive the machines all run at right angles.

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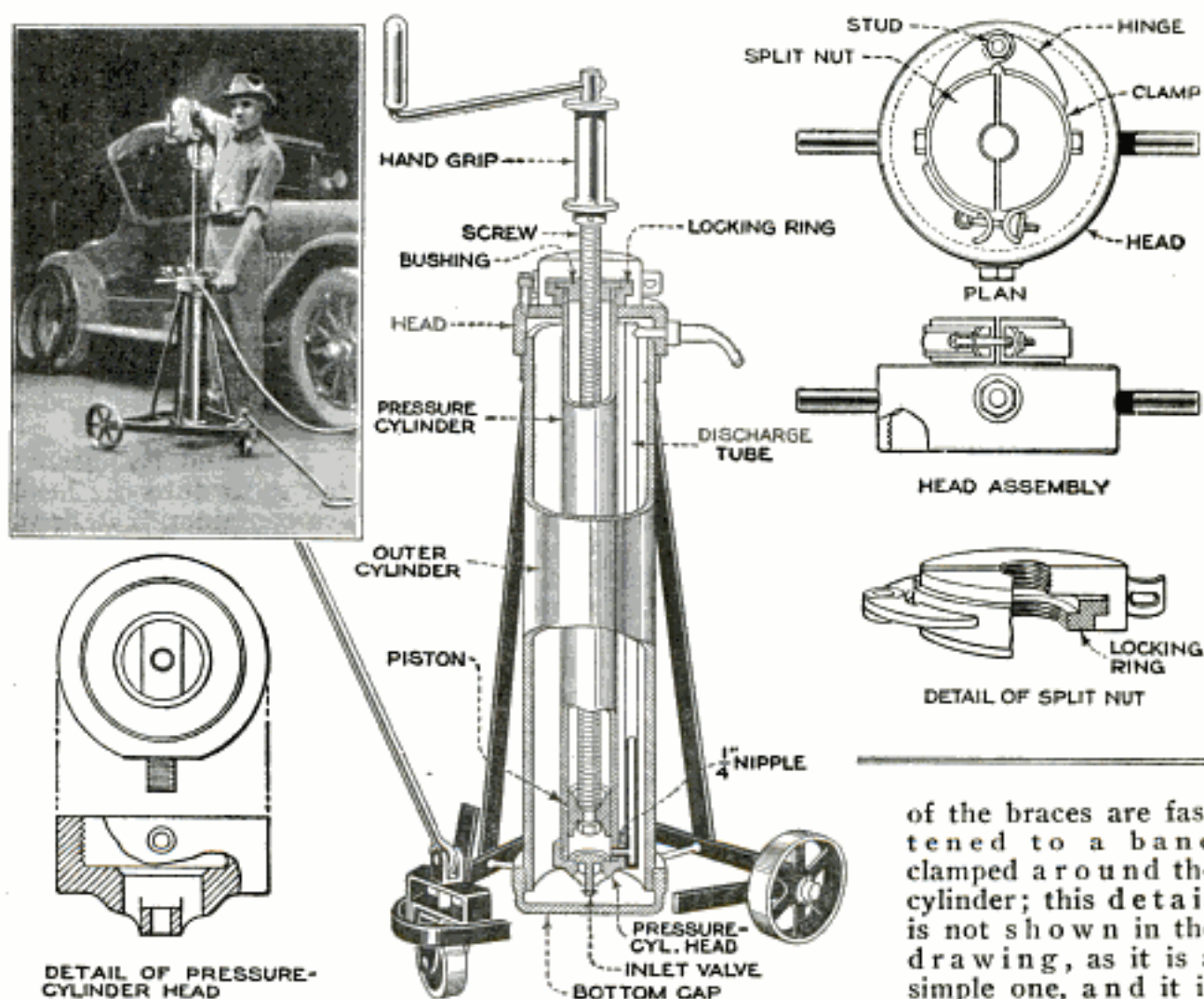
A High-Pressure Grease Machine

By J. C. DE PUE

THE object of this device is to supply grease, under a pressure of several thousand pounds per square inch, to all grease connections on an automobile, by means of a flexible hose equipped with various adapters.

The drawing clearly shows the various parts, and their relation to each other. It will be noted that no detailed dimensions are given; this is because the original machine was constructed from odd pieces of material found around the shop, and machined to fit each other, and so no record was made of individual sizes.

A 30-in. piece of 6-in. pipe, threaded at both ends, and two caps to fit, were obtained for the outer cylinder or container. One cap was screwed firmly on the lower end, and the cylinder mounted on the three-wheeled truck shown, by means of a clamping band, three braces, and three studs. The bottom cap was drilled and tapped for the threaded inner ends of the studs; the outer ends are also threaded, and extend through the truck-frame members, where they are fastened by the nuts that also hold the lower ends of the braces. The upper ends



DETAIL OF PRESSURE-CYLINDER HEAD

A Homemade Grease Machine for the Garage and Service Station: Insert, Filling the Pressure Cylinder with Grease

However, in the following description, approximate dimensions of the more important parts will be given, so that anyone wishing to duplicate the machine will have no difficulty in securing the necessary material; and in laying out the work to suit the shop facilities.

was one formerly used to carry oil barrels, but one can be made from flat iron.

The upper cap was then turned smooth on the outside, and bored out and threaded for the pressure cylinder, also drilled and tapped for the outlet for the hose connection, handles, and hinge stud.

For the pressure cylinder, a piece of brass tubing was used; this had an inside diameter of 2 in., a wall thickness of $\frac{3}{16}$ in., and was cut long enough to extend from $\frac{1}{2}$ in. above the top cap to within $1\frac{1}{2}$ in. of the bottom of the outer cylinder. The tube was threaded $\frac{3}{4}$ in. at each end, 14 threads per inch, one end being screwed into the upper cap. A locking ring was turned from a piece of bushing bronze, and threaded to fit the pressure cylinder; this locks the cylinder to the head, and has a flange that fits the split nut, thus when the nut is closed it is locked directly to the cylinder. The bushing for the upper end of the cylinder, which guides the screw, was also made of bronze, and is a push fit in the cylinder; it has a small flange that acts as a stop, the locking ring being machined out to clear it.

The screw was made of 1-in. cold-rolled steel, and, except for a length of 7 in. at the upper end, was threaded 8 threads per inch; the lower end was turned down to $\frac{3}{4}$ -in. diameter and threaded to fit the nut that holds the piston. The piston was also turned from a piece of cold-rolled steel, and made a good sliding fit in the cylinder, without rings or packing of any kind. The bore of the cylinder being true and smooth, the piston was found to work with practically no leakage, and, after six months' continuous use, scarcely allows enough grease to leak past to lubricate the screw.

The pressure-cylinder head was made of bronze; after being turned to size it was bored and threaded to fit the cylinder, then bored for the valve seat, inlet opening, and valve stem; two segment-shaped pieces were next cut out with a hacksaw, leaving an inlet opening on each side of the valve-stem guide. This part was then screwed onto the cylinder, and the outlet opening drilled through both head and cylinder, tapped, and fitted with a $\frac{1}{4}$ -in. nipple for connection to the discharge tube. The latter is a length of extra-heavy steel tubing, welded shut at each end, and drilled and tapped about 1 in. from the lower end for the $\frac{1}{4}$ -in. nipple; at the upper end it is tapped to fit a $\frac{9}{16}$ -in. S. A. E. cap screw; this forms the hose connection, and is drilled through and tapped $\frac{1}{8}$ -in. pipe-thread size to fit the hose. The hose, being a standard part of a well-known lubricating system, was purchased locally, and three adapters, to enable the machine to be used on other systems, were made to fit the outlet end of the hose.

The split nut was made from a piece

of brass, bored out to fit the locking ring and threaded to fit the screw; the clamping band, of flat iron, was then bent around it, and fastened in place with two $\frac{3}{8}$ -in. cap screws. The two halves of the ring were then welded in place on the band, after which the nut was sawed in two, placed in position on the head, and secured by means of the hinge stud. The drawing shows clearly the method used to clamp the halves of the nut together; there are only two operating positions, locked on the screw, and wide open.

The photograph gives a good idea of the method of filling the pressure cylinder. The split nut is opened to clear the screw and the screw drawn upward, filling the cylinder with grease through the inlet valve; which, by the way, is merely a large auto-engine valve. When the top of the stroke is reached the split nut is locked on the screw, and the screw turned down by means of the crank; the downward pressure closes the inlet valve and forces the grease out through the hose.

With the old method, using a small hand compressor, it required about $\frac{3}{4}$ hour to fill all the grease connections on a car, and more than this on a car fitted with spring covers. With this machine, the job can be done in 15 minutes, and done more thoroughly.

The pressure cylinder and its mechanism can be adapted to fit onto the head of a standard grease container, if desired, thus dispensing with the outer cylinder, and eliminating even the short time required to fill it.

This machine has been in constant use in a shop employing 20 men, and, to date, has handled over 500 lb. of grease, without any attention other than refilling, except for the replacement of one hose, which was broken from excessive pressure. A test gauge was attached, and it was found that a slight turn of the crank developed a pressure of 4,000 lb. per sq. in., and, as the hose is guaranteed only to stand 2,000 lb., it was necessary to caution the men to "go easy on the hard ones." With this reasonable precaution no further trouble has been experienced.

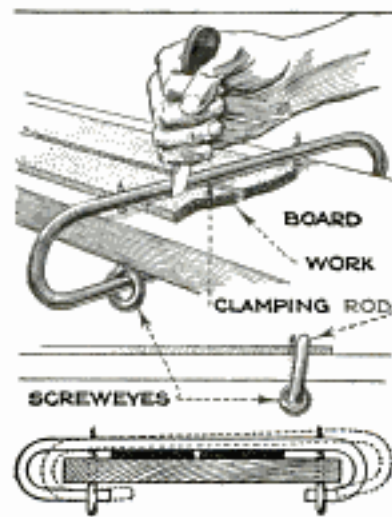
The total cost of the material purchased was \$12.00, the remainder being picked up around the shop; about \$20.00 covered the labor cost, as the machine was made in spare time. It will be noted that considerable bronze was used in the construction; cast iron could just as readily have been used, but, as the bronze was on hand, it was cheaper to use it than to hunt for cast iron.

Carrying a Rail on Handcar

A long iron rail is by no means an easy thing to handle, especially on a handcar. The work of transporting one is best accomplished by attaching the rail to the handcar in an underslung fashion, the rail being suspended from the handcar by means of two rail tongs, fastened to the rail and to the handcar. This method can only be used where there are no switches as there is not sufficient clearance between a switch and the rail to permit the latter to pass over it. Three men can easily do the work, one acting as a counterweight to balance the handcar while the other two are lifting the rail.—Willard A. Francis, Bowerston, Ohio.

Clamp for Soft Materials

The illustration shows a serviceable clamp for cutting by hand soft materials such as leather and felt. It consists of a length of round steel rod, bent to the shape shown and held on a board by



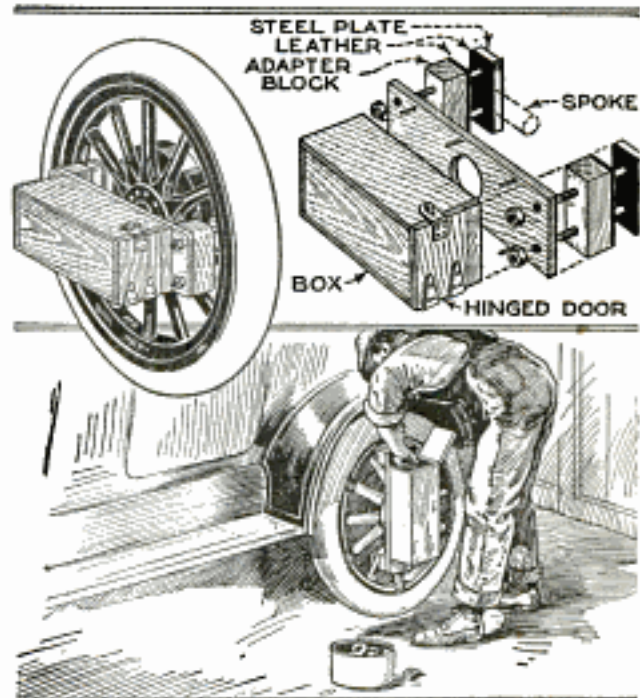
means of screweyes. The distance between the ends of the rod and between the screweyes is such that the clamp can be released from the screweyes by pulling it to one side as indicated by the dotted lines. By using long screweyes the ends will protrude above the board and will support the clamping rod when the knife is pressed against it. The screweyes may be turned to adjust the clamp to various thicknesses of material.

Auto-Driven Tumbling Barrel

A satisfactory tumbling barrel for cleaning and shining up auto and machine parts can be made by attaching a small wooden box to the rear wheel of an automobile. The box should have a hinged cover at one end and be provided with an additional board that projects about an inch beyond the ends. The box is clamped to the spokes between two

adapter blocks and two steel plates, both faced with leather to prevent marring the spokes. Two 1/2-in. bolts at each end hold the box securely on the spokes.

In use the wheel is jacked up from the



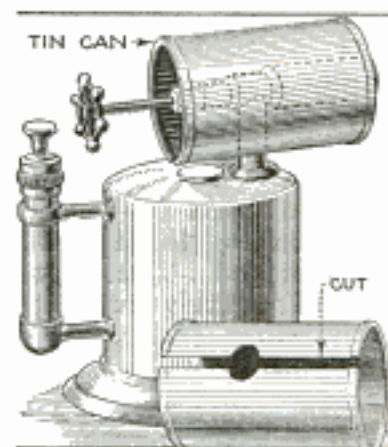
A Small Box Attached to the Rear Wheel of an Automobile Makes an Effective Tumbling Barrel

floor and run at a very slow speed. The box, when loaded, can easily be emptied by simply turning the wheel. For cleaning parts or for rolling small castings, shot or sand can be used as an abrasive, and for polishing, sawdust or scraps of leather will do the work.

Using Blowtorch on Windy Days

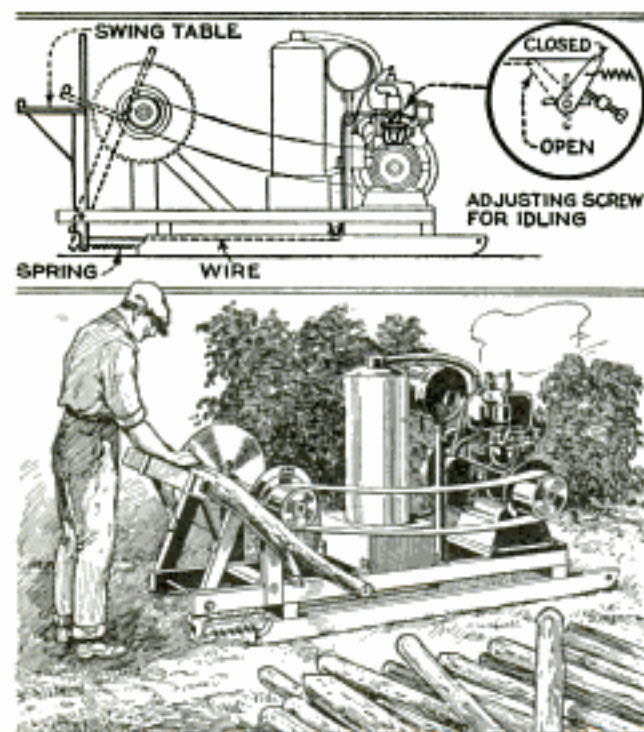
On windy days considerable difficulty is encountered in using a blowtorch, as the wind keeps the head too cool to make a blue flame.

To prevent this an effective windshield can be made from an ordinary tin can, cut out as shown, and slipped over the head of the torch. This shield is also of assistance in preheating the torch as it concentrates the flame around the head.—Andrew Fischer, Jr., Chicago Illinois.



Automatic Accelerator for Sawing Outfit

On circular saws it is often necessary to speed up the engine in order to cut heavy wood, but it is, of course, not



Automatic Accelerator Which Speeds Up the Engine When the Table is Moved toward the Saw

necessary to have the engine running so fast while no wood is being cut. To take care of the speed variation, an automatic accelerator can be improvised to work in connection with the swing table; when the latter is swung forward the speed of the engine is increased considerably, and when brought back again the engine will idle down. The accelerator consists of a length of flexible wire, one end of which is attached to the leg of the swing table and the other end to the arm of the throttle valve on the carburetor. A large coil spring is connected to the leg of the swing table and the end of the skid so that the table will be pulled back as soon as pressure against it is released. A small coil spring is also used to pull the throttle valve back to the closed position when the wire is released. The throttle valve is not closed entirely but kept open a trifle by the idling screw.—C. M. Wilcox, Torrington, Conn.

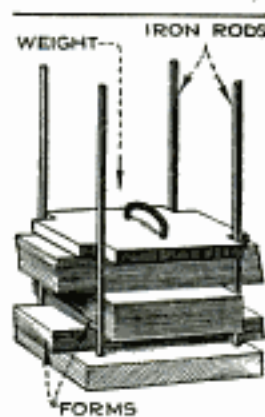
When melting scrap gold, the jeweler always examines it carefully to make sure that no iron, steel, or solder, or other foreign material is mixed with it. Do not use filings, or the joints of articles, but save these for the refiner.

Rack Aids in Filing Forms

Railroad and insurance offices, and many other places where a great deal of classification of printed forms is necessary in preparation for permanent filing, will find the device illustrated of considerable value.

A heavy wooden block, of any suitable size, is provided with four iron rods, properly spaced to suit the forms, as shown. An iron or heavy wooden block, with the corners cut out to clear the rods, and provided with a handle, completes the fixture. When the forms have been sorted and arranged in their proper piles, they are placed in the rack at right angles to each other, with the assurance that they will not be upset, or blown away.

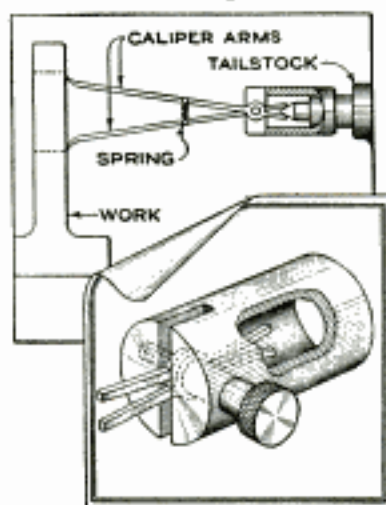
Any individual pile can be removed in an instant, and a piece of colored cardboard inserted in its place, to keep the piles from becoming mixed.



Alinement Gauge for Lathe

A useful gauge for centering work strapped to the saddle of a lathe is shown in the drawing, and can be made without much trouble. The usual method of measuring from the center is tedious, to say the least, but with a gauge of this type all parts of the bore can be measured quite easily.

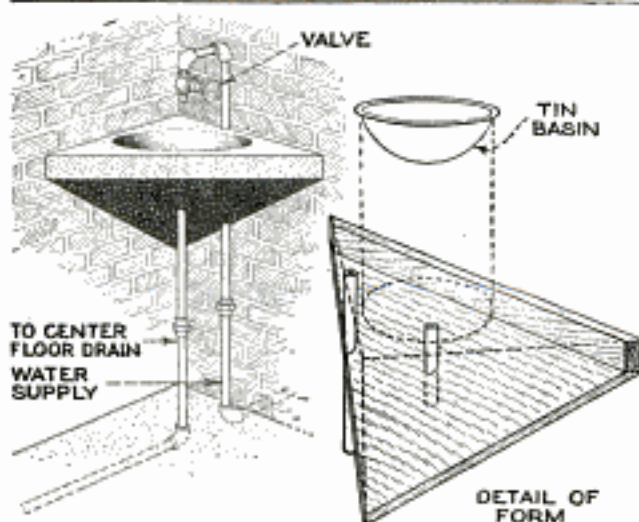
The cylindrical part is bored out to fit the tailstock spindle, slotted at the front to the width of the caliper arms, and drilled and tapped for the knurled tightening screw, as shown in the lower detail. The caliper arms are made as indicated and drilled to make a neat fit on the small diameter of the tightening screw. A light spring between the two arms completes the instrument.



To use the gauge, with a casting on the lathe saddle, the hollow cylindrical part is slipped over the tailstock spindle, with the tightening screw loose. The cylindrical sleeve is pushed back against the tailstock center, which causes the ends of the caliper arms to slide up on the center. The opposite ends of the arms are set by this means to the required diameter of the hole, and the screw is tightened. The gauge can then be revolved by hand around the tailstock spindle, showing at once when the work has been correctly set up.

Concrete Washbowl for Garage

The drawing shows a concrete washbowl for use in garages. The bowl is built in a corner, as shown, so that it will not take any floor space. A number of holes are made in the wall at the point where the bowl is to be made, so that the concrete will be anchored securely. A wooden form is made as shown in the right-hand detail, two holes being drilled in it for the two pipes that are brought through the bowl as indicated; one of these is the water pipe, and is fitted at the top with two elbows, a nipple, and a valve; the other pipe is the drain pipe, which runs under the floor to the sewer. An ordinary tin wash pan is used as a form for the bowl. Several coats of heavy oil paint and two coats of white enamel



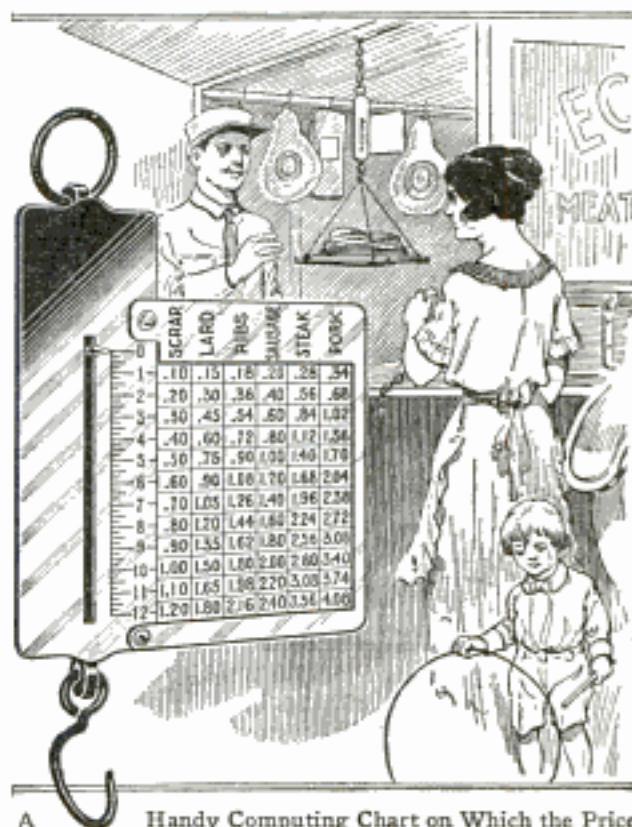
A Concrete Washbowl for the Garage can be Readily Made and does Not Take Any Floor Space

are applied to the inside and top of the bowl, to waterproof it and make it smooth.

☐ After a rain, do not put the auto top down until it is thoroughly dry.

Computing Chart for Spring Scales

A handy and helpful attachment for a spring scale is a computing chart of the kind shown in the illustration. It is made of tin, painted white and screwed to the



A Handy Computing Chart on Which the Price of Any Number of Pounds can be Seen at a Glance

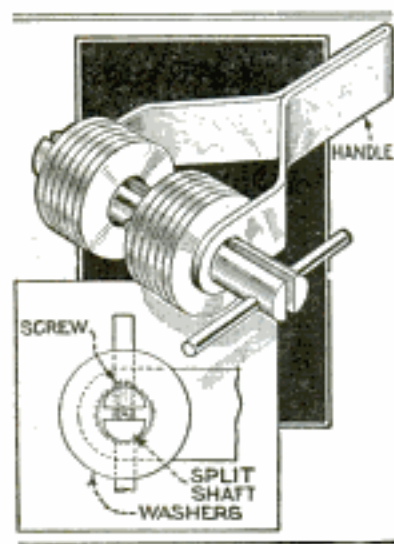
face of the scale. Lines are ruled across the tin horizontally in line with the pound graduations, and columns are ruled vertically under various articles listed. The number of columns, of course, varies considerably in different cases, the butcher's chart showing various kinds of meat, the poultry dealer's chart chickens, ducks, geese, etc., and the junk dealer's chart iron, brass, copper, lead, etc. It is a good idea to prepare several blank charts so that a new one can be filled out at once when prices change. The chart shows at once the price of any number of pounds of each article, up to the capacity of the scale.

Turning Long Babbitt Bearings

In making some long babbitt bearings difficulty was experienced in holding the babbitt in the lathe securely and turning it. However, this trouble was overcome by filling a piece of pipe with babbitt, placing the pipe in the lathe and turning the pipe and babbitt at the same time. This made it easy to turn as well as to hold it firmly in the chuck.

Grinding Washers

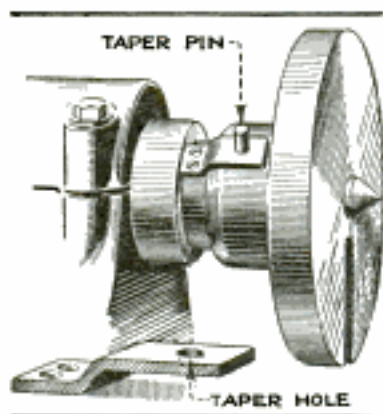
Standard washers are often too big on their outside diameters for some particular job, and must therefore be ground down to the required size. When quantities of washers have to be ground in this way, the work can be done quickly by using a holder of the kind shown in



the drawing. It consists of a short shaft and a handle. The shaft is split lengthwise as shown and drilled at one end for a pin, which must fit tightly in one piece of the split shaft and loosely in the other. The latter piece is drilled and tapped in the center for a headless screw. The holder is used by turning the screw back a little and slipping the washers on, six on each side of the screw. When the screw is tightened the shaft binds all the washers but not the handle, as the holes in it are slightly larger. To grind the washers the handle is held by the left hand on the tool rest of the emery wheel while the washers are turned around by the pin on the end of the shaft.

Holding Lathe Faceplate Securely

It is often desirable to reverse the lathe, especially when threading, but there is al-



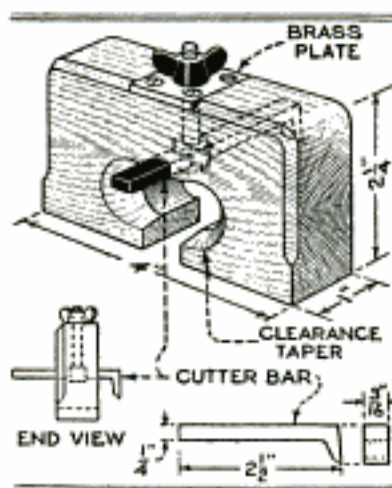
ways present the danger of having the faceplate fly off. The illustration shows a simple way of eliminating this danger. Fasten a small cold-rolled steel strap to the lathe spindle with two small screws, as indicated. Drill a hole through the other end of the strap, and into the hub of the faceplate, and ream this out to fit a heavy taper pin.

"Ball-Bearing" Trestles

To facilitate the sliding of sheet metal over a wooden trestle, where the material is being fed into or taken away from a punch press or other machine, groove the top of the trestle to receive steel balls $\frac{1}{2}$ in. or larger in diameter. The groove should be so deep that only about a third of each ball bearing projects above the surface. The balls themselves do not revolve, but their smooth surface, which comes in contact with the material, allows it to pass over with very little friction.—W. E. Rausch, Milan, Mich.

A Homemade Router

A router can be purchased in tool stores, but many workers, both amateur and professional, prefer to make their own. The one shown in the drawing is simple and easy to make, and answers the purpose perfectly. The block is made of beech or maple, the latter being the easier obtained, and it is usually desirable to have three sizes: 1 by $2\frac{1}{4}$ by 4 in., as in the drawing, $1\frac{1}{8}$ by 3 by 6 in., and



$1\frac{1}{4}$ by $3\frac{1}{2}$ by 8 in. A throat is cut out of the block, so that the worker can see the work, tapered to prevent clogging, and recessed to fit the cutter bar. Three sizes of these are used, to suit the various blocks: $\frac{3}{16}$ by $\frac{1}{4}$ in., $\frac{1}{4}$ by $\frac{1}{2}$ in., and $\frac{1}{4}$ by $\frac{3}{4}$ in., bent and ground as shown, and made a sliding fit in the block. The block is also drilled and counterbored to receive the shank and head of the clamping bolt, which can be made from a length of brass bar, or a brass casting, and provided with a wingnut. Below the wingnut, a brass plate is countersunk and screwed to the block; if desired, a plain washer can be used, but the brass plate makes the better job.—M. E. Dugan, Kenosha, Wis.

☛ If any difficulty is experienced in obtaining materials mentioned in these pages, write to the Bureau of Information.



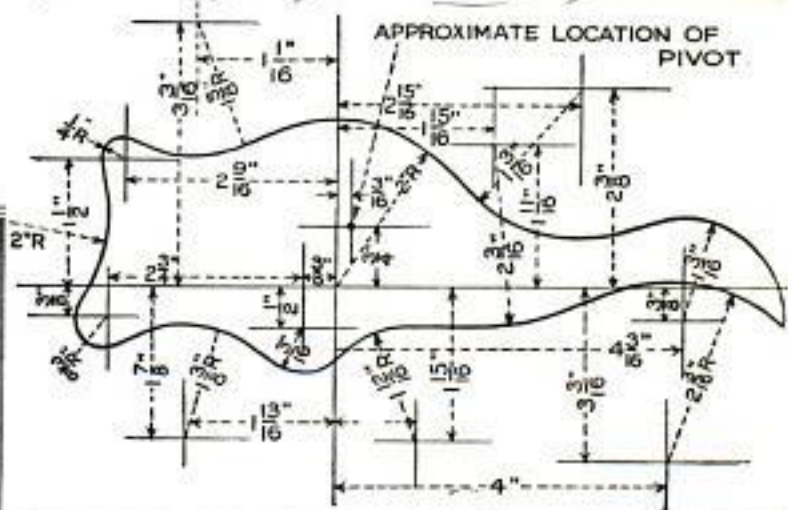
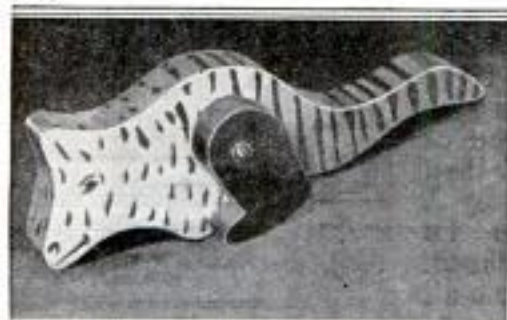
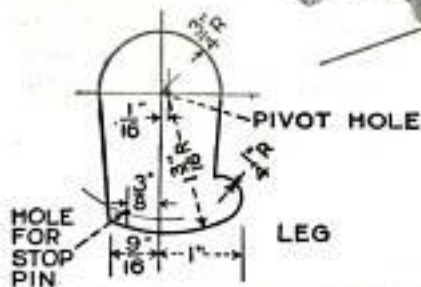
The "Walking Wampus"

BY L. BOCHIER

THE toy shown in the illustration will please any child. When placed at the top of an inclined board, it will walk down in a comical manner without any assistance from springs or any other mechanical parts. The secret of the action lies in the placing of the pivot point for the legs. The pivot must be a little ahead of and a little above the center of gravity of the body. When this pivot is located

on the stock according to the dimensions given, the centers for the curves are quickly located and the toy is easily laid out.

The legs of the toy are made from $\frac{1}{4}$ -in. material, finished on both sides. It is important that the curve of the feet be laid out carefully. Two legs will be needed, one for each side of the toy. A band saw is convenient when cutting



A Weird Toy That will Delight the Youngsters: It Walks down an Inclined Board without the Aid of Springs, Gears, or Other Mechanical Parts

correctly, the body falls forward on the legs, then tips forward slightly, allowing the legs to swing ahead again, and repeats the action until the bottom of the incline is reached.

The construction of the toy is made clear by the drawing. Material 1 in. thick, finished on both sides, is used for the body. If the center lines are drawn

out the body and legs, although a scroll or even a keyhole saw will do.

The holes in the legs should be large enough to be a loose fit on the wood screws used to fasten the legs to the body. A thin washer is placed between each of the legs and the body to reduce friction. An ordinary finishing nail or a piece of stiff wire will serve as the stop

pin that joins the legs; this pin keeps the legs moving in unison, and prevents them from swinging too far forward or back.

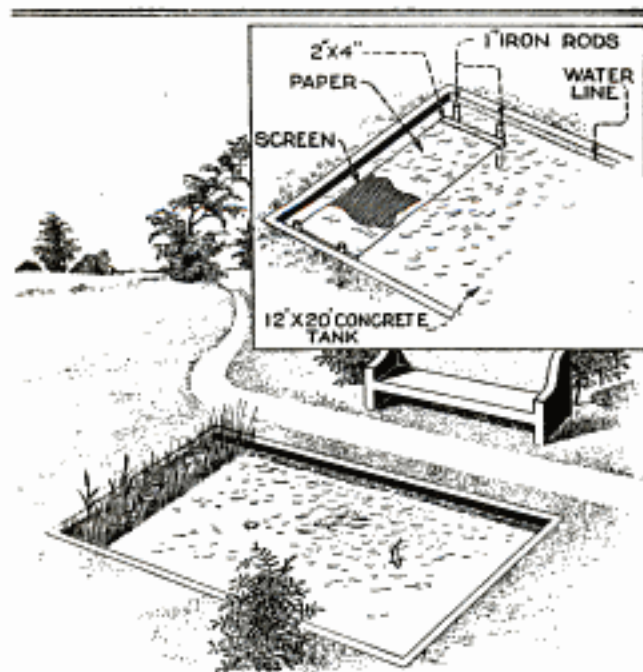
Before the pivot holes in the body are marked out, it is a good plan to find the center of gravity of the body. The legs must be pivoted in correct relation to the center of gravity or the toy will not move. The approximate position for the pivot point is shown in the drawing. This should be checked, however, as a knot or a dense place in the wood used for the body may locate the point dif-

ferently. The center of gravity of the body can be found by swinging the body between two uprights having nail points that clamp at right angles to the body. With a few trials a point can be found where the body will balance no matter in what position it is placed. The pivot for the legs should be a little above and ahead of this.

The color of the paint can be chosen according to the taste of the maker. The toy shown in the photograph has a yellow body striped with black, and red legs.

Screen Facilitates Growth of Water Plants

In a fish pool where it was desired to grow water plants, seed was first thrown into the water; some of it sank to the gravel bottom, but the remainder was



Method of Growing Water Plants in a Fish Pool by Means of a Screen

eaten by the fishes, who evidently thought that the seed was intended for them.

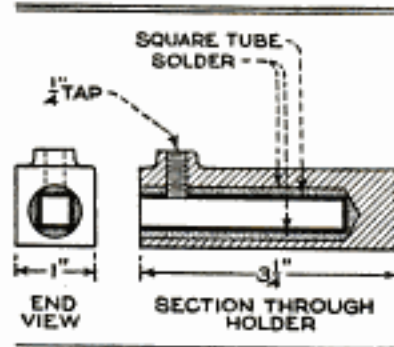
To prevent this, the method of growing the plants shown in the drawing was used. Four 1-in. iron rods were driven into the pond at one end, in the position indicated. A strip of copper screen with a $\frac{3}{16}$ -in. mesh, was cut to length and fastened at both ends to short lengths of 2 by 4-in. wood, which were attached to the posts by means of iron loops. Cleats fastened to the posts, about 6 in. below the water level, kept the arrangement from sinking to the bottom. It was found later that it was best to paint the screen. Thin coarse paper was laid on

the screen and the seeds sprinkled on the paper, then the screen was lowered into the water and attached to the posts. In a short time the seeds sprouted and the roots pushed through the paper and down into the water. The hanging roots provided a splendid cover for the protection and propagation of the fish, yet the screen held the plants securely anchored. The screen was well hidden from view by the plants.—Dale R. Van Horn, Walton, Neb.

Toolholder for Amateurs' Lathe

The usual amateurs' bench lathe employs solid forged tools, and, while the amateur realizes the superior advantages of a toolholder using square tool bits, he is usually unable to purchase a toolholder to suit the lathe, and doubts his ability to make one. The main difficulty in making a toolholder—the broaching of the square hole—is eliminated in the practical toolholder shown in the drawing. The bits used are

$\frac{3}{16}$ in. square by $2\frac{1}{2}$ in. long, and the body of the tool is made of a piece of cold-rolled steel, $\frac{1}{2}$ by 1 by $\frac{3}{4}$ in. in size. A $\frac{1}{8}$ -in. hole, about $2\frac{5}{8}$ in. deep,



was drilled along the bar from one end, a little off center, as shown, and the bar shaped to size, leaving a boss for the tool-clamp screw, as shown. A small square tube was then made, with an inside measurement of a little over $\frac{3}{16}$ in., and 3 in. long, using a piece of square-steel rod as a form, the outside of the tube was cleaned and tinned, and the tube filled with damp dirt, to prevent it from filling with solder. The inside of the hole was

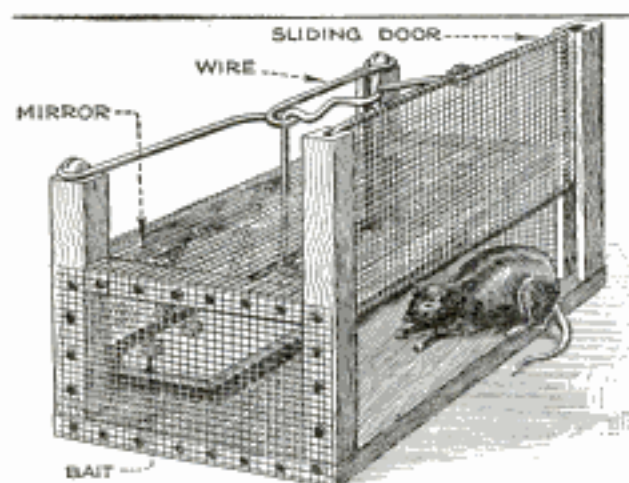
tinned by heating the holder and placing solder and flux in the hole. Enough solder was used so that when the tube was dropped in the solder overflowed. When the solder was hot, the tube was dropped in and turned to position, and the holder then cooled off with water.

The dirt was then dug out, and the hole for the $\frac{1}{4}$ -in. clamp screw drilled and tapped.

Right and left-hand holders can be made in the same way, except that the hole for the tube will run right through, and must be plugged at one end when filling with solder. The width will depend upon the toolpost, but the holder should not be much below $\frac{1}{2}$ in. wide, as then smaller than $\frac{3}{16}$ -in. bits must be used.—Leon Francia, Los Angeles, Calif.

A Novel Rat Trap

The novel rat or mouse trap illustrated has been found very effective in catching rats, which are attracted by the bait fixed on the trip board and also by the mirror behind the trip board. The mirror makes

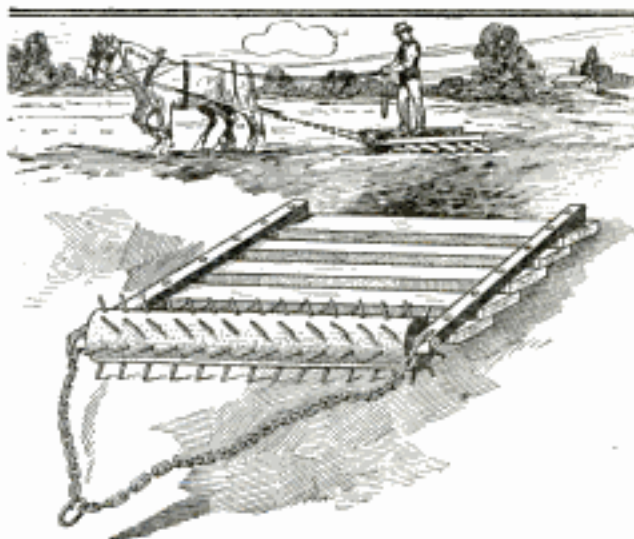


Rat Trap That has been Found Effective: A Touch on the Trip Board Causes the Door to Drop

it seem as if another rat is also stealing upon the bait, with the result that the rat will not be hasty to retreat but usually plays or fights with his image in the mirror. A light touch on the trip board dislodges the wire supporting the gate, which drops down, trapping the rat. The trap is made of wood, $\frac{1}{8}$ -in. wire mesh, and No. 12 galvanized wire. The construction is obvious from the drawing. The gate should be a sliding fit between two end posts, which are grooved to hold it. The wire mesh is tacked to the wooden braces and soldered to the wire gate. The only disadvantage of this trap is that it has to be set after every rat is caught.—E. K. Wehry, Cedar Rapids, Ia.

Combination Rotary Harrow and Drag

The combination rotary harrow and drag shown in the drawing and used for pulverizing clods can be made in a



A Combination Rotary Harrow and Drag That Is Very Effective in Pulverizing Clods

short time from material available on every farm. It consists of five 6-ft. lengths of 2 by 10-in. lumber, nailed or bolted to two 2 by 4-in. endpieces, and a 6-ft. wooden roller, attached to the front so that it will revolve when the drag is pulled over the ground. Rows of teeth, made from heavy spikes, are then driven in so that they project about 4 in., and the heads cut off and the teeth sharpened. Two $\frac{3}{4}$ -in. bolts, driven into each end of the roller, serve as journals, and turn in bearing holes in the 2 by 4-in. endpieces. The drag may be weighted down with stones, or if desired an old mower seat may be attached to it.—J. T. Garver, Huntington, Tenn.

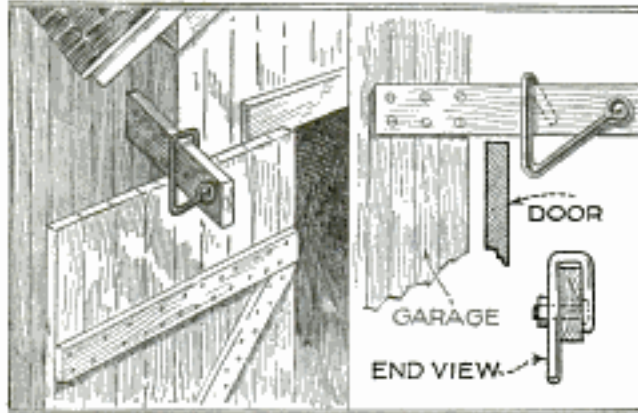
Homemade Graduates

In the workshop of the amateur photographer, electrician, or experimenter, occasion often arises for the use of several glass graduates. As few workers are equipped with more than one, it will be found convenient to use ordinary tumblers or fruit jars as substitutes, the graduations being marked with rubber bands cut from a discarded inner tube. The upper edges of the bands are set at the water lines.

It is, of course, necessary to keep the jars in a place where they will be out of reach of meddlers who might move the bands; under ordinary working conditions, there is very little danger of them being moved.

Garage-Door Catch

The garage-door catch shown in the drawing is used on garage doors to prevent the doors from swinging back

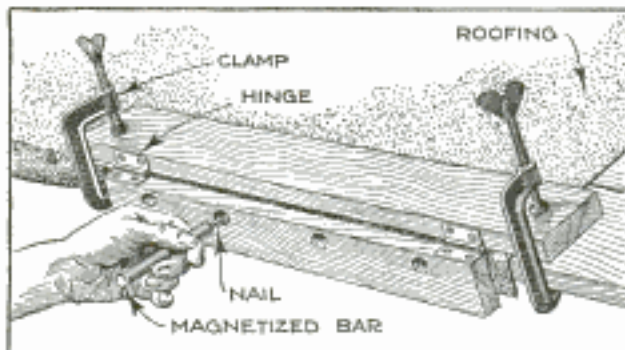


Garage-Door Catch to Prevent the Door from Swinging against the Car While Driving In

against the car while driving it into or out of the garage. The arrangement is unusually simple in that only one piece of iron rod, bent to the shape shown, and pivoted to a wooden bracket, forms the complete catch. The wooden bracket is screwed to the side of the garage and a bolt on the end of the bracket is used as a pivot for the catch.

Fastening Edges on Roll Roofing

When laying heavy roofing paper over the edge of a roof, it is usually found to be difficult to turn the material over and fasten it neatly without tearing. By hinging two hardwood strips together, a fixture is obtained that will prove of great assistance. The upper strip is made a little longer than the lower, to allow room for the two clamps required to hold it to the roof. One or both ends of the



A Good Method of Fastening the Edges of Prepared Roofing

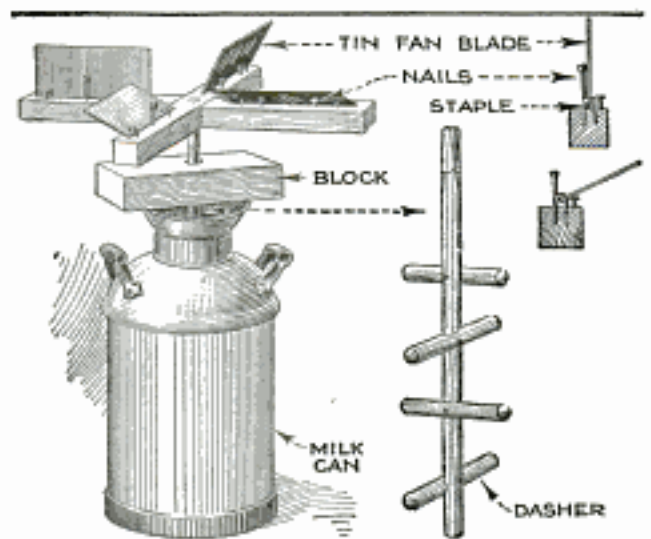
other piece are curved to prevent tearing the roofing by making a sharp crease in it when the edge is folded over.

The longer strip being clamped in place

at one end of the roof, the hinged piece is bent down, assisted by the hammer where necessary. It is well to get a few roofing nails in place before removing the fixture; this is accomplished by having a few holes drilled through the short piece, large enough for the big-headed nails to go through. A round, magnetized bar of hard steel will set the nails in place through the hole, and a few taps of the hammer will send them home. The rest of the nails can be driven after the fixture has been removed.

Simple Wind-Power Milk Stirrer

To keep milk sweet, especially during warm weather, it is necessary to remove the animal heat as soon as possible, and this can be accomplished only by thorough stirring. When done by hand this simple chore becomes rather tiresome, and therefore a wind-driven stirring device, of the kind illustrated, which will



A Simple Milk Stirrer Driven by Wind Power for Removing Animal Heat from Milk

serve the purpose equally well, will be found useful.

The device consists of a vertical wooden shaft, fitted with two short crosspieces, on which blades are mounted to catch the wind. The crosspieces holding the blades are made of 2-in. material and the blades themselves are merely pieces of tin, obtained by removing the ends of tin cans and flattening the cylindrical portions. Staples are used as hinges for the blades to swing on; nails are driven into the crosspieces on both sides of each blade; a nail on one side is partly driven in to hold the blade in the vertical position when the wind catches it, and two nails, on the other side, driven in almost entirely, hold the

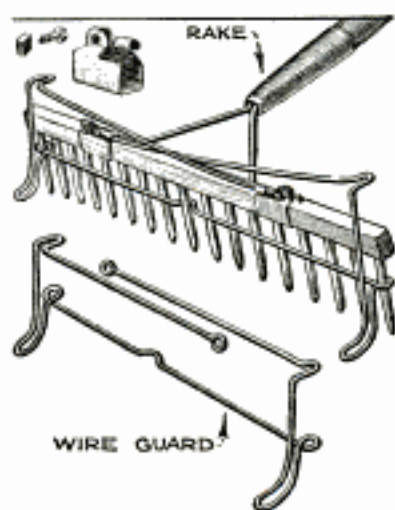
blades at an angle to permit the wind to catch it. The short crosspieces forming the dasher or stirring element are made of round wood, nailed or screwed to the shaft. A 4 by 4-in. block, with a hole drilled through it to serve as a bearing for the shaft, is placed on the milk can as indicated, to hold the stirring device in position.

In the slightest wind each blade of the wheel, as it catches the breeze, swings upward to an erect position, where it is held by the nail. Here it remains until it has revolved a quarter turn, when the reverse side is presented, causing it to fall back until a similar action of the other blades brings it into the wind again.

—G. E. Hendrickson, Argyle, Wis.

Attachment for Leaf Rake

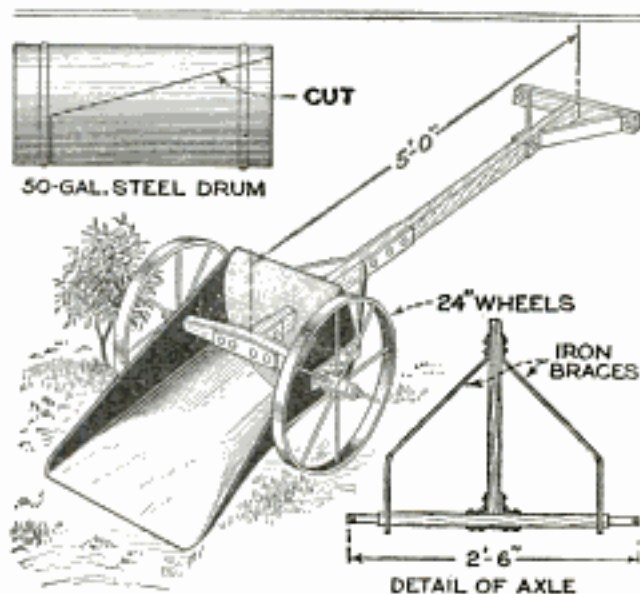
When using leaf rakes constant difficulty is experienced, as the leaves and grass quickly accumulate between the teeth and must then be pulled out by hand. An attachment that eliminates this trouble is shown in the illustration. It consists of a length of heavy galvanized wire, bent to the shape shown in the lower detail and attached to the top of the rake with thin sheet-metal clamps.



Of course, there are so many different types of rakes that the exact method of attaching this guard will vary, but the principle is the same in all cases. In its normal position the guard runs across the teeth near their ends, and is bent to form an eye at each end to fit the outer teeth. While using the rake, the guard moves up. This gives the leaves a chance to get on the teeth, but as soon as the rake is lifted from the ground, the guard pushes the leaves off. The guard does not add much to the weight of the rake and there is no necessity for removing it. The use of the guard also eliminates the "digging in" and tearing of grass roots experienced in raking, as the rake rides smoothly on the "feet" of the guard, and the rake teeth barely touch the ground.

Yard Scoop Saves Labor

A scoop of the kind shown in the drawing has been found useful for leveling small plots of ground and also as a substitute for a wheelbarrow. It consists of



A Homemade Scoop for Leveling Uneven Plots of Ground and Carrying Heavy Loads

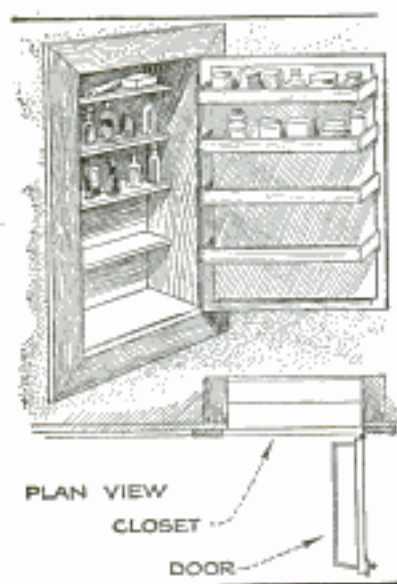
part of a 50-gal. steel drum, cut as indicated in the upper detail, and with the lower edge flared out to present an even digging edge. This part is then mounted on a wooden or iron axle; two wheels, about 24 in. in diameter, taken from an old farm implement, are mounted on the axle. A 5-ft. handle is also attached to the axle at right angles to it, the handle passing through the end of the scoop and being supported by two iron braces, bent to the shape indicated, and bolted to the side of the scoop. A crosspiece is provided on the end of the handle so that one or two persons can push it. The edge of the scoop should be sharpened to lessen the pressure required in scraping hard ground. As the edge of the scoop is only a few inches above the ground, the handle does not need to be tilted very high to make the scoop dig.

Removing Bloodstains

Many methods of removing bloodstains from linen and other cloth leave a dark spot on the material, especially if the stain is large. A method that will not do this is to soak the cloth in cold water for 24 hours and then wash it for 30 minutes in soap and suds, to which a small amount of soda has been added. Then the cloth is washed a few minutes in warm, but not hot, water.

Making the Medicine Cabinet More Convenient

Medicine cabinets are usually found too small to permit an orderly arrangement of the numerous bottles, vials, and other

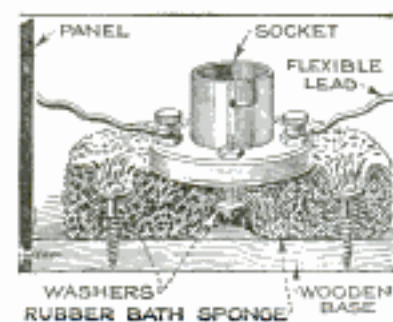


containers, kept in them and therefore additional space is necessary. This can easily be provided by building a few narrow shelves on the inside of the door as shown in the illustration, most cabinets of this type having the shelves set

back far enough to permit this. It may be necessary, in some cases, to provide a heavier door as well as heavier hinges to take care of the additional weight. One end of the shelves on the door must be cut off at an angle as shown in the plan view so that the door can be closed. A rail around the edge of each shelf is also necessary as opening and closing the door moves the bottles.

Cushions for Vacuum Tubes

It is an excellent idea to mount a vacuum tube on a shock-absorbing base in order to prevent interference from vibration, which is especially noticeable in the $1\frac{1}{2}$ -volt dry-cell tubes. Talking close to the set causes the grids to vibrate, which gives a ringing sound in the phones or loud speaker. To prevent this springs and rubber-band supports have



been tried out in factory-built sets, but neither has been found as successful as a rubber-sponge cushion.

The socket is attached to the sponge and the sponge to the wooden base by means of screws, which are fitted with

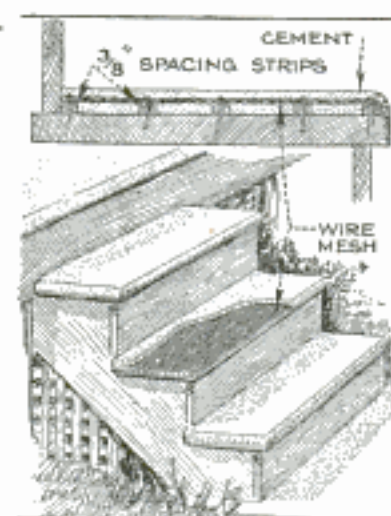
large washers to prevent the heads from tearing through the rubber. Heavy wire should not be used to connect to the socket terminals, as this will transmit vibrations to the tube; it is preferable to use common lampcord. When inserting or removing a tube, the socket should be held with one hand to prevent tearing the sponge.

Improvement on Gas-Tank Kink

The scheme of soldering a tire valve into the gas-tank cap, on an auto with a gravity-feed system, so that a tire pump may be used to provide pressure to get the car up a hill, is well known. Of course, the vent hole in the cap must be plugged when using pressure, and taken out again for gravity feed. An improvement on this scheme is to solder two valve stems in the cap, one containing a valve core and fitted with a dust cap, the other to serve as the vent. When necessary to use pressure, the cap of the stem containing the valve core is removed so that the pump can be attached, and the cap screwed on the other valve stem, to seal the vent.

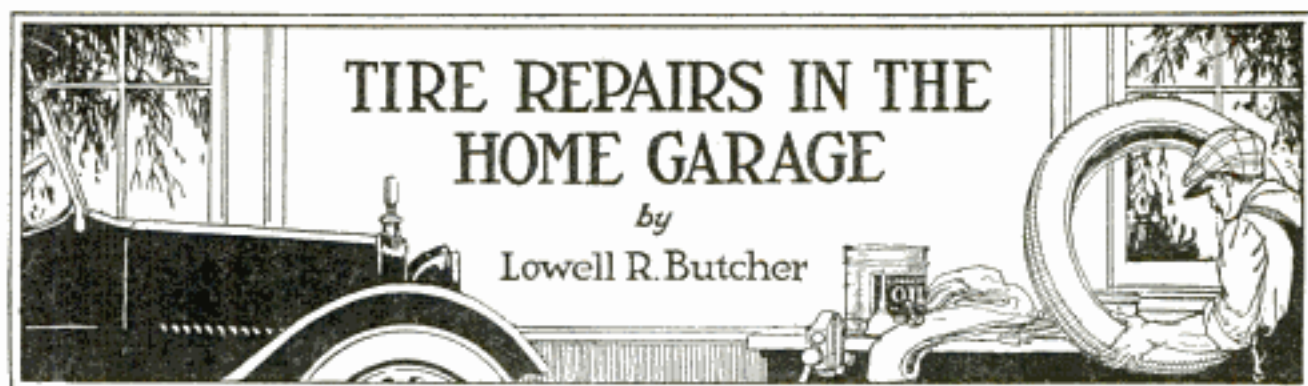
Retreading Steps with Concrete

Wooden steps that are used continuously wear down soon and must then be replaced. A good method of renewing the steps is to retread them with concrete, which involves little work, as the



old steps need not be torn off, providing they are sound. Thin wooden strips are first nailed on the steps and a double layer of wire mesh is stapled over this to reinforce the cement. Almost any kind of meshed wire will do

except fly screen or similar screen, which is too light. The layer of cement should be about $\frac{3}{4}$ -in. thick and the mixture should consist of half sand and half cement. It is, of course, necessary to provide forms along the edges of the steps.—G. A. Luers, Washington, D. C.



Part II—Casing Repairs

WHILE some of the more serious tire damages must be taken to the tire shop for repair, there are many simple repairs that the car owner can make. Most of the bad blowouts are caused by neglecting some simple injury that could have been repaired in the home garage. Trips to the tire shop and the purchase of new tires will be less frequent if the owner will learn to make a few simple repairs—and will make these when needed.

The most simple repair to make, and the one most often required is the tread patch. This repair is the same whether the carcass of the tire is of ordinary fabric, cord-fabric, or cable cords. The repair is used on tires the treads of which have been damaged by bruises or cuts. These minor injuries may not seem serious, but their neglect will cause other and more serious troubles. The patch is used to fill in the broken place on the tread and seal up the carcass against dirt and moisture.

Such damages usually extend only to the carcass of the tire. If many plies of the tire are damaged, it is best to take the tire to a competent repairman and have a section repair made. Broken plies make a hinge section at the point of the damage, and internal rubbing and friction take place, no matter how well the tread is sealed up.

All broken or injured gum must be removed from the injury before any attempt is made to build up the tread patch. Remove all separated or broken tread down to the breaker strip. A sharp knife or an old razor blade will be needed for cutting out the damaged gum, as shown in Fig. 1. The instrument must be kept sharp and will cut much better if it is dipped in water from time to time. The cut-down portion of the tread will be circular in shape, and the sides of the hole should be beveled off at an angle. Wash the injured spot with high-test gasoline to remove all dirt and grease, use a coarse file or a rasp to buff and roughen the injury, and finish the

work with some coarse sandpaper. Roughing the tread allows the tread patch to get a better grip on the tire.

Regular vulcanizing cement is used in making the tread patch. Apply this in three coats, allowing each coat to dry before the next is applied. As this cement consists for the most part of raw rubber it is almost impossible to apply too much. After the last coat has dried until it is "tacky" to the touch, the injury is ready to be rebuilt up with new gum.

Cushion stock and tread gum will be needed to build up the patch. The cushion stock is applied first in a thin layer that completely covers the injured spot, and laps at least $\frac{1}{2}$ in. all around the cut-down portion, as in Fig. 2. Use a sharp prod or screwdriver to work down the gum evenly over the injury, and roll the gum well with a tire roller before applying the tread stock. This prodding and rolling drives out any air bubbles that might be lurking under the gum, and is quite necessary, as the repair may fail if good contact is not secured at all points.

Wash off the repair with high-test gasoline to remove any dirt or grease that may have been rubbed on while working down the gum, then use the tread stock to build up the hole until the center of the repair is slightly higher than the surrounding tire. This operation is shown in Fig. 3. This will allow the gum to flow down evenly during the vulcanizing. Work down the tread gum with a prod, and roll before curing.

An electric or gasoline-heated patch vulcanizer may be used to cure the repair, but fully as good results can be obtained by using the electric iron. Shape a block to fit the inside of the tire by rounding the corners of a chunk of wood. The top of the block must be flat as the tire will have to be flattened out for the cure. Spread a piece of holland—the protective wrapping for repair materials—over the patched spot, and clamp down

the electric iron. A large C-clamp will serve to hold the iron tightly against the patch, as shown in Fig. 4. It is important that the iron be held tightly during the cure; if it is not, the gum may bulge at the point of contact, and make an unsightly repair.

The length of time required for cure will depend somewhat on the kind of gum used, and the depth of the repair. If the patch is shallow, enough heat may be retained in the hot iron without using current when the iron is clamped in place. More often, the repair will require more heat than can be supplied in this way, and the current will need to be turned on for a little while. The exact length of time for the cure is best determined by experiment. A piece of new gum may be used as a test piece and the exact heat and the length of time required to complete the cure found by making several tests. Properly cured gums will be full of life and elasticity.

If the fabric of the tire is bruised or partly broken, the tire should be reinforced from the inside. An inside shoe, firmly cemented into place, is used for this purpose. Prepared shoes may be purchased, but the car owner can easily make serviceable shoes from the carcasses of old tires. A tire slightly larger than the one for which the shoe is intended should be chosen. The shoe should extend from toe to toe of the bead and consequently cannot be made from a tire of the same size.

An inside shoe is usually made of three plies, cut down to the shape shown in Fig. 5. Its length will depend upon the length of the injury it is to cover but the ends of the shoe will be cut down or "stepped down" as shown in the illustration regardless of the length of the boot. Two plies of the shoe reach from toe to toe of the tire, but the third ply—the one that goes next to the inside of the tire—ends $\frac{3}{4}$ in. from each toe. In other words, this third ply lacks $1\frac{1}{2}$ in. of being as wide as the other two plies. The second ply is stepped down so that it is 1 in. shorter at each end than the first ply, the third ply is $\frac{3}{4}$ in. shorter at each end than the second ply. The large ply of the tire is always placed so that it is on the outside and the stepped-down layers of the shoe fit against the inside surface of the casing.

If all the plies of the shoe were ended at one point, there would be some danger of a hinge point at the ends of the shoe, and the sharp bumps which would be formed might injure the inner tube. The

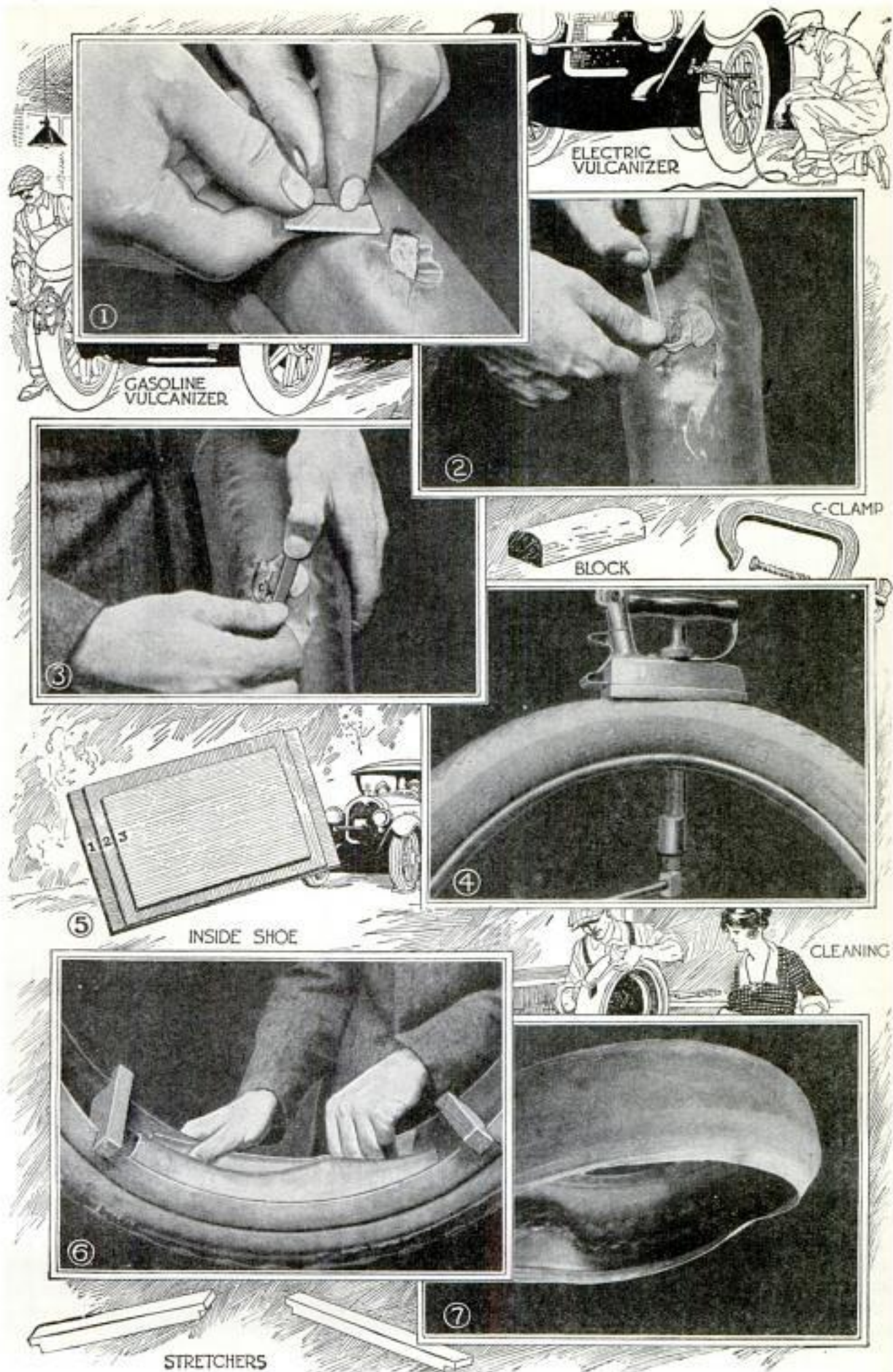
gradual ending, or the stepping-down, prevents these sharp edges at the ends.

Ordinary vulcanizing cement is best to fasten the shoe into place. In spite of the fact that there is no equipment in the home garage to apply heat for vulcanizing the shoe into place, the heat from the tire in operation on the road will gradually cure the shoe to the carcass of the tire. In applying the shoe to the inside of the tire, start at the toe of one bead and fasten one edge of the shoe. Work across the tire, pressing down the center of the shoe first and working out from the center to each end. Placing the shoe in this way will do much to eliminate the chance of wrinkles and will insure good contact at all points. With a little practice, one can tell by touch whether the shoe is fitted snugly. A couple of wooden stretchers, used as shown in Fig. 6, should be made to keep the tire spread during the operations described.

If the tread patch is to be used in connection with an inside repair, apply the shoe before curing the patch. Some of the heat from the vulcanization of the tread patch will help to cure the shoe into place. Three coats of vulcanizing cement are used on both the inside of the tire and on the shoe. The tire and shoe must be thoroughly cleaned and washed before the cementing is done; a block of sandpaper and a wire brush are best for doing this. The application of the cement should be extremely liberal, as fabric will soak up a much larger amount of the cement than will the tread of the tire.

The inside shoe is often used without the tread patch, when the injury is confined to the inside of the tire. Sometimes stone bruises will break one or two plies on the inside of the tire and yet not break the tread or sidewall. Chafed spots on the inside of the tire may also be covered with an inside boot. These damages may not seem serious, but are apt to cause much tube trouble until they are repaired.

Reliners are really large inside shoes that extend all the way around on the inside of the tire. They give protection to the tube and are a welcome reinforcement to a weakened casing. Some tire men hold that the reliner does not add to the life of the tire, and such is certainly the case if the reliner is applied improperly. There are many times when the use of a reliner is justified, however, and will add many additional miles of service to the tire. A fairly good tire,



Various Steps in Repairing the Minor Injuries in Tire Casings That may Easily be Repaired If Attended to in Time, But Often Ruin a Tire Beyond Hope of Repair When Neglected

whose carcass has been broken or cracked by abuse, justifies the use of a reliner. The reliner will protect the tube and give strength to the carcass of the tire, but, whenever used, the reliner should be cemented firmly into place.

This type of inside reinforcement may be purchased ready for use, or be made from an old casing. If it is to be made from an old tire, the casing selected for that purpose should have a fairly sound carcass, as broken plies in the reliner will cause much trouble. Like the tire selected for making inside boots, the tire for making the reliner will be somewhat larger than the tire in which the reinforcement is to be used. Reliners are usually made from three plies, with the under ply stepped down so that it fails to reach the bead by $\frac{3}{4}$ in. on each side. The ends of the plies should also be stepped down so that no two end at the same point.

Both the inside of the tire and the reliner are well cleaned and liberally cemented before the reliner is applied. If the casing is light, it may be turned inside out, as in Fig. 7, while the reliner is applied. Heavier tires must have the reliners applied without turning. Prop the tire open with short stretchers, and work in the reliner in a manner similar to the way the boot was applied. The narrow ply of the reliner should go next to the inner surface of the casing.

Before the cement has had time to dry, mount the tire on a rim and inflate to the proper pressure. The pressure of the tube on the reliner will help to smooth out any wrinkles and make good contact at all points. It is a good plan to powder the inside of the tire with soapstone before the tube is placed. This will prevent the tube from sticking to any cement which may have overrun the reliner.

In cutting down an old tire for a re-

liner, the tread and sidewalls are removed first. Cut along the junction of the tread and sidewall with a sharp knife. The cut should be deep enough to extend down to the carcass of the tire yet not deep enough to injure it. An old razor blade makes an excellent instrument for cutting down the tire. After making the cuts around the tire, cut across the tread and sidewall to make a starting place for removing the rubber. Pry up one end of the tread and sidewall with a sharp screwdriver and remove the rubber in three strips. The screwdriver may be needed to loosen the rubber as it is stripped back. If the rubber sticks so tightly that it cannot be removed by this method, it can be cut from the tire in small strips.

After the rubber has been removed, the bead cover is taken off. If the end of this cannot be found, a starting place is made by cutting across the cover. The cover is pried loose with a screwdriver and stripped from the tire. Following the bead channel closely, cut the beads from the carcass. If the carcass is to be used for inside boots, cut it into sections of the proper length and step down the plies as explained before. When the material is wanted for a reliner, all plies but three are removed, and the inside ply cut down to the proper width. It is best not to cut the reliner to length until it has been measured and fitted to the tire in which it is to be used.

These simple repairs will handle the most common tire injuries. One should not hesitate to consult a tire man if the repair is beyond the equipment of the home garage, as a few dollars spent at the tire shop may save the price of a new casing. These more serious injuries will be much less frequent, however, if the minor damages are repaired as soon as discovered.

Oiling Motorcycle Transmission

As no appreciable amount of oil is consumed in the gear box of a motorcycle it has to be refilled so seldom that one is liable to forget all about it. On motorcycles equipped with a hand pump this danger can easily be overcome by providing an oil pipe from the pump to the gear box so that the oil can be pumped into the latter in the same way that it is pumped into the crankcase, the same oil being used for both purposes. The additional pipe, which is a length of copper tubing of the kind commonly

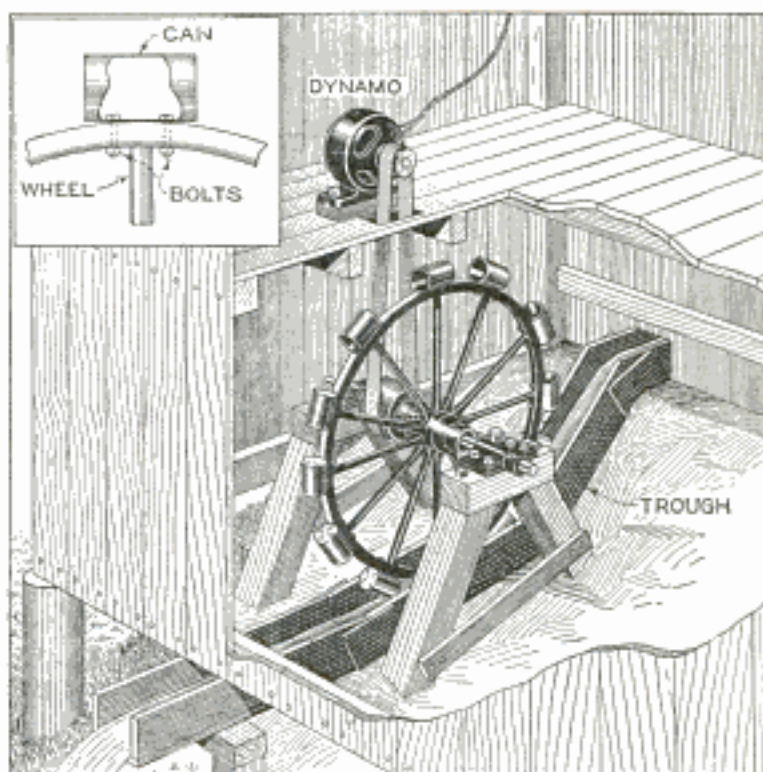
used for this purpose, is attached by soldering a T or Y-fitting in the pipe leading to the crankcase. A shut-off valve must, of course, be provided in both lines so that when oil is wanted in either crankcase or gear box, the flow of oil in the opposite pipe can be shut off. The tubing leading to the gear box should be bent to an S-shape so that it will not be affected by a slight change in the position of the gear box, which must be moved forward or backward occasionally to adjust the driving chain of the motorcycle.—George Wallace, Dallas Center, Ia.

Waterwheel for Running Small Dynamo

By using a light waterwheel of the type illustrated, where sufficient water current is available for turning it, the energy of the flowing water can be transformed and used for practical purposes.

The waterwheel can be made by attaching a number of tin cans, of suitable size, on the felloe of a discarded buggy wheel, and fastening the wheel, together with a pulley, on a shaft, that is supported by a wooden frame. The pulleys on the waterwheel and dynamo must be so proportioned in size that it will be possible to revolve the armature at its rated r. p. m., in order to obtain the voltage and amperage that the dynamo is capable of producing.

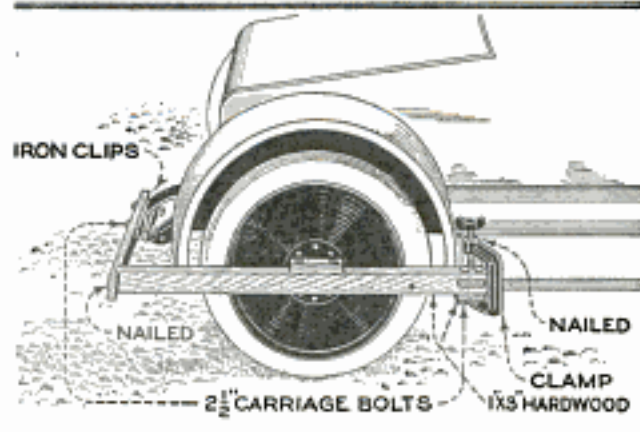
By concentrating the water current in a narrow channel, as shown, a greater force will be exerted on the waterwheel.



A Simple Waterwheel That can be Easily Made for the Purpose of Driving a Small Dynamo

Emergency Repair for Full-Floating Axle

The drawing shows a method used in an emergency to hold the wheel and axle of an auto in position, when the retaining nut on the full-floating axle came off. The weight of the car, resting on the outdrawn axle, forced the end of the housing out of round, which prevented the replacement of the nut, and therefore the arrangement shown was assembled from parts picked up at the nearest farm,



Emergency Repair for Full-Floating Axle That Permits the Car to be Driven to the Repair Shop

and in the toolbox. It consisted of a length of 1 by 3-in. hardwood, bolted to a strip

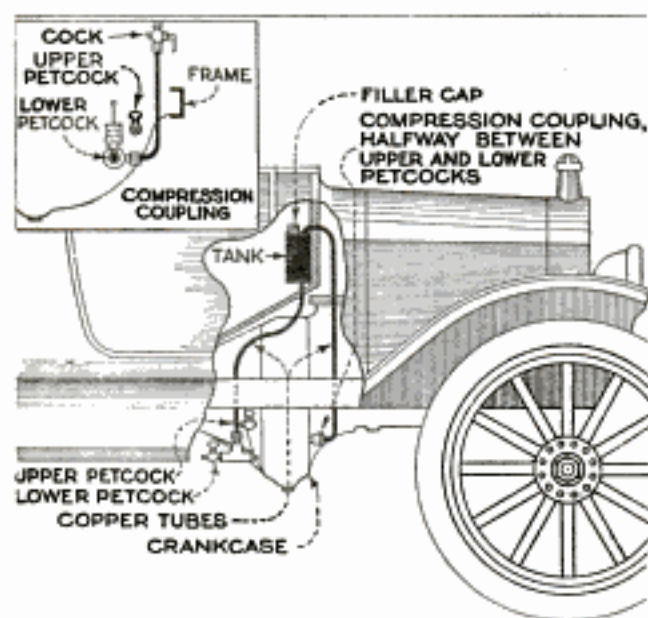
nailed and clamped to the running board, and attached to a second strip, which was bolted to the rear spring as indicated. This arrangement kept the shaft in place, and allowed the car to be driven for 40 miles, until permanent repairs could be effected.—J. F. Ware, Dayton, Ohio.

Painting Boat Hulls

The hulls of small boats are usually painted white but do not remain white very long owing to the dirt in the water, which coats the paint. This can, however, be prevented by using a paint consisting of white lead and turpentine instead of white lead and oil. White lead, which contains about 10 per cent of oil, is thoroughly mixed up with turpentine and is allowed to stand overnight to permit the lead to settle; the turpentine absorbs about half of the oil contained in the white lead. It is then poured off, the residue mixed with fresh turpentine, and the boat painted with it. As this paint dries quickly, several coats can be applied in a short time, thus building up a thick coat. As this paint lacks the necessary binding material, it washes off slowly, exposing a fresh surface of paint, and as it has no affinity for water, it does not become water-soaked. It does not blister or chip off, but gradually wastes away.

Automatic Oil Feed for Auto

This automatic oil feed, while illustrated and described as applied to a light car, may be used on any engine where



A Simple and Efficient Automatic Oiling System for the Light Car

the oil level must be kept at a predetermined height.

A hole is drilled into the crankcase at about $\frac{1}{4}$ in. below the point at which the oil level is to be held; this is tapped $\frac{1}{8}$ in. pipe size, and a compression coupling for $\frac{3}{16}$ -in. outside-diameter copper tubing screwed in firmly. The lower petcock is removed, and screwed into a $\frac{1}{8}$ -in. tee, which is connected to the crankcase with a nipple; a compression coupling is then screwed into the side outlet of the tee.

A tank of about 1 gal. capacity, made of sheet iron, and with all joints brazed, is then strapped to the dash; this tank may be a gallon oil can, but the constant vibration will chafe holes in it after about six months use, so it is better to use a specially made tank; in any event, the tank must be provided with a screw cap, fitted with a gasket, so that it will be airtight. The tubes are then soldered or brazed to the tank as shown in the drawing, and the tank filled with oil.

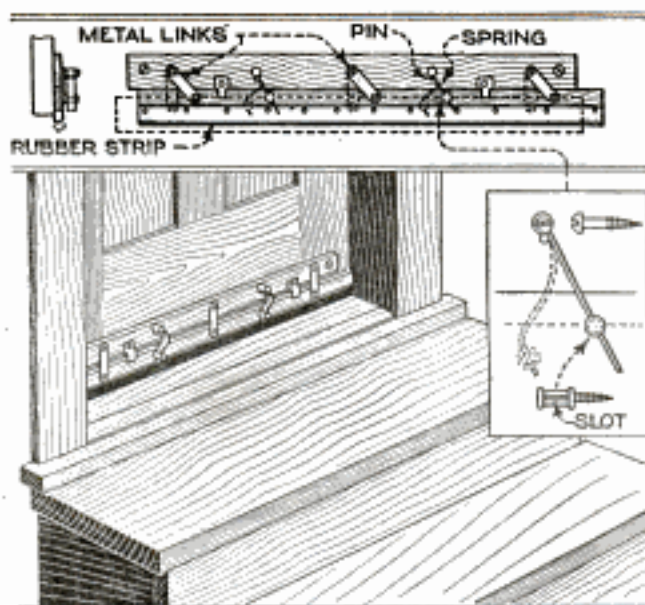
The oil will flow out of the tank, into the crankcase, until the oil level reaches the upper tube opening. When it covers the tube no more air can get up to the tank, and the oil ceases to flow. As soon as sufficient oil has been used to uncover the end of the upper tube again, a bubble of air passes up the tube, and a corresponding quantity of oil comes down the other tube. This continues automatically

until the oil in the tank is used up. The system may be improved by the addition of a float gauge, which may be purchased anywhere; when the gauge shows the least drop in height, it indicates that the tank is empty. A shutoff cock, of the compression-coupling type, can also be fitted in the oil line.

This system has been in use for over a year, and I would not be without it, as it eliminates much of the time spent in "oiling up."—John A. Blaker, West Auburn, Mass.

Ingenious Weather Strip

The drawing shows an effective weather strip that prevents cold air from entering under the door. It consists of two wooden slats, one screwed to the bottom of the door and the other loosely connected to the first with metal links and flat springs as indicated. A rubber strip is tacked to the lower slat. When the door is opened the springs force the lower slat to the position shown in the upper detail, the action of the spring being shown in the insert. Closing the door brings the one end of the lower slat against the door jamb, on the hinge side,



A Weather Strip That Effectively Prevents the Entrance of Cold Air under the Door

and this forces the lower slat tightly against the floor, effectively preventing all drafts.—D. M. Halliday, Chesley, Can.

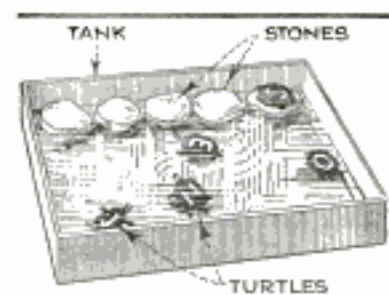
It is a difficult matter to catch a moth with the hands as it flies through the air. However, if the hands are moistened, the moth can easily be caught, as the nearness of a wet surface seems to have a paralyzing effect on its wings.

Radio-Panel Bushings from Valve Stems

It has been found that excellent bushings for use on radio panels can be easily made from the valve stems of discarded inner tubes. Any length bushing, up to 1 in., may be made by cutting off the large end of the stem and drilling out the small hole to the desired size.—H. M. Flint, Strathmore, Calif.

Novel Window Display

A clever window display, which attracted considerable notice, and caused much comment, was used by a Chicago furniture dealer to advertise a line of refrigerators. The display consisted of



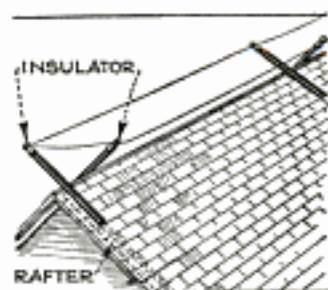
a tank containing water, some flat stones with the tops level with the surface of the water, and an equal number of turtles with letters

painted on their upper shells as shown in the drawing. A prize was offered for the person who discovered the turtles all on the stones at the same time in the proper position to spell the name of the refrigerator. In the drawing, the letters constitute the word "Jones."

Erecting Aerials

A simple method of erecting supports for aerials, when height is not a great consideration, is to nail lengths of 2 by 2-in. wood to the roof as shown in the drawing. The supports are fastened on opposite sides of the roof, and are located over rafters, so that the spikes can be driven into these. The distance between the upper ends of the supports should be about 16 to 24 in.

Ordinary porcelain insulators, which can be procured from any electrical store, are screwed to the ends of the supports and the aerial is attached to these. Care must, of course, be taken to have the aerial wires stretched as rigidly as possible so that they will not touch the roof.



Handy Hog Hanger

Farmers and others who butcher hogs outdoors will appreciate the usefulness of the hog hanger shown in the drawing; with this hanger it is an easy task for

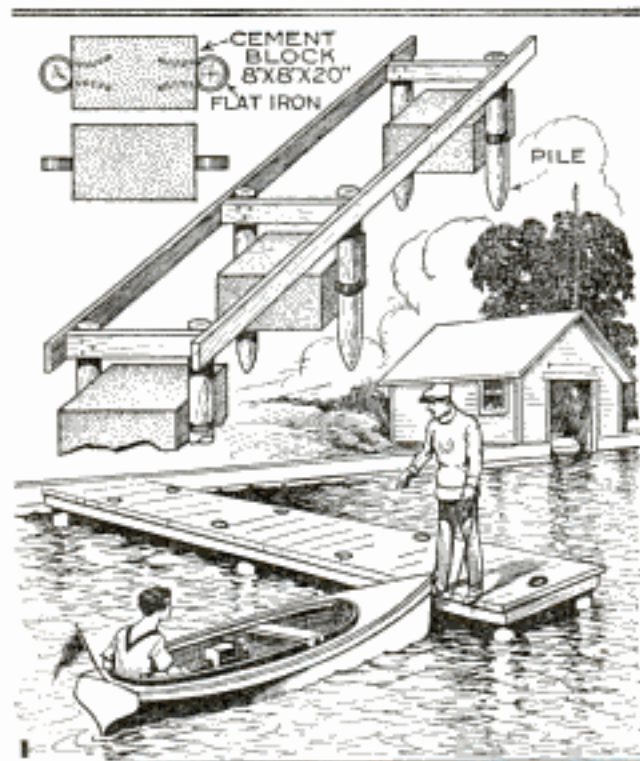


A Hog Hanger That can Easily be Operated by One Man without Any Assistance

one man to hoist a hog without any assistance. The post stands about 6 ft. above the ground and must be at least 6 in. in diameter; it should be set about 2 ft. in the ground as it must support heavy loads. A 2 by 4-in. crossbar is pivoted on the top so that it can readily be swung around to different positions, the pivot being a 1/2-in. bolt, driven into the top of the post. Two other 2 by 4-in. crosspieces are attached to the post about a foot below the top, and are arranged at right angles to each other. They are fitted into slots sawed into the side of the post and are securely fastened in place with large spikes. A 1-in. iron or steel crank is made to fit in either of two holes, drilled through the post at right angles to each other as shown. In use, the upper crossbar is brought directly above one of the lower crosspieces, and a rope loop is passed over the ends to support the upper one when a hog is pulled up. This is accomplished by means of the crank, a pulley attached to the upper bar, and a length of stout rope. The rope is provided with a hook which engages with the sharp pin that is pushed through the hog's "heels." Turning the crank lifts the hog up to the position where the pin can be slipped over the lower crosspiece, on which the hog is hung.—Robert H. Neill, Ottawa, Ohio.

Anchors for Small Boat Landing

The drawing shows a novel method of using cement blocks to anchor a small boat landing. The blocks are made in



Cement Blocks Used to Anchor Small Boat Landing: They are Located between the Piles

a rectangular shape and of a size depending on the width of the landing. A block 8 by 8 by 20 in. in dimensions was found to be a convenient size. Lengths of $\frac{1}{2}$ -in. flat iron are set into the ends of the blocks, while the cement is soft, the exposed portion of each piece being rounded to form a ring that fits the pile loosely.

In setting up the framework of the landing, the piles on one side are first driven in. The rings at one end of the blocks are placed over the piles and the blocks are lowered down to the bottom. The blocks are then shifted to the correct position and the other piles located in the rings and driven down about 2 ft. Crosspieces, nailed to the piles at their upper ends, and two long 2 by 12-in. timbers, nailed along them as shown, form the framework upon which 2-in. lumber is nailed to form a walk.—M. E. Duggan, Kenosha, Wis.

When the paste pot or mucilage bottle is empty and some adhesive is needed for pasting papers, photos, and similar items, condensed milk can be used as a substitute. Spread it thinly over the surface to be pasted and it will hold well.

Preparing Concrete Floors for Dancing

The simplest and cheapest way to prepare a concrete floor for dancing is to treat it with liquid soap. The soap should be worked up into a lather and rubbed into the floor by means of a scrubbing brush. After this an occasional application of powdered soap will keep it in good condition. It will be necessary to apply several coats of liquid soap if the floor is rough and porous. Liquid soap is prepared by boiling a large quantity of soap in a small proportion of water.

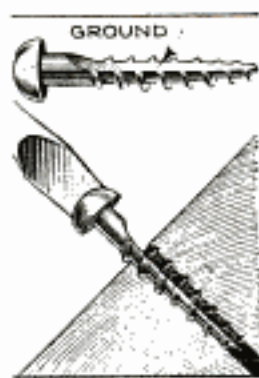
A mixture of paraffin and turpentine can also be used. The paraffin is mixed in turpentine, just as much paraffin being used as can be absorbed by the turpentine. Only enough of the mixture should be applied to the floor to thoroughly fill the pores of the concrete, as an excessive amount will leave a sticky film on the surface. After the mixture has been allowed to dry, the surface should be treated with paraffin, applied in the same manner as to any wooden floor.

A third method is to treat the floor with heated wax, driven into the pores of the floor by means of a device similar to a blowtorch. The permanence of this treatment depends on the penetration of the wax, and this in turn depends on the temperature of the concrete. If possible the concrete should be heated just before the wax is applied. The surface is maintained by the application of powdered wax in the usual manner.

Setting Screws into Hardwood

It is frequently necessary to drive screws into hardwood or composition panels, and unless proper precautions are taken, the panels are easily cracked. Of course, it is common practice to drill a hole before driving the screw in, but this does not always prevent cracking, and it is therefore much better to tap the hole by means of a screw ground down for this purpose as shown.

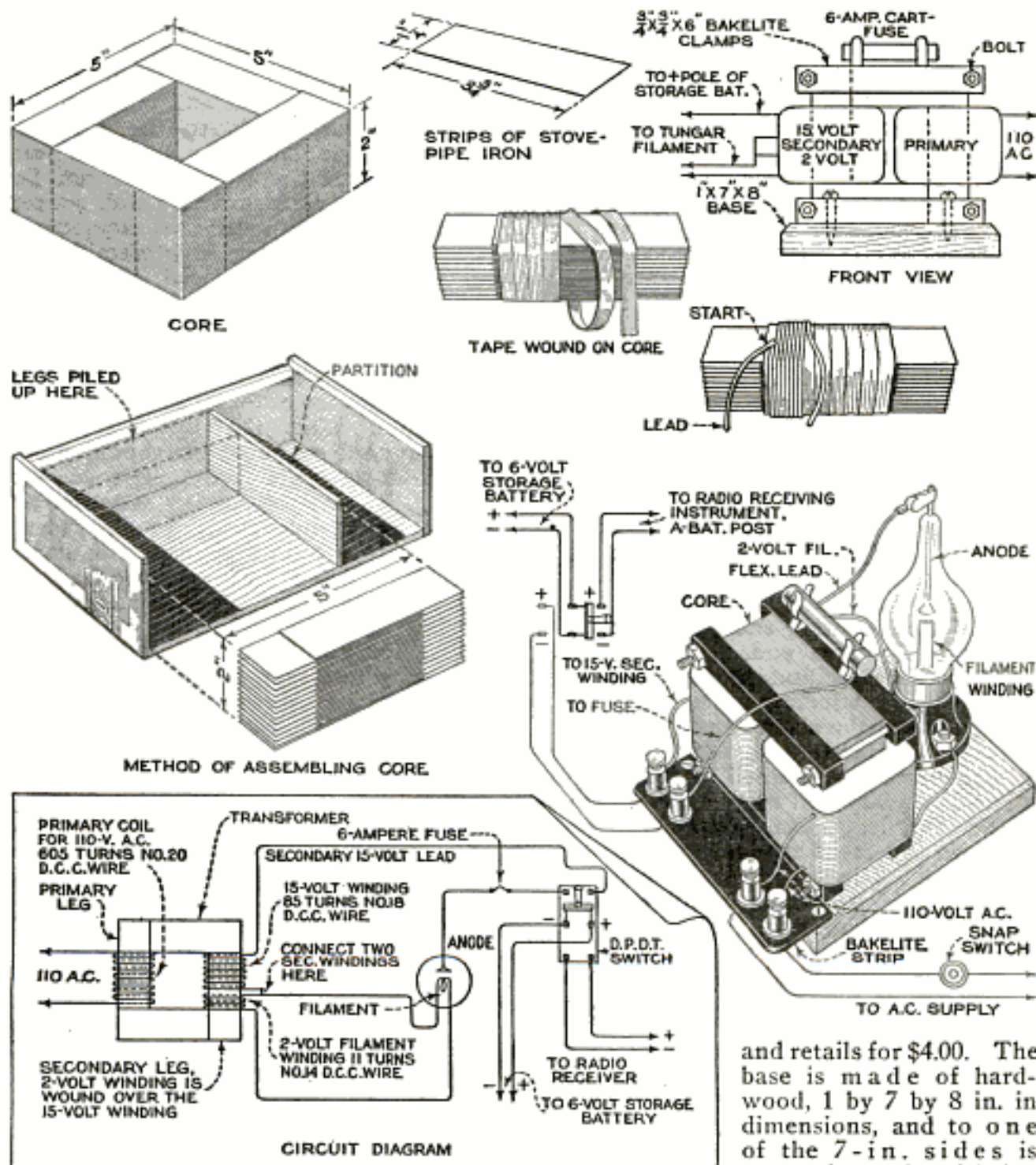
Such an improvised tap cuts a good thread that allows the following screw to be driven in easily, and provides a good "grip" from which the screw will not pull out.



can be obtained from General Electric Co., Schenectady, N.Y.
Building a Battery Charger
Jungar Bulb *Westinghouse Electric*
 BY F. L. BRITTON *Emp. Co., East Pittsburgh Pa.*

THE type of battery charger using a rectifier bulb is to be preferred to either the noisy vibrator type or the chemical rectifier. While there has been some trouble in purchasing this type, anyone

for about \$7.50, not counting time. The instrument consists of a wood base, a socket, the rectifying bulb, and a two-voltage transformer. The bulb is the most expensive part of the instrument,



A Home Charger for the Radio Battery That Anyone can Make, and That will Save Many Trips to the Nearest Battery-Charging Station

who wishes to go to a little trouble can build his own at a considerable saving, as the commercial rectifier sells at from \$18.00 to \$35.00, while one can be made

The transformer is wound to furnish 2 volts for lighting the filament of the bulb, in addition to the 15 volts to be rectified for the battery. The secondary has

and retails for \$4.00. The base is made of hardwood, 1 by 7 by 8 in. in dimensions, and to one of the 7-in. sides is screwed a strip of bakelite to carry the binding posts necessary.

Therefore two windings, one carrying 10 amp. at 2 volts, the other 2 amp. at 15 volts. As silicon steel is rather difficult for the amateur to obtain, the core laminations are made of black stovepipe iron, of such a thickness that the laminations will pile up 58 to the inch, allowing for the shellac used in binding. The iron is cut into $1\frac{1}{4}$ by $3\frac{3}{4}$ -in. strips, and piled to make a hollow square, 5 in. on a side, the ends of alternate strips being overlapped $1\frac{1}{4}$ in. When all the strips have been cut so that there are no ragged ends overlapping the square, and it looks neat and regular, tear off one side and the lid of an old cigar box, then nail a partition across it so as to make a compartment 5 in. long. Pile the strips for one leg of the core in this compartment, shoving alternate strips to opposite ends; this will keep the ends even and square. As each strip is laid in, coat it with shellac, and when the pile is 2 in. high, place a wooden block on it and clamp until dry. When dry, remove the leg and bind it with friction tape; two legs are made in this manner, one for the primary and one for the secondary. Now wind the primary coil on one leg; this coil consists of 605 turns of No. 20 d.c.c. wire. Leave a long starting end on the coil, and bind it down under the first layer of turns, to hold it firmly. Coat each layer, as it is wound, with shellac; if desired, two wooden spool ends may be made for the leg, to facilitate winding the coil evenly. After winding, place the coil in an oven, and bake slowly and thoroughly. Take care to leave plenty of wire at the start and finish of the coil for leads.

The secondary coil may now be wound on the other leg, which should be wrapped with two layers of tape and one of empire cloth. Wind on the 15-volt winding first; this consists of 85 turns of No. 18 d.c.c. wire, and the 2-volt winding, 11 turns of No. 14 d.c.c. wire, is wound over it. Shellac each layer as it is wound and leave long ends for connections. Shellac the whole coil thoroughly, then bake until completely dry.

Stand the two legs on end, and insert the side strips or laminations on one end, then reverse and fill in the other end. Coat the entire assembly with shellac, and allow it to dry. The top and bottom ends of the core should be clamped to prevent the transformer from humming. To do this, use either regular iron transformer clamps, obtainable from electrical supply houses at 25 cents each, or use bakelite strips and long screws, as shown in the drawing. These strips are $\frac{3}{4}$ by

$\frac{3}{4}$ by $6\frac{1}{2}$ in. in size, and the lower ones, in addition to being bolted to the transformer, are screwed to the base to support the transformer. One of the top strips also serves as a support for a 6-amp. cartridge fuse, which is placed in series with the fahnestock-clip anode terminal at the top of the tube, and the negative battery clip. Join the secondary coils, as indicated in the wiring diagram, by a soldered connection, and tape and shellac the joint. Screw or bolt the tube socket in position and connect the 2-volt secondary leads to the filament terminals. The 110-volt a.c. supply for the primary of the transformer can be connected with lampcord to a wall socket if desired, but the method of connecting shown in the drawing is preferable, as the battery can be placed on charge merely by throwing the switch.

To operate, see that the bulb is in the proper position, then connect the clip attached to the flexible lead from the fuse to the anode terminal at the top of the bulb. When the 110-volt a.c. current is turned on the bulb should glow with a bluish-white light. The 15-volt winding is now supplying alternating current, which is rectified by the tube; the resulting pulsating direct current charges the 6-volt radio or auto battery at the correct rate. As this method of charging is rather slow, it is recommended for radio rather than for auto batteries, where time is important.

For charging the ordinary 6-volt, 60-amp. hour radio battery, an overnight charge about every week or ten days will keep the battery "up" for average use, however, do not leave this to guesswork, use a hydrometer, and keep the electrolyte as near 1.280 sp. g. as possible; never let it fall below 1.175 before charging, if possible to avoid it. The cost of operation, for the average radio battery, is about 15 cents for each charge. The tubes are rugged, the one the author uses has been in operation for two years.

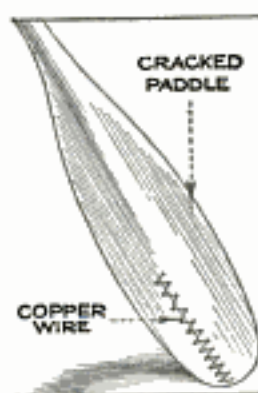
If the bulb does not glow when the current is turned on, disconnect the end of the 15-volt winding, where it is connected to the 2-volt coil, and connect it to the other end, that is, reverse the 2-volt connections. If it still refuses to glow, it may be necessary to add one or two more turns to the 2-volt winding, or five or six turns to the 15-volt winding, as the characteristics of the tubes vary a little. When the instrument has been found satisfactory, tape the coils to complete it. Do not place the charger in a box, away from the air.

Soldering a Broken File

A thin round file that had been broken in two was repaired satisfactorily by soldering, much to my surprise, ordinary solder, chloride-of-zinc flux, and an alcohol lamp being used in the process. I first tinned the broken ends and then heated them just enough to melt the solder. The ends were dipped in solder and were then held together until the solder had set. During the entire process I took great care not to heat the parts more than necessary to melt the solder, and as a result, found that the temper of the file was not injured except at the joint. The repaired file was found to be almost as strong as it was originally.—Wm. J. Edmonds, Rutland, Vt.

Sewing a Split Paddle

A split blade of a paddle or oar can be satisfactorily repaired by the simple process of sewing up the split with copper or brass wire. As a rule such a crack does not extend into the thick part of the blade and therefore the main consideration is to hold the edges of the crack securely together. To do this, punch or drill a series of small holes all along the crack, on both sides, about $\frac{1}{4}$ in.

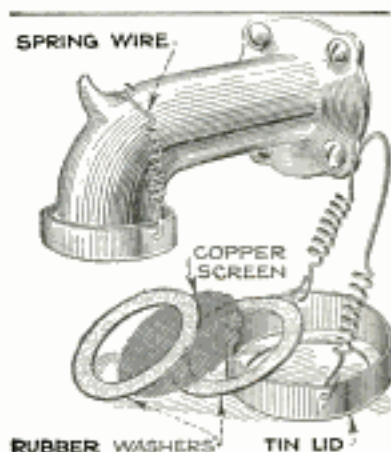


from the crack and $\frac{1}{2}$ in. apart. The holes should be staggered, those on one side coming halfway between those on the other side. Clamp or bind the blade so that the crack will be tightly closed, and then sew it together by passing the wire through the holes, beginning at the point farthest from the tip of the blade. When the tip has been reached, work back again, using the same holes. Finish off by twisting the two ends and fastening them down with a copper tack or a small brass screw. Use about No. 20 wire, and pull it tight at every stitch, taking care, however, not to break it at the sharp bends. As for the durability of such a repair, an oar repaired in this way has been used for an entire season without having any trouble at the seam. There are, of course, cases where this plan will not work, but in the majority of cases, where the edges are not broken apart on a long taper or bevel, the repair will be effective and permanent.

Simple Pump Filter

The old custom of tying a small cloth sack around the pump spout to filter the water is not recommended, as it is insanitary and unhandy. A much better filter and one that can readily be made is shown in the drawing; it consists of a tin-can lid, two rubber washers, a piece of copper screen, and a length of spring wire.

The inside of the lid is cut out equal to the diameter of the inside of the spout. The washers and screen are cut to fit inside of the lid. Ears are



formed opposite each other in the side of the lid, and holes are punched in the ears to receive the ends of the spring wire, which is twisted to form a coil spring. A short section of the spring in the center and at each end is pulled open and straightened, and the ends are turned over to form hooks, which are brought through the holes in the lid.—J. V. Romig, Allentown, Pa.

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Convenient Mounting for Electric Fan

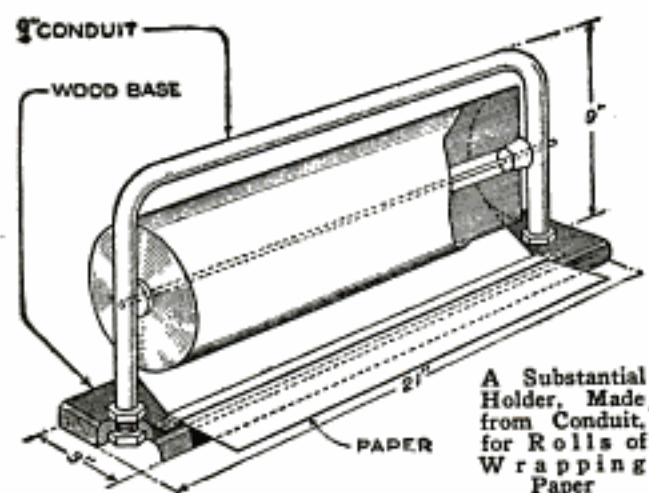
By mounting an electric fan on a camera tripod as shown in the photograph, the fan can be placed wherever desired, and can be adjusted to any desirable height. A circular wooden top is made for the tripod and is bolted to it by means of the screw on the tripod head.



On small fans that have only one speed, a lamp connected in series will cause the fan to run slower if desired.—K. H. Hamilton, Chicago, Ill.

Holder for Paper Rolls

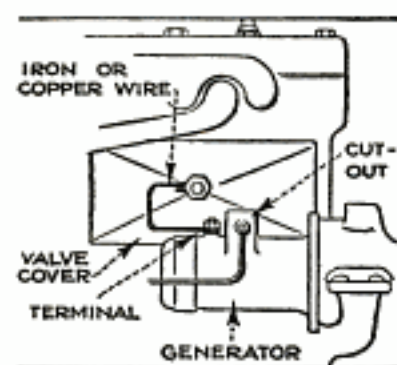
An inexpensive and substantial holder for rolls of wrapping paper may be made from a short length of conduit, as shown in the drawing. Each end of the conduit



is bent at right angles at the proper points, and the ends are threaded for the nuts that hold it securely to the wooden base. A $\frac{1}{4}$ -in. or $\frac{3}{8}$ -in. hole is drilled in the center of each leg to accommodate a rod for supporting the roll. The rod is a trifle longer than the outside width of the holder, and is provided with a head on one end, and a thread and wing-nut on the other. The paper cutter that is attached to the base is made of light flat iron bent to the shape indicated, and fastened at the ends of the base with wood screws.—J. C. Bush, Duluth, Minn.

Grounding Generator When Battery Is Removed

When a storage battery is removed from an automobile for charging or repair, and the engine is run on the auxiliary magneto,



the generator should be grounded to prevent it from being damaged. To make a ground for the generator is an easy matter, as any piece of wire, insulated or not, can be used, this wire being connected to the terminal of the generator and to one of the nuts holding the valve covers in place, as shown in the illustration.

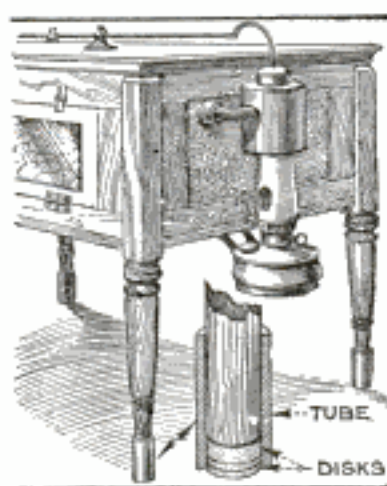
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Stabilizing a Portable Typewriter

The main feature of several portable typewriters consists of an arrangement for folding the platen over the keyboard. When these typewriters are operated at high speed the platen is not very stable and consequently the letters are not printed evenly. This objectionable feature can be overcome by placing heavy rubber bands around the side arms so as to keep them together solidly. They can readily be removed when the machine is folded.—Charles I. Reid, New York City.

Leveling the Incubator

When an incubator is located in the cellar or basement it is usually necessary to lay small blocks under the legs to make it stand level, but it often happens that these blocks are accidentally dislodged, causing the incubator to tilt, and this not only shuts off the circulation of



the water, but sometimes jars the eggs, which is very harmful for the setting. To overcome this trouble it is a good idea to place short lengths of tubing or pipe over the legs as shown, these pieces being free to slide up or

down. Circular disks of wood and cardboard, cut to fit inside the pipe, are placed under the legs. When the proper height is secured for each leg, the pieces of pipe are slipped down over the disks and this eliminates all danger of dislodging them, even though the incubator is moved over the floor.

Repairing a Damaged Gun

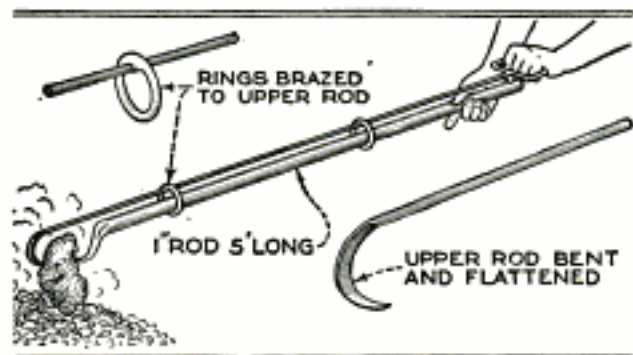
While on a hunting trip I had the misfortune to strike my gun on a rock, which made a deep dent in one barrel and also bent both barrels slightly. The dent was easily taken out by driving a hardwood rod, which was rasped down to the inside diameter of the barrel through the barrel several times. This nearly pressed out the dent. Then I forced a brass rod, fitting the barrel close-

ly, through in the same way, which completely took out the dent. To straighten the barrels I calipered both ends and center and drilled a hole in each of three blocks to correspond to the measurements taken. Then I sawed these blocks in half and placed the barrels in a carpenter's vise, placing the two blocks that fitted the ends between the barrels and the bench, and the other block between the barrels and the movable jaw of the vise. The end blocks were, of course, planed down so that the distance between the bottom of the groove and the side was equal to the thickness of the stationary jaw of the vise. By carefully screwing the vise down, I straightened the barrels out successfully.—Lewis B. Rogers, Downers Grove, Ill.

A Clinker Remover

The usual method of removing clinkers from a fire is a tedious job, but it is greatly facilitated by using the tool illustrated, made especially for this purpose.

It consists of two iron rods, one 1 in. and one $\frac{1}{4}$ in. in diameter, both about 5 ft. long. On the end of each rod a hook is shaped to the form shown, so that the clinker can easily be grasped between them. Two or three rings are welded to the $\frac{1}{4}$ -in. rod so that it can slide on



A Handy Tool, Made from Two Iron Rods, Facilitates the Removal of Clinkers from Fires

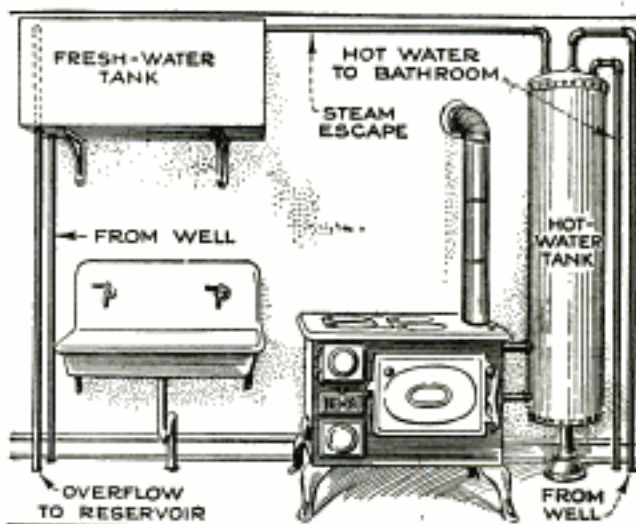
the larger rod. A handle is formed at one end of the smaller rod for convenience.

Fireproofing Paper

Paper can be made fireproof by immersing it in a strong solution of alum and water until the paper is saturated, and then permitting it to dry. Paper money can be fireproofed in this way. The paper is tested by holding it over the flame of a candle or match; if it ignites, the alum solution is not strong enough.

Fresh Water for the Farm Kitchen

Usually the fresh water pumped by the windmill goes to a reservoir outdoors, and from there to the kitchen, and there-

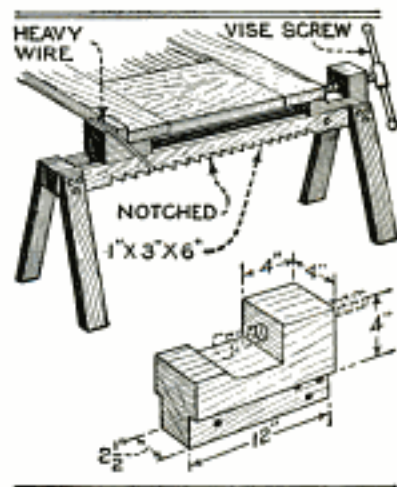


Fresh Well Water is Pumped into Tank in the Kitchen and from There to the Reservoir

fore the fresh water is not directly available in the kitchen. The drawing shows a system that first brings the freshly pumped well water into a tank located in the kitchen and from this tank, through an overflow, to the reservoir in the yard.

Improvised Gluing Clamp

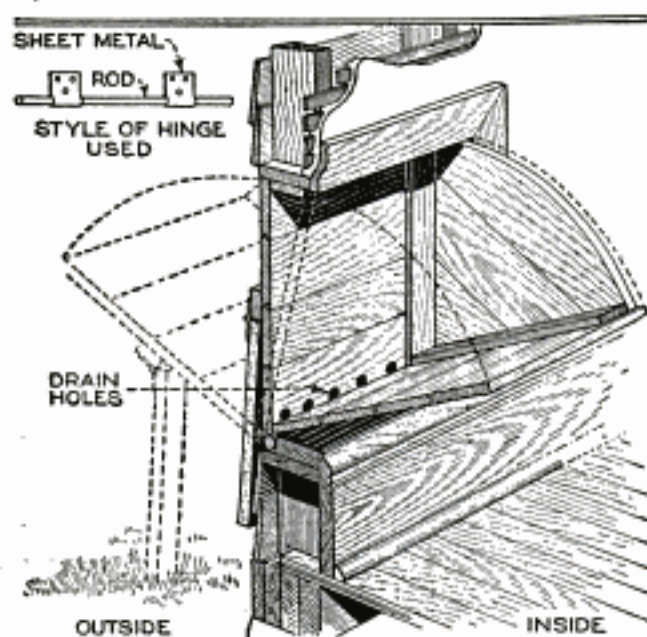
A gluing clamp that is similar to a sawhorse in appearance and combines the advantages of both, has been found very useful for woodworkers. It consists of two rails of 1 by 3-in. material, about 6 ft. long, notched on the underside, and supported by two legs at each end. A vise screw is securely fastened at one end and a heavy block of wood, which serves as a movable jaw, fits the rails as shown.



A groove is cut across the top and a heavy rod, bent to a rectangular shape, and with the ends securely twisted or welded together, is used to lock the block on the rails at any desired point. Woodwork of almost any size can be accommodated by such a clamp.

A Swinging Wood Box

When building a small hunting lodge, a Missouri man who remembered his youthful antipathy toward carrying wood,



A Swinging Wood Box That can be Filled on the Outside of the House and Emptied Inside

installed in the wall a swinging wood box, which could be swung outward to be filled and then swung back inside again to its position next to the fireplace. It is built to resemble a feed trough, and, when viewed from one end, has the appearance of a 55° sector of a circle. It is pivoted on the bottom on a bar hinge, made as shown in the left-hand detail, and can be swung inward or outward freely. When it is in its normal position inside the house, the outer side of the box forms part of the exterior wall; and when swung outward for filling, the other side closes the opening in the wall and prevents cold air from entering. When swung outward the box is supported by a 2 by 4-in. leg, hinging on a cleat nailed on the outside. The top edge of the inner side comes against a cleat that is nailed on the top side of the opening. The box is naturally held in its inward position by gravity, but if desired, it can be fastened securely by an ordinary lock, attached to the wall above; and sliding into a keeper on the side of the box.—Ward L. Schrantz, Carthage, Mo.

☛An excellent holder for the back saw, when it is not in use, can be made from two clothespins, the heads of which are sharpened and set into holes drilled in the workbench. The saw fits between the upturned prongs.

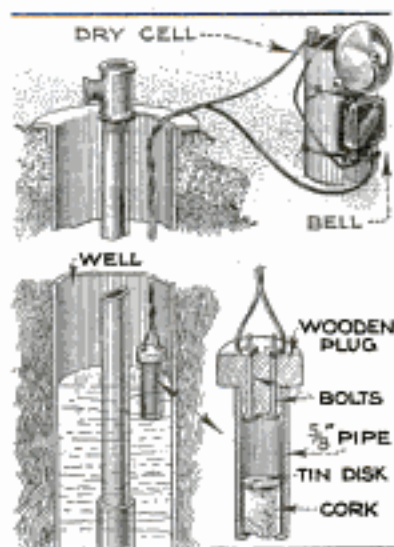
Starter Troubles

Before blaming the starting motor or switch when the starter refuses to operate and the battery is known to be in good shape and fully charged, or nearly so, examine all terminals carefully, taking them off, cleaning thoroughly with a file or sandpaper, and scraping the battery-post clamps inside and out. Very often there is nothing wrong except dirty or corroded terminals, and cleaning will remove the trouble at once. Keep the battery posts and clamps clean and covered with vaseline to prevent corrosion, and be especially careful about the ground connections, which in many cars collect dirt, and rust or corrode.

It is also good practice to examine the starting-motor cables occasionally, and to renew them if the insulation is badly frayed or there are broken strands.

Locating Surface of Water in Well

A simple and accurate method of locating the surface of water in a well is shown in the illustration. A length of ordinary lampcord is connected at one end to a bell and dry cell, two or more dry cells being necessary if the lampcord is quite long. At the other end of the lampcord is connected an automatic switch, which operates upon striking water. The switch consists of a short length of $\frac{5}{8}$ -in. pipe with a wooden plug



screwed into one end, and a cork, with a tin disk tacked on top, inserted at the other end, the lower edge of the pipe being hammered over to keep the cork from falling out. Two small-diameter brass bolts are passed through the wooden plug and the ends of the lampcord connected to them. The bolts are connected with each other electrically as soon as the cork rises in the pipe and pushes the tin disk against their heads, which closes the circuit and rings the bell, indicating that the surface of the water has been reached.

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THE train illustrated below consists of a locomotive, Buffet-Car, Parlor-Car and Observation-Car and 8 pieces of curved and 4 pieces of straight track (2 Gauge, $2\frac{1}{4}$ " from center to center), one terminal section, control switch and connecting wire.

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In the aggregate these devices to multiply man-power mean an enormous yearly saving of time, labor and money throughout the whole Bell System. Without them telephone service would be rendered neither as promptly, as efficiently nor as economically as it is to-day.

"BELL SYSTEM"

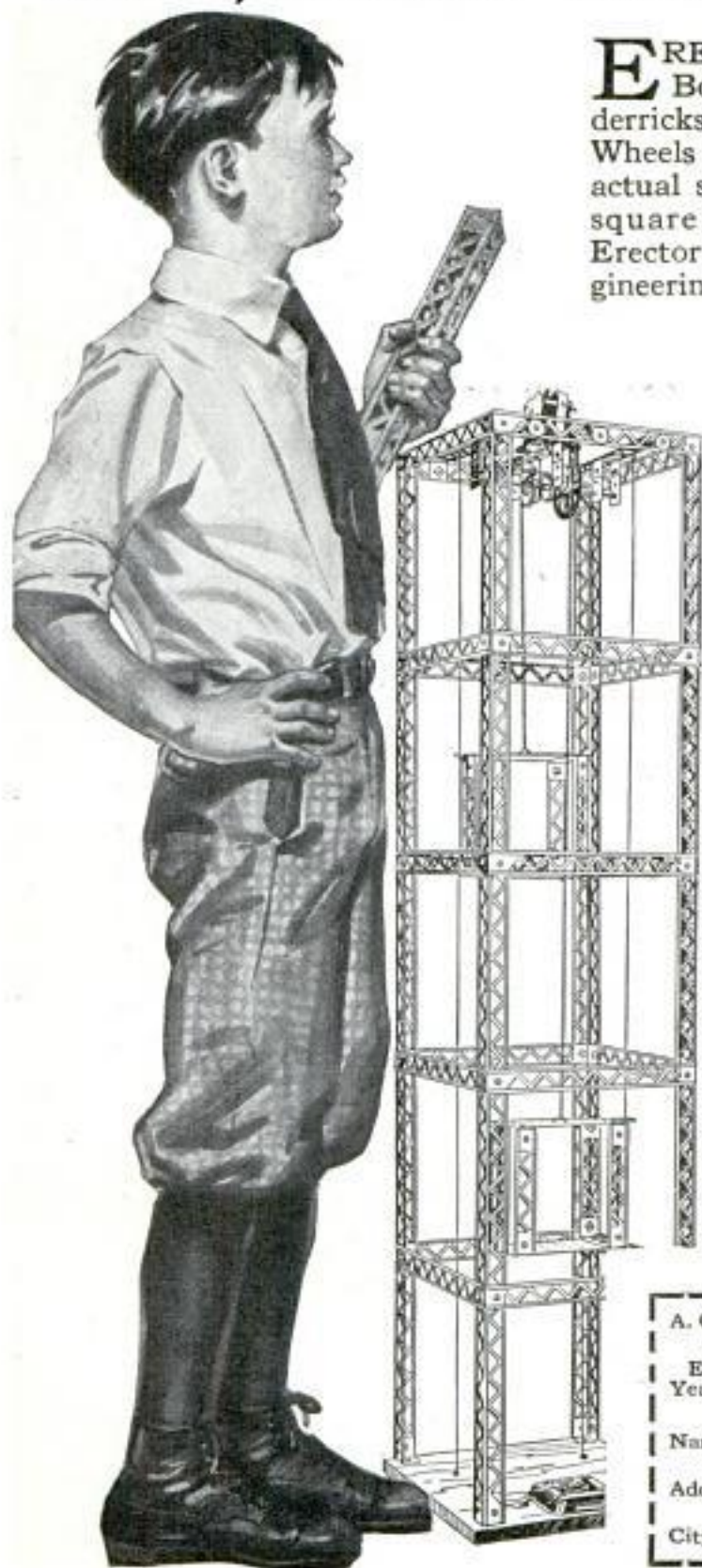
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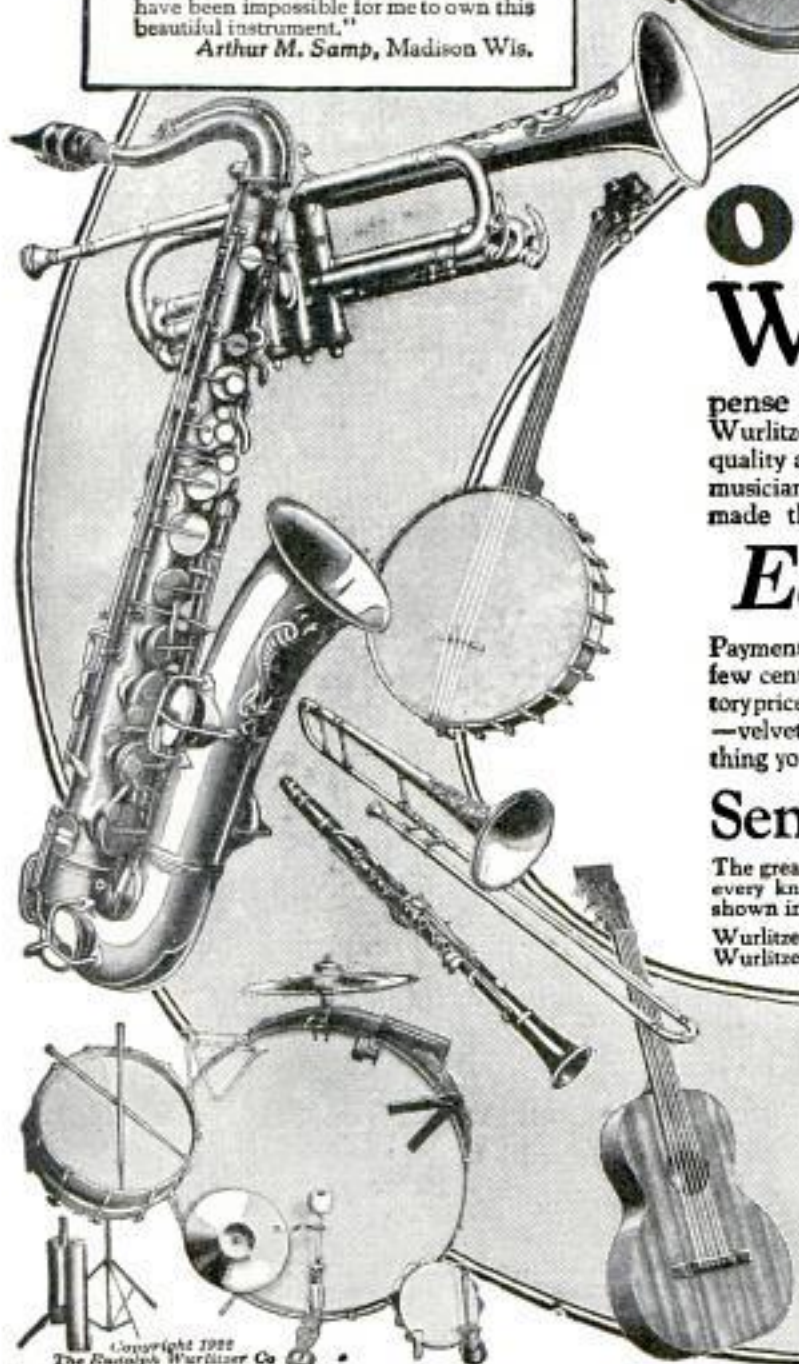
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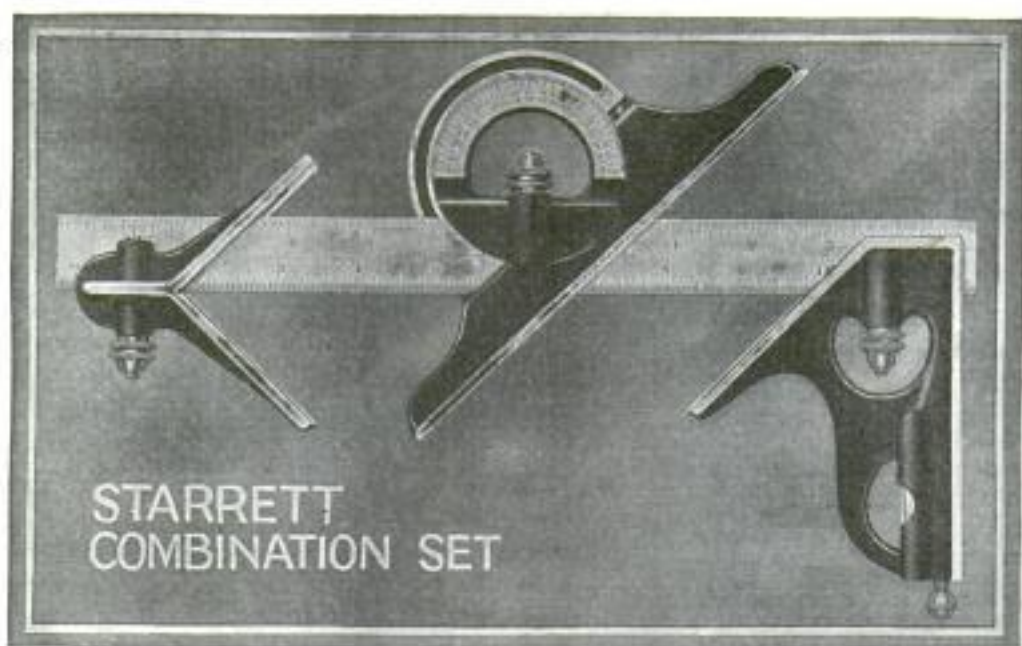
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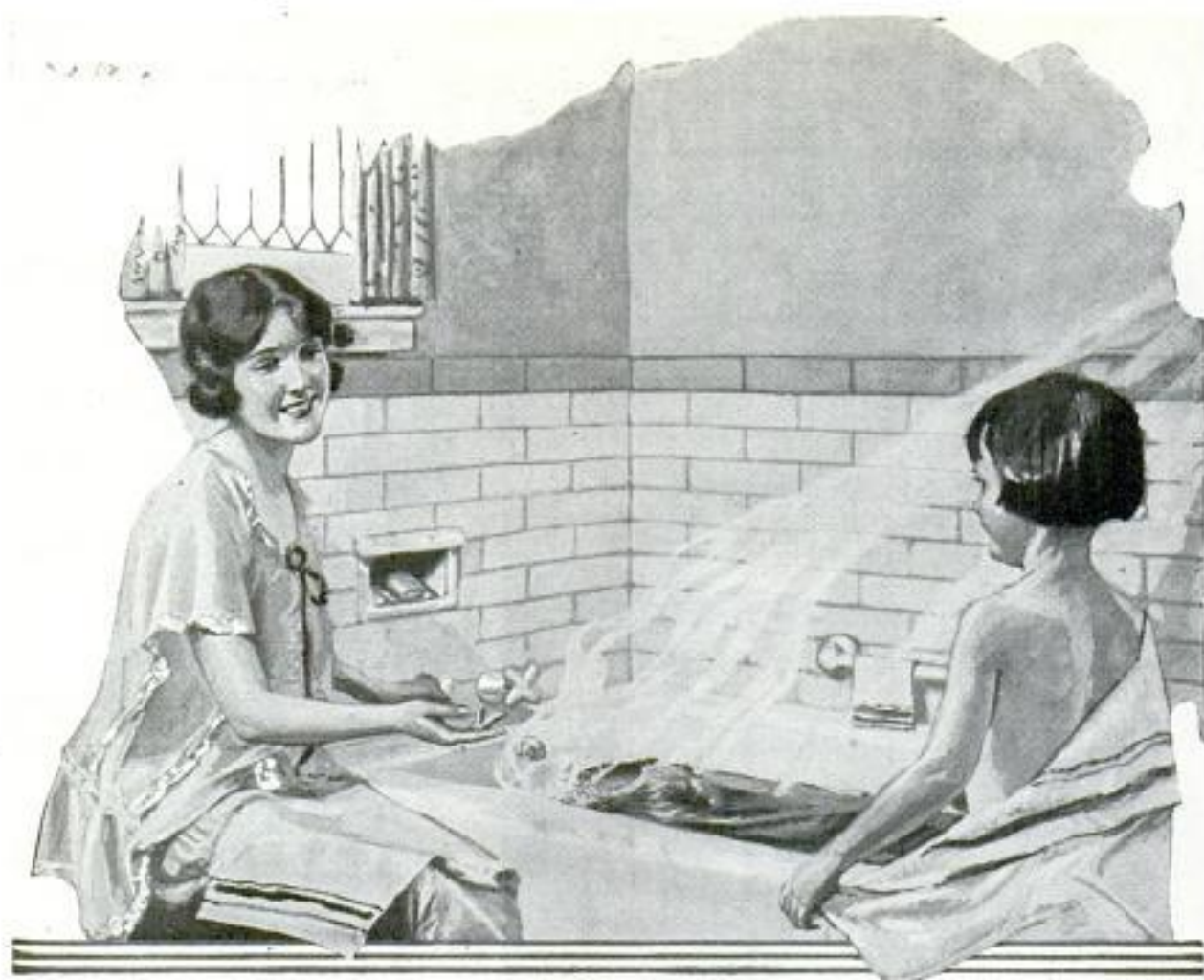
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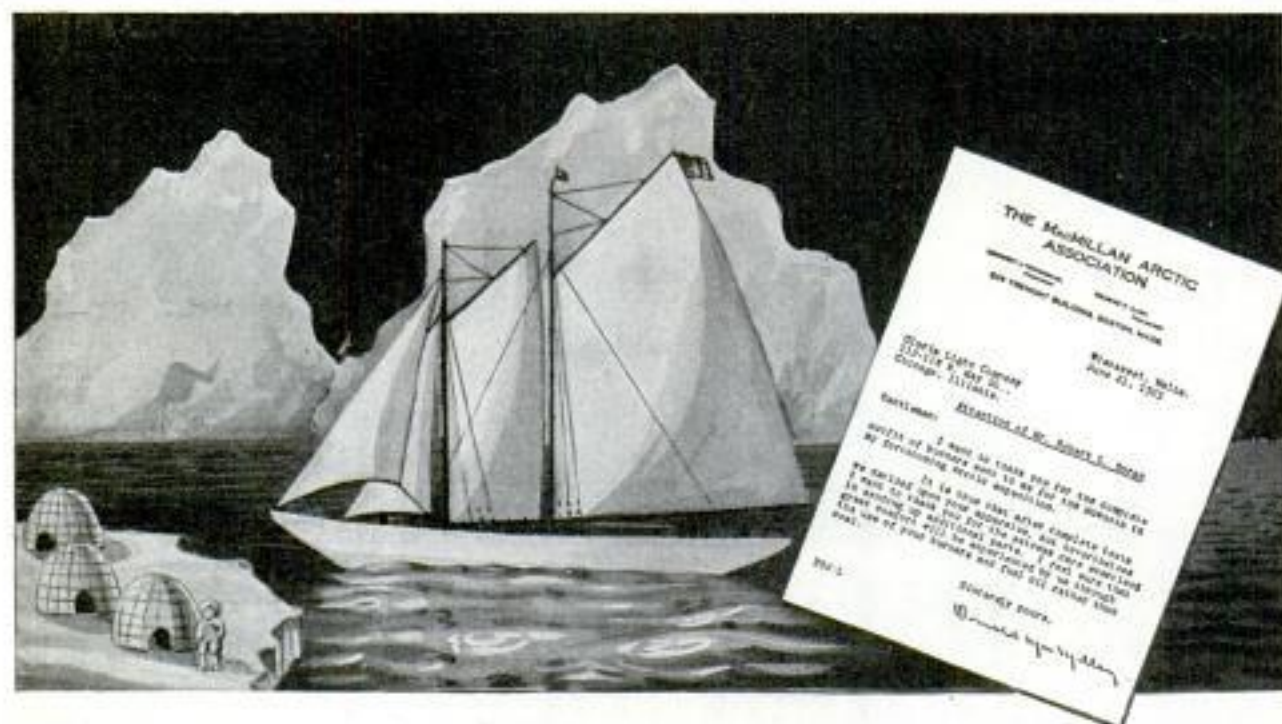
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Oxo-Gas is made from Kerosene, Stanolin or Distillate.

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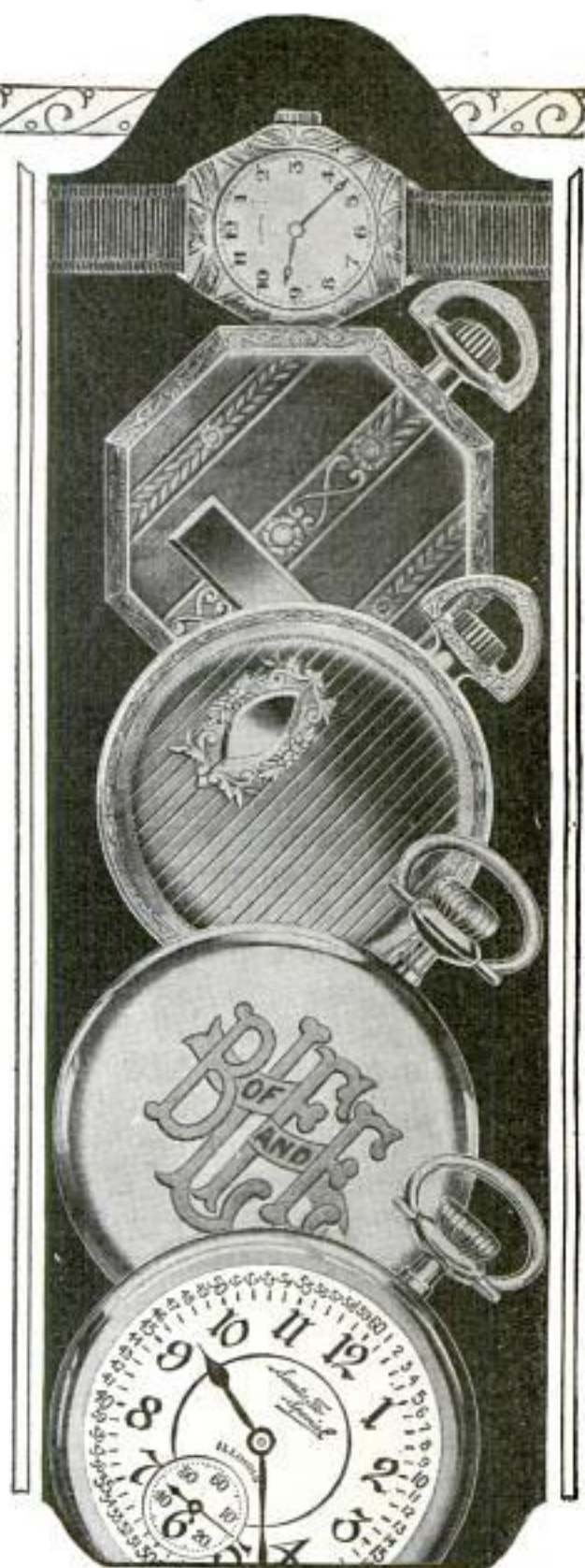
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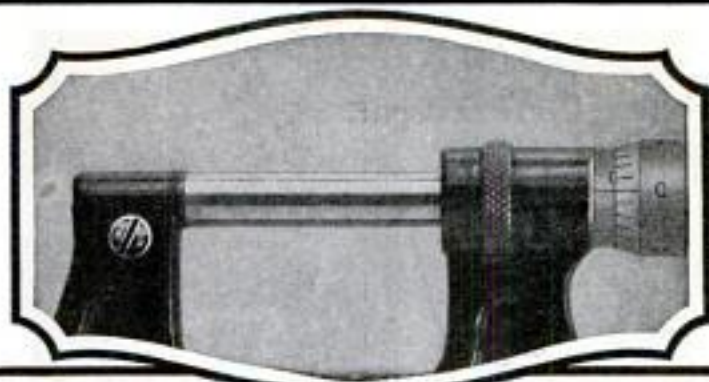
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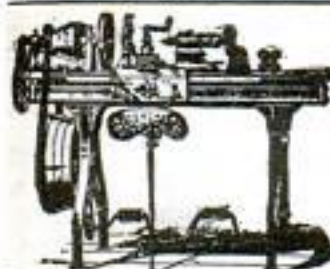
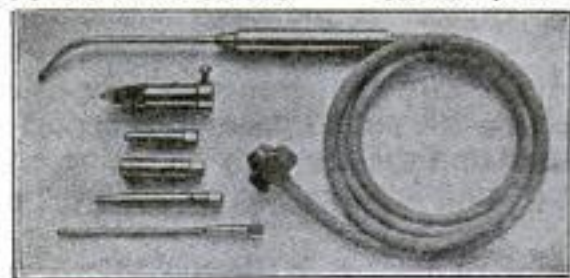


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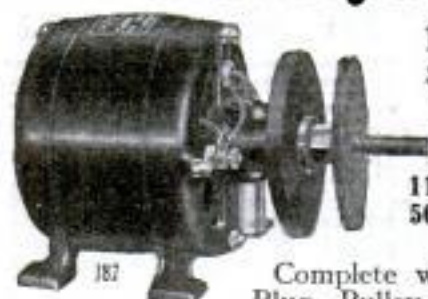
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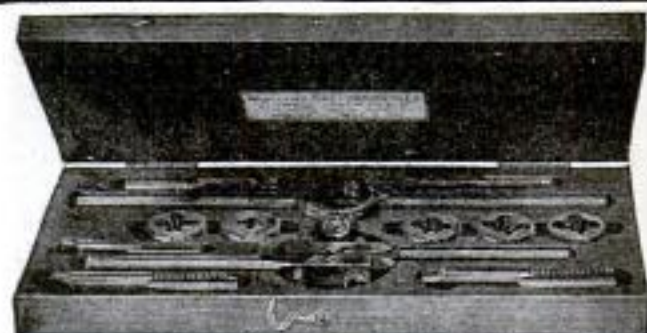


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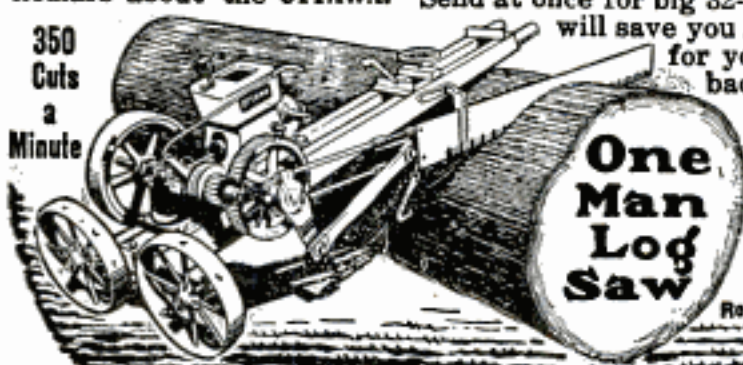
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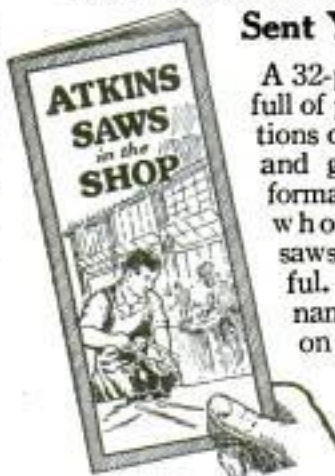
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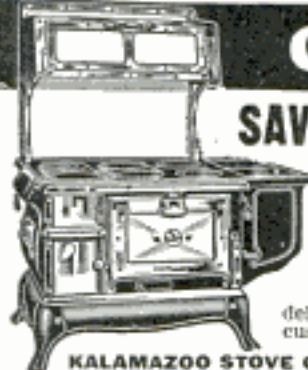
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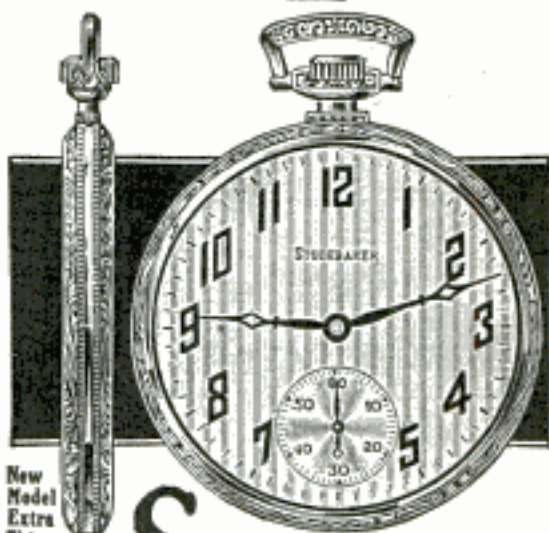


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Perfect machines, Correspondence size, Keyboard of Standard Universal arrangement, 42 Keys, writing 84 characters. The entire line of writing completely visible at all times, has the tabulator, the two color ribbon, with automatic reverse, the back spacer, variable spacer, self-starter, in fact, every late style feature and modern operating convenience. Comes to you with everything complete: tools cover, operating book and instructions—nothing extra to buy. You cannot imagine the perfection of this beautiful reconstructed typewriter until you have seen it. We have sold thousands of these perfect late style machines at this bargain price and every one of these thousands of satisfied customers had this beautiful, strictly up-to-date machine on five days' free trial before deciding to buy it. We will send it to you F. O. B. Chicago for five days' free trial. It will sell itself, but if you are not satisfied that this is the greatest typewriter you ever saw, you can return it at our expense. You won't want to return it after you try it, for we are sure you cannot equal this wonderful value anywhere.

Send No Money! \$4.80
Put in Your Order Now AFTER TRIAL

When the typewriter arrives deposit with the express agent \$4.80 and take the machine for five days' trial. If you are convinced that it is the best typewriter you ever saw keep it and send us \$4.00 a month until our bargain price of \$44.80 is paid. If you don't want it, return it to the express agent, receive your \$4.80 and return the machine. We will pay the return express charges. This machine is guaranteed just as if you paid \$100.00 for it. It is standard. Over half a million people own and use these typewriters and think them the best ever manufactured. The supply at this price is limited, the price will probably be raised when next advertisement appears, so don't delay. Fill in the coupon today—the typewriter will be shipped promptly. There is no red tape. We employ no solicitors—no collectors—no chattel mortgages. It is simply understood that we retain title to the machine until full \$48.80 is paid. You cannot lose. You will perhaps never have a greater typewriter opportunity. Do not send us one cent. Get the coupon in the mails today—now.

Young Typewriter Co., Department 210B Chicago
654 W. Randolph St.

Young Typewriter Co., Department 210B Chicago
654 W. Randolph St.

Ship me the Remington Monarch Typewriter, F. O. B. Chicago as described in this advertisement. I will pay you \$4.00 monthly as rent until the \$40.00 balance of the SPECIAL \$44.80 sale price is paid. The title to remain in you until fully paid for. It is understood that I have five days in which to examine and try the typewriter. If I choose not to keep it I will carefully repack it and return it to the express agent. It is understood that you give the standard guarantee.

Name

Street Address

City State

Business or Occupation

SAVE YOUR BODY

Conserve Your Health and Efficiency First
"I Would Not Part with it for \$10,000"

So writes an enthusiastic, grateful customer. "Worth more than a farm," says another. In like manner testify over 100,000 people who have worn it.

The Natural Body Brace

Overcomes WEAKNESS and ORGANIC AILMENTS of WOMEN AND MEN. Develops erect, graceful figure.

Brings restful relief, comfort, ability to do things, health and strength.

Wear It 30 Days Free at Our Expense

Does away with the strain and pain of standing and walking; replaces and supports misplaced internal organs; reduces enlarged abdomen; straightens and strengthens the back; corrects stooping shoulders; develops lungs, chest and bust; relieves backache, curvatures, nervousness, ruptures, constipation, after effects of flu. Comfortable and easy to wear.

Keep Yourself Fit Write today for illustrated booklet, measurement blank, etc., and read our very liberal proposition.
HOWARD C. RASH, Pres. Natural Body Brace Co.
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For
Boys
and
Girls
Also



YOU CAN SELL

Salesmen!
\$1.50
 an hour
 for full
 or spare
 time

IDEAL FIBER CUTTER

The Kitchen Convenience every housewife wants.

House-to-house salesmen average \$40.00 to \$100.00 weekly.

Write for free book, "Coining Cash," and read how other salesmen are making big money.

Don't put it off. Write at once. NOW!

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Selling men's gas-mask

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\$1.90 each, in dozen or gross lots. Sample sent upon receipt of \$2.15. Agents wanted (Write for our 6 best sellers).

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Sell Madison "Better-Made" Shirts, Pajamas, and Nightshirts direct from our factory to wearer. Nationally advertised. Easy to sell. Exclusive patterns. Exceptional values. No experience or capital required. Large steady income assured. Entirely new proposition.

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The Buescher-Grand Cornet is exceptionally easy to blow, yet possesses a tone of wonderful volume. It is the same instrument with which the greatest cornetists of America have made their reputations.

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 Makers of Everything in Band and Orchestra Instruments
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 Your skin can be quickly cleared of Pimples, Blackheads, Acne Eruptions on the face or body, Enlarged Pores, Oily or Shiny Skin. \$1,000.00 Cold Cash says I can clear your skin of the above blemishes. WRITE TODAY for my FREE Booklet—"A Clear-Tone Skin"—telling how I cured myself after being afflicted for fifteen years.
FREE
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WE'LL send you any one of these beautiful Diamonds for a thorough examination and approval—simply send us \$2.00. If satisfied, keep and pay balance in ten monthly sums—otherwise return, and examination will have cost you nothing. We don't want your money unless you are thoroughly pleased and satisfied. **Guarantee Value Bond given with every Diamond purchased. All transactions strictly confidential.**

SWEET Diamonds are all absolutely perfect in cut, blue-white in color and superior in quality. No matter how much or how little you pay you are sure to get the utmost for your money.

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Send for our beautiful DeLuxe Diamond Book, 98 pages in color, showing exquisite assortment of Diamonds, Watches, Jewelry, Silverware and Toilet Goods. Amazing values—all on 10 months' credit. Write for copy NOW to Dept. 63-5.



AA1 7-Diamond Solitaire Cluster set in hexagon-shaped Platinum mounting. Hand-engraved shank of white gold. **Price \$57.50**



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AA5 Ladies' fine 15-Jewel Wrist Watch with Sapphire Jewel Stem and beautifully hand-engraved case of 14K Solid White Gold. Guaranteed against repairs for one year. **Price \$20.50.**



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CAPITAL \$1,000,000.
L.W. SWEET INC.
1650-1660 BROADWAY, NEW YORK

\$3 Cash Buys Typewriter



Balance Only \$5 Monthly
Save 35 to 60% on all standard makes—Underwood, Royal, Remington, etc. Every machine thoroughly rebuilt and **GUARANTEED**. Try five days at our expense before you buy.

WRITE at once for Free Descriptive Circular and Special Low Prices.

5 DAYS FREE TRIAL

WYNN TYPEWRITER EXCHANGE 11 Reliance Bldg. Kansas City, Mo.

30 DAYS FREE TRIAL \$10 Worth of Records FREE



Simply wonderful! The limit of value giving! Just think! **AGENUINE DAVIS PHONOGRAPH** on 30 Days' Free Trial, and on terms as low as

\$2 A MONTH
in case you decide to buy. Magnificent instruments in quartered oak or mahogany piano finished cases, equipped with the finest worm gear motors, rich toned machines—at less than half the standard prices—and \$10 worth of records **FREE**.

Send No Money
Just a postal with your name and address. Only a limited number of machines shipped on this extra-liberal offer. Better act quickly. This is a life-time opportunity.
DAVIS, 314 West 43rd St. Dept. F-41 CHICAGO



"Been on a vacation Bill?"

"No, Jim — I've stopped smoking. Gained six pounds in a week. You know how I used to smoke—a package of cigarettes and a cigar or two a day—it sure had some hold on me. But I'm cured—

took a scientific home tobacco treatment—fixed me up in two weeks.

"Wasn't hard on me at all—noticed improvement the first day—I feel like a new man. It didn't interfere with my work—didn't leave any druggish after-effects—the money I saved in the last two weeks has paid for the treatment alone.

"Why don't you take it! It has cured men like you and me for over forty years—it is a doctor's individual prescription that sure fixes you up. Just send the coupon for full information NOW. No obligation. All correspondence is strictly confidential."



"A Doctor's Prescription"

The Keeley Institute, Dwight, Ill.

Please send me, without any obligation on my part, your free booklet which will tell me how to rid myself of the tobacco habit.

Name.....
Town.....
Street..... State..... P. M. - 11

Ingersoll MODELS 2⁰⁰ to 10⁰⁰
RELIABLE WATCHES AT LOW PRICES

\$2 Brings This Genuine DIAMOND RING



Simply send \$2.00 for the Most Sensational Price Smashing Diamond Ring Offer Ever Made. A perfect cut, blue white, fiery Diamond in new and hand pierced model of 18 Karat White Gold. Both sides of Diamond set with a Genuine French Blue Sapphire. Send Only \$2.00 and ring comes to you charges paid. Guarantee Bond accompanies each ring. 10 Days' Free Trial—You take no chance. If you are not satisfied at the end of ten days, your deposit will be refunded to you. **No Red Tape, No Delay**—After trial, pay \$5.55 a month for ten months. Price only \$57.50. Ring furnished in gentleman's mounting without extra charge.

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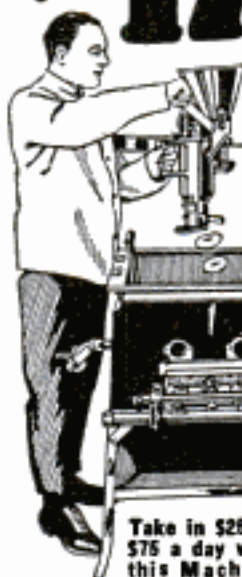
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\$47²⁵ Profit in 4 Hours



Doughnut Making business has wonderful possibilities. Doughnuts have taken the country by storm. Enormous demand. \$25.00 to \$75.00 a day. Capacity 800 doz. a day. Doughnuts sell fast at 30¢ to 40¢ a doz. 200% profit. No experience needed. Flour ready prepared—add water—put dough in hopper—turn crank—out drop sweet, savory, golden doughnuts

AMAZING PROOF FREE

Money-making possibilities unlimited. Put this Automatic Doughnut Machine in display window. Attract crowds. Enticing odor whets appetite. You take in money fast. Pay for the machine the first week. Joe V. Donmoyer, Pa., says: "Made \$47.25 profit in four hours." Others report earnings equal or better. Big money wholesaling.

WRITE NOW Get in on the ground floor—act quickly before others start. These machines pay big anywhere—no town too small. Get full details of this new profitable business—costs nothing to investigate. Write today.

Take in \$25 to \$75 a day with this Machine

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Greatest money-making line in America. Made to measure suits, overcoats, one price, \$33.65, express prepaid, all wool, all wool linings, hand tailored, finest workmanship. No extra charges for style or oversize. Bigger advance commissions, weekly salary besides. Protected territory. Apply at once.

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New ¼ H. P. 110 Volt Guaranteed Motors Complete with Cord, Plug and Pulley



60 cycle A. C. 1740 speed ... \$13.00
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BURNERS make your old kerosene lamps and lanterns give a brilliant white light, better than electricity or gas. Doubles your light. Saves oil. **NO MANTLE TO BREAK.** Guaranteed Safe and Reliable. Delights every user. Send now for complete sample postpaid 50 cents, stamps or coin. 3 for \$1.25. Money Back if Not Satisfactory. Live Representatives Wanted. Exclusive Territory.

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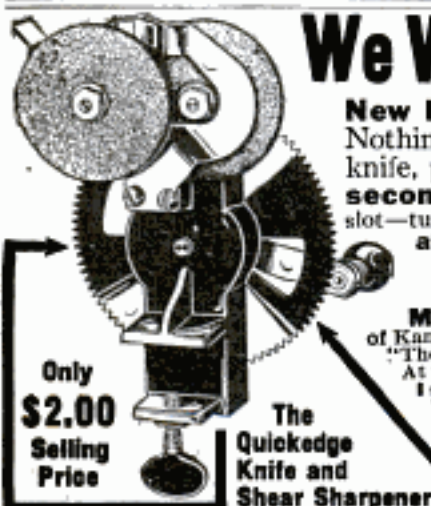
We Want Agents at \$50 to \$90 a Week

New Invention—Just out. Needed in every home every day. Patented. Nothing else like it. Low priced—**Sells on sight.** Sharpens any kitchen knife, paring knife, carving knife, bread knife, or shears and scissors in **ten seconds.** Mechanical masterpiece. A child can use it. Just put knife in slot—turn crank—sharpens both sides at once automatically. **We want representatives at once—men and women hustlers.** Get this position where **profits start first day.**

No Experience Necessary—200% Profit

Make as much money next week as these men are making now. J. C. Lewis, of Kansas, says: "I have sold one hundred sharpeners in four days." Hobart Kerr, of Md., writes: "The women can hardly wait till they get them." Herbert Cain, of Ky., sold nine after supper. At the end of the first day, J. W. Gordon, of Pa., writes: "I sold two dozen and I sold to every one I saw." Wm. G. Hall, of N. J., says: "I think it is great. I sold six in about one-half hour. The machine is a mighty fine proposition. I am a mechanic and I know what I am talking about." You can make this money. **WRITE TODAY. TERRITORY FREE.** Get busy at once.

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Only \$2.00 Selling Price

The Quickedge Knife and Shear Sharpener



Good Profits for Demonstrator Agents



Elto
3 HP Twin
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Exclusive territory for the ELTO — the only full 3 H. P. fast, light "twin!" Earn big money! Turn sport into profit! We'll send you a demonstrator at factory price. Or, if you cannot be an active agent, but will help us find one in your territory, you can have the latest ELTO at factory price. This is open to only one buyer in new territory. Write at once for liberal offer.

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RELIABLE STANDARD MAKES that you can **DEPEND ON.**

Enjoy the glorious experience of going wherever you like—whenever you like. The price is within your means—35% to 50% less than others. These machines are slightly used, thoroughly overhauled or rebuilt. Send for catalogue.



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THE SHAW MOTOR ATTACHMENT Makes Your Bike Like a Motorcycle

A high grade 2½ H. P. Motor attachment quickly clamped to any bike frame. Speed 4 to 40 miles an hour. 90 to 125 miles per gallon of gas.

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12 Months to Pay if desired. Many boys and girls easily save the small monthly payments. Parents often advance first payment.

Tires—best quality, at factory prices. **Lamps**, **Wheels** and equipment, low prices. **Send No Money**, do business direct with makers.

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Invention for seekers of Health Power Beauty

Elco Health Generators at last are ready for you! If you want more health—greater power to enjoy the pleasures and delights about you, or if more beauty is your desire—write! Ask for the book on these inventions which has just been prepared. It will be sent to you without cost. It tells you how Elco Health Generators aid you in leaving the lethargy and hopelessness of bad health and weakness behind forever. Re-vitalize yourself. Bring back energy. Be wholly alive. Write today!

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They operate on the electric light in your home or on their own motive power at less than 50 cents per year. Elco Health Generators are positively the only instruments which can give you in one outfit Electricity, Violet Ray—Vibration and Ozone—the four greatest curative agents. Send the coupon below. Get the Free Book NOW!



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Paralysis	Catarrh
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FOR every possible Ford job. Upstanding, two-fisted wrenches that are built to withstand the hardest work—day-in-and-day-out.

Examine the nearest stock of Mossberg Wrenches for Fords. You will find their construction superior to any you have seen. Their prices represent real value. Every Mossberg Wrench is made of Chrome Manganese Steel. Every wrench or tool is built to do a particular job—in the quickest, surest, easiest way.

Ask to see No. 654 Valve Lifter, Set No. 1944—"8 wrenches in 2" and other Mossberg leaders.



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No. 1944 "Double Four" Socket Set—2 Wrenches, 8 Openings

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Please Mention Popular Mechanics

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At your service day or night, you will find Radiator Neverleak will find all leaks anywhere in cooling system and stop them permanently in from 5 to 10 minutes.

Simply pour contents of a 75c can of Radiator Neverleak into the water in your radiator. That is all that is necessary. And it is absolutely guaranteed not to clog or injure the cooling system in any way.

Radiator Neverleak should be put in all new radiators. It will add years to their life by preventing rust and scale from forming.

Just try it! If it is not entirely satisfactory in every way, we will refund your money.

Write for free "Secret Service" booklet.

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Tougher Than Elephant Hide

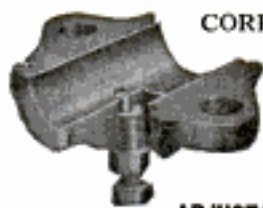
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CORRECTS END-PLAY and sets magneto for full efficiency without removing motor from car. Saves battery on cars with starter, saves the arm on cars without. Installed in few minutes. Guaranteed for one year. Ask your dealer, or sent pre-paid on receipt of..... **\$3.75**

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Absolutely rust-proof—edges as well as sides. Not the space of a pin point exposed to weather. Also fire and lightning proof. Reduce insurance. Outlast building. Need no repairs—and all roofing expense. Easy to lay—any man can do the work—hammer and nails only tools needed. Lay over old shingles if desired. Patent Interlocking Device makes water tight seams—all metal heads covered—no rust or leaks possible.

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Put all Edwards Galvanized Roofing in a class by itself. Bend, twist, strike it with a hammer as much as you like—you can't loosen or scale off the galvanizing—due to our "TIGHTCOTE" process which practically makes steel covering a part of the metal sheet. No other galvanized roofing can withstand this test.

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No nail heads in sight or exposed to the weather



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Lowest prices on Ready-Made Fire-Proof Steel Garages. Set up any place. Send postal for Garage Book showing styles.



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How Did Your Garters Look This Morning?

The new Wideweb "Boston" is light—cool—secure—adjustable—and rests so easily on the leg that you forget you have it on. Insist on having the Boston because it is the only garter with the famous Oblong All Rubber Button Clasp.

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MAKERS OF VELVET GRIP HOSE SUPPORTERS FOR ALL THE FAMILY

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Recover your old auto top frame yourself. Custom tailor made to fit all makes and models of cars. Any person that can drive a car can put it on. Roof and quarters sewed together, with rear curtain, fasteners, welts and tacks complete. Give name, year and model number of your car and we will send you catalog with samples.

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Inner Armor for Automobile Tires

Used over and over again. Will not heat or pinch. Positively prevent punctures and blowouts.

Guaranteed to Give Double Tire Mileage

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SAVE TIME GETTING HOME FROM WORK

You are home and dressed before your fellow workman returns from work because he prefers to walk rather than take a chance of accident by riding his bicycle after dark.

But your bike is equipped with a Delta Electric Bicycle Lamp and you have no fear of being run over for you can see the road ahead and passing motorists can see your light either from the front or rear. Complies with all laws. The Delta is a great convenience, protection and time saver.

Fits any bicycle instantly—under axle nut front left side.
Ask your dealer or Model 80 sent prepaid for \$2.25 complete (less battery).

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Genuine Gold Leaf Letters
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For store fronts, office windows, Bank windows, Office Doors, Panels, Board Signs, Trucks, Automobiles and Glass Signs of all kinds. Anyone can put them on and make money right from the start without previous experience. All you have to do is to show your samples; the letters are very attractive and easy to sell. Letters costing 3 1/2c sell for 25c. One agent says: "Your Letters are the best thing I have seen in years; I have made \$125.00 the first week and still going strong." Paul Clark says: "Smallest day \$28.70." H. Gilder made \$835.00 in six weeks.

\$60 TO \$200 A WEEK
GENERAL AGENTS—It is easy to appoint sub-agents for this line. We pay you 20% cash commission on all orders we receive from local agents appointed by you anywhere. We allow you 50% discount on your own orders. You can sell to nearby trade or travel all over the country, as you please. Large demand for window lettering everywhere. Write today for free sample, full particulars and liberal offer to general agents.

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INSTALL AN ELECTRIC LIGHT IN YOUR HOME. It costs only a few cents a day. You can do it easily, quickly, with a Midget Marvel electric light outfit. No matter how far you are from a power plant this new discovery gives you a dazzling flood of electric light at the touch of the switch. You recharge your battery with a 10c powder obtained from your druggist. With ordinary use one charge supplies light 7 to 10 days. Outfit will last for years. Sent complete ready to install, including 60 feet wire, staples, switch, completely wired fixture with shade, guaranteed Mazda lamp, battery system, battery charger and instructions. **Postpaid for \$2. Agents Wanted.** Send today for complete outfit and schematic terms. No circulars or U. S. D. Your \$2 returned if not satisfied.

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allowed, no matter where you live. If not more than pleased with our values, return violin AT OUR EXPENSE—and no harm done. Ability to play the violin brings social and financial success. Get a violin with a rich, mellow tone and it will create within you a desire to master it.

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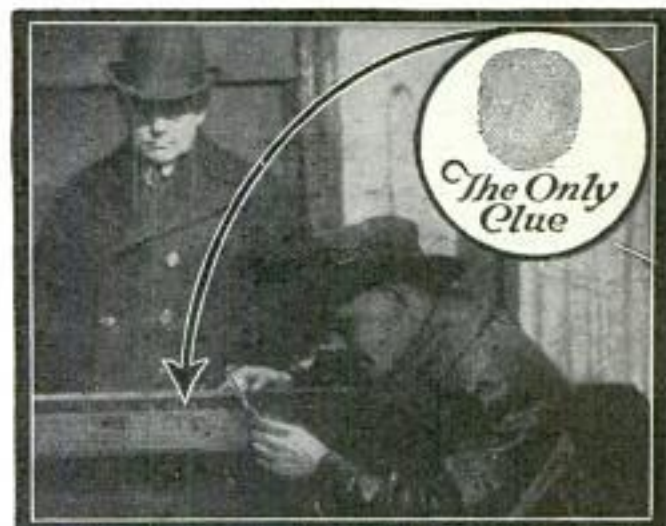
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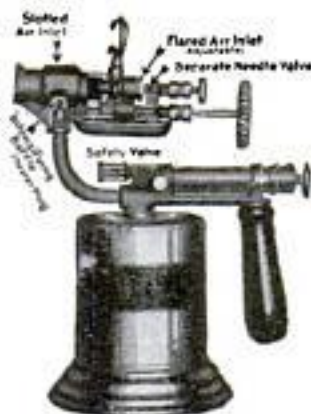
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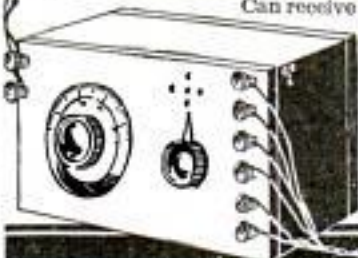
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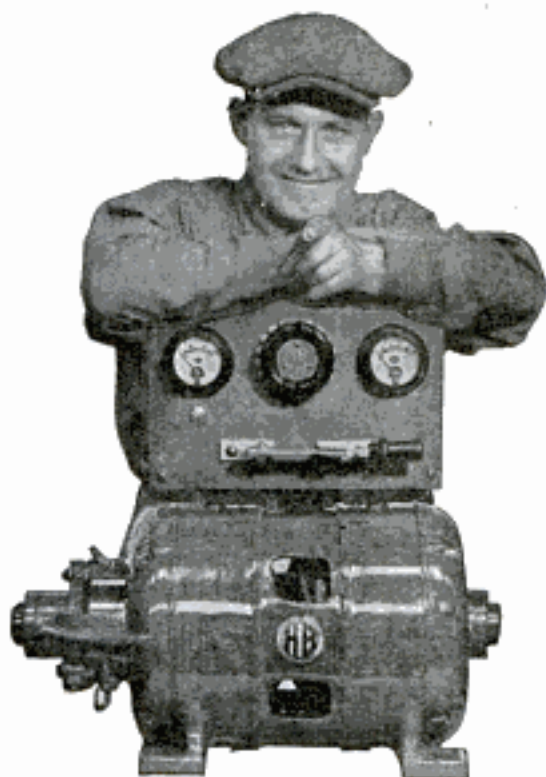
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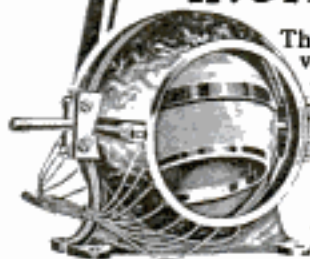
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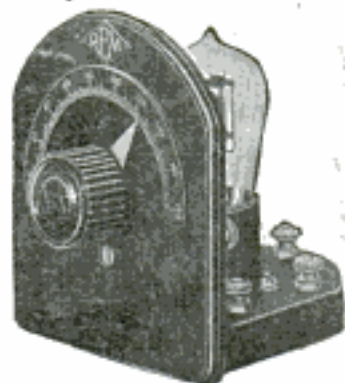
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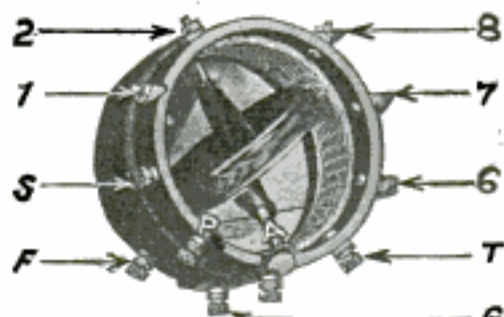
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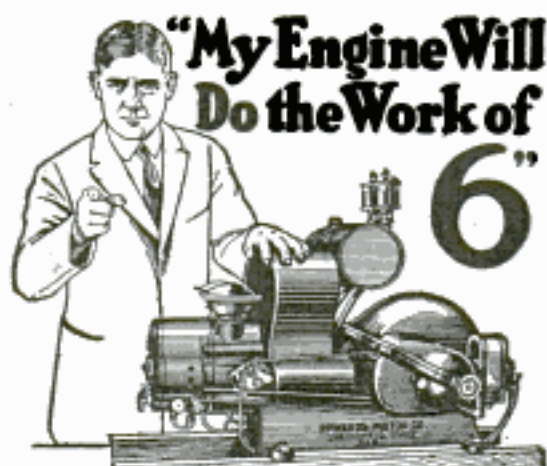
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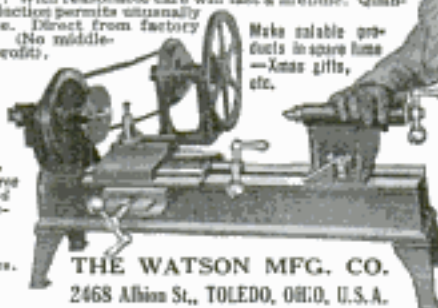
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**SAVE YOU
50%**
WRITTEN 2-YR. GUARANTEE

We maintain the same high quality material and workmanship found on the most expensive batteries and still are able to allow our remarkably low sale price by greatly reducing our overhead and sale costs.

COMPARE THESE PRICES

AUTO PRICES

6 Volt, 11 Plate . . . \$12.25
Ford, Chev., Mitchell, Hup., Grant,
Elgin, Vello, Saxon.

6 Volt, 13 Plate . . . \$14.00
Overland, Buick, Geo., Paige, Hud-
son, Nash, Stude., Dect.

12 Volt, 7 Plate . . . \$17.00
Maxwell, Dodge, Regal, Frank., Bris-
coe and Crow-Eikhart. Give year
and model of car.

Send No Money We ship C.O.D. subject to inspection, or will allow 5% discount for cash with order. Shipment made same day order is received. Save 50% on your next battery and get better service and longer life. Written 2-yr. guarantee is your proof of satisfaction. Order NOW!
WORLD BATTERY CO., Dept. 8, 1219 S. Wabash Av., Chicago, Ill.

RADIO PRICES

Special 2-Volt Storage Battery \$5.00
For W. D. 11 and W. D. 12 tubes.
Will run 200 hours on one charge.
Rechargeable.

Special 4-Volt Storage Battery \$8.00
For U. V. 129 tubes. Same features
as 2-volt.

6-volt, 60 amp. . . . \$ 8.50
6-volt, 80 amp. . . . 10.00
6-volt, 100 amp. . . . 12.50
6-volt, 120 amp. . . . 14.50
6-volt, 140 amp. . . . 16.00



Remington No. 10
Self-Starting \$38⁶⁵
30 Day Trial

Think of it — the most popular typewriter ever made—all late improvements — guaranteed 5 years—and you save at least \$60.

Biggest Value Ever Offered

—that's the comment we receive from thousands who have purchased from us. Guaranteed to have the same action, appearance and durability of a new machine.

Send Today — a postal will do — for details of our remarkable offer — or send \$38.65 NOW with the understanding that your money will be promptly refunded if you're not MORE than satisfied.

LINCOLN TYPEWRITER COMPANY
Dept. 134 298 Broadway, N. Y.

\$31.50 All Wool Free Suit Offer

The Bell Tailors, Dept. 1444, Chicago, Ill., will make a fine tailored to measure suit or overcoat free for one man in each locality who will show and recommend their high grade made-to-measure clothes to a few friends. Simply send them your name and address and they will send you a large assortment of wool samples, style book, self-measuring chart and their free suit offer.—Adv.

CAR OWNERS WANTED!

To use and introduce the greatest improvement in Inner Tubes since autos were invented. Air gauge in valve stem of every Tube shows at a glance through the Unbreakable Transparent Valve Cover amount of air in tires. (5)



AIR-GAGE Heavy Duty Tubes

—sell on sight to almost every car owner because they save trouble, time, worry and expense. Add one-third to life of tires. Paul salesman makes big profits selling direct to car owners. Our million dollar factory can use 500 more salesmen at once. Experience not necessary. Big Illustrated Free Book tells how the Paul Plans will start you in this big money-making business without capital. Write for Free Book Today.
THE PAUL RUBBER CO., Dept. 25, Salisbury, N.C.

Complete Telephone Instrument



\$12.50

These are army Field telephones, never having been used, made by the Western Electric Co. for receiving and transmitting. They couldn't be built for \$50.00. For homes, between house and garage, or on the farm, for mines, lumber camps, schools, churches, lodge rooms, office and factory use,

for contractors—any place where wire can be run over your own property, this instrument will prove of untold value.

The material and workmanship have passed government inspectors; there is nothing better; the government sold them because the war was over. Here is your opportunity. The leather case alone is worth \$5.00.

Easily moved about. You can install several phones on one wire and ground, or two wires if you prefer; can be used with either dry cell or No. 703 Tungsten Flashlight Battery. Nothing to buy but battery and wire. Full instructions with each instrument at the unheard of price of \$12.50 each. Order two for complete set.

Combination Phone and Buzzer Set

Every boy will be delighted with this instrument. He can learn the Radio code with the telegraph key and by stretching a wire to his neighbor's house or into another room,



\$12.50

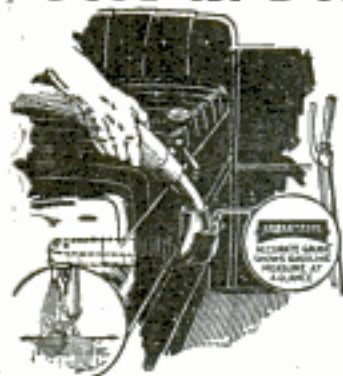
practice with his friends. The phone transmitter for voice is equal to any phone made and is combined with the buzzer telegraph sending set, using the same wire. The instrument was used by U. S. Army in the war. The ones we are offering have never been used. Light weight, with carrying straps for Boy Scout camp work. Schools, etc. All you need is a 322 Burgess Battery and some wire. These instruments cost the government over \$50.00, yet we are selling them for \$12.50 each. Order two for complete set. Get your friend to buy one and hook up with yours. Both these items are sold on a positive guarantee of your money back if you are not satisfied. The supply is limited and we cannot get more. Orders will be filled in order received.

J. J. WATSON & CO.

634 Hearst Building

CHICAGO, ILL.

**"Sold 1st Dozen Today!
Rush 18
More"**



"First dozen received this morning and sold before night. Rush 18 more today. Order for gross follows."—D. C. ORTH, Menlo, Iowa.

You, too, can make quick, easy sales and big profits with the

Kirstin

Fil-O-Meter

A GASOLINE GAUGE AND FILLER COMBINED
Fills Ford Gas Tanks—Shows Gas Measure Without Lifting Cushion

Eliminates bother, dirt, and loss of time in filling Ford (or Chevrolet) gasoline tanks. It is a filler and gauge combined. Automatic Air Vent, allows full flow from pump. Accurate gauge with glass covered dial, always in plain sight. Prevents running out of gas and short measure at filling station. Made of aluminum. Weighs only two pounds. Easy to install—clamps into regular gas tank opening.

SELLS FOR \$5—BIG PROFIT

Retail price \$5.00 (\$5.50 on Pacific Coast). Big profit—Easy Seller. Ford owners now paying \$6.00 for gas gauges alone! KIRSTIN FIL-O-METER at \$5.00 gives visible gauge besides providing the only comfortable, clean, easy way of filling tank. Magnuson made \$48.00 in one day. Laux, as a side line, cleared \$56.00 in 3 days.

Territory Going Fast—Write Today

Get our proposition TODAY. Closing territory fast. Sample sent on 10 day Money-Back Trial.

A. J. KIRSTIN COMPANY

13 First Street

ESCANABA, MICH.

How to Build the Cockaday Set

told complete (with diagrams) in our latest 1923-24 handbook catalog. Send 15¢ (coin or stamps).

Mid-West Dealers: Make more money handling better radio equipment. Write for our special franchise on Mu-Rad Receivers. Western Electric, & General Radio Co. parts. **CHICAGO RADIO APPARATUS CO.** 415 So. Dearborn St. Dept. PM-11 CHICAGO, ILL.



THE 1923 New OLIVER SPEEDSTER

Send for 1923 Oliver Catalog Showing New Standard three bank Keyboard. The Oliver Typewriter Co., Dept. 1097, Chicago

THE FAMOUS GREEN AUTOMATIC



Grinds, hones and strips in one operation

A BIG MONEYMAKER

THE FAMOUS GREEN AUTOMATIC

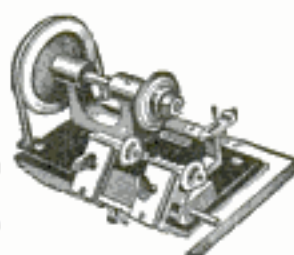
grinds, hones and strips all kinds of safety razor blades in one operation. If you now own a business of your own or have at least \$300 in capital to start an independent, profitable business of your own which will make you a handsome profit of from \$3.00 to \$5.00 per hour, then write us.

Wonderful Opportunities in the Sharpening Station Business

We make the latest models of machinery for sharpening safety razor blades (all makes), scissors, clippers, surgical instruments, carving knives, butcher knives, razors and all cutting instruments. Operating cost small. Wonderful advertising value for window installations. Estimated by operators as greater than cost. **BEAR IN MIND—ALL MEN SHAVE. MOST MEN USE SAFETY RAZORS. UNLIMITED SERVICE OPPORTUNITY.** If wide awake and progressive, write for full particulars and further information. Address

AMERICAN SHARPENING MACHINE COMPANY
(Makers of sharpening and key cutting machinery)
Dept. P. 11 KALAMAZOO, MICHIGAN

AMERICAN KEY CUTTER



Built for Custom Service. Cuts square, angular or curved slots. Accurate work guaranteed.

Greatest Bargain Offer in History

Brand New Farm Tractors

List Price \$1485.00 f. o. b. Factory—Our Price \$375.00 While They Last, f. o. b. Chicago

25% deposit with order, balance eight draft attached to B/L.

Just Think of it!

\$375.00 FOR THESE TRACTORS

Our Guarantee We have been in the automobile business for nearly 15 years. We guarantee these tractors to be new and in perfect running order when shipped. We also are prepared to furnish service on parts at any time for these tractors should you need them. Never has there ever been such a bargain as this offered before. **SPECIFICATIONS—(MOTOR)** Waukesha—4 cyl.; bore, 3 1/2"; stroke, 5 1/2"; 26 H. P.; speed, 900 R. P. M.; governor, high tension magnet; cooling system, 9 gallon armored radiator, 18" fan, Centrifugal pump. **TRANSMISSION** Fuller selective sliding gear, 3 speeds forward, 1 speed reverse, power take-off, 850 R. P. M.; pulley 8" dia., 7" face. **REAR AXLE**—Torbenon double reduction tractor axle; gear reduction 44:1. **FRAME**—Pressed steel, channel 4" deep, 2" flange; wheels, front 22"x6", rear 40"x11"; wheelbase, 70"; weight 3500 lbs.; belt, horse power, 20; draw-bar, horse power, 12. We Can Furnish Anything From a Cotter Pin to a Complete Power Plant for Your Automobile or Truck. Write Us for Quotations on Anything in This Line You Require. Let Us Put You On Our Mailing List for Our "Air Snaps," Mailed Each Month. Also Our General Catalog. We Can Save You 20% on New and Used Parts Such as Tires, Speedster Bodies, Trays, Gears, Diff. Gears, Timing Gears, Tires & Tubes, Cushions & Springs, Fenders, Radiators, Lamps, Motors, Transmissions, Differentials, Wheels and Rims. Write Today for Our Descriptive Circular.

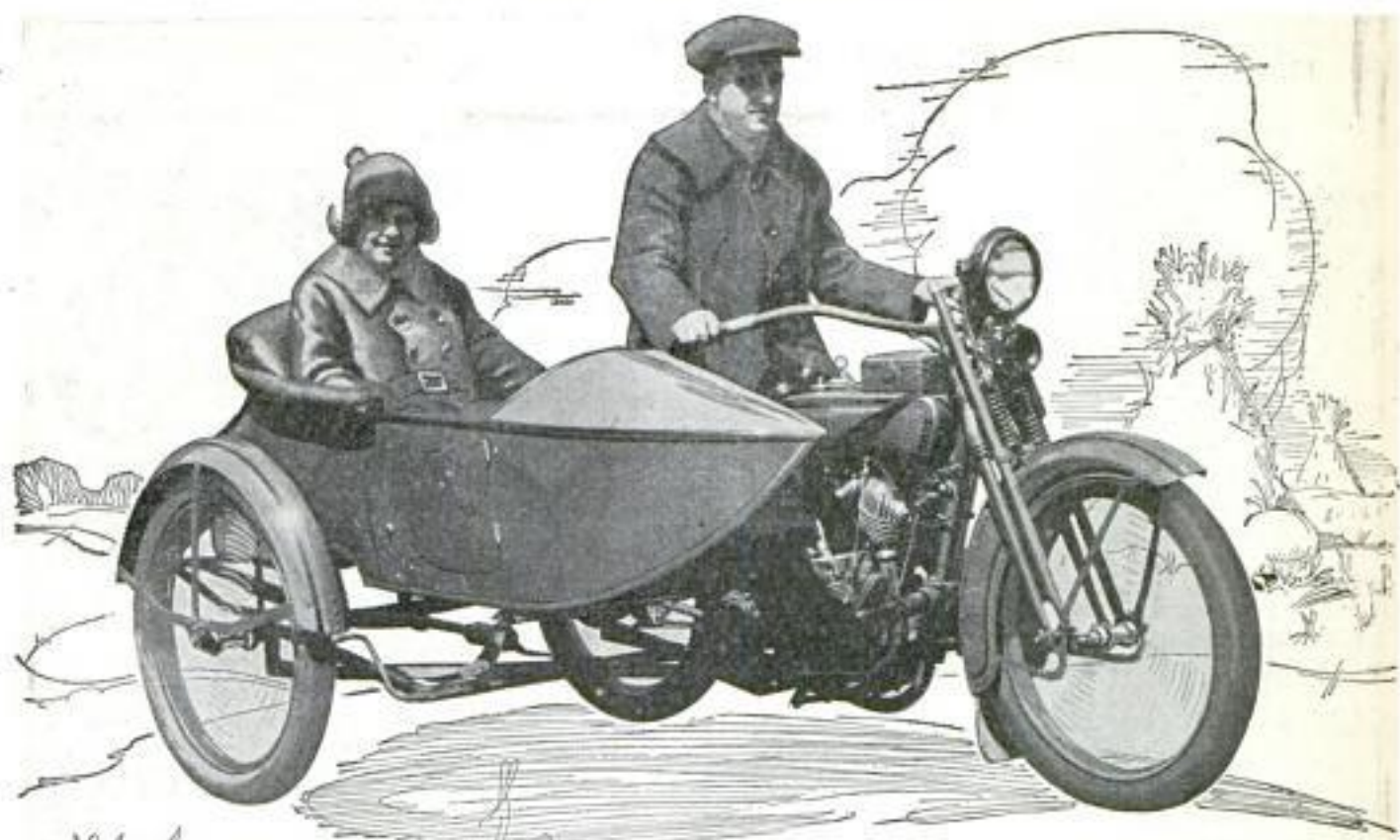
ORIGINAL WARSHAWSKY & COMPANY

World's Largest Replacement Parts House
1915-35 So. State St., Dept. PM 11, Chicago, Illinois

MYERS WONDERFUL AWL SEWING AWL

Tools in Hand! Have it when you need it. Don't stop work. A complete repair shop in itself. Sew anything heavy or light. Leather, Shoes, Harness, Automobile or Buggy Taps, Canvas, Belts, etc. Price to introduce, \$1.00 Postpaid. **C. A. MYERS CO., 6339 Woodlawn Ave., CHICAGO, ILL.**

AUTO SUPPLIES WHOLE SALE 3000 BARGAINS SEND FOR THIS CATALOG—**it's FREE!** Everything you need in Auto Supplies at Amazingly LOW PRICES. **NEMCO BARGAIN SUPPLY HOUSE** 849-851-853-855 W. Washington Blvd., Chicago, Ill.



Speed! Easy Riding!

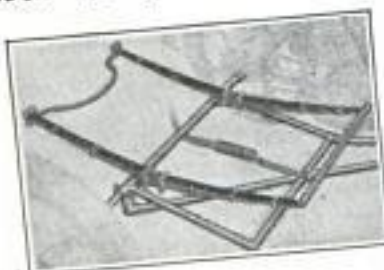
FORTY—fifty—even sixty miles an hour, and still you ride smoothly and comfortable on the 1924 Harley-Davidson. Even over roads that look rough this wonderful motorcycle glides you on — to haunts unknown to those who must travel by train or automobile.

Aluminum-alloy pistons add speed, give marvelous pick-up, prevent overheating. New spring construction takes the bumps out of sidecar riding. Alemite lubrication (first on any motorcycle) makes the 1924 Harley-Davidson easier to care for. New olive green finish, maroon striped, makes it more handsome. And it's just as economical as ever — 50 miles for a dollar (gas, oil, tires and all!)

Take a demonstration ride on a '24. It's the finest motorcycle ever built because it's Harley-Davidson's best. Ask your dealer about his Pay-as-You-Ride plan. Write us for free literature, showing 1924 models in actual colors.

HARLEY-DAVIDSON MOTOR COMPANY
Dept. P Milwaukee, Wisconsin

New!
Full-floating
semi-elliptic springs



EVEN bad roads are smooth now—when you ride in the sidecar of the 1924 Harley-Davidson. Full-floating, semi-elliptic, 49-inch springs make it wonderfully easy riding.

Money-making sales opportunities in open territories. Write for particulars.

Harley-Davidson

The Motorcycle

Date.....

Send me descriptive literature, in full colors, showing the 1924 Harley-Davidsons and Sidecars.

Name

Address.....

England

Canada

AMPLION

Scotland

Australia

**Junior
DeLuxe**

Wales

New Zealand

\$26⁰⁰

List

Ireland

So. Africa

The Uncanny Amplion A "Human" Loudspeaker

Norway

India

YOU can scarce believe your ears when you first hear the Amplion Loudspeaker.

The clearness, softness and rich tone-quality with which it reproduces voice and music are so real as to be uncanny. You get a new thrill from radio. Delicious "chills" course up-and-down your spine, as they do when you listen to some master of voice or instrument face-to-face.

Sweden

France

American Engineers who have tested the Amplion are unanimous in their opinion that for true reproduction and volume it's the best loud speaker yet produced.

Denmark

Italy

The Amplion is not a head receiver fitted with a horn, but the adaption for Radio of an electro-magnetic and acoustic instrument which for thirty years has been successfully used in all parts of the world.

Ask your dealer to let you hear the wonderful "AMPLION" Loudspeaker. Send for illustrated folder.

Patentes Alfred Graham & Co.

SIGNAL ELECTRIC MFG. CO.

Sole United States Distributors Menominee, Michigan

Holland

Spain

BURNDEPT OF CANADA, LTD.

Canadian Distributors 172 King St., West, Toronto

Belgium

Japan

*The Supremacy of the AMPLION
is the Supremacy
of Actual Performance*



"Bob, You Be the Conductor— I'll Be the Engineer"

Think of the fun of running a railroad that is all your own! Lionel Electric Trains are exact duplicates of the equipment used on America's greatest railroads. They look alike and work alike. Even the block signals, warning bells, and crossing gates work the same—automatically.

A touch of your finger on the Lionel "Multivolt" transformer sends the Lionel train whizzing round the track, through tunnels, across switches and over bridges. Automatic crossing gates raise and lower as the train approaches and passes by. Warning bells sound danger at the crossings. Electric block signals with real electric lights flash "caution" and "clear."

Real Boys want the real thing. They want their railroad to be up-to-the-minute in every respect. That's why more and more boys buy Lionel Electric Trains every year. They know that Lionel Trains

are the real thing and built so perfect, electrically and mechanically, they will last a lifetime. There is economy in this preference besides pride of ownership and years and years of happiness.

Now come on, Dad, and give your boy the gift that you would have "jumped for joy" to receive when you were a kid. Nothing is more instructive and commands such interest from the boy.

You can buy a complete Lionel Train for as low as \$5.75, or you can buy a larger locomotive and track and add to it as you wish. You can see Lionel Electric Trains and Accessories in operation at the best toy, electric, hardware, sporting goods and department stores.

Send for the new 48-page Lionel catalog—a handsome book showing the complete Lionel line in actual colors. It's FREE. Write Today.

THE LIONEL CORPORATION
Dept. 14, 48-52 East 21st Street, New York City
"Standard of the World" Since 1900



LIONEL ELECTRIC TOY TRAINS

& Multivolt Transformers

\$10,000 to \$25,000 for Check Protecting Fountain Pens

**District Managers
and Agents
Wanted in
Every State
\$2,500 to
\$7,500**

**The
Wonder-
ful Selling
Points That
Make Every
Man a Buyer**

12 BIG FEATURES OF THE SECURITY PEN

- 1—Steel check-protecting wheel; scores paper, fills cuts with acid proof red ink.
- 2—Coil spring in automatic clip.
- 3—Automatic clip riveted to Pen on both sides.
- 4—Clips of **Rolled Gold**.
- 5—18 Kt. Gold Filled band. Protects cap.
- 6—Screw Pressure Filling Device. Fills in a second.
- 7—Hardened steel lever—copper plated.
- 8—Rounded Pressure bar (made of Monel Metal—rust proof) prevents injury to ink sack.
- 9—Seamless rubber sack, extra strong.
- 10—Air cushion (vacuum) fed bar. Gives perfect, even flow.
- 11—14 Kt. Gold Pen. Tempered by secret process.
- 12—Native iridium ball point. Cannot be harmed by inks or acids.

An unconditional FIVE YEAR written guarantee is furnished with each Pen.

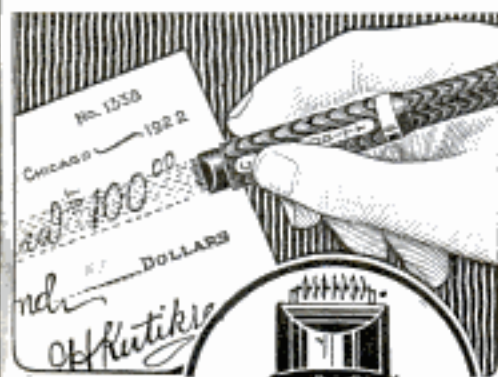
PRICES

No. 300...\$3.50 No. 600...\$5.00
No. 400... 4.00 *No. 800... 7.00

Long and Short models.
*Giant Security made in a beautiful red and black (mottled) finish has an exceptionally large ink capacity.

PRICES IN CANADA

\$5.00—\$6.50—\$8.00—\$10.00



Just think! Last year \$53,000,000 was lost through alteration of checks and other papers.

And 70% of this amount—\$37,000,000—was due to changing the payee's name to bearer or cash or to changing dates and numbers so that payment could not be stopped. Many of these altered checks had been protected against raising of amounts—but the protection did not extend to other features.

The Security Check Protecting Fountain Pen prevents both classes of loss. It is designed to give protection of EVERY kind, EVERYwhere, against EVERY sort of check-manipulating crookedness. Its knife-edged, steel, rotating, cutting wheel scores the paper and fills the scoring with an ineradicable, acid-proof red ink, which cannot be removed. This protection is given to the amount, payee's name, check number, date and memoranda. It affords equal protection to names, amounts, signatures and important clauses in deeds, wills, contracts, etc.

The Fountain Pen itself is the result of 17 years' experiment. It flows so easily, is balanced so delicately, writes so smoothly and is so durable that on these merits alone it will cause most fountain pen users to discard their present pens in its favor.

The check protector attachment gives the maximum of check protection. It not only prevents raising of amounts as do expensive check protecting machines—but it goes further for it stops the still greater harvest which crooks now reap through changing name of payee, altering dates and numbers on checks and through changing sections of deeds, wills and contracts. Yet it is so light that its presence in the cap is not shown in the weight of the pen.

FROM INDIVIDUAL USERS

The Security is the best and smoothest writing pen I have ever used. Out of a dozen pens which I have in my desk I prefer to write with the Security. I paid \$5.00 for my Security and I wouldn't take \$50.00. The check protecting device alone is worth \$25.00 to any one who writes checks.

SECURITY PEN CORPORATION
Dept. 200 P. M., 900-910 W. Jackson Blvd., CHICAGO, ILL.

Distributors Selling

NEVER before in the history of direct selling has such a wonderful opportunity been offered to Specialty Salesmen to engage in a business of such rapid growth and that represents such splendid and unlimited possibilities. **JUST THINK OF IT!** One out of every seven persons in the United States purchased fountain pens last year—16,000,000 in all. More will be sold this year and many more next year. **WHY!** Because, while years ago a fountain pen was considered an article of luxury it has now become an absolute necessity, indispensable to every one who writes.

When you bear this in mind, you will readily appreciate the wonderful possibilities of the "SECURITY" as compared to the ordinary fountain pens on the market, not only on account of its novel and improved features which give it smooth and excellent writing qualities, but also on account of its unique and practical check protecting device which alone is worth many times the price of the pen, adding tremendously to its advertising value and overcoming all sales resistance.

Manufactured in our own complete and daylight factory by a group of competent, contented and profit-sharing employees with a long experience in the fountain pen industry, the "SECURITY" offers a product of PAR EXCELLENCE and is in a class all by itself.

No wonder it is becoming more and more popular every day and we have enjoyed such a meteoric success in a short period of ten months, ever since we inaugurated our new merchandising plan of selling through specialty salesmen direct to the user.

Now I want men to help me place a "SECURITY" in the hands of every business and professional man and woman in the United States and eventually in the hands of every one who writes.

Can this be done? Yes, it can and will be done.

Of course we can't accomplish this in six months or a year, but when I get the right kind of men behind this meritorious article and all of us work together and co-operate to the fullest extent, we are bound to put the "SECURITY" over the top.

First of all I want some real big men, good experienced organizers, to take over the exclusive distribution of the "SECURITY" in the remaining open states. I want these men to be real workers, of pleasing personality, full of determination and vision enough to picture what I see in the future and the unlimited possibilities of this "MASTER PEN" and fully convince themselves that the "SECURITY" is destined to be the leader in the field.

We have practically closed one-half of the States, and indications are, that the balance of the territory will be assigned within the next thirty or sixty days. When this is accomplished and our distribution plans are finally completed, we will commence a judicious and systematic, national advertising campaign, which will popularize the "SECURITY", create a large demand, and be of great assistance to our representatives throughout the country in their sales efforts.

CASH REQUIREMENTS

In order to avoid any possible misunderstandings and as I am not at all anxious to take up your time or mine by corresponding and for the purpose of keeping away the curiosity seekers I will endeavor to make our proposition very clear in every way.

1. If you wish to act as our Distributor, have had experience in organizing and maintaining an efficient sales force and are in a position to finance yourself to the extent of from \$1,000.00 to \$2,500.00 we will grant you the exclusive sales rights of our product in a territory having a population of from 1,000,000 to 5,000,000.

2. If you wish to act as a District Manager and are able to train and organize a small sales force and can finance yourself to the extent of from \$150.00 to \$500.00 we will allow you exclusive sales rights for the "SECURITY" within a territory ranging in population of from 100,000 to 500,000 people.

3. If you wish to become an Agent and to devote part or all of your time to the "SECURITY" you must have a capital of \$17.75 to enable you to purchase one of our complete sample outfits which will start you on the road to success, and as soon as you have proven to us your ability to successfully distribute our product I will make you a proposition offering you exclusive territory of from 10,000 to 50,000 people.

ATTENTION: We do not sell territorial rights. Your capital is always under your control and is to be used strictly for the purchase of pens and furnishing suitable office quarters when necessary.

In order to avoid unnecessary correspondence and speed up negotiations, when writing please don't say "I wish to act as Agent, District Manager and Distributor," but judge for yourself in what capacity you are able to serve yourself and our organization to the best advantage and specify exactly in the coupon below. Also write a personal letter giving me a brief history of yourself, your past experience, financial, commercial and character references; whether you wish to devote full or part time and mention territory wanted, specifying names of Counties or States. I will then give you full details.

NOTE.—Please do not ask for Credit, Free Samples or Samples at wholesale prices. We do a strictly cash business.

If you desire to see the "SECURITY" before taking further action, send with your letter check or money order for style wanted and a complete demonstrating outfit will be forwarded to you free of charge together with sample pen.

After you have received the pen, examined all the parts, noted the simplicity and strength of construction and followed carefully the directions relative to filling and the use of the pen and given it a thorough trial, we are confident you will agree with us that the "SECURITY" is all we claim it to be.

Then go and show the pen to your friends and acquaintances, also several business men including your Banker, get their opinion and let them be the judges. In the event however you are not completely sold on its merits and are not thoroughly satisfied with the "SECURITY" you may return the pen at our expense and the entire price will be refunded you without any "ifs" or "ands."

JOHN H. KRITIKSON, President.

Present Distributors

DOROKAY CORPORATION
25 West 43rd St., New York, N. Y.
Exclusive Distributors New York and New Jersey

SECURITY PEN COMPANY
152 Temple St., New Haven, Conn.
Exclusive Distributors Connecticut and Rhode Island

EASTERN SECURITY PEN COMPANY
Konnarock, Virginia
Exclusive Distributors Virginia and West Virginia

SECURITY PEN SALES COMPANY
30 Euclid Arcade, Cleveland, Ohio
Exclusive Distributors Cleveland and Surrounding Territory

SECURITY PEN COMPANY
805 Walton Bldg., Atlanta, Ga.
Exclusive Distributors Georgia, Alabama, Florida, North and South Carolina

E. E. PEOPLES
Prudential Hotel, San Antonio, Texas
Exclusive Distributor Southern Texas
NORTHWESTERN MFGRS. AGENCY
Lewistown, Montana

Exclusive Distributors Montana, Wyoming, Colorado
STANDARD SALES COMPANY
506 Chamber of Commerce Bldg., Los Angeles, Calif.
Exclusive Distributors California, New Mexico, Arizona, Nevada

TUNNELL, LIMITED
Harland Smith Bldg., Toronto, Ont.
Exclusive Distributors Dominion of Canada and Newfoundland



Security Pen Corporation, Dept. 200 P. M.,
900-910 W. Jackson Blvd., Chicago, Ill.

Gentlemen: I am interested in your proposition from the standpoint of DISTRIBUTOR DISTRICT MANAGER AGENT. I wish to devote FULL TIME PART TIME in the following territory. Explain in full.

Enclosed find check money order \$.....
Send me one Security Pen No. Long Short Medium
 Fine Stub Coarse in Flexible or Stiff Action.
Also DEMONSTRATING OUTFIT FREE.

Name.....

Address.....

City..... State.....

Ford Owners Make \$12 to \$36 Daily!

Startling Opportunity to Make Money Fast!

At home or traveling. All or spare time. Experience not necessary. Willingness to demonstrate all we ask. If you own Ford, you're lucky. It's a gold mine. Simply install GIDEWEL steering device. Show to other Ford Drivers. They're bound to buy. Quarter mile demonstration convinces most skeptical. Sell right and left. Makes you independent. Always have money. Ed. Krampton, Canada, makes high as \$300.00 week. W. H. Pfing, Ohio, clears \$75.00 week often. Each sale earns \$4.00. Two sales in one evening common. \$8.00 between supper and bedtime not bad. It's yours for the asking. Must act quick. Territory going fast.

There's Not a Ford Driver on Earth Who Wouldn't Gladly Pay \$10 for GIDEWEL!

It's a wonder. Nothing exactly like it. Absolutely and positively guaranteed. Stops steering vibration. Takes shock, jar, jolt, jiggle and jerk out of steering wheel. Eliminates front wheel wobble. Makes car track perfectly. Won't jump ruts. Rides bumps without swerving. Prevents locking on short turns. Makes driving a pleasure. Adds safety to motoring in a Ford. Car responds to slightest touch on steering wheel. Can steer for miles over roughest roads without fatigue. GIDEWEL easily attached. Installed without disturbing present construction of car. Is dirt, dust- and grit-proof. Practically no wear out to it. Lasts lifetime. Can be transferred from one Ford to another. Hundreds in use. Difference it makes in steering amazing. Be first man in your town to demonstrate and sell GIDEWEL. Ten dollar bill buys it. Where's Ford driver who wouldn't pay \$10 to make his Ford steer like large, heavy car? Every Ford driver live prospect. Hundreds swarming around in your territory. Think of the money-making possibilities for you! Again we say: Act quick. Wire or write at once for liberal proposition. Don't wait. Address

THE ROLLAWAY MOTOR CO.

1121 Southard Ave.

TOLEDO, OHIO, U. S. A.

THE NEW MOTORLESS SAIL PLANE

Fly in a Rider glider



Build your own for \$20 or less

Following my scientific drawings and simple instructions, an amateur can quickly build it. Safest glider ever designed, the result of my long experience in the Eng. Div. of the Govt. Air Service. Very simple construction. You can obtain the materials from your local stores for \$15 or \$20. Send only \$3 for complete blue print plans. Money refunded if not entirely satisfied.

W. KEITH RIDER

P. O. Box 1062

Arcade Station, Los Angeles, Cal.

It's Safe
Simple to handle
Scientifically
Designed

Any Amateur
can operate
Very Latest
construction
Glides with
least air pressure

Plans
in detail complete
(Guaranteed)

\$3⁰⁰

\$365⁷⁵ ONE DAY

Ira Shook of Flint Did That Amount of Business in One Day

—making and selling Popcorn Crispettes with this outfit. Profits about \$269. Bram bought first outfit Apr. 6, 1923 and 7 more outfits by Aug. 28, 1923. Iwata, Cal., bought one outfit, then 10 more within a year. Mrs. Lane of Pittsburg says, "Sold 8000 packages in one day (1923)". J. R. Bert, Ala. wrote, "Only thing I ever bought that equalled advertisement". J. M. Pattilo, Ocala, writes, "Enclosed find draft to pay all my notes. Getting along fine. Crispettes all you claim and then some."

John W. Culp, So. Car., writes, "Everything going lovely. Crispette wrappers lying all over town. It's a good old world after all." Kellog \$700 ahead end of second week. Mesner, of Baltimore, \$250 in one day. Baker sold 3,000 packages in one day. Perrin, \$380 in one day.



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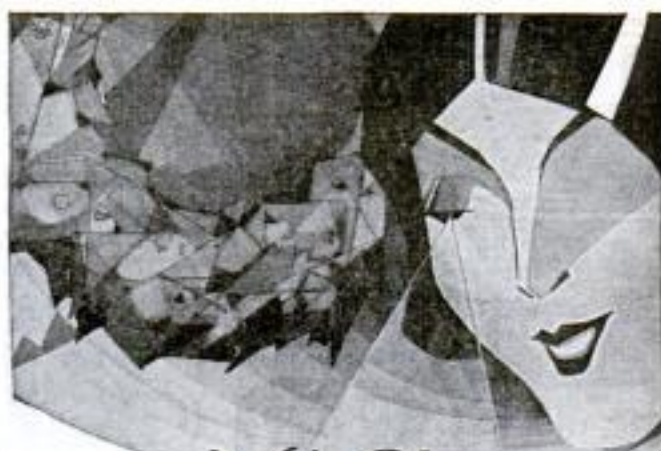
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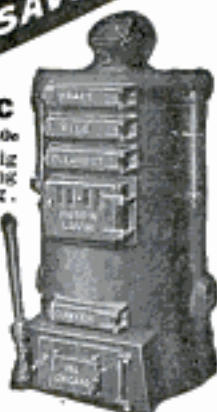
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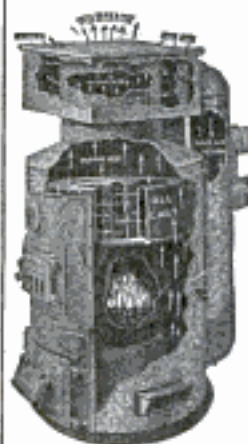


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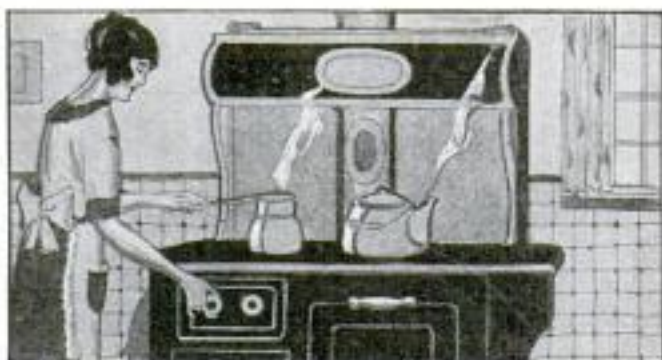
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Those who wear them say:
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Life-size paper patterns—You can build your own body at small cost. We are manufacturers and our quantity production enables us to quote exceptional low prices. Our unique shipping methods save you 73% in FREIGHT CHARGES. Send at once for free particulars on Central Bodies. Our Book: "HOW TO BUILD A FORD RACER" sent anywhere on receipt of 25c in cash or stamps. WRITE TODAY!

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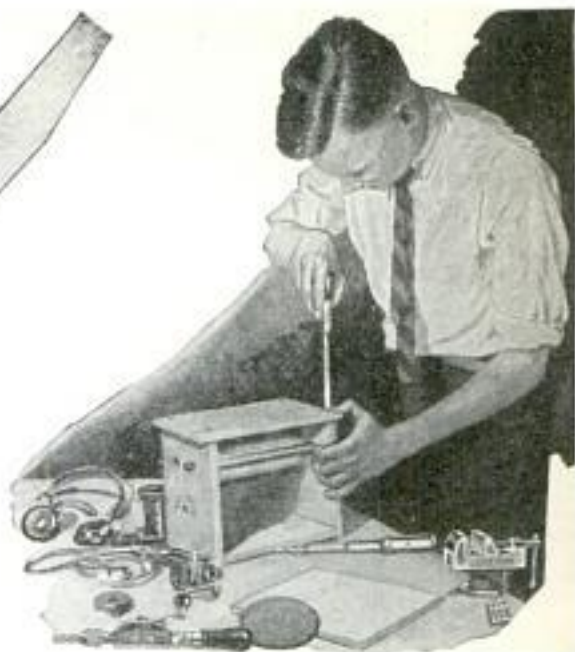
UP
UNDER
SLUNG
PARTS
Per Set
\$6.75

"YANKEE" Ratchet Screw-drivers

No. 10 (illustrated) comes with 2, 3, 4, 5, 6, 8, 10, and 12 inch blades.

No. 11 is same as No. 10 except that Ratchet Shifter moves across instead of parallel with tool.

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Make it easier

BECAUSE of the "Yankee" Ratchet you never need to release your first good grip until screw is home. "Yankee" Ratchet Screw-drivers aid in the accurate construction so necessary to satisfactory tuning.

Quicker. Easier. No tiresome grip-and-let-go. Knurled washer on No. 15 helps to start tiny, wobbly set screws. Long thin blade reaches in tap holes.

For drilling holes, use "Yankee" Ratchet Hand Drill No. 1530. Your hardware dealer sells "Yankee" Tools.

Write for "Yankee" Tool Book, showing all the "Yankee" Ratchet Tools—Hand, Breast, Chain and Bench Drills, Tap Wrenches, Push Drills, Spiral Screw-drivers, etc.

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Make Better mechanics

**REMINGTON
PORTABLE TYPEWRITER
Dealers and Branches Everywhere**

Swing 4 in.; 11 in. between centers, 17 in. total length. Shipping weight 13 lbs. Bed of lathe is machined. Workmanship first-class. Equipped with wood turning chuck. Can be fitted with 3 in. face plate and drill chuck as special equipment. Order one today.



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Made also in larger sizes.
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This \$2 KNIFE \$1.18 Postpaid
Hand Forged Razor Steel Blades
Handy shaped Blade makes this knife best for mechanics, sportsmen and farmers; light but strong; re-sharpened easily. Stag handle. German silver finish; blades file tested, hand forged from razor steel and warranted.

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Hand Forged
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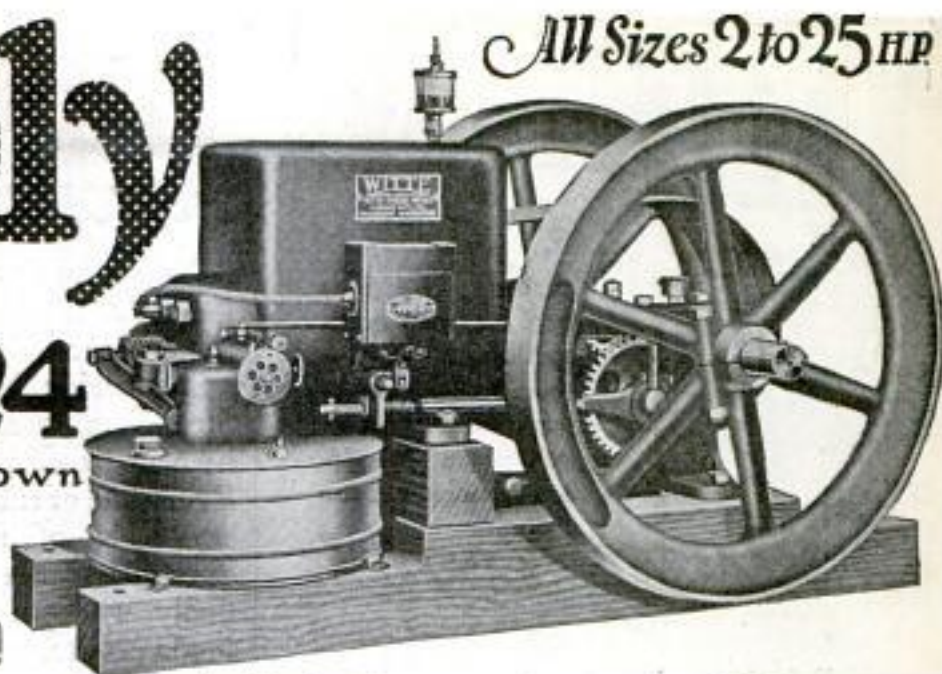


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FOR
\$1.18 POSTPAID

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(Magneto Equipped)



All Sizes 2 to 25 HP

Puts this THROTTLING GOVERNOR WITTE on Your Place

Here's a revolution in farm power—now a cheap, dependable engine is within the reach of every progressive person—you can make \$1,000.00 or more extra profit every year you have a Witte Engine working for you.

BURNS KEROSENE, GASOLINE, DISTILLATE or GAS!

(NO SPECIAL ATTACHMENTS NECESSARY)

Here's the standard engine value—the WITTE Throttling-Governor ENGINE which burns kerosene, gasoline, distillate or gas without any special attachments. With the WITTE you are no longer at the mercy of fuel fluctuations—you get steady, dependable power and always use the cheapest fuels.

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The WITTE delivers the big surplus of power that you need for the larger heavier jobs but can also be speeded down to handle small jobs at a minimum fuel cost. Easily moved from place to place—the WITTE answers every power need on the place. Trouble-proof and so simple to operate that a boy can tend to it. Makes all farm work easy and cheap—Louis Knoche says: "I didn't know a WITTE could show me such a profit. I do all the chores easily and quickly and have saved the wages of several hands this year. The engine works like a charm and I have kept it going steadily ever since I got it."



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I build my engines and I sell them—I have been doing this for over forty years. Over 100,000 satisfied customers say that the WITTE is the one engine that can be relied upon all the time. And because I build the WITTE and sell it direct to you I give you a price that no one can equal on such a high-quality engine. I deal with you personally—if there is any problem confronting you in the purchase of an engine, write me PERSONALLY and I'll help you. ED. H. WITTE.

Equipped with the Famous Wico Magneto

THE WITTE comes equipped with the Wico Magneto—the most perfect system of high tension ignition known. A guarantee that the WITTE will always have a fast, hot spark and give perfect performance in all climates, under any weather condition or temperature. Far superior to the old-style battery-equipped engine—it combines dependability and economy all the time.

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The WITTE ENGINE is guaranteed for a lifetime of hard, steady work—mechanically perfect, built of only the best selected material in the largest factory of its kind in the world.

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I employ no salesmen—the WITTE ENGINE is sold direct from my factory to you at the lowest price in history and I give you nearly a year to pay on any size, 2 to 25 horse-power.

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So confident am I that the WITTE ENGINE will make you money day in and day out that I offer to let you try a WITTE 90 days at my risk and if it's not right, I simply say—"I'LL MAKE IT RIGHT AND IT WON'T COST YOU A CENT." Can I make a fairer offer to prove to you that now you can buy cheap, dependable farm power that is sure to show a profit?

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Write for my FREE Engine BOOK Now

Write me today—no obligation whatever, for my big free illustrated engine book that shows the low prices on this remarkable engine. Gives full details of operation and shows the way to the biggest profit year you will ever have.

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Different!



Through the ages there has been nothing like the Sphinx—it is *different*. Just as today in the motorcycle world the *different* machine is the

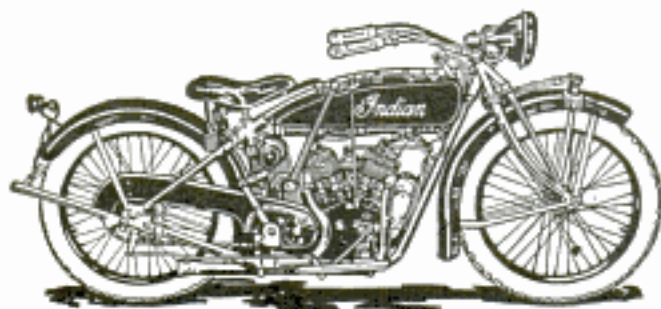
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New riders daily acclaim it as the complete answer to the demand for speed, power, and endurance without excessive weight, combined with lowest economy and greatest ease of control. Old riders find it *different* from anything they ever threw a leg over. It is a compact model of everything modern motorcycling calls for.

A demonstration at your dealer's will let you "feel" the *difference*. Other models and sidecar outfits if you prefer.

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Spencerian Personal Steel Pens

When buying pens—here's a point to remember: There's a Spencerian Personal Steel Pen to fit *your* hand, perfectly. Every one of the many styles is of special Spencerian steel with finely worked, hand-made points. Result—a longer-lasting, smoother-writing pen than you ever used before.



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College,
fine point,
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around
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pointed;
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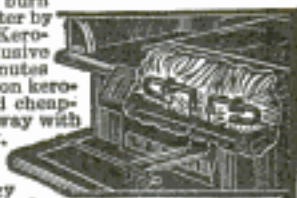
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A dozen sample pens for a
dime and our hand-writing
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or wood when you can burn gas in your stove or heater by installing a Uni-Hete Kerosene Burner (with exclusive 1924 features) in five minutes time. It gasifies common kerosene to the hottest and cheapest fuel known. Does away with dirt and high fuel cost. Heat regulated to any degree by valve. Increases stove efficiency 100%. Has brought joy and economy to thousands. **FREE TRIAL.** Saves its cost in 30 days. Write quick for full particulars and introductory price.



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\$195 PER CARAT

From 1-8 Carat to 2 Carats

Former Price, \$325.

You Save 40 per cent

If you can duplicate

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will RETURN

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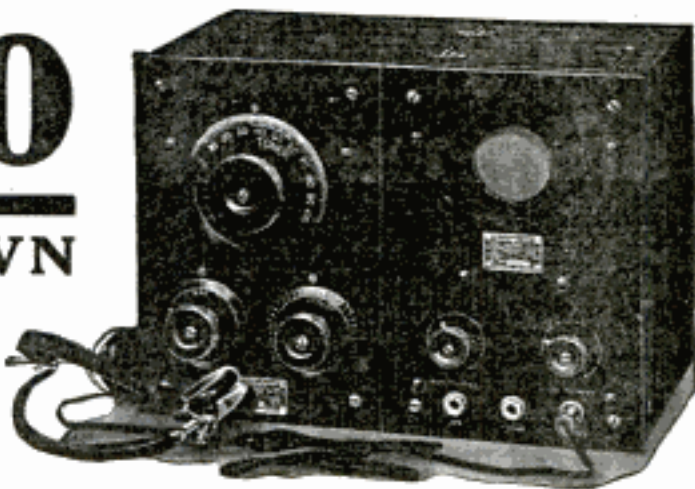
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Genuine "RADIOLA"

Made by Westinghouse for the Radio Corporation of America

OUTFIT COMPLETE:

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Regenerative Receiver and 2-Step Amplifier

Now everyone can have the finest radio receiver and amplifier that is made. No need to put up with inferior equipment. For here we are offering you the set designed by the great Radio Corporation, the highest authorities in the industry—and built by the Westinghouse Electric Company. It comes to you complete with all the accessories you need, for just a five-dollar payment. Take advantage of this new way of selling radio. Get an outfit that will give you permanent satisfaction. Send the coupon below for our Great Special Offer, made for a limited time only.

The Perfected Radio At Last!

So simple to tune that it is just the thing for the beginner. Yet so perfect that it will delight the most hardened "radio fan" who has long been searching for the ideal circuit. Its long range will bring in stations never heard before, so loud and clear that a loud speaker will delight the whole family. Wonderfully selective. With it interference, internal noises and annoying body capacity are forgotten.

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Just mail the coupon. Get all the details without any obligation. Don't think of buying an ordinary set without finding all about this new and better way. Very easy terms. Free Trial. The highest quality of radio equipment possible to have.

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No Accessories to Buy

The radio outfits we sell are absolutely complete. Most others make an offer on the bare set and leave you to buy all the extras like tubes, phones, etc. in addition. The outfit we offer you now includes, the Regenerative Receiver and 2 step Amplifier all enclosed in a solid mahogany case. Also the batteries, head-phones, tubes, aerial, lightning arrestor, and full wiring installation equipment. You start operating without investing another single penny. Your \$5 payment brings it all.

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Now, with our Low Direct-from-Factory Prices and Easy Terms, any farmer or dairyman with 5 to 100 or more cows can not afford to be without the wonderful OTTAWA Milking Machine. Soon pays for itself milking only 5 cows. Saves

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30 Days' Trial Try the OTTAWA Milker on your own herd for full 30 days. Guaranteed for 10 years.

FREE! Before you buy any milker! be sure to get Free facts on the OTTAWA. Send your name and address on a postcard for "The Truth About Milking Machines" and other interesting and helpful information.

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\$142.50
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**Costs Nothing
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**CHARGE YOUR
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**GOLD SEAL
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The World's Most Popular
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Reliably and efficiently charges your radio or automobile battery over night for a nickel. No stopping—no sticking—no fuss—no fuss—no trouble. Self-polarizing

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Custom-Made Tops Less Than Half Price

SEND NO MONEY

You can attach them easily. Full instructions sent. Complete tops with beveled plate glass, tacks, fasteners and welts. Free delivery 1,000 miles. For an extra special price on Maxwells, Overland Fours, Dodges and Chevrollets. Describe your car. Samples and money-saving Bulletins free.
Automobile Trunks for Running Board or Rear Platform.
High grade—low cost.

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NEW LAMP BURNS 94% AIR

Beats Electric or Gas

A new oil lamp that gives an amazingly brilliant, soft, white light, even better than gas or electricity, has been tested by the U. S. Government and 35 leading universities and found to be superior to 10 ordinary oil lamps. It burns without odor, smoke or noise—no pumping up, is simple, clean, safe. Burns 94% air and 6% common kerosene (coal oil).

The inventor, H. E. Johnson, 609 W. Lake St., Chicago, Ill., is offering to send a lamp on 10 days' FREE trial, or even to give one FREE to the first user in each locality who will help him introduce it. Write him to-day for full particulars. Also ask him to explain how you can get the agency, and without experience or money make \$250 to \$500 per month.

NO JOKE TO BE DEAF

—Every Deaf Person Knows That I make myself hear, after being deaf for 25 years, with these Artificial Ear Drums. I wear them day and night. They are perfectly comfortable. No one sees them. Write me and I will tell you a true story, how I got deaf and how I make you hear.



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Medicated Ear Drum
Pat. Nov. 3, 1908

This Palatial

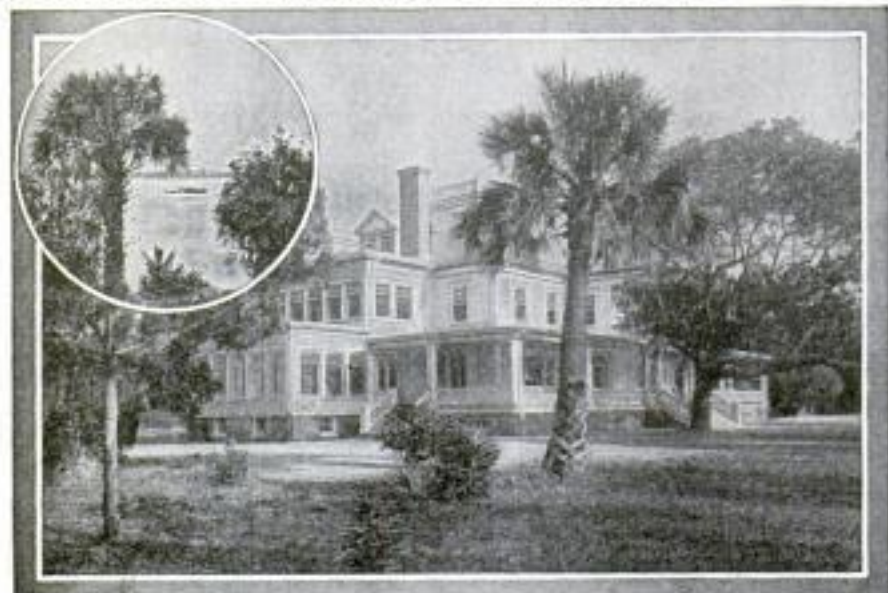
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can be purchased at a very reasonable price. It is the finest estate in a community of 30,000 situated amid 5 acres of orange, grape fruit, sweet bay, palmetto and a large variety of semi-tropical trees and foliage. A water front of 400 feet, with entrance from a Boulevard, affording every modern convenience. House recently completed and never occupied. Has every modern improvement, large sun parlors, sleeping porches and 8 bath rooms. Inexhaustible supply of soft water, steam heat, high, light basement under entire house. Surf bathing all winter within 5 minutes' walk.

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Do Away With Dirty Coal and Wood



No Chopping
No Shovelling
No Dirty Ashes

NEW KIND OF HEAT!



No Coal Bills

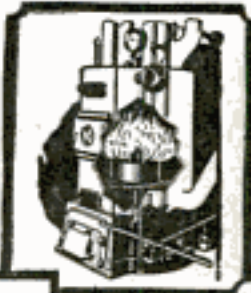
—no worry about high prices, coal strikes and shortages that come with discouraging regularity.

For Ranges—Heaters—Furnaces

No more big coal bills to pay—no more uncertain, uneven heat that brings colds, grippe and sickness all winter long. No more lifting and carrying of back-breaking scuttles—no more clouds of ashes to breathe, and hours of precious time spent each day poking and feeding fires. Amazing new invention of Mr. B. M. Oliver, of St. Louis, turns any range, heater, or furnace into a real oil-gas stove, that does away with all this—and gives you any amount of heat you want by simply turning a valve—just like a city gas stove.



Makes any coal or wood range a gas stove—on and off at the turn of valve.



Made in 16 models to fit every type and size of Range, Heater, and FURNACE.



3 TIMES THE HEAT OF COAL

This amazing new invention is called the Oliver Oil-Gas Burner because it burns 95% air and 5% oil—the cheapest fuel there is—turning them into an actual gas that burns with an intense, hot, clean flame. No wicks, no odor, no smoke, no carbon. Absolutely safe. Will last a lifetime. Three times the heat of coal if you want it—and cheaper.

Cheaper Than Coal or Wood

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Here is your opportunity to "cash in" on the big money opportunity that this amazing invention is bringing to agents and spare time workers in every part of the country. People are clamoring for this burner. You know lots of people who would be glad to buy one or more burners for their home if you would only tell them about it. You have two or three hours of spare time every day that could easily be turned into real money.

F. W. Bentley of Philadelphia made \$215 in one day. J. Carnegie, S. Dakota, writes: "Making \$1000 a month." A. M. Russell, Conn., averaged \$600 the last six months. Mrs. Seider, Kansas, made \$100 a month in her home.

If you want to earn \$50 to \$100 a week in your spare time write to me at once for full details of my exclusive territory and Free Sample Case Offer. Address me personally, Mr. B. M. Oliver, President, The Oliver Oil-Gas Burner Co. At address at right.

Every day you burn high priced coal means hours of extra work—emptying ashes, cleaning out and filling up stove—cleaning out ashes and coal dust. You literally burn up money, often using coal that is outrageously high, to keep fires all day and all night when you really need heat only part of the time. You stand and freeze on cold mornings waiting for slow fires to start. But now—how easy to do away with all these discomforts, inconveniences and waste.

OLIVER OIL-GAS BURNER

OLIVER OIL-GAS BURNER CO.
2048-K Oliver Bldg., St. Louis, Mo.

Oldest and largest manufacturers of Oil-Gas Burners in the world
Can. Dist.: 2048-K Oliver Bldg., Toronto, Ont.

Fits All Stoves Over 150,000 already in use

Mr. Oliver's invention is made in 16 different models to fit any kind of stove, range or furnace. No holes to drill, no bolts to fasten, no changes whatever to your stove. Simply set in firebox—easily installed by anyone in three minutes. At the turn of a valve you have much or little heat, when and as you want it. 150,000 homes already use this wonderful device.

FREE BOOK

Don't pay another coal bill. Don't go on with the work and drudgery of coal and wood, risking your family's health during the winter months. Send immediately for Free Attractive booklet which tells about this amazing invention. We are making a Special Low Price Introductory Offer to readers of this magazine, which you will be entitled to if you send in this coupon at once—no obligation. Fill out and mail this coupon at once.



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Send me your FREE book, "New Kind of Heat" and Special Low Price Introductory Offer. I am interested in the burner for a

Coal Range Heating Stove Furnace
Specify Steam, Hot Water, Hot Air

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Wouldn't you like to work this 10 ton CRANE ?

Look at it! A slight pull of a lever and away up into the air swings 10 tons as though it were ten pounds.

Every bit of the fun of working this crane is yours, if you have Meccano. You see, Meccano parts are real engineering parts and that makes your crane work just like the bigger ones. And just whenever you want to, you can take your crane to pieces and build a tower, a battleship, a bridge, a fire-escape—anything you like.



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Engineering for Boys

Send for This New Meccano Book

It describes Meccano and tells interesting things about model building. Every page a pleasure. Free, if you send names and addresses of yourself and three chums. Put No. 63 after your own name for reference.



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"Saws 25 Cords In 5 Hours"

Any hustler can make big money with the WITTE Saw Rig—Ed. Davis sawed 25 cords in 5 hours—another user sawed 40 loads of pole wood in 3 hours. Hundreds of owners make \$3,000 to \$5,000 a year. Sold on Easy Payments.

5 H-P
3-in-1
Saw
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Big Cut in Price



Cuts 60 to 70 Cords a Day Easy

A real all-purpose outfit for farmers and men who make wood sawing a regular business. When not sawing you can fill silos, grind feed, shell corn, thrash and do other work. Easy to start at 40 below zero—equipped with the famous WICO Magneto.

FREE Write today for full description and low prices—no obligation.

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ELECTRIC SOLDERING IRON

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IDEAL FOR RADIO
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Every mechanic, motorist, and radio man needs it. With it you can make repairs yourself that you would otherwise pay to have done. Compact, efficient—universal screw driver tip. 50 Watts—110 Volts. Complete with cord and plug. Satisfaction guaranteed, or money refunded. Send P. O. or Exp. M. O. to ARRANDALE ELECTRIC CO., 100 Schley Street Newark, N.J.



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The *First* and *Still* the
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Phones for only **\$5**

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WHEN our VACUUM CAP is used a few minutes daily. We accept no pay until you have tried the Cap 60 days and are satisfied. The Vacuum Cap is an appliance that draws the blood to the Hair Roots and starts a new healthy crop of hair. It stops Dandruff, stops the hair from falling out.

Bought by Doctors and men who know that it is the only reasonable HAIR GROWER known to science. No Drugs Used. Write for application blank, testimonials, and booklet on "HAIR" sent sealed in plain envelope. FREE.

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Make it Pay You
\$70 to \$200 a Week

Be a **Certificated Electrical Expert**

It's a shame for you to work for small pay when Trained "Electrical Experts" are in great demand at such high salaries, and the opportunities for advancement and a big success in this line are the greatest ever known. "Electrical Experts" earn \$70 to \$200 a week. Fit yourself for one of these big paying positions.

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Today even the ordinary Electrician—the "screw driver" kind—is making money—big money. But it's the trained man—the man who knows the whys and wherefores of Electricity—the "Electrical Expert"—who is picked out to "boss" ordinary Electricians—to boss Big Jobs—the jobs that pay. You, too, can learn to fill one of these jobs—spare-time only is needed. BE AN "ELECTRICAL EXPERT"—Earn \$70 to \$200 a week.

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You don't have to be a College Man; you don't have to be a High School graduate. If you can read and write English, my course will make you a big success. It is the most simple, thorough, and successful Electrical Course in existence, and offers every man, regardless of age, education, or previous experience, the chance to become, in a very short time, an "Electrical Expert," able to make from \$70 to \$200 a week.

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FREE—Electrical Working Outfit, Radio Course and Employment Service

I give each student a splendid Outfit of Electrical Tools, Materials and Measuring Instruments absolutely FREE. You do PRACTICAL work—AT HOME with this Outfit. You start right in after the first few lessons to WORK AT YOUR PRO-

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Chicago Engineering Works

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Dear Sir:—Send at once the "Vital Facts" containing Sample Lessons, your Big Book, and full particulars of your Free Outfit and Home Study Course—all fully prepaid, without obligation on my part.

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City and State

Occupation..... Age.....

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GIVES complete instructions for finishing all wood—hard or soft—old or new. Explains just what materials to use and how to apply them. Tells how inexpensive soft woods may be finished so they are as beautiful and artistic as hard wood. This book is the work of experts—illustrated in color. Includes color card—gives covering capacities, etc.

Johnson's Wood Dye

Use coupon below for a free copy of "The Proper Treatment for Floors, Woodwork and Furniture." It is full of valuable ideas on Wood Finishing and Home Beautifying.

Johnson's Wood Dye is very easy to apply—dries in four hours and does not rub off or smudge. Penetrates deeply, bringing out the beauty of the grain. Made in fourteen popular shades, all of which can be easily lightened or darkened. Color card in book.

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Please send me, free and postpaid, your instruction Book on Wood Finishing and Home Beautifying.

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